COMMAND AND STAFF TRAINING INSTITUTE

BANGLADESH AIR FORCE

Junior Command and Staff Course

AIR POWER MODULE

HISTORY OF AIR POWER

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HISTORY OF AIR P0WER
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PART-I

EVOLUTION OF AIRPOWER
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EVOLUTION OF AIR POWER

The Beginning

1. The use of the expression 'air power' was first recorded in H.G. Wells's novel 'The War in the Air' in 1908. However, according to Professor Tony Mason the official birthday of air power has arbitrarily been selected as 1893, when Major Fullerton of the British Army had presented a paper to a meeting of army engineers in Chicago in which he prophesied that the impact of aeronautics foreshadowed 'as great a revolution in the art of war as the discovery of gun powder' that 'future wars may well start with a great air battle' that 'the arrival over the enemy capital will probably conclude the campaign' and that 'command of the air would be an essential prerequisite for all land and air warfare. This date has been selected in preference to when the first airship company was formed in France; or 1883 when Albert Robida envisaged a sudden crushing air strike in his War of the Twentieth Century, or 1903 that marked the first heavier than air machine flight by the Wright brothers.

2. While the 19th century may well be credited with 'the conceptual visualization of air power, it was the epic heavier than air machine flight by the Wright brothers in 1903, which was the first concrete step in the fulfilment of the vision by 1909, aircraft had been inducted in military service. The first official record of the use of aircraft in actual combat was made in 1911 by the Italians in the Libyan campaign when Captain Moizo and De Rada flying in a military bi-plane Forman spotted an Arab encampment and proceeded to drop hand carried bombs on them.

3. Britain was amongst the pioneers in developing its air power "Royal Flying Corps (RFC)" with its military and naval wings was established in 1912. Inter-Service rivalry soon surfaced and by 1914, despite opposition by Churchill, Royal Navy unilaterally broke away from RFC and established its own Royal Naval Air Service, under the direct control of the British admiralty. At the outbreak of WWI, RFC and RNAS thus formed two separate bodies under the aegis of British Army and Navy respectively. In the meanwhile, Germany, France and USA had also developed their air corps as a part of their land forces.

The First World War

4. At the outbreak of WWI in 1914, military aviation consisted of light wooden bi/tri planes with maximum speeds of under 100 mph and very limited load carrying capacity. Their roles were initially restricted to reconnaissance and artillery observations. While there may not have been any air power doctrine on the eve of WWI, there was no shortage of alarming speculations about strikes from the sky. Within seven weeks of WWI of RNAS conducted an air raid on the Zeppelin sheds in Germany. A year later Germany retaliated when Zeppelins (airships) in turn

bombed the English cities. The actual damage in all these raids may have been minimal but the psychological impact on civilians and populations was profound. With both sides using increasing number of aircraft for reconnaissance, artillery observations and occasional bombing raids, the inevitable happened and aircraft started to shoot at each other to prevent the adversary from taking military advantage of the new medium. It marked the birth of fighter aircraft whose numbers proliferated and their performance took a quantum leap. The battle for 'control of the air' had truly begun. The first air power doctrine of gaining', control of the air had been established.

5. July 1917 marked a watershed in air power's history when German Gotha bombers raided London. The damage again was more psychological than real as the images of HG Wells's destruction from the skies appeared to become a reality. As a direct result of these attacks, Britain had established what amounted to a strategic bombing unit in France, known as the Independent Force, to conduct reprisal raids against the German homeland. The concept of strategic bombing whose mission was made independent of support to surface forces was born. This action laid down the seeds of a new service. Royal Air Force, independent of the Royal Army and Royal Navy was established in 1918.

6. WWI ended in 1918. During the war, all subsequent roles of air power had either been established or attempted, and the doctrines of command of air and support to surface forces had been firmly established. For the surface forces, roles such as close air support, transport support, reconnaissance, interdiction, artillery spotting, anti-submarine warfare, convoy escort, search and rescue and maritime strikes became vital contributors to the existing land and maritime strategies. Historian Lee Kennett aptly summed the progress made by air power during WWI when he wrote, "While the role of air weapon in the Great War was a modest one, the role of the Great War in the rise of air power was anything but modest".

The Inter War Years

7. WWI had glamorized air warfare and in the public eye combat pilots became the modern substitute of the knights in shining armour with their acts of gallantry, chivalry and dare devil exploits. This hero-worship of aviators was to continue during the inter-war years. Newspapers and newsreels were filled with the exploits of Charles Lindbergh, Amy Johnson, Jimmy Doolittle, Amelia Earhart and many others like them. Aviation enjoyed a high public profile, which exerted a powerful psychological force. It also led to a continuous improvement in aircraft performance in all fields, making them much more effective war fighting platforms.

The Second World War : Blitzkrieg

8. The next major milestone in the history of air power was the Second World War. The study of air campaign during WWII has to begin with the German Blitzkrieg.

9. Tanks and aeroplanes were the two new elements of warfare that had been introduced during WWI. During the inter war years, the British, French and other European powers “had failed to grasp the inherent speed and range of the air weapon that had made the time and space factor which prevailed in WWI outdated and irrelevant. By contrast, the Germans' innovative combination of aircraft, fast armour, infantry and modern communication in the form of blitzkrieg demonstrated a battle winning understanding of what amounted to a revolution in military affairs. These concepts were first tested and improved upon during the Spanish War of 1936. When the Germans finally unleashed the coordinated attacks by its Panzer (tank) divisions supported by the infantry with the Luftwaffe dominating the skies during WWII in what now the world knows as 'blitzkrieg' operations, it overran Poland and the rest of western continental Europe. According to the historians, at the eve of WWII, French aircraft and tanks were technically superior to their German counterparts yet France was steamrolled into submission by the fury of the German blitzkrieg. In the blitzkrieg operations, Luftwaffe demonstrated the doctrines of control of air and support to surface forces with such brutal efficiency that it stunned its opponents into submission. Blitzkrieg was a perfect example of air power acting together in support of the ground forces.

10. While the contribution of Luftwaffe in the defeat and submission of Western European nations was significant, it had been developed more as a tactical air force to be used in support of the surface forces. The three primary missions of Luftwaffe were 'to combat enemy air forces' (win command of the air), 'intervene in ground or naval actions' (close air support) and 'combat the sources of the enemy's strength and disrupt his logistics supplies to the front line (interdiction).Conspicuously absent was the mission of strategic bombing which Douhet, Trenchard and Mitchell had so strongly advocated as the primary task of air power. General Max Wever, the German Air Force Commander who was unfortunately killed in an aircraft accident in 1936 was aware of this shortcoming and development of four engine heavy bombers was on the drawing board. However after his death, this project was abandoned as the German high command believed that the available twin-engine bombers could be used both in the tactical and strategic role. While this assumption did not affect Germany's war aims in its campaign against the neighbouring states, when Hitler decided to take the war westward over the North Sea and eastward into the Soviet heartland, he had no weapon to match his political objectives. Lack of long-range heavy bombers that could conduct sustained strategic bombing operations against UK and USSR was a serious shortcoming that was to cost Germany dearly.

Battle of Britain

11. Having subdued Western Europe, Hitler turned his attention to Britain. Operation 'Sea-lion', which envisaged landing of troops in England through amphibious operations was planned. For the amphibious operation to succeed, control of air over England had to be established by Luftwaffe. This set the scene for the Battle of Britain which witnessed sustained and massive offensive counter air operations by Luftwaffe in a bid to subdue and neutralize Britain's RAF. RAF's fighter bases, air defence network, command and control centres, logistic dumps were attacked on ground by German bombers while German fighters engaged British fighters over England in a do or die battle. Despite the lack of heavy bombers, by September 1940, Luftwaffe had the measure of RAF and was beginning to win the battle for command of the air. According to professor Mason, RAF's fighter command had lost approximately one-third of its flight commanders and of its squadron commanders. The survivors were flying up to four sorties a day and there were no reserve squadrons fit to replace the battered ones. The lone raid of Berlin by RAF bomber command during the battle so infuriated Hitler that a switch from counter air operations against RAF to attacks on London's civilian population was ordered. This switch relieved the direct pressure on RAF Fighter Command and it was able to regroup and inflict such heavy casualties on the German bombers that eventually Hitler had to call off the air campaign. Inability of Luftwaffe to win the air superiority battle over England led to the abandonment of operation Sea lion while Hitler turned his attention to USSR. The British nation paid a very heavy price in terms of civilian casualties during the attacks on London but the survival of RAF resulted in the even trial victory for Britain in repulsing the German assault. Historians agree that the decision by Goering, the German Air Commander to switch German bomber attacks from fighter command to London on 7 September 1946 was the turning point in the Battle of Britain.

12. Three keys lessons emerged from the Battle. First, winning the control of air is an essential prerequisite to any modern land/sea offensive. Second, Luftwaffe’s rack of heavy long-range bombers, which could conduct sustained strategic bombing offensive, was an important factor in Germany's inability to win the Battle. And finally the campaign disproved the assertion of Douhet and Mitchell that heavy aerial bombardment of civilian centers would result in rapid loss of morale and would lead to the nation's capitulation. The early air power visionaries had seriously underestimated the will, determination and resolve of human beings to resist subjugation by force.

African Campaign

13. The African campaign by the Americans is an important landmark in the context of air power because one of the lessons that came out of it had a profound effect on the development of air power as an independent service.

14. During the African campaign, American Air Corps had distributed its considerable assets to the various Army formations operating there. The German air assets in Africa by contrast were all under the command of Luftwaffe. While the American air assets in Africa were superior to the ones deployed by Luftwaffe both in quality and quantity, the latter by virtue of being under one command was able to

concentrate superior numbers on individual American air formations and caused substantial damage. Although the allies eventually prevailed due to a host of other factors, the performance of American Air Corps was not compatible with its potential. On the instructions of General Eisenhower a committee was formed to conduct a thorough analysis of the air campaign. One of the principle findings of the committee was that deployment of American air assets in penny packets had resulted in their less than optimum utility. The principle of 'unity of command' had been violated. Since then, unity of command is considered as one of the air power doctrines. The findings of the committee eventually led to the independence of US Air Corps and USAF was established in 1947 with very few exceptions all new air forces that came into being after WWII have been created as independent services.

Strategic Bombing Campaign of German

15. Under the influence of General Trenchard, RAF had developed a sizeable bomber force for conducting strategic bombing on its adversaries. After surviving the Battle of Britain onslaught, this force was unleashed to attack Germany. The campaign commenced with large formations conducting daylight bombing missions but heavy casualties primarily due to Luftwaffe fighters reached a level where the high degree of attrition could no longer be sustained. Besides the heavy losses, the accuracy of the bombing campaign during actual combat was far lower than what had been achieved during peacetime trials. Daylight bombing was not having the desired results RAF then switched to night bombing raids only. While night raids did lower the attrition rate to a manageable level, as Luftwaffe did not possess an adequate night fighter, it resulted in even lower bombing accuracy. The effect of strategic bombing campaign reduced further.

16. Trenchard had made two faulty assumptions in his advocacy of offensive operation through strategic bombing. He had erroneously believed that his bombers were armed and protected well enough to run the gauntlet of enemy fighters relatively unscathed and therefore did not need fighter escorts. Britain had not invested in long-range fighters, which could escort the bombers and protect them for enemy interceptors. Trenchard and his staff also made the mistake of basing their calculation of bombing accuracy on peacetime trials. During actual combat with enemy fighters lurking around and very heavy anti-aircraft ground fire, bombing accuracy was nowhere close to the peace time results. Much more bombers were needed to take out a target than had been anticipated. When daylight bombing attrition reached an unacceptable level, and because RAF had failed to develop long-range fighters capable of escorting the bombers up to their targets, it had no option but to discontinue day bombing sorties and resort to night bombing.

17. The Americans entered the fray later but they were able to deploy far larger assets than Britain. The Americans were also strong advocates of strategic bombing and they too commenced their operation with massive daylight raids over Germany. RAF's experience was repeated and the American attrition rate was nearly double of what had been anticipated. Unlike RAF however, the Americans did not abandon their daylight raids as they correctly assessed that night bombing

would further lower the effectiveness of the campaign due to loss in accuracy, and will jeopardize the mission. The Americans were fortunate in that they had developed long-range fighters in the shape of P-51 Mustangs that could escort their bombers right upto their targets. Mustangs were deployed in the escort role with the bomber formations. This move brought a dramatic reduction in the attrition rate. The P-51s being superior to any of the contemporary German fighters began to take a heavy toll of German interceptors. P-51s managed to establish air superiority around their bombers over the German hinterland.

18. The strategic bombing campaign over Germany was a long drawn affair. While it did not result in quick capitulation of Germany, nor could it be solely credited with bringing about the defeat of Germany on its own, most critics agree that it played a very vital role in the eventual success of the allied victory in Europe.

The Pacific War

19. The Pacific War began with the Japanese attack on Pearl Harbour on December 7, 1941. As early as in 1924, Mitchell following a trip to Japan had submitted a report where he foretold of Japanese expansionist ambitions in the Pacific and presented what he considered would be the start of a Pacific War. According to Mitchell the Pacific War would start with a Japanese air and sea attack upon Pearl Harbour in Hawaii with an accompanying aerial attack on the Philippines, at 7:30 AM and 10:40 AM respectively. In actual event, the attack on Pearl Harbour occurred at 7:55 AM and at Philippines at 12:45 PM on December 7, 1941. Mitchell was off by only 25 minutes for Hawaii arid less than 2 hours for the Philippines.

20. Pacific War was primarily a naval/air campaign with air power playing a decisive role. Air power deployed in the Pacific was both sea-based (carrier task forces) and land-based. It was a battle between the two opposing carrier groups attempting to wrest sea control and command of the air from each other. Eventually USA prevailed and the dropping of two nuclear bombs over Hiroshima and Nagasaki ultimately sealed the fate of Japan. Douhet and HG Wells's prophesy of subjugation of the enemy through massive destruction of his civilian population and infrastructure through massive aerial bombardment appeared to become a reality. The bombing marked the dawn of the nuclear age, which has brought about its own dynamics, very different to all previous military strategies. Mercifully the world has not witnessed another use of nuclear bombs in all the subsequent conflicts since then but nuclear strategy has had a very profound effect on the way nations have approached conflicts when one or both the antagonists were in possession of nuclear weapons. Nuclear warfare is a completely new form of warfare and while it is linked to air power, it must be and is being treated differently than all forms of conventional warfare.

21. The impact of air power on naval warfare was comprehensively demonstrated in the Pacific War. To the credit of naval forces, rather than oppose the new medium of warfare, navy almost universally has absorbed it as one of its integral parts, just as it had adopted the submarine forces. Now a modern navy operates in all the three dimensions: Surface, sub surface and above the surface.

22. Another interesting comment on the conduct of the Pacific War was that this was the first and perhaps only occasion to date when land forces operated in support of air power. Land forces in amphibious assaults were used to capture Pacific islands from the enemy where air bases were set up for attack on Japanese mainland in what is also referred to as the leapfrog strategy.

Role of Air Power During WWII

23. The role of air power during the Second World War can be summed up in two quotes, one by Winston Churchill and the other by Professor Tony Mason. While speaking at the Massachusetts Institute of Technology in 1949, Churchill had commented: "For good or ill, air mastery is today the supreme expression of military power. And fleets and armies, however necessary and important, must accept subordinate rank. This is a memorable milestone in the march of man." Professor Tony Mason in his book Air Power-A Centennial Appraisal, states. " Air power had been peripheral between 1914 and 1918. In the Second World War it dominated most theatres and in at least two was decisive."

The Korean Conflict

24. Flush from its victory in WWII, American forces, this time under the auspices of UNO were soon involved in the Korean Peninsula. In 1950, when Communist forces in Korea militarily overran the entire Korean Peninsula, American forces as a major part of UN forces decided to intervene.

25. Inchon landing led by Mc Arthur marked the counter offensive by the UN forces following its successful landing at Inchon. UN forces pushed back the North Koreans to the 38th parallel before a truce was declared. US air power was crucial to the success of the Inchon landing and the subsequent counter offensive. This phase of the war clearly demonstrated the crucial role air power could play in support of its surface forces.

26. Once truce was declared on the 38th parallel, an uneasy ceasefire on the ground took effect. At that stage the American air strategists proposed that the war could be successfully prosecuted by an air interdiction campaign against the North Korean forces. Operation Strangle was formally launched.

27. Operation Strangle aimed at strangling the communist forces of their provisions and supplies through a sustained campaign of air interdiction behind the enemy lines. This, it was hoped, would prepare the way for the allied invasion of

North Korea itself. The operation began in earnest but despite its best efforts, it failed to achieve its military objectives. Three factors can be identified for the failure of the campaign. First, UN air power was operating under political constraints: they were not allowed to attack the enemy air bases which were operating from within mainland China for fear of further escalation into WWII. North Korean and Chinese air power operating from Chinese mainland did not permit a free run to the interdicting forces. UN forces were not able to establish total command of the air & resultantly, the overall effectiveness of the interdiction mission reduced. Second, the technology available in 1950s was not advanced enough in terms of accuracy and lethality to inflict the kind of damage on the enemy that would paralyze its logistics support. And finally the manpower-intensive supply lines of the Chinese proved too resilient to interdiction. Coupled with the fact that with a truce in place and the front not being active, the total logistics needs of North Korean forces was comparatively much lesser. Interdiction campaign did slow down the North Korean supplies but failed to halt them.

28. The air power statistics used in the Korean conflict were formidable. The allied forces alone flew more than a million sorties; over 476,00 tons of explosives were dropped and more than 2000 aircraft were lost in the four years. Yet the aspiration that superior air power by itself would be sufficient to win a conflict was wide off the mark.

The Vietnam War

29. In the Vietnam War, over one million fixed-wing and 37 million helicopter sorties were flown; 3700 fixed-wing and 4900 helicopters were lost in the campaign. New concepts of close support using both ground and airborne forward air controllers were-successfully developed. The conflict also witnessed widespread use of Surface to Air Missiles (SAM) and its counter through tactics, Electronic Countermeasures (ECM), & anti-radiation missiles. Precision-guided munitions were developed and deployed during the conflict with devastating effect but their introduction had come about at a fairly late stage, when the American public had appeared to lose the will to fight 'someone else's battle'. Air supremacy was established despite the restrictions due to political reasons of not attacking North Vietnamese aircraft on their bases. Yet airpower failed to determine the outcome of the war. American forces eventually withdrew from the conflict without achieving their military or political aim.

30. Unsuitable terrain, lack of public support for the campaign by the Americans, a very resilient enemy, excessive political interference and general backwardness of the enemy (no worth while counter value targets) are some of the major factors that have been put forward for the failure of airpower to deliver victory. The oft-

quoted assertion that since 1939, no state has lost a war while it maintained air superiority was once again disproved. As one USAF analyst has very aptly surmised. "Difficult to fathom is the air chiefs' lingering conviction that their doctrine was right throughout Vietnam and that it is right for the future. For the Air Force, the guerrilla struggle during most of the Vietnam war was an acknowledged anomaly that may well reappear. Bombing doctrine remains geared to a fast paced conventional war, and the conviction that such doctrine is appropriate for any kind of war permeates the service."

The Arab Israeli War 1967 & 1973

31. If the Korean and Vietnam Wars had brought out the inadequacies of air power, the Arab Israeli Wars of 1967 and 1973 again demonstrated its dominance in a conventional war. In both these conflicts, air power played a major role. In 1967, having won the command of the air on the very first day through a pre-emptive offensive counter air operations, Israel Air Force (IAF) brought to bear such effective bombardment on the Arab land forces that it became relatively simple for the Israeli Army to defeat them. Even in 1973, airpower was dominant. IAF's inability to win the command of the air initially cost them dearly but in later stages through substantial technical and logistical support of USA, IAF succeeded in neutralizing the Arab Air Defence Network. From then onward, IAF's support to their land forces helped turn a likely defeat into victory. By the time cease-fire was declared, Israel had gained the upper hand in the conflict.

32. Air power has been the chosen security instrument of Israel. Superior technology, better training, a topography and climate ideal for exploitation of air power and an air power doctrine in complete harmony with the strategic environment are some of the key factors that have given IAF a decisive edge over its Arab adversaries. To this list, one must also add the unqualified and unstinted support of USA that Israel has enjoyed since its very inception. Massive financial and technical support of USA has ensured the superiority of IAF over its neighbours. This support is not restricted to peace time only. During the 1973 War, besides logistics support, Israel benefited immensely from the satellite intelligence gathering of US spy satellites. This single factor had tilted the balance in favor of Israel.

Indo-Pak and Iraq - Iran Wars

33. Pakistan and India fought two wars in 1965 and 1971 with both the conflicts ending within three weeks. By contrast Iran-Iraq War lasted for nearly a decade, While air power was applied in all these conflicts, the historical verdict is that the role of air power was peripheral and it did not effectively influence the outcome of

the conflicts. In the 1965s Pakistan-India conflict, Pakistan Air Force did enjoy the upper hand in air combat and had created a degree of favourable air situation over the battlefront, but neither side could establish total air superiority. Air power was largely restricted to ground support and the air war came to an early halt because of shortage of spares and weapons as a result of the imposition of international embargo. In 1971, India did achieve air supremacy in the Eastern Wing against an adversary whom it outnumbered by a ratio of over to 12 to 1 and it took three days to achieve what a more efficient air force could have achieved in a single day. Given the disparity between Indian and Pakistani forces in East Pakistan and the near hopeless political environment being faced by the latter, military defeat for them was inevitable the contribution of Indian air power in the sector notwithstanding.

34. Iran-Iraq fought each other to a stalemate in 1980s. Initially Iran had a technological edge over Iraq with F-14s, and F4s in its inventory. Iran did use its air assets to attack oil facilities and other counter value targets in Iraq but in due course, cut off from US sources of weapons and spare parts, the effectiveness of Iranian Air Force diminished rapidly. Iraqi Air Force too did not possess sufficient offensive strike aircraft to make much impact. Iran-Iraq war was primarily fought by their ground forces. Air power had little influence in the final outcome of the war.

35. The one obvious lesson that comes out very clearly from these conflicts is that nations who are heavily dependent on others for their air power inventory can rarely take full advance of the potential of their air-assets. Heavy dependence on other nations for key defends invariably leads to a loss of freedom and sovereignty during the conduct of war.

Bekka Valley Campaign

36. Essentially a one-day campaign, Bekka Valley operation was planned by Israel to take out all the air defence units in the Valley in a single coordinated air assault. The presence of Syrian SA-6 units in the east of Bekka Valley was constraining IAF's contribution when Israeli Defence Forces (IDF) had launched operation Peace in Galilee in 1982. These units had to be taken out.

37. IAF painstakingly plotted the position of every SA-6 unit in the valley. On 9th October 1982 Israeli long-range artillery and surface-to-surface missiles engaged the Syrian missile batteries. IAF aircraft followed up with aerial attacks using free fall bombs and anti-radiation missiles. When Syrian Air Force rose to defend the air defence complex, IAF's F-15 and F-16 fighters equipped with the most modern air-to-air missiles, airborne radars and electronic warfare package massacred them. This was the most one-sided air victory in the history of air power. In terms of the evolution of air power, Bekka Valley campaign was a generation ahead. This campaign is relevant because it was a harbinger of how the next air battle would be

fought. The Gulf War of 1990-91 was to demonstrate the same philosophy on a much larger scale.

The Gulf War

38. Iraqi invasion of Kuwait on 2nd August 1990 marked the beginning of the Gulf War that ended with a ceasefire on 28 February 1991. The actual lighting took place for only 43 days from 17 January 1991. Upto 24 February, the war was prosecuted almost exclusively from air in the ground offensive that lasted from 24th to 28th February the Coalition Forces encountered little resistance and Iraqi army was expelled from Kuwait. All this was achieved at a paltry cost of only 340 coalition combat deaths and 776 injuries. According to the then American Defence Secretary Dick Cheney the Iraqi forces collapsed as rapidly as they did because of the air campaign that was mounted against them. This has been the common theme explaining the overwhelming and speedy Coalition success. As Professor R A Mason has very rightly observed, 'The Gulf War marked the apotheosis of twentieth century air power."

39. The phenomenal success of air power has given rise to a number of illusions, the most widespread being that air power alone had eventually forced the Iraqis to vacate Kuwait. While there is little doubt that air power was fundamental to the ultimate Coalition victory, it was the ground campaign that finally led to Iraq's capitulation in Kuwait.

40. Dr James A Mowbray has correctly concluded that 'Technology helped to win the fastest lowest casualty, almost devastatingly destructive one-sided war in recorded history. Air Force capabilities had come of age.' Col Warden, the architect of Desert Storm air campaign has elaborated the technological advancement made by air power further by saying, 'To have a 90 percent probability of putting one bomb on a target of the size of a normal room in WWII it needed 9000 bombs or over 1000 B-17 sorties-which meant putting 10,000 men at risk over the target. A F-117 class aircraft will achieve the same probability in a single sortie'. Between the Second World War and the Gulf War, bombing accuracy had registered a 1000 percent increase.

41. In the Gulf War, air power demonstrated its ability to strike at the strategic heart of a country with maximum precision and minimum collateral damage and casualty. It proved beyond any shadow of doubt that air power has become an integral component of modern warfare.

Summary

42. Robin Higham has aptly summed up that "the history of air power has been confused by the bragging of its prophets and the derisions of its enemies. Too often vision has outrun reality and resulted in disappointment and reaction. As newcomers forced to plead from a position of weakness, airmen carried arguments

to their logical extremes and talked about what air power was going to be able to do, and their listeners tended to target that these were prognostication, accepting them as imminent realities". He further concludes that Air Power already has the capacity to determine the outcome of conflict. But not necessarily all conflicts.

43. The progress of air power so far has brought out that Douhet's vision of destroying an enemy's will to resist by air attack alone remains a vision, and that the attainment of air superiority alone has not yet brought a country to its knees. After 100 years there is still no incontrovertible evidence that strategic bombing has been decisive in breaking the determination of any opponent to carry on fighting. Even in Desert Storm, strategic air attacks on Iraq by itself did not lead to its withdrawal from Kuwait. A ground offensive was needed to achieve the Coalition's military and political aims.

44. The equation between modern air power and the other components of military force has been very eloquently expressed by CoI Warden where he likened the relationship between armies, navies and air forces in war to a solo instrument in a concerto, where the composer having decided upon his objective selects the appropriate instrument which, translating the metaphor, becomes the key force in the music and in war. The instrument will vary from concerto to concerto; on some occasions it will be a soloist, on others it will harmonize, on others it will fall silent. Orchestration, not subordination or integration is the sine qua non of modern warfare'.

TOPIC-2

AIR POWER THEORISTS

Giulio Douhet

1. **Background**. Born into a military family in Italy in 1869 Giulio Douhet served as a professional artillery officer. He was never trained as a pilot but was appointed as the commander of Italy's first aviation battalion before World War I. Douhet was a prolific writer and had successfully marketed several plays and poems before the war.

2. **A Continental Theorist**. During World War I, he was critical of the Italian army high command that he was court-martialed and imprisoned for one year. However, the Battle of Caporetto began and demonstrated that Douhet had been correct; he was later forgiven. Soon after the war, Benito Mussolini came to power and Douhet was given a place of honour, but he left the service and passed his remaining years in writing and speaking out for airpower. He brought forth his Command of the Air in 1921 as an official publication. American scholars were made aware of the publication soon after its release through partial translations and word of mouth, even though a published English version did not appear until 1942. Douhet died in 1930.

3. **Modus Operandi**. Douhet was a talented writer and propagated his ideas mostly by the written word. He was an innovator and had the quality of a gadfly about him. He was reported to be a cranky individual and not very tolerant of fools. During World War I, as noted, his impolitic criticism of his military and civilian superiors landed him in jail.

4. **Assumptions**. By most accounts, Douhet was extremely dedicated to logical thought process perhaps excessively so. But even the most logical processes can result in disaster if they are founded upon false or faulty assumptions. Among his most prominent misconceptions were the following statements:

   a. Airpower is inherently offensive; the bomber will always get through.

   b. All wars will be total wars.

   c. Civilian morale is unstable.

   d. The hegemony of the defensive form of ground warfare is permanent.

5. **Thesis**. Douhet argued that an early air attack one the enemy's vital centers could win a humane victory, while surface forces could contain the enemy. It is a stretch of the imagination for the modern reader to imagine that bombing cities could be considered a humane way of war. Yet it is more understandable if one re-examines the context:- in which Douhet was writing and speaking-in the presence of the recent memory of the blood and gore of the long agony in the trenches and the absence of the knowledge of Hamburg, Dresden, Tokyo, and Hiroshima. Too, the notion that the world

would ever return to the kind of limited wars-of the eighteenth century-seemed quaint in the 1920s and 1930s. Thus, the idea of increased violence to be endured through only a much shorter period was not as far-fetched as--many authors now believe. In the words of Douhet:

> "Mercifully, the decision will be quick in this kind of war, since the decisive blows will be directed at civilians, that element of the countries at war least able to sustain them. These future wars may yet prove to be more humane than wars in the past in spite of all, because they may in the long run shed less blood."

6. **Targeting**. More ink has been spilled and passion expended over the proper selection of targets than over any other airpower subject. Dwight D. Eisenhower's decision to go after the French rail yards instead of Gennan synthetic oil plants before Overlord provides just one case in point. Douhet himself made the following remark:

> All this sounds very simple; but as a matter of fact the selection of objectives, the grouping of [attack] zones, and determining the order in which they are to be destroyed is the most difficult and delicate task in aerial warfare, constituting what may be defined as aerial strategy.

7. **Air Superiority**. Douhet argued that the first step in war-gaining command of the air – is achieved best by attacking the enemy's airpower on the ground, at the airfields, and in the factories. In his mind, this is so because of the vastness of space: A bomber was but a tiny speck there, and the chances of a defensive fighter discovering it, climbing up to catch it, and still having gas enough to fight the intruder were almost zero. This conclusion fostered the notion that airpower is inherently offensive. It could fly over all enemy defences without defeating them and still go directly to the heart of enemy power.

8. **Air Exploitation.** Once command of the air is won, the next step is to exploit that advantage immediately to punish the civilians. This way, civilians will coerce their own government to come to terms to end their suffering. In fact, Douhet argued that the mere act of gaining command might be enough. Enemy vulnerability would be so great that their leaders would soon likely recognize it and capitulate. If not, attacks on the cities and other vital targets would so depress the people that they would force the leadership to give way. This development would happen so rapidly that the total suffering would be less than it would be in the trenches-a major objective and selling point for his theory.

9. **Organization for War**. As noted earlier, Douhet argued that the humane short war could not be brought about under traditional military organizations. Armies and navies were certain to employ airpower as an auxiliary to the infantryman and the battleship. According to Douhet, to bring about victory over the enemy before the collapse of one's own civilian morale would require organizing air power under a separate air force. Only- in that way could air leaders employ air Power as an independent force to achieve victory without any need for tactical victories on the sea or in the trenches.

10. **Role of Other Armed Forces**. Since the time of the French Revolution at the latest, humanity has generally recoiled at the horrors of war. For most people, the next best thing to peace is a short war. Usually, those who fire the first shot, be they Confederates or the Wehrmacht, make a short-war assumption. In light of Douhet's argument that independent airpower would achieve the objective in a trice without surface struggles, anything not invested in airpower could be no more than a necessary evil. He asserted that the other armed forces were only to stand on the defensive until the air force offensive had been quickly decisive.

11. **Force Structure**. Economy of force principles therefore would be applied to armies and navies to concentrate the maximum combat power in the main attack. Douhet recognized that he was writing from an Italian perspective. Italy was essentially an island with water on three sides and the Alps to the north. Additionally, the country was so poor that it could not afford a complete array of armed forces to act against conceivable contingencies. He did allow that other nations, like the United States, had the resources to field more than just a strategic air force and might have reason to do so.

12. **Technology**. Douhet was highly assertive regarding his notion that aircraft devoted to the support of armies and navies were worse than a pure waste. He believed they detract from the main effort, which must be the battle for command of the air. In addition, aircraft concentrated in the Independent Air force were not to be of the small fighters or attack variety. Only one type of airplane was to be required, the battle plane;. This' airplane must have moderate speed, long range, and heavy armor for self-protection. If escort protection were required, battle planes could be made a part of the strike package, even though these planes could be armed only with self-defence weapons. Everything not put into bombing battle planes was a diversion that would weaken the main effort and reduce the probability of success. The battle plane bombers would have to have a combination of high explosive and incendiary and gas bombs to have a synergistic effect.

Hugh Trenched

13. **Background**. Born in 1873 Hugh Trenched was well along in his military career when he learned to fly in 1913. He fought much of World War I as head of the Royal Flying Corps in France and at that point was firm in his vision of aviation as an auxiliary to the Army.

14. **British Empire Theorist**. At first, he opposed the creation of an independent air force and the idea of strategic bombing. He was stout in his commitment to the prefer ability of offensive operations for air forces-and suffered substantial losses because of it. Trenchard nonetheless wound up in command of the Independent Air Force (IAF) in France in 1918. It was created in reaction to the German bombing of London and was charged to undertake retaliatory bombing of targets in Germany. The war ended before Trenchard's force could conduct much strategic bombing; therefore, most of its effort was in support of the armies. When Trenchard returned to the United Kingdom, he was appointed chief of the air staff of the Royal Air Force (RAF). He soon became an advocate of strategic bombing and of colonial control through the use of airpower instead of ground power. He remained in his post through the first decade of the RAF's

existence and was beleaguered by both the army and navy because they were generally determined to undo the creation of the RAF in 1918. He lived on for a long time after he retired in 1929, dying in 1956. "Billy" Mitchell had a considerable acquaintance with Trenchard, who had many personal contacts among the USAAF senior officers even into World War II.

15. **Modus Operandi**. A taciturn person with poor writing and speaking skills, Trenchard achieved his objectives mainly through internal communications without resorting to much dash and posturing. He was a conditioning factor for many years and an influence on the founding of many of the RAF's ideas and institutions. His ideas were at the center of the RAF doctrine manuals and the staff college. However, for the first several years, the major occupation for Trenchard and his staff was defending the RAF against army and navy attempts to have it abolished.

16. **Assumptions**. On the surface Trenchard's assumptions seem to have much in common with the following assertions of Douhet.

a. The bomber will always get through; it does not need escort.

b. Civilian morale is fragile but the British [morale] is tougher than the German and the moral effect of bombing is much more devastating than the physical effect.

c. The offensive is the stronger form of air war.

d. Night navigation target acquisition, and bombing accuracy are manageable problems.

e. Air superiority is a prerequisite for all other military operations.

17. **Thesis**. Trenchard's core idea was that victory could be achieved by bombing enemy vital centers and thus breaking his will. He was a little vague from time to time on what those centers were, but Trenchard seemed to suggest that civilian morale could be undermined by attacking vital industrial and communications targets and that the resulting loss of will would cause the civilians to pressure their movement into making terms. Trenchard argued early on that the RAF could do more to maintain order in colonial areas much more cheaply than the other services. His theory of air control asserted that relatively light air attacks supported by armored car ground units could achieve the same end with far fewer financial resources and people than the number the army would need.

18. **Targeting**. For Trenchard, as with Douhet, the timing of operations for air superiority took precedence. However, scholars should not project RAF city bombing against morale in World War II backward to Trenchard's time in office to make his ideas identical to Douhet's. Trenchard's targeting scheme against morale was vague, but he insisted on following international law, limiting collateral damage, selecting targets in urban areas for their military significance, and attacking vital centers in the infrastructure and production systems.

19. **Air Superiority**. As noted, air superiority was a prerequisite for all other operations. Having been disappointed with airfield attack in World War I, Trenchard believed that at least part of the struggle would take place with an air battle. He asserted most strongly throughout his career that engagements over land or sea would commence with a clash of air forces for control of the air. Also, these forces would strongly tend to be determinants of the final outcome because the future course of events depended heavily on the outcome of the first collision.

20. **Air Exploitation**. Both Trenchard and Douhet aimed at the collapse of civilian morale, but Trenchard wanted to achieve it indirectly through destruction of infrastructure targets and the like, while Douhet wanted to attack the people directly. Trenchard no doubt favored independent operations but made a greater allowance than Douhet did for cooperation with other services in operations against the enemy's fielded forces.

21. **Organization for War**. Originally the Royal Flying Corps (RFC) commander in France, Trenchard was opposed to the creation of a single air arm and to strategic bombing, though perhaps not as adamantly as often supposed. His position developed because he believed that the British Expeditionary Force was a key perhaps the key-to the British role in the war. He also held that the priority for the RFC had to remain the support of the ground forces. Once the war was over, though, Trenchard became ever more firmly committed to a separate air force, strategic bombing, and defending the RAF from the depredations of the army and the navy, both of which were trying to reverse the decision. The rationale that Trenchard's staff used most powerfully was the RAF's supposed mission to gain and maintain air superiority over land and sea. The unified control of airpower was essential to that, and ultimately it would extend to the control of the floating airdromes. As in America, there had been suggestions to place all the services under a ministry of defense, but these suggestions came to naught during Trenchard's day. Britain proceeded with the idea of a separate air ministry and a separate air force, but without a formal organization above to control all three services.

22. **Role of Other Armed Forces**. Air Chief Marshal Trenchard was well indoctrinated in ground warfare, having been an army officer himself. While World War I was still being fought, he was firm in his commitment to ground support and allowed only that "excess" aircraft could be dedicated to independent operations. After the war, though, Trenchard increasingly argued that the role of the British army and Navy was secondary and the role of the RAF and strategic attack was primary. First, by 1921 he was asserting that the RAF should be seen now as the primary instrument of defense for the British Isles and declaring that such a role would best be accomplished through an air offensive. Second, he wanted to reduce the functions of the two older services in such matters as colonial control (as noted), and coastal defense of the home islands. Third, he sought to reduce the many overseas bases and to turn their functions increasingly over to the RAF. The air arm, Trenchard insisted, could accomplish these functions more economically and effectively than the army and navy. In Trenchard's day, the defense of the British bastion at Singapore was a central part of the debate.

23. **Force Structure**. After World War I, Trenchard gave a very high priority to bomber units, and he found only a modicum of opposition to his ideas from either inside the RAF or outside. However, he always saw a role for fighters. Early in his tenure, plans were made for a substantial metropolitan air force known as the Air Defence of Great Britain. However, the threat seemed to diminish in the mid-1920s, and the scheme was never implemented. In part, that outcome was also due to the inability to detect inbound raids. Nonetheless, the planning that had been done proved beneficial after radar was conceived, making an air defense more feasible. As we have seen, some scholars argue that the British lost an enormous technological lead during the tenure of Trenchard. Yet blame for the decline cannot all be laid at Trenchard's door, for these were austere times; and, before 1929 conditions were even more difficult for Great Britain than they were for the United States. Too, it was a new service and there was no immediate foreign threat. Thus, not only would investments have been theoretically desirable in the earlier phases of research and development, but also in such longer- term factors as officer education and building a base infrastructure. Some investments were made in the latter areas during the Trenchard tenure, and when the crisis came, the officer corps of the RAF enjoyed more professional development than many of those leading the Luftwaffe. In addition, though the building of the wartime infrastructure to support the USAAF presence in England would be a hectic procedure, it would have been even more so without the start that Trenchard made.

24. **Technology**. As noted, scholars have argued that the British squandered a huge lead in aviation technology after 1918. This conclusion cannot be laid exclusively at Trenchard's door, for all the services were held to very tight budgets until after the rise of Hitler. The largest bomb in the inventory as late as 1939 was a 500-pounder (Mitchell's people used several 2,000-pounders to sink the Osifriesland in 1921). For all of Trenchard's former emphasis on bombers Bomber Command was not on the line until 1936; and when war came in 1939, all of its aircraft were two-engine types of unimpressive performance. In the United States the four-engine B-17 first flew in 1935 and was on the line from 1937 forward. By 1939 the four-engine B-24 Liberator also was fresh out of the factories; the RAF did not get its first four-engine airplane into Bomber Command until 1942. These planes showcased all-metal construction, retracting landing gear, superior radial engines, and closed cockpits. At the same time, the German and British (and Italian and Russian) air forces were still flying the old biplanes. Of course, the biggest advance was in radar, and that, too, came just in time. The short of it is that one simply cannot blame Trenchard for failing to foresee it.

25. **Influence on the RAF**. Trenchard's influence on the country's military service was enormous. He laid down its initial institutions and doctrine. His 10-year tenure came during a period of theoretical flux and was said to have had an enormous impact on most of his officers. Trenchard's ideas on colonial control held great appeal for Britain's politicians in that austere period because of their promised economy. His ideas were most successful in Mesopotamia, where indeed control was maintained at low cost. Nonetheless, in some other areas, these ideas flopped. Air Chief Marshal Trenchard was largely responsible for making the RAF a strategic attack force with a decided preference for the offensive that survived even the Battle of Britain. However,

his ideas were modified somewhat in their application, and one would have to stretch it to make him blameworthy for the largely unsuccessful attempt to break German civilian morale with direct attacks on workers and their homes by bombing down Hamburg and Dresden.

William Mitchell

26. **Background**. William “Billy” Mitchell was born in France in 1879 and spent the first three years of his life there. He came from a wealthy and prominent Wisconsin family. His grandfather had been a railroad mogul, and his father, a US senator of the Democratic Party, was an ardent anti-imperialist. Mitchell attended private schools and had an unremarkable academic record. He was enrolled in the ancestor unit of GeorgeWashingtonUniversity for three years, but did not graduate.

27. **New World Theorist**. When the Spanish-American War broke out, he left school and his father engineered a second lieutenant’s commission for him in the volunteers. Mitchell did not get to Cuba until some months after the fighting was over. He did some telegraph layout work in Cuba, and later went to the Philippines at a time when the guerrilla war was resurrected and lasted longer than anticipated. In those years, he had remained in the signal Corps. Later, he went to Alaska for a couple of years of survey work in support of laying telegraph lines, and then got involved in the actual construction.

28. Billy Mitchell was an athletic soul. But he was not always as independent as one might think-sometimes he had to be subsidized by his mother. He was at Fort Leavenworth, Kansas, for a while to go through the School of the Line and then the StaffCollege. He also taught Signal Corps subjects while he was there. His boss in those days was George O. Squier, the Army's first PhD recipient and later a general and chief of the Signal Corps. Mitchell was appointed to the General Staff at a young age, while still a captain, and was the only Signal Corps officer so assigned.

29. Mitchell had occasional reasons to investigate and write up aviation subjects, but displayed no-particular interest in flying at that time. He made major just before the United States entered World War I. His flight training near Norfolk in 1916 amounted to a mere 30-odd hours, and he wound up paying for it himself. He did not receive his junior military aviator wings until September 1917. This timing may have led to his assignment as an aeronautical observer in Europe, beginning just a few weeks before declaration of war.

30. Mitchell was in Europe when the United States entered the war, and he wound up commanding the combat aviation at the front. He returned home after the war to become assistant chief of the Air Service, first for Gen Charles Menoher and later for Gen Mason Patrick. He led an Air Service provisional brigade in the bombing tests against various naval vessels and sank an ex-German battleship with a two-thousand-pound bomb-at anchor, close to shore, and unprotected with antiaircraft artillery. The isolationist mood of the 1920s made it impolitic to suggest that the United States would

ever again be involved in overseas wars. A sea borne attack against the continental United States was not much of a possibility then, but that was the only threat that could be publicly addressed by either the Air Service or the Navy. Thus, Mitchell's strategic bombing ideas were discussed much less openly, and the airpower in coastal defence became the major issue. He deliberately provoked a court-martial in 1925, was convicted of insubordination, and left the Army early in 1926. He lived on his farm in Virginia for the rest of his life, became involved in the presidential campaign of 1932, and was disappointed that President Franklin Delano Roosevelt did not choose him as assistant secretary of war for air. Mitchell died in February 1936.

31. **Modus Operandi**. Mitchell was a showboater, one who was not at all averse to going outside channels. He used public relations extensively to try to advance his cause and published frequently in national media while on active duty. Mitchell wrote several books, some of which were published before he resigned. He used a sensationalist approach, which the Navy and soldiers oftentimes considered as firing from the hip. He frequently used immoderate language and seldom paused to qualify it. He was a social lion and behaved rather like a feudal baron as he travelled about his Air Service domains. He was sometimes too quick to reveal his hand to adversaries. Gen Jimmy Doolittle told me that he and perhaps the majority of senior Air Service and Air Corps officers came away with the opinion that Mitchell's methods more so than his ideas had done more harm than good to the service.

32. **Assumptions**. The assumptions underlying Billy Mitchell's concepts of airpower in its strategic attack role seem strikingly similar to those of both Douhet and Trenchard. It is well established that he had the opportunity to learn the views of both well before his court-martial in 1925. It seems equally likely that the whole set of ideas had multiple sources for all three-as had been the case with Alfred Mahan and his theories of sea power. Mitchell's assumptions included the following:

a. The coming of aviation was revolutionary.

b. Command of the air is a prime requirement.

c. Airpower is inherently offensive; the bomber will always get through.

d. Antiaircraft artillery is ineffective.

e. Airpower could defend the continental United States more economically than the Navy, and the latter's form of warfare is obsolescent.

f. Airmen are a special and elite breed of people, and they alone can understand the proper employment of airpower.

g. Future wars will be total; the ascendancy of the ground defensive will persist; everybody is a combatant.

h. Civilian morale is fragile.

33. **Thesis**. Airpower, organized into a separate, equal (to Army and Navy), and autonomous air force under a unified department of defence, could serve as the most effective and economical means of defending the continental United States. If the matter ever came to fighting an overseas enemy, airpower could decisively attack the enemy's vital centres without first defeating his armies and navies. Attacks on such vital targets would render war so decisive and quick that the total suffering would be less than otherwise, therefore, such bombing would be more humane than conventional trench warfare. Airpower is best generated by nations with populations that are air-minded; the United States has great potential for airpower but needs to develop it. Airpower is best controlled by an airman in a centralized way to facilitate its offensive use.

34. **Targeting.** Whether for motives of public relations, humanity, military efficiency, or some combination, Mitchell almost always stood squarely opposed to targeting civilians directly and generally advocated breaking their morale through the destruction of other vital centres like industry, infrastructure, or even agriculture. Mitchell's intellectual heirs at the AirCorpsTacticalSchool refined and systematized his ideas, using the north eastern industrial triangle of the United States as the model for the development of the precision-bombing theory and doctrine. From a very early date, General Mitchell endorsed the idea of a separate air force, centralized command of airpower, and the creation of a department of defence. In public, at first, he did not dwell all that much on strategic targets, as we know them today. He was more concerned with tactical functions, concentrating especially on maritime targeting. All the same, in lecturing at the ArmyWarCollege in 1922, Mitchell discussed targeting thusly:

> "At first it must be assumed that the hostile [to the United States] air forces will operate from airplane carriers to shore bases from Bermuda and that, as soon as possible, large concentrations of Red and Crimson (British) offensive aviation will be located in the Ontario Peninsula. From this Peninsula, a great percentage of aircraft factories, munitions factories, industrial centres, and automobile factories will be within a radius of action of long distance aerial bombardment. Practically all the main arteries of communication between the East and West pass within easy bombing distance of the Ontario Peninsula, near the South shore of Lake Erie, in the vicinity of Sandusky, Ohio."

35. **Air Superiority**. Mitchell was consistent in asserting that air superiority was a prerequisite for other military operations. In the general sense, he agreed with both Douhet and Trenchard in this. However, Douhet envisioned achieving command of the air through quick blows at the onset of hostilities against the enemy air forces while they were still on the ground. On the other hand, Mitchell argued that this advantage would be achieved largely through an air battle, but attacks on enemy airpower on the ground were also in his repertoire. He expressed much the same opinion in 1921:

a. The principal mission of Aeronautics is to destroy the aeronautical force of the enemy and, after this to attack his formations, both tactical and strategical, on the ground or on the water.

b. The secondary employment of Aeronautics pertains to their use as an auxiliary to troops on the ground for enhancing their effect against the hostile troops.

c. Pursuit Aviation is the kind designed to take and hold the offensive in the air against all hostile aircraft, and it is with this branch of Aviation that air supremacy is sought and obtained.

d. Mitchell disclaimed the effectiveness of AAA. His doctrinal descendants at the Air Corps Tactical School in the 1930s may have downplayed the achievement of air superiority in part through a great air battle, and many say that this led to a neglect of both pursuit and attack aviation in favor of strategic bombing.

36. **Air Exploitation**. According to General Mitchell, once air superiority was established, it could be exploited at will in all sorts of operations against vital centres. Sometimes vaguely described, these vital centres usually were seen as industrial, infrastructure, and agricultural values, the loss of which would lead to the collapse of civilian morale. As noted earlier, Mitchell's most prominent arguments in the 1920s focused on the use of airpower in lieu of naval power in the coastal defence mission. It came to a crisis in the latter half of 1925 with Mitchell's court-martial and his later resignation. Meanwhile, President Calvin Coolidge convened the Morrow. Board to consider the problem of aviation. For the most part, the board concluded that the ideas of Mitchell were not well founded and that the threat to American security was remote. It rejected most of Mitchell's ideas, though it did recommend a substantial build-up of airpower in the US services. The country seemed to accept the board's conclusions, and the Air Corps Act of 1926 reflected many of them.

37. For whatever reason, in Mitchell's day the idea of attacking civilians with airpower was not much discussed in public. The Douhetan idea of direct attack on civilian morale was diminished further at the AirCorpsTacticalSchool in the 1930s by the increased emphasis on industrial and infrastructure vital centres that would undermine enemy capability to resist. Also, as time passed (especially after Hitler and the Japanese went on their rampages), the coastal defence issue waned, and defense planners paid increased attention to the offensive use of long-range airpower in overseas operations.

38. **Organization for War**. As he steamed back from World War I aboard the SS Aquitania, Mitchell treated Lt Cmdr Jerome Hunsaker of the US Navy to his vision of airpower and the future security of the United States. Then and for the remainder of his days, Mitchell argued for a separate and equal, independent air force and for a unified department of defense. He asserted that only an airman could have the vision of the proper role of airpower and, therefore, all military aviation should fall under the direct control of such an airman. Even though the RAF itself was but a year old, Mitchell was

using it as a proper model for the United States-and many Navy airmen were using it as a bogey to scare their own mossbacks into fighting for naval aviation. Only four months after the RAF's founding, an American naval officer was complaining to the US Navy's General Board that the RAF had been a disaster.

39. **Role of Other Armed Forces**. At the onset of the decade of the 1920s, Mitchell asserted that the air force would have to be primary and the Navy, especially, would have to be secondary at best. After the famous naval bombing tests of July 1921, Mitchell became increasingly strident in claiming that surface vessels could not survive air attacks. Therefore, they could not be effective in the coastal defense mission. Of course, the Air Service worked for the chief of staff of the Army-and that tended to dampen the criticisms of the airmen a bit-but the General Staff came in for some substantial heat of its own. From the beginning, Mitchell saw a place for independent missions for air forces well beyond the battlefield. But in his mind they took on an ever-increasing higher priority as time wore on-with a relative diminishment of the role of the ground army. Increasingly, he argued that enemy armies and navies had never been the ultimate objectives; the final goal always had been to change the will of the enemy, and through airpower this finally could be done without defeating his surface forces.

40. **Force Structure**. At first, Mitchell advocated a preponderance of pursuit, but then increasingly emphasized the need for more bomber units. In the early 1920s, pursuit was the premier part of the force, though there were also a bomber and an attack group. Doubtless there was an increasing emphasis on bomber organization and technological development, but the work with pursuit and attack aircraft never disappeared altogether either on the line or in the curriculum of the Air Corps Tactical School.

41. **Technology**. In contrast to Douhet, Mitchell believed no single type of airplane was adequate; pursuits for command of the air were a paramount requirement, and at least in the early 1920s, Mitchell stipulated a need for both attack and reconnaissance aircraft. The "Mitchellites" of the Air Corps Tactical School (and much of the rest of the air arm of the 1930s) were persuaded that technology had arrived to validate Mitchell's theories. The high-altitude, four-engine bomber (predating radar) would be so difficult for a slow-climbing fighter to intercept before the latter had to turn back for want of gas, that it seemed ever more possible that the bomber would always get through. The combination of such strike force security in daylight with the new Norden bombsights seemed to promise adequacy in both target finding and hitting to enable decisive damage in a time so short that it would be economical and humane. According to Mitchell, the bombs would include high explosives, incendiaries, and gas. Mitchell had placed some emphasis on big bombs-and even on aerial torpedoes and radio-controlled guided missiles.

42. **Influence on the United States**. General Mitchell's economic appeal helped to commit the United States partially to inexpensive (they thought) security through airpower. According to his most prominent biographers, Mitchell, like Mahan, was more the articulator and catalyst than the originator of new ideas. The array of ideas he propounded was widely shared within the small corporate body of the Air Service, and his flamboyant style brought those notions to public attention, even though he was merely giving voice to the ideas of others.

John Warden

43. **Background**. John Warden was born in Texas in 1943. He was appointed to the Air Force Academy from Pennsylvania and graduated in the class of 1965. As noted, Carl Builder has asserted that the Air Force remains afflicted with pilot elitism, and insofar as that ever was true, the 1965 AirForceAcademy still epitomized that feature of the culture. This is not to say that Colonel Warden himself was or is an elitist. In my opinion, he seems to be much more concerned with airpower than with flying airplanes.

44. **Theorist or Throwback?**

a. Warden did go directly to pilot school, after which he conducted a combat tour in OV-10s with the First Air Cavalry Division in Vietnam. Later he flew a tour in F-4Ds. Warden was thus much more experienced in the trenches of airpower than any of the other three theorists we have considered. Douhet was not rated, and Mitchell and Trenched got their wings so late in their careers that neither of them had significant service experience at the squadron level.

b. Warden earned a master's degree in political science from Texas Tech University, graduated from the National War College, and was an F-15 wing commander at Bit burg, Germany. To some extent, we are comparing apples and oranges, but on paper Warden seems also to have more extensive formal education than any of the three classical theorists. He even travelled more widely than all, save perhaps Mitchell.

c. While Colonel Warden was a student at the NationalWarCollege, he wrote a thesis on air operations planning at the theatre level of war. Subsequently published by National Defense University Press, “The Air Campaign: Planning for Combat” has been printed in many copies. Warden wrote the book before the fall of the Berlin Wall and the USSR and focused it on a European war. Several of Warden's writings after the Persian Gulf War have refined his views considerably, but Warden's main notions were at the very least implied in his book long before such a war was contemplated or even possible. Readers cannot find nearly as much emphasis on information, air, and weapons technology in The Air Campaign as they can in his subsequent writing and speaking.

d. Warden served in the rank of colonel in command of his wing in Germany. He remained in that grade when he returned to the Pentagon to head CHECKMATE, an office serving under the Air Force deputy chief of staff for plans and operations and concerned with long-range planning. Warden was serving in that capacity at the onset of the Gulf War.

e. At the beginning of the war, the Air Staff theoretically had no business getting involved in operational or campaign planning. The orthodox procedure was for area commanders in chief (CINC) to make plans for possible combat operations. The usual arrangement was for one of the numbered air force commanders to be designated in advance as the air component commander for each CINC. It was recommended, but was not made mandatory, that a CINC appoints an individual as the joint force air component commander (JF ACC). This person would be responsible for planning and executing air campaigns in that theatre. The JFACC would develop and maintain a set of contingency plans, modify or create a new one to fit the situation when a campaign was in the offing, and seek the CINC's approval of the scheme. After the approval, the JFACC would execute the plan.

f. As it happened at the time of the Iraqi invasion of Kuwait, Gen Norman Schwarzkopf was the CINC of US Central Command headquartered at MacDill AFB, Florida. He sent the commander of Ninth Air Force, Lt Gen Charles Horner, ahead to Saudi Arabia to serve as the temporary, on-scene commander as well as the JFACC. In those early days, Homer and his staff had their hands full with deployment and bed down issues for all the services inbound to the whole theater, not to mention defensive preparations in case the Iraqis decided to invade further south. The US Central Command did have a contingency plan for war in the area, but it was an imperfect one as shown in an exercise shortly before the crisis. Therefore, General Schwarzkopf called the Air Force chief of staff for assistance in developing an offensive air plan. As the chief was out of town at the time of the call, the vice chief of staff, Gen John M. Loh, received the call and promised to help. He sent the task down the chain of command to Warden's CHECKMATE office, which had no formal responsibility for that work.

g. Warden and his people already had given the subject some thought. But it was largely fortuitous that they were tasked to assist with the planning. CHECKMATE quickly generated an initial offensive operational strategic plan, which authorities in the United States approved after some changes. Warden and his assistants then carried their briefing to the theatre, and after the initial delivery to General Horner, the assistants were retained in-theatre while General Homer sent the chief of CHECKMATE back to Washington. In the ensuing weeks, the plan was supplemented with many defensive and tactical features, but Warden's people were able to retain the essence of the original offensive scheme within the larger evolving plan.

h. After the Gulf War, Colonel Warden was transferred to Maxwell Air Force Base, where he became commandant of the Air Command and Staff College (ACSC). He stirred up that institution greatly, reorienting its study to focus on the operational strategy level of war and air planning at that level. Colonel Warden was highly active in bringing new educational technology to the school, and he frequently lectured there and at many other places on the art of air planning. He moved strongly to cause his students to adopt serious personal professional reading programs and to build their own professional libraries. Warden retired from the USAF in 1995 with the Air Force chief of staff presiding over the ceremony. He has continued to live in Alabama.

45. **Modus Operandi**. Warden is a hard-working, serious man. He has projected his ideas through both the spoken word in lectures and briefings and the written word in his book and articles. Warden has enormous self-assurance. It is clear enough that he has generated some opposition within the Air Force. He was the first commandant of ACSC in many years to retire in the rank of colonel.

46. **Assumptions**. As with the classical theorists, John Warden based his ideas on a set of assumptions. They include the following notions:

a. Human behavior is complex and unpredictable.

b. Material effects of military action are more predictable.

c. Air superiority is prerequisite for victory or even survival.

d. The offensive is by far the stronger form of air war. .

e. Victory is and always has been achieved in the mind of the enemy commander-everything must be directed toward that end.

f. Americans are even more sensitive to friendly and even enemy casualties than ever before.

47. **Thesis**. The core ideas of John Warden are that the art of air campaign planning is vital and that once air superiority is assured, airpower can be used either in support of the other arms, or can be supported by the other arms, and sometimes can function independently to achieve decisive effects. Technology has corrected the deficiencies of the Mitchell/Air Corps Tactical School theories so that the vital centres are vulnerable at acceptable costs to the attacker. That technology also has made parallel attack (as opposed to sequential ones) more possible than ever, and that is highly desirable. The centres of gravity vary from case to case. They may be arranged in five rings. At the centre are leadership targets, then means of production, infrastructure, population, and fielded forces in the outer perimeter. Almost all states and other political entities have the five rings, and they always appear with leadership at the centre. In general, it is preferable to attack the rings from the centre, then move outwards.

48. **Targeting**. According to Warden, because of the unpredictability of human behaviour and the predictability of material damage, the capability of the enemy should be targeted as the first priority. Clearly, he is even more concerned with avoiding both friendly and enemy civilian casualties than Mitchell and Trenchard were, and he is certainly no adherent of any Douhetan notion of attacking civilian morale directly. Warden believed that targeting the enemy's physical capability (as opposed to his psychological objectives) should be done with the full realization that military objectives must clearly serve the political objectives. Fewer centres of gravity (COG) exist in the middle than on the periphery; but they tend to be much more decisive than those on the

outer rings. However, attacking COG in the outer rings can yield more immediate impact than an attack on the ones at the centre. Consequently, close air support can sometimes take priority over interdiction and strategic attack in a tactical emergency on the ground. Targeting the COG in any ring simultaneously is more effective than sequential targeting; targeting the objectives in all the rings in parallel, rather than sequentially, tends to be even more decisive than attacking only one ring or starting with the outer ring and proceeding inward through each ring in turn.

49. **Air Superiority.** As with the classical theorists, command of the air remains Warden's first priority for all operations in the air or on the surface, though it sometimes may be achieved in parallel attacks rather than sequential. In The Air Campaign Warden admits that sometimes only local or temporary air superiority may be possible-and sufficient. As with Douhet, Warden believed that the least efficient place for achieving air dominance was in the air. Sometimes an air attack can serve more than one role. For example, the destruction of finished petroleum supplies can advance an air superiority campaign as it aids the interdiction effort. (German tanks in World War II ran out of fuel on the Ardennes battlefield.) In a tactical emergency on the ground, powerful incentives can divert all other sorties to close air support right at the front. Sometimes diversion could be disastrous because it might release the enemy air force from defending its bases to missions that could bring about the total downfall of own forces, and even make the situation on the ground a greater emergency than it would be otherwise.

50. **Air Exploitation**. John Warden, like most preceding airmen, argues that air interdiction by any other name is still preferable to close air support, because it allows more targets to be killed at less cost. The exception occurs when CAS is an emergency requirement. But the choice can be highly painful for the CINC here as well. I have written elsewhere that John Warden's position on air reserves is something new, but on reconsideration, I think it is more a restatement of an airman's view common all the way back to 1922 at the very least. In the early 1920s, Billy Mitchell himself was lecturing on the need for centralized control of tactical airpower by an airman at the theatre level. He maintained that the precise purpose of such control was to avoid dissipating tactical airpower's effect in penny packets. His worry was that were it parcelled out to the ground commanders, it would be impossible to pry tactical airpower away from some of them to meet emergencies at other parts of the front or in the interdiction or air superiority campaigns. The same thought stimulated Warden's notions in The Air Campaign where he envisions the preservation of air reserves and argues the idea as a radical one.

51. **Organization for War**. Colonel Warden so concentrates his work at the campaign level that he does not have much to say about national organization. The creation of an autonomous air force and a department of defence had become dead issues 14 years before he went to the academy. He does assert that sometimes airpower should be applied in support of the land and sea forces, sometimes it should be supported by them, and sometimes it can be decisive if applied independently. He explicitly asserts that single-service operations, even against other kinds of forces, have

been and will continue to be effective sometimes. That assertion leads him to suggest that jointness does not mean equal portions of the action for all services. Certainly, Warden adheres to the traditional ideal that airpower should be organized under centralized command, by an airman at the theatre level. The airman should report only to the CINC.

52. **Role of Other Armed Forces**. John Warden is less vitriolic on the subject of the roles of the other armed forces than were the other classical theorists. To him, the other armed forces can function in either a supporting or a supported role depending on the circumstances. Warden sees occasions when they conceivably will be irrelevant because airpower alone can win some campaigns. Still at all times, however, air superiority will be necessary to ensure victory. He cites history as "proof" that nobody has ever won without air superiority, and sidesteps the question of Vietnam by saying, "Indeed, no nation enjoying air superiority has ever lost a war by the force of enemy arms."

53. **Force Structure**. Warden is orthodox in noting that a theatre force is usually deployed in phases, with the forces intended for air defence in the first phase. Also orthodox is his notion that the nature of the units sent will vary in accordance with what is available and the constraints and opportunities peculiar to that theatre. One of the constraints operative in the Gulf War is distance. There is an inverse relationship between the distance and the variety and volume of forces that a nation can deploy quickly. However, Colonel Warden repeatedly suggests in The Air Campaign, and even more so in subsequent writings, that simultaneous operations against all the varieties of target sets can offer significant benefits. So, where the lift and tanking is available, or the distance is short, the tendency would lean toward sending the greatest variety and number of forces as early as possible, always with the understanding that the priority goes to achieving and maintaining air superiority. Like almost all preceding airmen, Warden's preference for the offensive is based largely on the idea of denying the enemy the ability to react. That denial depends not only on the size and character of the forces sent to battle but also on the ability to do so early in the campaign.

54. **Technology**. Warden shows a special fondness for high-tech solutions. Basic to his appeal for parallel attack is the assumption that the coming of precision-guided munitions (PGM) and stealth make possible the fulfilment of many of the older theorists' claims that the destruction of a given target required a far smaller strike force than heretofore, and with stealth no supporting aircraft is needed. At least for the time being, the bombers with stealth can get through with acceptable losses. Now bombers with PGM can get results as fast as Douhet had dreamed. A target can be taken out with far, far fewer bombs than in earlier eras. PGM makes strategic attack all the more feasible, and even makes parallel attack possible in many cases. It grants a modification of the principle of mass, for it allows sending far fewer shooters to a given target and permits the attack of many more targets at the same time, thus saturating defenses and yielding synergistic effects-concentration in time.

55. **Impact on the Gulf War**. Warden's followers insist that he provided the campaign plan with its strategic dimension. On the one hand, they contend that had he not stirred the pot with a plan out of the Air Staff, the result would have been purely an auxiliary effort in support of the Army. They argue that the auxiliary effort would have won, but only with many more casualties than was the case. Even further, Warden's supporters acknowledge there was not much of a defensive element in his original plan. On the other hand, detractors suggest there was no way of knowing then that Saddam Hussein would be inept and let us do a six-month build up without launching a ground assault that required other kinds of airpower in defense.

56. **Impact on the USAF**. Carl Builder contended that the Air Force has lost its doctrinal roots. If so, John Warden has at least stirred things up to stimulate a re-discussion of the institution's purpose. There is not a consensus behind Warden's set of ideas, though many of his ideas are shared as company property handed down from Mitchell and his followers. It is not too much to say that most of his ideas were common to the officer corps of the interwar period and since. However, if 'The Air Campaign did no more than synthesize old ideas into a single, compact, and highly readable form, it would have much in common with The Influence of Sea Power on History, 1660-1783. Nothing new appeared in that book, but it had an enormous influence. Mahan synthesized old ideas into a compact and readable set of notions that had long been the basis for the success of Britain's Royal Navy and British sea power in general. His work burst upon the scene at a particularly propitious time and is still a mighty influence. Mahan prepared his book for the US Naval War College, where he served on the faculty while that institution was in its infancy. In time it would grow to be one of the pillars of American sea power.

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TOPIC-1

OPERATION 'KILO FLIGHT'

1. **Introduction**. Air war played a pivotal role in 1971 Liberation war of Bangladesh. Besides the land operation, Bangladesh Air Force played a vital role in bringing positive result in the war. Though small in number, the heroic contribution of the Bengali pilots were the path finders for the initial journey of BAF. The true spirit and the dedications displayed during the war in the event of air operations contributed substantially in bringing the victory. The notable events are discussed in this chapter.

2. **KILO FLIGHT Formation**. In the height of our liberation war the Kilo Flight was formed by the initiative of some dedicated airmen who left PAF to join the war of liberation. The aim of Kilo Flight was to provide air support to the Mukti Bahini. The pioneer Bengali airmen included Group Captain Khondaker, Wing Commander Bashar, Wing Commander Mirza, Flight Lieutenant Rahim, Flight Lieutenant Sadruddin, Flight Lieutenant Shamsul Alam and Flying Officer Nurul Kadir. The proposal for forming the Kilo Flight was initially kept pending as the BAF had no aircraft in its inventory till then. After repeated persuasions and discussion with the Indian the Kilo Flight emerged in 28 September 1971. IAF Chief, Air Marshal PC Lai and Group Captain AK Khandaker Deputy Chief of BAF inaugurated the flight in a simple ceremony at Dimapur, Assam. The Indian gave one DC -3, one Alouette-III and an Otter. Nine officers and 47 airmen were absorbed from different sectors in the air element. Squadron Leader Sultan Mahmud was appointed as the commander. Flight Lieutenant Shamsul, Flying Officer Badrul, Civil pilot Capt Khaleque, Sattar, First Officer Sarfuddin, Akram and Mukit joined later.

3. **Training**. From September to the beginning of December the crew members were trained in night supply and attack operation S-23. Pilots were divided into three groups. Squadron Leader Sultan, Flight Lieutenant Badrul, and Captain Shahabuddin were in Alouette-III, Flight Lieutenant Samsul Alam, Captain Sarfuddin and Captain Akram was in Otter, Captain Khaleque, Mukit and Sattar were in DC-3. There were no weapons fitted in the aircraft. The technicians modified the aircraft for attack and bombing role. Two rocket pods were fitted under the wings of the Otter, while the machine gun was kept inside the aircraft and arrangement was made to drop bomb. Alouette-III was also modified in the same manner as Otter. Dakota was assigned for transportation role. Several training missions were flown in the forest of Nagaland against dummy targets. The aircraft did not have any camera and gun sight. The target used to be aimed with the help of own marked 'red cross' on the windshield.

4. **Air Operations**. A number of air operations were carried out by the Kilo Flight during the war.The significant air attack was carried out at night on fuel dump at Patenga and Narayanganj on 03 and 04 Dec 71.The details of the operations are as below:

a. The first air operation was on 03 Dec 71 by Otter at the oil refinery at Chittagong port area. The successful bombing mission with primitive weapons denied the oil supply to the Pakistanis. The aircraft received few bullet hit but the dare devil pilot Flight Lieutenant Alam managed to evade the Pakistani anti-aircraft firing by low flying on the river of Karnafuli and landed back safely.

b. Soon after the successful air attacks, the Otter carried out few more missions in Sylhet area.

c. Squadron Leader Sultan Mahmud with his Alouette-III carried out second successful mission attacking fuel storage at Godanail of Narayanganj area. During this mission the helicopter got a few bullets hit but could land back safety in the Base.

d. DC-3 was dedicated for the transportation of forces and VIPs.

5. The modest effort by the Kilo Flight with the meagre number of aircraft signifies the commitment of the Bengali airmen to the cause of our liberation war. This flight formed the embryo of today's BAF and bears the testimony of our predecessors who ceaselessly toiled against all odds to shape up a future Air Force for Bangladesh.

6. The very formation of Kilo Flight signifies the dedication, commitment and will of Bengali airmen for the cause of liberation. The overall impact of the air operations on the conduct of the war was significant, but they greatly contributed to the raising of the morale of the Mukti Bahini and the people who supported them. The careful selection of the target also signifies the foresightedness of the Bengali airmen as it was chosen to maximize the effect through limited resources.

Conclusion

7. Emergence of Bangladesh as a nation is an epic history of blood bath and honour. It had the participation of People of all walks of life. The political manipulation, economic deprivation, social discrimination by the ‘west’ pushed the people of east for an arms struggle for freedom. Being separated by 1200 miles, the two wings had nothing in common except religion. The 25 March crackdown eventually broke this thin line of common feelings, which resulted in arms conflict.

8. The rudimentary state of preparation to fight against the well-equipped Pakistani forces actively supported by the Indians paved the way for our victory. Initially the BDF was formed comprising freedom fighters, regular Bengali soldiers, sailors and airmen defected from Pakistani forces. Later on the Kilo Flight, the air arm of BDF, came into being comprised of Bengali airmen. The Kilo Flight was the embryo of today's BAF.

TOPIC-2

OPERATION LINEBACKER

Introduction

1. American forces conducted two operations in the name of Line Baker during Vietnam War. The Line Backer-I was conducted from May to October 1972 and Line Backer-II was conducted in the month of December 1972. However, the Line Baker brought some decisive result and the operation considered to be the turning points for the American forces after enormous setbacks.

Linebacker-I

2. Operation Linebacker was the title of a U.S. Seventh Air Force and U.S. Navy Task Force 77 aerial interdiction campaign conducted against the Democratic Republic of Vietnam (North Vietnam) from 9 May to 23 October 1972, during the Vietnam War. Its purpose was to halt or slow the transportation of supplies and materials for the *Nguyen Hue Offensive* (known in the West as the Easter Offensive), an invasion of the Republic of Vietnam (South Vietnam), by forces of the People's Army of Vietnam (PAVN), that had been launched on 30 March. *Linebacker* was the first continuous bombing effort conducted against North Vietnam since the bombing halt instituted by President Lyndon B. Johnson in November 1968.

3. Linebacker had played a crucial role in blunting the northern offensive by drying up its vital sources of supply. PAVN had evolved into a conventional military force, and such a force depended upon a complex logistical system, which made it vulnerable to aerial attack. By September, imports into North Vietnam were estimated at 35 to 50 percent below what they had been in May, bolstering claims that the campaign had been successful in its interdiction effort. Air Force General Robert N. Ginsburgh, of the Office of the Secretary of the Air Force, summed up the attitudes of U.S. commanders by remarking that Linebacker had "a greater impact in its first four months of operation than Rolling Thunder had in three and one-half years. Although Henry Kissinger may have announced that peace was at hand, it was not going to come easily. American bombers would once again return to the skies of North Vietnam in 1972 during Operation Linebacker II before the American commitment to the Vietnam War came to an end.

Linebacker II

4. Operation Linebacker II was a US Seventh Air Force and US Navy Task Force 77 aerial bombing campaign, conducted against targets in the Democratic Republic of Vietnam (North Vietnam) during the final period of US involvement in the Vietnam War. The operation was conducted from 18–29 December 1972, leading to several of informal names such as "The December Raids" and "The Christmas Bombings".[5] It saw the largest heavy bomber strikes launched by the US Air Force since the end of World War II. Linebacker II was a resumption of the Operation Linebacker bombings conducted from May to October, with the emphasis of the new campaign shifted to attacks by B-52 Stratofortress bombers rather than tactical fighter aircraft. 1,600 civilians died in Hanoi and Haiphong in the raids.[6]

Background

5. On 8 October 1972, U.S. National Security Advisor Dr. Henry Kissinger and North Vietnamese Politburo member Le Duc Tho met in Paris. They were there to discuss new proposals by both nations, hoping to reach mutually agreeable terms for a peace settlement for the decade-old Vietnam war. Though presented a new North Vietnamese plan which included proposals for a cease-fire, the withdrawal of American forces, and an exchange of prisoners of war. All three Vietnamese combatant governments: North Vietnam, the Republic of Vietnam (South Vietnam), and the Provisional Revolutionary Government of South Vietnam (PRG) would remain intact, as would their separate armies. Hanoi no longer demanded that South Vietnamese President Nguyen Van Thieu be removed from office, the U.S. did not have to cease its aid to the southern government and both Washington and Hanoi could continue to resupply their allies or forces on a parity basis. No new North Vietnamese forces were to be infiltrated from the north and the U.S. agreed to extend post-war reconstruction assistance to North Vietnam.

6. The new terms on the table also included the establishment of a National Council of National Reconciliation and Concord, a loosely defined administrative structure which was to work toward general and local elections within South Vietnam. Political power would be shared by three groups, the Saigon government, the PRG, and a "third force" group to be mutually agreed upon by the other two parties. Since it was to work by consensus, nothing could be accomplished by the new council without the agreement of President Thieu. When the two sides convened again on 17 October, there were two main areas of disagreement: the periodic replacement of South Vietnam's American weaponry, and the release of political prisoners held by the Saigon government. The North Vietnamese had made significant modifications to their past negotiating position and were hurrying to get the agreement signed before November, believing that President Richard M. Nixon would be more willing to make concessions before, rather than after, the upcoming presidential election. Although there were still some issues to be finalized, Kissinger was generally satisfied with the new terms and so notified Nixon, who gave his approval to the settlement. The finalized agreement was to be signed in Hanoi on 31 October.

7. Kissinger then flew on to Saigon on the 18th to discuss the terms with Thieu. The South Vietnamese president was not happy with either the new agreement or with Kissinger, who he felt had betrayed him. Although Kissinger knew Thieu's negotiating position, he had not informed him of the changes made in Paris nor had his approval been sought. Kissinger "had negotiated on behalf of the South Vietnamese government provisions that he, Thieu, had already rejected. Thieu completely castigated the agreement and proposed 129 textual changes to the document. He went further, demanding that the Demilitarized Zone separating the two Vietnams be recognized as a true international border and not as a "provisional military demarcation line" (as had been stipulated in the Geneva Accords) and that South Vietnam be recognized as a sovereign state. The supreme irony, in the words of Stanley Karnow, had now arrived: "having fought a war to defend South Vietnam's independence, the United States was now denying its legitimacy. Thieu then went one step further on 26 October and publicly released an altered version of the text that made the South Vietnamese provisions look

even worse than they actually were. The North Vietnamese leadership, believing that they had been hoodwinked by Kissinger, responded by broadcasting portions of the agreement that gave the impression that the agreement conformed to Washington and Saigon's objectives. Kissinger, hoping to both reassure the communists of America's sincerity and convince Thieu of the administration's dedication to a compromise, held a televised press conference at the White House during which he announced "We believe that peace is at hand.

8. On 20 November, the South Vietnamese revisions and 44 additional changes demanded by Nixon were presented to the North Vietnamese delegation by Kissinger (who personally considered them "preposterous"). These new demands included: That the DMZ be accepted as a true international boundary; that a token withdrawal of North Vietnamese troops take place; that the North Vietnamese guarantee an Indochina-wide cease fire; and that a strong international peace-keeping force (the ICCS) be created for supervising and enforcing the cease-fire.

9. Once the North Vietnamese read the new demands, they began to retract their own concessions and wanted to bargain anew, leading Kissinger (who fully understood their position) to proclaim that they were "stalling. The talks, scheduled to last ten days, ended on 13 December with both parties agreeing to resume negotiations. Teams of experts from each side met to discuss technicalities and protocols on 14 December, during which the North Vietnamese representatives submitted a Vietnamese-language text of the protocol on prisoners containing several important changes that Hanoi had failed to gain in the main negotiating sessions. At a subsequent meeting of experts on 16 December, the North Vietnamese side "stone-walled from beginning to end." The talks broke down that day, and the Hanoi negotiators refused to set a date for the resumption of negotiations.

Prelude to the Operation

10. Nixon was now working against a January deadline. Kissinger's "peace is at hand" statement had raised expectations of a settlement among the US population. Even weightier on the president's mind was the fact that the new Ninety-third Congress would go into session on 3 January, and the president feared that the heavily Democratic legislative branch would preempt his pledge of "peace with honor" by legislating an end to the war. Also prompting the president toward some form of rapid offensive action was the cost of the force mobilization that had accompanied Operation *Linebacker*. The additional aircraft and personnel assigned to Southeast Asia for the operation was straining the Pentagon's budget. The cost of maintaining this "augmentation force" totaled over $4 billion by mid-autumn and Secretary of Defense Melvin Laird insisted that the president request a supplementary defense appropriation from Congress to pay for it. Nixon and Kissinger were convinced that the legislative branch "would seize the opportunity to simply write the United States out of the war.

11. After returning from Paris on 14 December, and after consultations with Nixon, Kissinger fired off an ultimatum to Hanoi, threatening "grave consequences" if North Vietnam did not return to the negotiating table within 72 hours. On that day, Nixon ordered the reseeding of North Vietnamese ports with air-dropped naval mines and that

the Joint Chiefs of Staff direct the Air Force to begin planning for a bombing campaign (a three-day "maximum effort") which was to begin within 72 hours. Two days after the 16 December deadline had passed, the U.S. bombed Hanoi. Senior Air Force officers James R. Mccarthy and George B. Allison stated years later that the operation had been mainly politically driven, as a negotiation tool to "bring the point home".

12. Many historians of the Vietnam War follow the lead of President Nixon, who claimed that Hanoi's representatives had walked out of the talks, refusing to continue the negotiations. Both sides had proclaimed their willingness to continue the talks; however, Hanoi's negotiators refused to set a date, preferring to wait for the incoming Congress. The goal of President Nixon was not to convince Hanoi, but to convince Saigon. President Thieu had to be convinced that "whatever the formal wording of the cease-fire agreement, he could count on Nixon to come to the defense of South Vietnam if the North broke the cease-fire.

Planning

13. In the wake of Operation *Linebacker*, the U.S. had a force of 207 B-52 bombers available for use in Southeast Asia. 54 bombers (all B-52Ds) were based at U-Tapao RTAFB, Thailand, while 153 were based at Andersen Air Force Base, Guam (55 B-52Ds and 98 B-52Gs). This deployment, however, utilized nearly half of the Air Force's manned bomber fleet and Strategic Air Command (SAC) commanders were initially reluctant to risk the highly expensive aircraft and their highly trained crews in such an operation. The use of large numbers of B-52s was unprecedented in the war and the proposed large-scale attacks on targets within 10 nautical miles (20 km) of Hanoi "represented a dynamic change in the employment of air resources. Many within SAC, however, welcomed the opportunity to fly into the heavily defended airspace of North Vietnam, hoping to finally prove the viability of manned bombers in a sophisticated Soviet-style air defense network of surface-to-air missiles (SAMs), anti-aircraft artillery and MiG interceptors. One purely local reason for utilizing the B-52s instead of tactical aircraft for the planned campaign was the September through May monsoon weather within North Vietnam, which made visual bombing operations by tactical fighter-bombers difficult. The B-52s were equipped with their own radar bomb navigation systems and supporting fighter-bombers would be able to strike targets with either newly-deployed laser-guided bombs in clear weather or by utilizing LORAN and radar-guided bombing systems.

14. The new operation, given the title *Linebacker II*, was marked by top-down planning by the SAC headquarters at Offutt AFB, Omaha, Nebraska. Due to the restrictive time frame imposed by Richard Nixon (only three days) and the experience of *Linebacker* (in which North Vietnamese fighter aircraft had posed the highest threat to the bombers), SAC's plan called for all of the bombers to approach Hanoi at night in three distinct waves, each using identical approach paths and flying at the same altitude. The aircraft themselves were to fly in three-plane formations known as "cells" for more effective electronic warfare (EW) jamming coverage.

15. Once the aircraft had dropped their bombs, they were to execute what SAC termed "post-target turns" (PTT) to the west. These turns had two unfortunate

consequences for the bombers: the B-52s would be turning into a strong headwind, slowing their ground speed by 100 knots (185 km/h) and prolonging their stay in the target area and the PTT would point the emitter antennas of their EW systems away from the radars they were attempting to jam, degrading the effectiveness of the cells, as well as showing the largest radar cross-section to the missile guidance radars. The aircraft employed, however, had significantly different EW capabilities; the B-52G carried fewer jammers and put out appreciably less power than the B-52Ds, however had they had more efficient engines and larger fuel tanks, hence they were assigned to longer range mission routes. Because of these factors, the campaign would ultimately be conducted in three distinct phases as tactics and plans were altered in response to losses to SAMs.

Operations : Initial Phase

16. The first three missions of the operation were flown as planned by SAC on three consecutive nights beginning on 18 December. On the first night 129 bombers were launched, 87 of them from Guam, 39 support aircraft of the Seventh Air Force, the Navy's Task Force 77, and the Marine Corps supported the bombers by providing F-4 fighter escorts, F-105 Wild Weasel SAM-suppression missions, Air Force EB-66 and Navy EA-6 radar-jamming aircraft, chaff drops, KC-135 refueling capability, and search and rescue aircraft; the skies were dominated by American airpower to ensure the safety of the aircraft involved in the operation.

17. The targets of the first wave of bombers were the North Vietnamese airfields at Kep, Phuc Yen, and Hoa Lac and a warehouse complex at Yen Vien while the second and third waves struck targets around Hanoi itself. Three aircraft were shot down by the 68 SAMs launched by North Vietnamese batteries, two B-52G's from Andersen and a B-52D from U-Tapao. Two D models from Andersen with heavy battle damage managed to limp into U-Tapao for repairs. Only one of the three downed crews could be rescued. That same evening, an Air Force F-111 Aardvark was shot down while on a mission to bomb the broadcasting facilities of Radio Hanoi.

18. Unlike the initiation of *Linebacker*, which had been launched in response to a North Vietnamese offensive in South Vietnam, President Nixon did not address the nation on television to explain the escalation. Instead, Kissinger held a press conference at which he accused (at Nixon's behest) Le Duc Tho of having "backed off" on some of the October understandings.

19. On the second night, 93 sorties were flown by the bombers. Their targets included the Kinh No Railroad and storage area, the Thai Nguyen thermal power plant, and the Yen Vien complex. Although 20 SAMs were launched and a number of the bombers were damaged, none were lost on the mission. SAC expected that the third (and supposedly last) night of the operation would proceed just as well as the previous one.

20. The repetitious nature of the previous evening's strike profiles had allowed North Vietnamese air defense forces to anticipate strike patterns and to salvo 34 missiles into the target area. Four B-52Gs and three B-52Ds were lost in the first and third waves of the mission. A fourth D model, returning to Thailand, crashed in Laos. Only two of the eight downed crews were recovered by search and rescue aircraft.

21. The repercussions from the mission were fast and furious. SAC headquarters was under pressure from "many external sources" to "stop the carnage...it has become a blood bath. Of more concern was the position taken by many senior Air Force officers "that we would lose too many bombers and that airpower doctrine would be proven fallacious...or, if the bombing were stopped, the same thing would occur.

22. The main problem seemed to lie within the headquarters of SAC, which had based its tactics on a MiG threat that had not materialized during the three missions. The tactics utilized (flight paths, altitudes, formations, timing, etc.) had not varied. The Air Force explanation for this course of events was that the similarity would be helpful to the B-52 crews, who were inexperienced in flying in such high-threat environments. Air Force historian Earl Tilford offered a differing opinion: "Years of dropping bombs on undefended jungle and the routines of planning for nuclear war had fostered a mind-set within the SAC command that nearly led to disaster...Poor tactics and a good dose of overconfidence combined to make the first few nights of *Linebacker* nightmarish for the B-52 crews.

Re-evaluation

23. It was at this point that President Nixon ordered that the effort be extended past its original three-day deadline. The first change that could be made by local Air Force commanders was divulged by a comparison of the differences between the radar jamming equipment of the B-52 models. The equipment aboard the G models was designed for use in the more sophisticated air defense environment of the Soviet Union, not against the more antiquated SAM-2 and FAN-SONG radar systems utilized by the North Vietnamese. SAC headquarters in Omaha stipulated that only the aircraft stationed at U-Tapao (equipped with more powerful and sophisticated ECM gear) be allowed over the North. As a result the attack waves were reduced in size, although the tactics employed did not change.

24. On the fourth night (21 December) of the operation, 30 of the U-Tapao bombers struck the Hanoi storage area, the Van Dien storage depot, and Quang Te Airfield. Two more of the D models were lost to SAMs. On the following night, the target area shifted away from Hanoi to the port city of Haiphong and its petroleum storage areas. Once again, 30 aircraft participated in the strikes, but this time there were no losses among the bombers. An F-111, however, was shot down over the Kinh No Railroad complex. On the 22nd, a wing of the Bach Mai Hospital, located in the southern suburbs of Hanoi, was struck by an errant string of bombs from a single B-52. The civilian deaths were turned into a cause celebre by the North Vietnamese and U.S. peace activists. The hospital sat 1 kilometer from the runway of Bach Mai Military Airfield and a major fuel storage facility was only 200 yards away. Fortunately, the patients of the hospital wing had been evacuated from the city, but 28 doctors, nurses, and pharmacists were killed.

25. Two days before Christmas, SAC added SAM sites and airfields to the target list. Air Force F-111s were sent in before the arrival of the bombers in order to strike the airfields and reduce the threat of enemy fighters. The Aardvarks proved so successful in these operations that their mission for the rest of the campaign was shifted to SAM site suppression.

26. The bomber missions of the sixth night (23 December) again avoided Hanoi and hit SAM sites northeast of the city and the Lang Dang Railroad yards. There were no losses. On the following night, the run of luck (and avoidance of Hanoi) continued. Thirty bombers, supported by 69 tactical aircraft, struck the railyards at Thai Nguyen and Kep and no American aircraft were lost during the mission.

27. Although the Stratofortresses garnered the lion's share of the publicity during the campaign, their "little brothers", the tactical aircraft, were also hard at work. While the B-52s and F-111s attacked by night, an average of 69 tactical aircraft of the Air Force, Navy and Marines attacked by day (averaging nearly 100 sorties per day). Losses for these aircraft were extremely light, with fewer than a dozen lost during the entire campaign. It was not difficult for their crews to deduce why. The North Vietnamese air defense forces "simply waited for nightfall and the arrival of more lucrative targets."

Operations : Final Phase

28. The strikes of the 24th were followed by a 36-hour Christmas stand-down, during which Air Force planners went to work to revise their plans for the next phase of operations. Due to aircraft losses during the initial phase, they intended to launch an all-out attack on North Vietnam's air defenses when the operation resumed. This course was also necessary since, by Christmas, most of the strategic targets within North Vietnam were in shambles. SAC also belatedly turned over tactical mission planning to its subordinate Eighth Air Force headquarters on Guam, which promptly revised the previously costly tactics. Instead of utilizing multiple waves, all of the bombers would be in and out of the target area within 20 minutes and they would approach from multiple directions and at different altitudes. They would exit by varying routes and the steep PTTs were eliminated. Ten targets, in both the Hanoi and Haiphong areas, were to be struck by bombers approaching in seven separate streams, four of which were to come in off the Gulf of Tonkin. Additional jammers were also installed in the B-52Gs, allowing them to return to the operation.

29. On 26 December 120 bombers lifted off to strike Thai Nguyen, the Kinh No complex, the Duc Noi, Hanoi, and Haiphong Railroads, and a vehicle storage area at Van Dien. 78 of the bombers took off from Andersen in one time block, the largest single combat launch in SAC history, while 42 others came in from Thailand. The bombers were supported by 113 tactical aircraft which provided chaff corridors, escort fighters, Wild Weasel SAM suppression, and electronic countermeasures support.

30. The North Vietnamese air defense system, though still capable, was overwhelmed by the number of aircraft it had to track in such a short time period and by a dense blanket of chaff laid down by the fighter-bombers. 250 SAMs had been fired, and the strain on the remaining North Vietnamese inventory showed, since only 68 were fired during the mission. One B-52 was shot down near Hanoi and another damaged aircraft made it back to U-Tapao, where it crashed just short of the runway. Only two members of the crew survived. On the following night, 60 bombers flew the mission, with some attacking SAM sites while others struck Lang Dang, Duc Noi, the Trung Quang Railroad, and Van Dien. One B-52 was so heavily damaged that its crew ejected over Laos, where it was rescued. A second aircraft was not so lucky. It took a direct hit and went down

while attacking the Trung Quang Railroad yards. During the evening's operations two F-4s and a HH-53 search and rescue helicopter were also shot down.

31. Day ten (28 December) called for strikes by 60 B-52s–15 Gs and 15 Ds from Andersen and 30 Ds from U-Tapao, The aircraft formed six waves attacking five targets. Four of the waves struck targets in the Hanoi area (including SAM Support Facility #58), while the fifth hit the Lang Dang Railroad yards southwest of Lang Son, a major chokepoint on the supply route from the People's Republic of China. No aircraft were lost on the mission.

32. By the eleventh and final day (29 December), there were few strategic targets worthy of mention left within North Vietnam. There were, however, two SAM storage areas at Phuc Yen and the Lang Dang yards that could be profitably attacked. A total of 60 aircraft again made the trip north, but the mix was altered; U-Tapao again provided 30 D models but the Andersen force was varied, putting 12 G models and 18 Ds over the north. Total bombing was rounded out by sending 30 G models on *Arclight* missions in southern panhandle of North Vietnam and in South Vietnam. Once again, there were no aircraft losses to anti-aircraft fire, MiGs, or missiles.

Negotiating

33. On 22 December, Washington asked Hanoi to return to the talks with the terms offered in October. On 26 December, Hanoi notified Washington that it was willing to "impress upon Nixon that the bombing was not the reason for this decision, the VWP Politburo told Nixon that halting the bombing was not a precondition for further talks." Nixon replied that he wanted the technical discussions to resume on 2 January and that he would halt the bombing if Hanoi agreed. They did so and Nixon suspended aerial operations north of the 20th parallel on 29 December. He then informed Kissinger to accept the terms offered in October, if that was what it took to get the agreement signed. Senator Henry Jackson (D, Wash.), tried to persuade Nixon to make a televised address in order to explain to the American people that "we bombed them in order to get them back to the table. It would, however, have been extremely difficult to get informed observers in the U.S. to believe that he "had bombed Hanoi in order to force North Vietnamese acceptance of terms they had already agreed to.

34. Now the only stumbling block on the road to an agreement was President Thieu. Nixon tried to placate him by writing on 5 January that "you have my assurance of continued assistance in the post-settlement period and that we will respond with full force should the settlement be violated by North Vietnam. By this time, however, (due to congressional opposition) Nixon was in no position to make such a promise, since the possibility of obtaining the requisite congressional appropriations was nil. The South Vietnamese president, however, still refused to agree. On the 14th Nixon made his most serious threat: "I have therefore irrevocably decided to proceed to initial the agreement on 23 January 1973...I will do so, if necessary, alone. One day before the deadline, Thieu bowed to the inevitable and consented to the agreement.

35. On 9 January, Kissinger and Le Duc Tho returned to Paris. The agreement struck between the U.S. and North Vietnam was basically the same one that had been reached in October. The additional demands that had been made by the U.S. in December were generally discarded or went against the U.S. John Negroponte, one of Kissinger's aides during the negotiations, was more caustic: "We bombed the North Vietnamese into accepting our concessions. The DMZ was defined as provided for in the Geneva Accords of 1954, and would in no way be recognized as an international boundary. The demanded withdrawal of North Vietnamese troops from South Vietnam was not mentioned at all in the text of the agreement. Kissinger did, however, obtain a "verbal agreement" from Tho for a token withdrawal of 30,000 North Vietnamese troops.

36. The demand for an inclusive, Indochina-wide cease-fire was simply discarded in the written agreement. Once again, Kissinger had to be satisfied with a "verbal understanding" that a cease-fire would be instituted in Laos simultaneous with, or shortly following, that in South Vietnam. An agreement on Cambodia (where the North Vietnamese had no influence whatsoever over the Khmer Rouge) was out of the question. The size of the ICCS was finally decided by splitting the difference in the number demanded by both parties at 1,160 personnel. The Paris Peace Accords were signed at the Majestic Hotel in Paris on 27 January 1973.

Aftermath

37. During operation *Linebacker II* a total of 741 B-52 sorties had been dispatched to bomb North Vietnam and 729 had actually completed their missions. 15,237 tons of ordnance were dropped on 18 industrial and 14 military targets (including eight SAM sites) while fighter-bombers added another 5,000 tons of bombs to the tally. 212 additional B-52 missions were flown within South Vietnam in support of ground operations during the same time period. Ten B-52s had been shot down over the North and five others had been damaged and crashed in Laos or Thailand. 33 B-52 crew members were killed or missing in action, another 33 became prisoners of war, and 26 more were rescued. North Vietnamese air defense forces claimed that 34 B-52s and four F-111s had been shot down during the campaign.

38. 769 additional sorties were flown by the Air Force and 505 by the Navy and Marine Corps in support of the bombers. 12 of these aircraft were lost on the missions (two F-111s, three F-4s, two A-7s, two A-6s, an EB-66, an HH-53 rescue helicopter, and an RA-5C reconnaissance aircraft).[47] During these operations, ten American aviators were killed, eight captured, and 11 rescued. Overall US Air Force losses included fifteen B-52s, two F-4s, two F-111s, one EB-66 and one HH-53 search and rescue helicopter. Navy losses included two A-7s, two A-6s, one RA-5, and one F-4. Seventeen of these losses were attributed to SA-2 missiles, three to daytime MiG attacks, three to antiaircraft artillery, and four to unknown causes. A total of eight MiGs were shot down during the operation, including two by B-52 tail gunners.

39. Damage to North Vietnam's infrastructure was severe. The Air Force estimated 500 rail interdictions had taken place, 372 pieces of rolling stock and three million gallons

of petroleum products were destroyed, and 80 percent of North Vietnam's electrical power production capability had been eliminated. Logistical inputs into North Vietnam were assessed by U.S. intelligence at 160,000 tons per month when the operation began. By January 1973, those imports had dropped to 30,000 tons per month. The North Vietnamese government criticized the operation stating that the U.S. had "carpet-bombed hospitals, schools, and residential areas, committing barbarous crimes against our people", citing the bombing of Bach Mai Hospital[84] and Kham Thien street on 26 December which they claimed had resulted in 278 dead and 290 wounded, and over 2,000 homes destroyed. In total, Hanoi claimed that 1,624 civilians had been killed by the bombing.

Conclusion

40. Both the Soviet Union and China denounced the bombing, while some Western countries also criticized the US operation. Olof Palme, the Prime Minister of Sweden, compared the operation to a number of historical atrocities including the bombing of Guernica, the massacres of Oradour-sur-Glane, Babi Yar, Katyn, Lidice and Sharpeville, and the extermination of Jews and other groups at Treblinka, which resulted in a cooling of diplomatic relations between the two countries. In America, Nixon was criticized as a "madman", and some of the people who supported Operation Linebacker I questioned the necessity and unusual intensity of the operation.

TOPIC - 3

OPERATION ROLLING THUNDER

Introduction

1. Operation Rolling Thunder was the title of a gradual and sustained US 2nd Air Division (later Seventh Air Force), US Navy, and Republic of Vietnam Air Force (VNAF) aerial bombardment campaign conducted against the Democratic Republic of Vietnam (North Vietnam) from 2 March 1965 until 1 November 1968, during the Vietnam War. The operation became the most intense air/ground battle waged during the Cold War period; indeed, it was the most difficult such campaign fought by the U.S. Air Force since the aerial bombardment of Germany during World War II. Supported by communist allies, North Vietnam fielded a potent mixture of sophisticated air-to-air and ground-to-air weapons that created one of the most effective air defenses ever faced by American military aviators. After one of the longest aerial campaigns ever conducted by any nation, Rolling Thunder was terminated as a strategic failure in late 1968 having achieved none of its objectives.

Background

2. In response to President Ngo Dinh Diem's abrogation of the 1956 reunification election and suppression of communists during the late 1950s, Hanoi had begun sending arms and material to the guerrillas of the National Front for the Liberation of South Vietnam (NLF), who were fighting an insurgency to topple the American-supported Saigon government. To combat the NLF and to shore up the government in the south, the U.S. initially delivered monetary aid, military advisors, and supplies. Between 1957 and 1963, the U.S. found itself committed, through its acceptance of the policy of containment and belief in the domino theory, to defending South Vietnam from what it saw as expansive communist aggression. U.S. policy was for a time dictated by its perception of improvement in the Saigon government. No further commitment by the Americans would occur without tangible proof of the regime's survivability. Events in Vietnam, however, outraced this policy. By the beginning of 1965, it was stood upon its head – without further American action the Saigon government could not survive.

3. Questions then arose among the U.S. administration and military leadership as to the best method by which Hanoi (the perceived locus of the insurgency) could be dissuaded from its course of action. The answer seemed to lie in the application of air power. By 1964 most of the civilians surrounding President Lyndon B. Johnson shared the Joint Chiefs of Staff's collective faith in the efficacy of strategic bombing to one degree or another. They reasoned that a small nation like North Vietnam, with a tiny industrial base that was just emerging after the First Indochina War, would be reluctant to risk its new-found economic viability to support the insurgency in the south. Constantly affecting this decision-making process were fears of possible counter moves or outright intervention by the Soviet Union, the PRC, or both. The civilians and the military were divided, however, on the manner of affecting Hanoi's will to support the

southern insurgency. The civilians thought in terms of changing the regime's behavior while the military men were more concerned with breaking its will. In August 1964, as a result of the Gulf of Tonkin Incident, in which U.S. naval vessels claimed to have been attacked by North Vietnamese patrol boats, President Johnson ordered retaliatory air strikes (Operation Pierce Arrow) launched against the north. This did not, however, satisfy the military chiefs, who demanded a wider and more aggressive campaign.

Objectives

4. The four objectives of the operation (which evolved over time) were:

a. To boost the sagging morale of the Saigon regime in the Republic of Vietnam.

b. To persuade North Vietnam to cease its support for the communist insurgency in South Vietnam without actually taking any ground forces into communist North Vietnam,

c. To destroy North Vietnam's transportation system, industrial base, and air defenses, and

d. To cease the flow of men and material into South Vietnam.

5. Attainment of these objectives was made difficult by both the restraints imposed upon the U.S and its allies by Cold War exigencies and by the military aid and assistance received by North Vietnam from its communist allies, the Soviet Union and the People's Republic of China (PRC).

Implementation

6. By the end of August, the Joint Chiefs had drawn up a list of 94 targets to be destroyed as part of a coordinated eight-week air campaign against North Vietnam's transportation network. Bridges, rail yards, docks, barracks and supply dumps were all targeted. Johnson, however, feared that such a campaign might trigger a direct intervention by Chinese or Soviets, which might, in turn, cascade into a world war. With McNamara's support, the president refused to endorse such an unrestricted bombing campaign. Instead, the U.S. launched more "tit-for-tat" airstrikes in retaliation for a 7 February 1965 NLF attack at Pleiku (Operation Flaming Dart) and for a bomb attack against an American enlisted men's billet at Qui Nhon on the 10th (Operation Flaming Dart II). These small-scale operations were launched against the southern region of the country, where the bulk of North Vietnam's ground forces and supply dumps were located.

7. Surrendering to continued NLF advances and pressures from the Joint Chiefs, Johnson formally authorized a sustained bombing program, codenamed Rolling Thunder, which would not be tied to overt North Vietnamese actions. Rolling Thunder called for an eight-week air campaign consistent with the restrictions that Johnson and

Secretary of Defense Robert S. McNamara had imposed upon it. If the insurgency continued "with DRV support, strikes against the DRV would be extended with intensified efforts against targets north of the 19th parallel.

8. It was believed that selective pressure, controlled by Washington, combined with diplomatic overtures, would prevail and compel Hanoi to end its aggression. The military was still not satisfied, since, for the time being, the bombing campaign was to be limited to targets below the 19th parallel, each of which would have to be cleared individually by the president and McNamara. The first mission of the new operation was launched on 2 March against an ammunition storage area near Xom Bang. On the same day, 19 VNAF A-1 Skyraiders struck the Quang Khe Naval Base. The Americans were shocked when six of their aircraft were shot down during the mission. Five of the downed crewmen were rescued, but it was a portent of things to come.

Strategic Persuasion

9. In keeping with the concept of "gradualism", in which threatening destruction would serve as a more influential signal of American determination than destruction itself, it was better to hold important targets "hostage" by bombing trivial ones. From the beginning of Rolling Thunder, Washington dictated which targets would be struck, the day and hour of the attack, the number and types of aircraft and the tonnages and types of ordnance utilized, and sometimes even the direction of the attack. Airstrikes were strictly forbidden within 30 nautical miles (60 km) of Hanoi and within ten nautical miles (19 km) of the port of Haiphong. A thirty-mile buffer zone also extended along the length of the Chinese frontier. According to Air Force historian Earl Tilford:

“Targeting bore little resemblance to reality in that the sequence of attacks was uncoordinated and the targets were approved randomly – even illogically. The North's airfields, which, according to any rational targeting policy, should have been hit first in the campaign, were also off-limits.”

10. Although some of these restrictions were later loosened or rescinded, Johnson (with McNamara's support) kept a tight rein on the campaign, which continuously infuriated the American military commanders, right-wing members of Congress, and even some within the administration itself. One of the primary objectives of the operation, at least to the military, should have been the closure of Haiphong and other ports by aerial mining, thereby slowing or halting the flow of seaborne supplies entering the north. President Johnson refused to take such a provocative action, however, and such an operation was not implemented until 1972. There was also little consultation between Johnson and the military chiefs during the target selection process. Even the Chairman of the Joint Chiefs, Army General Earl G. Wheeler, was not present for most of the critical discussions of 1965 and participated only occasionally thereafter.

11. The majority of strikes during Rolling Thunder were launched from four Air Bases in Thailand: Korat, Takhli, Udon Thani, and Ubon. The aircraft would refuel from aerial tankers over Laos before flying on to their targets in the DRV. After attacking their targets (usually by dive-bombing) the strike forces would either fly directly back to

Thailand or exit over the relatively safe waters of the Gulf of Tonkin. It was quickly decided that, in order to limit airspace conflicts between Air Force and Naval strike forces, North Vietnam was divided into six target regions called "Route Packages", each of which was assigned to either the Air Force or Navy and into which the other was forbidden to intrude. Navy strikes were launched from the aircraft carriers of Task Force 77, cruising off the North Vietnamese coast at Yankee Station. Naval aircraft, which had shorter ranges (and carried lighter bomb loads) than their Air Force counterparts, approached their targets from seaward with the majority of their strikes flown against coastal targets.

12. On 3 April the Joint Chiefs convinced McNamara and Johnson to launch a four-week attack on North Vietnam's lines of communications, which would isolate that nation from its overland sources of supply in the PRC and the Soviet Union. About one-third of the north's imports came down the northeast railroad from the PRC, while the remaining two-thirds came by sea through Haiphong and other ports. For the first time in the campaign, targets were to be chosen for their military, rather than their psychological significance. During the four weeks, 26 bridges and seven ferries were destroyed. Other targets included the extensive North Vietnamese radar system, barracks, and ammunition depots.

13. The panhandle of southern North Vietnam, however remained the primary focus of operations and total sorties flown there rose from 3,600 in April to 4,000 in May. Slowly moving away from the destruction of fixed targets, "armed reconnaissance" missions, in which small formations of aircraft patrolled highways, railroads, and rivers, searching for targets of opportunity, were authorized. These missions increased from two to 200 sorties per week by the end of 1965. Eventually, armed reconnaissance missions would constitute 75 percent of the total bombing effort, in part because the system through which fixed targets were requested, selected, and authorized was so complicated and unwieldy.

Changing Priorities and POL Strikes

14. If Rolling Thunder was supposed to "send signals" to Hanoi to desist in its actions, it did not seem to be working. On 8 April, responding to requests for peace negotiations, North Vietnamese Premier Pham Van Dong stated that they could only begin when: the bombing was halted; the U.S. had removed all of its troops from the south; the Saigon government recognized the demands of the NLF; and it was agreed that the reunification of Vietnam would be settled by the Vietnamese themselves. Ominously, on 3 April the North Vietnamese Air Force made its first appearance when American aircraft were attacked by Soviet-built MiG-15s.

15. The entire complexion of the American effort was altered on 8 March 1965, when 3,500 U.S. Marines came ashore at Da Nang, ostensibly to defend the southern airfields committed to prosecuting Rolling Thunder. The mission of the ground forces was expanded to combat operations and, from that point onward, the aerial campaign

became a secondary operation, overwhelmed by troop deployments and the escalation of ground operations in South Vietnam. Until the third week of April, Rolling Thunder had enjoyed at least equal status with air missions conducted in the south. After that time, strikes that interfered with requirements for the southern battlefield were either cut back or cancelled.

16. By 24 December 1965, 170 U.S. aircraft had been lost during the campaign (85 Air Force, 94 Navy, and one Marine Corps). Eight VNAF aircraft had also been lost. Air Force aircrews had flown 25,971 sorties and dropped 32,063 tons of bombs. Naval aviators had flown 28,168 sorties and dropped 11,144 tons. The VNAF had contributed 682 missions with unknown ordnance tonnages.

17. U.S. reconnaissance discovered on 5 April 1966 that the North Vietnamese were constructing positions for what could only be surface-to-air missile (SAM) batteries. The Air Force and Navy then filed a joint appeal to Washington for permission to strike the sites, but they were refused since most of the sites were near the restricted urban areas. It came as no surprise when, on 24 July, an F-105 was shot down by a SA-2 Guideline missile. Three days later, a one-time strike was authorized against the two offending missile sites. The Americans, however, fell for an elaborate trap when the sites turned out to be dummies surrounded by anti-aircraft artillery defenses. One American pilot described the action which followed as "looking like the end of the world. Six of the strike aircraft were destroyed (two of the pilots were killed, one missing, two captured, and one rescued) during the debacle.

18. On 29 June 1966, airstrikes against the north's petroleum, oil, and lubricants (POL) storage areas were authorized by Johnson. The American military had advocated such strikes since the inception of the operation, believing that to deny North Vietnam its POL would cause its military effort to grind to a halt. The strikes at first appeared successful, destroying tank farms near Hanoi and Haiphong and leading the CIA to estimate that 70 percent of North Vietnam's oil facilities had been destroyed for the loss of 43 aircraft. The success proved only a short-term inconvenience for North Vietnam, however, since Hanoi had anticipated just such a campaign and had dispersed the majority of its POL stocks in 50-gallon drums across the length of the country. The POL attacks were halted on 4 September after U.S. intelligence admitted that there was "no evidence yet of any shortages of POL in North Vietnam.

Problems in Operations

19. Rolling Thunder exposed many problems within the American military services committed to it and tended to exacerbate others.

a. **Command Control.** A key inter-service issue (and one which was not solved until 1968) was the command and control arrangement in Southeast Asia. The Air Force's 2nd Air Division (replaced by the Seventh Air Force on 1 April 1966) was ostensibly responsible for aerial operations over North and South Vietnam. It was subordinate, however, to MACV and its commander, U.S. Army General William C. Westmoreland, who tended to see his problems centered in

the south. The U.S. Seventh/Thirteenth Air Force, based in Thailand (which carried out the majority of the Air Force's strikes in North Vietnam), had a dual command structure. It reported to the Seventh on operational matters and to the Thirteenth Air Force (whose headquarters was in the Philippines) for logistical and administrative concerns. These command and control complexities grew even more tangled with the division of the aerial effort into four competing operational areas (those in South Vietnam, North Vietnam, and Laos (both north and south). The Navy's Task Force 77 took its orders via 7th Fleet from CINCPAC, a Navy admiral based in Honolulu, through his subordinate, the Air Force commander of Pacific Air Forces (PACAF). Due to their influence, the Navy could not be persuaded to integrate its air operations over North Vietnam with those of the Air Force. General William Momyer, commander of the Seventh, had the impression that CINCPAC and PACAF wanted to keep the Thai-based aircraft out of his hands. By denying Momyer, they were really denying Westmoreland and keeping air operations against the DRV under their control. To complicate matters, the U.S. ambassadors to Thailand (Graham Martin) and Laos (William H. Sullivan) exerted undue influence over operational and command arrangements. This bizarre command structure went against the grain of the Air Force's single air manager concept, which dictated that one commander was to control and coordinate all aircraft within a combat theater. The chain through which operational strike requests had to flow gave some indication of the growing overcomplexity of the campaign. Requests for airstrikes originated with the 2nd Air Division and Task Force 77 in Vietnam and then proceeded to CINCPAC, who in turn reported to his superiors, the Joint Chiefs, at the Pentagon. After input from the State Department and the CIA, the requests then proceeded to the White House, where the president and his "Tuesday Cabinet" made decisions on the strike requests on a weekly basis.

b. **Unpreparedness**. Another problem exposed by Rolling Thunder was the unpreparedness of the Air Force for the operations it was undertaking. Its aircraft had been designed and its pilots trained for strategic operations against the Soviet Union – for nuclear, not conventional war. The new campaign exposed years of neglect in conventional tactics, while aircraft capabilities and armament were ill-suited to the task at hand. The Air Force was also embarrassed by the fact that the Navy was better prepared. It possessed the only all-weather fighter-bomber in the U.S. inventory in the new A-6 Intruder and was also responsible for the development of the F-4 Phantom fighter-bomber, which became ubiquitous during the Vietnam War.

c. **Air–to–air Combat**. Once air-to-air combat began over North Vietnam, the Air Force was again found lacking. The mainstay missiles of the air war turned out to be the Navy-developed AIM-9 Sidewinder and AIM-7 Sparrow, not its own AIM-4 Falcon. The Air Force continuously opposed adapting to the war in Southeast Asia, since its leadership believed that it was an aberration that

would be quickly resolved. It could then turn its attention (and its more modern weapons) against the greater threat posed by the Soviet Union. None in the Air Force high command foresaw that the war would drag on for nearly a decade.

d. **All – weather Capability**. The Air Force did possess an aircraft which had an all-weather capability, radar-guided bombing equipment, and awesome destructive potential – the B-52 Stratofortress. The civilian administration, however, never considered utilizing the big bombers (whose operations remained under the control of the Strategic Air Command) very far north of the DMZ, believing that it was too overt an escalation. Air Force Chief of Staff John P. McConnell also opposed sending the bombers into the air defense environment in the north and limited B-52 strikes to Route Package One.

e. **Experience of Air Crew**. Compounding these issues was the one-year rotation policy adopted by the Pentagon in Southeast Asia. Although the first aircrews arriving in-theater were highly experienced, the rapidly growing tempo and ever-expanding length of the operation demanded more personnel. This exacerbated a growing lack of experienced aircrews. This dilemma was further compounded by an Air Force policy which dictated universal pilot training while proscribing involuntary second combat tours, which combined, had the effect of rotating personnel to different aircraft. Conversely, the Navy tended to maintain its aircrews within the same community for the duration of their careers, thereby retaining their expertise, but also incurring greater losses among experienced crews undergoing multiple combat tours.

f. **Weather**. Another factor was the weather within the operational theater. The cyclical monsoon patterns meant that the weather was deplorable for flight operations eight months of the year (from late September to early May) when rain and fog tended to conceal targets. Lack of adequate all-weather and night-bombing capability made it necessary for the majority of U.S. missions to be conducted during daylight hours, thereby easing the burden on the air defense forces of North Vietnam.

People's War in the air

20. Before Rolling Thunder even began the North Vietnamese leadership knew what was coming. It issued a February 1965 directive to the military and the population to "maintain communication and transportation and to expect the complete destruction of the entire country, including Hanoi and Haiphong. The communist leadership declared "a people's war against the air war of destruction...each citizen is a soldier, each village, street, and plant a fortress on the anti-American battlefront. All except those deemed "truly indispensable to the life of the capital" were evacuated to the countryside. By 1967, Hanoi's population had been reduced by half.

21. Since gaining air superiority over U.S. forces was out of the question, the northern leadership decided to implement a policy of air deniability. At the beginning of the campaign, North Vietnam possessed approximately 1,500 anti-aircraft weapons,

most of which were of the light 37 and 57mm variety. Within one year, however, the U.S. estimated that the number had grown to over 5,000 guns, including 85 and 100mm radar-directed weapons. That estimate was later revised downward from a high of 7,000 in early 1967 to less than a thousand by 1972. Regardless, during Rolling Thunder, 80 percent of U.S. aircraft losses were attributed to anti-aircraft fire. Backing up the guns were the fighter aircraft of the North Vietnamese Air Force, which originally consisted of only 53 MiG-15 and MiG-17 Fresco aircraft. Though considered antiquated by the Americans when compared to their supersonic jets, the North Vietnamese turned their aircraft's weaknesses into strengths. They were fast enough for hit and run ambush operations and they were also maneuverable enough to shock the American fighter community by shooting down more advanced F-8 Crusaders and F-105 Thunder chiefs, which had to quickly develop new tactics. The newer missile-armed F-4 Phantom would become the American's primary dog fighting platform.

22. The simple appearance of MiGs could often accomplish their mission by causing American pilots to jettison their bomb loads as a defensive measure. In 1966, the 15s and 19s were joined by more modern Soviet-built MiG-21 Fish beds, which could fight on a more equal footing with the U.S. aircraft. By 1967, the North Vietnamese Air Force was maintaining an interceptor force of 100 aircraft, many of which were based on PRC airfields and out of reach of American air attack.

23. To protect the northern economy, it was decentralized and large factories, located in the heavily populated Red River Delta region, were broken up and scattered into caves and small villages throughout the countryside. In the more heavily bombed southern panhandle, entire villages moved into underground tunnel complexes for the duration. Food shortages in North Vietnam became widespread, especially in the urban areas, as rice farmers went into the military or volunteered for service repairing bomb damage. When the nation's transportation system came under attack, destroyed bridges were repaired or replaced by dirt fords, ferries, and underwater and pontoon bridges. The system proved to be durable, well built, easily repaired, and practically impossible to shut down.

24. Perhaps North Vietnam's ultimate resource was its population, which was fired by nationalist zeal. During 1965, 97,000 North Vietnamese volunteered to work full time in repairing the damage inflicted by U.S. bombs. Another 370,000–500,000 worked part time. When the nation's lines of communication came under attack, railroad supply trains and truck convoys were split into smaller elements which traveled only at night. The logistical effort was supported by citizens on sampans, driving carts, pushing wheelbarrows, or man-pottering supplies on their backs to keep the war effort going. They were motivated by slogans like "Each kilogram of goods...is a bullet shot into the head of the American pirates.”

Using SAMs and Wild Weasels

25. North Vietnam's deployment of SAMs forced American pilots to make hard choices: either approach targets at higher altitudes (to avoid anti-aircraft fire) and become prey to SAMs, or fly lower to avoid the missiles and become the target of anti-aircraft batteries. Due to altered tactics and the increased use of electronic radar jamming, the record of SAM kills decreased over time. The already dismal missile success rate fell from one kill for 30 launches to less than one kill for 50. Those figures do, however, say a great deal about the inefficiency of Rolling Thunder, since North Vietnam's SAM batteries never lacked sufficient stocks of missiles, regardless of efforts to interdict the supply system.

26. The nature of the gradual escalation had given Hanoi time to adapt to the situation. By 1967, North Vietnam had formed an estimated 25 SAM battalions (with six missile launchers each) which rotated among approximately 150 sites. With the assistance of the Soviet Union, the North Vietnamese had also quickly integrated an early warning radar system of more than 200 facilities which covered the entire country, tracking incoming U.S. raids, and then coordinating SAMs, anti-aircraft batteries, and MiGs to attack them. During 1967 U.S. losses totaled 248 aircraft (145 Air Force, 102 Navy, and one Marine Corps).

27. To survive in this ever more lethal air defense zone, the U.S. had to adopt newer, more specialized tactics. Large-scale strikes, known as force packages in the Air Force and multi-carrier "Alpha strikes" by the Navy, were assigned numerous support aircraft to protect the fighter-bombers. First into the target areas were specialized Iron Hand flak suppression missions. These consisted of F-105 Wild Weasel hunter/killer teams configured with sophisticated electronic equipment to detect and locate the emissions associated with SAM guidance and control radars.

28. The Wild Weasels also carried electronic countermeasures (ECM) equipment to protect themselves. They directed flak suppression strikes and carried AGM-45 Shrike anti-radiation missiles (another Navy development), which homed in on the radar systems of the SAMs. The SA-2 had greater range than the Shrike, but if the Shrike was launched and the radar operator stayed on the air, the American missile would home in on the signal and destroy the radar source. A sophisticated cat and mouse game then ensued between North Vietnamese radar operators and the Wild Weasel pilots. The Navy also utilized aircraft in a similar role, but did not create a specialized unit like the Wild Weasels to conduct SAM suppression.

Combat Support

29. Next came the bomb-laden strike aircraft protected by escort fighters (Combat Air Patrol or MIGCAP) and electronic jamming aircraft to degrade enemy radar. New ECM devices had hurriedly been deployed to protect aircraft from missile attacks, but they remained subject to frequent breakdowns because of climate conditions in Southeast Asia. Also included in the missions were KC-135 aerial tankers and Search

and Rescue (SAR) helicopters, which were, in turn, protected by propeller-driven A-1 escorts.

Targeting

30. From mid-1966 until the end of 1967, President Johnson continued to dole out sensitive targets one by one to the generals while simultaneously trying to placate the doves in Congress and within his own administration with periodic cutbacks and half-hearted peace initiatives. In the end, this erratic course satisfied no one and did little to alter the course of the war. The nature of the targets and the risks involved in striking (and re-striking) them began to take a toll. Chief of Naval Operations David McDonald reported to his co-chiefs after a trip to South Vietnam in September 1966, that Rolling Thunder aircrews were angered with the targeting process and that they faulted the campaign due to "guidelines requiring repetitive air programs that seemed more than anything else to benefit enemy gunners. During 1967, the second full year of Rolling Thunder operations, 362 U.S. aircraft had been lost over North Vietnam. (208 Air Force, 142 Navy, and 12 Marine Corps).

MIGs and Interdiction

31. Rolling Thunder reached the last stage of its operational evolution during 1967 and 1968. The chief purpose of the American air effort in the higher Route Packages of North Vietnam was slowly transformed into that of interdicting the flow of supplies and materiel and the destruction of those segments of the north's infrastructure that supported its military effort. Although most U.S. aircraft losses continued to be inflicted by anti-aircraft fire, U.S. Air Force F-105s and Navy A-4 Skyhawks increasingly encountered SAMs and MiGs. North Vietnamese fighters also became a particular problem because of the lack of radar coverage in the Red River Delta region, which allowed the MiGs to surprise the strike forces. Airborne early warning aircraft had difficulty detecting the fighters at low altitudes and the aircraft themselves were difficult to see visually.

32. While F-105s did score 27 air-to-air victories, the overall exchange ratio was near parity. In January 1967, the Americans sprang a surprise on the MiGs when they launched Operation Bolo. F-4 Phantoms, using the same radio call signs, direction of approach, altitude, and speed as a typical flight of bomb-laden F-105s, lured the MiGs toward what the MiG pilots thought would be easy prey. The result was seven MiGs shot down within 12 minutes.

Final Attempt

33. Later in the year, the U.S. launched its most intense and sustained attempt to force North Vietnam into peace negotiations. Almost all of the targets on the Joint Chiefs' list had been authorized for attack, including airfields that had been previously off limits. Only central Hanoi, Haiphong, and the PRC border area remained prohibited from attack. A major effort was made to isolate the urban areas by downing bridges and

attacking LOCs. Also struck were the Thai Nguyen steel complex (origin of the Pardo's Push), thermal and electrical power plants, ship and rail repair facilities, and warehouses. North Vietnamese MiGs entered the battle en masse, as their capital was threatened and kill ratios fell to one U.S. aircraft lost for every two MiGs. During 1968, MiGs accounted for 22 percent of the 184 American aircraft (75 Air Force, 59 Navy, and five Marine Corps) lost over the north. As a result, operations against the last of North Vietnam's airfields, previously off-limits to attack, were authorized.

34. Despite the best interdiction efforts of Rolling Thunder, however, the NLF and PAVN launched their largest offensive thus far in the war on 30 January 1968, striking throughout South Vietnam during the lunar new year holiday. The Tet Offensive concluded as a military disaster for North Vietnam and its NLF allies, but it also adversely affected U.S. public opinion, which in turn affected the will of Washington. Fortunately for North Vietnam, many U.S. bombing advocates (including Air Force Chief of Staff McConnell) did not want to risk the one aircraft capable of delivering a lot of bombs in bad weather – the B-52. Without them, there was little that could be done over the north in response to Tet, since bad weather minimized fighter operations until the beginning of April.

End of the Operation

35. By spring 1967, Robert McNamara and other civilians in the administration had become convinced that both Rolling Thunder and the ground war in South Vietnam were not working. The bombing campaign had fallen far short of its goals and the disappointed continuously opposed the Joint Chief's recommendations for an increased tempo of bombing and the loosening of target restrictions. The generals found themselves on the horns of a dilemma of their own making. They continuously claimed that the campaign was working, yet they also had to continuously demand greater latitude in order to make the campaign succeed. The limited goals entailed in American foreign policy and the military's goal of total victory were simply not reconcilable. The great challenge had then become how to defeat North Vietnam without defeating North Vietnam.

36. On 9 August 1967 the Senate Armed Services Committee opened hearings on the bombing campaign. Complaints from the armed services had sparked the interest of some of the most vocal hawks on Capitol Hill. The military chiefs testified before the committee, complaining about the gradual nature of the air war and its civilian-imposed restrictions. It was obvious that McNamara, the only civilian summoned and the last to testify before the committee, was to be the scapegoat. The Secretary of Defense marshaled his objections to an indiscriminate air war and adeptly rebutted the charges of the military chiefs. He bluntly admitted that there was "no basis to believe that any bombing campaign...would by itself force Ho Chi Minh's regime into submission, short, that is, of the virtual annihilation of North Vietnam and its people.

37. It had now become clear to President Johnson that McNamara had become a liability to the administration. In February 1968, McNamara resigned his position and was replaced by Clark Clifford, who was chosen because of his personal friendship with

Johnson and his previous opposition to McNamara's suggestions that the number of troops in the South Vietnam be stabilized and that Rolling Thunder be ended. McNamara's position, however was almost immediately taken up by Secretary of State Dean Rusk, (until then an ardent advocate of the bombing campaign). Rusk proposed limiting the campaign to the panhandle of North Vietnam without preconditions and awaiting Hanoi's reaction. Within months Clifford too began to adopt the views of the man he had replaced, gradually becoming convinced that the U.S. had to withdraw from an open-ended commitment to the war. Disappointed by perceived political defeats at home and hoping that Hanoi would enter into negotiations, President Johnson announced on 31 March 1968, that all bombing north of the 19th parallel would cease. As a result of that decision, into the area between the 17th and 19th parallels, the Air Force and Navy began to pour all the firepower that they had formerly spread throughout North Vietnam. The Air Force doubled the number of sorties sent into Route Package One to more than 6,000 per month with the campaign concentrated on interdiction "choke points", road closing, and truck hunting. Once again, the military commanders were faced a familiar dilemma: having opposed the bombing cutback, they then decided that the new policy had a lot of merit, especially when considering the alternative of no bombing at all. The North Vietnamese responded by doubling the number of anti-aircraft batteries in the panhandle, but most of their SAM batteries remained deployed around Hanoi and Haiphong.

38. Hanoi, which had continuously stipulated that it would not conduct negotiations while the bombing continued, finally agreed to meet with the Americans for preliminary talks in Paris. As a result, President Johnson declared that a complete bombing halt over North Vietnam would go into effect on 1 November 1968, just prior to the U.S. presidential election. Although the bombing halt was to be linked to progress in the peace talks, the Joint Chiefs were skeptical that the administration would reopen the bombing campaign under any circumstances. They were correct.

Conclusion

39. Rolling Thunder had begun as a campaign of psychological and strategic persuasion, but it changed very quickly to interdiction, a tactical mission. Its ultimate failure had two sources, both of which lay with the civilian and military policy-makers in Washington: First, neither group could ever conceive that the North Vietnamese would endure under the punishment that they would unleash upon it. The civilians, moreover, did not understand air power well enough to know that their policies might be crippling it; Second, the American military leadership failed to initially propose and develop, or later to adapt, an appropriate strategy for the war. Along the way, Rolling Thunder also fell prey to the same dysfunctional managerial attitude as did the rest of the American military effort in Southeast Asia. The process of the campaign became an end unto itself, with sortie generation as the standard by which progress was measured. Sortie rates and the number of bombs dropped, however, equaled efficiency, not effectiveness.

TOPIC- 4

OPERATION 'DESERT STORM'

Introduction

1. The stage for Gulf War was set on 02 Aug 1990 when other Iraq invaded Kuwait with an aim to end her economic sufferings utilising Kuwaiti oil and other resources. Iraqi invasion sparkled wide spread criticism and opposition from almost every corner of the world. Western powers, most notably the USA demanded unconditional withdrawal of Iraq from Kuwait. In next five and a half months, intense political and diplomatic measures followed by massive concentration of military forces took place in Persian Gulf to persuade Iraq to quit from Kuwait. However, when diplomatic measures and military deterrence failed, coalition forces resorted to the application of military power against Iraq. Thus, the Gulf War-1991 had started on 17 Jan 1991 with a planned and dedicated air campaign named 'Desert Storm'. Well-orchestrated offensive employment of air power not only rapidly drained out the Iraqi capability to wage war; it also prepared the battlefield for the friendly surface forces to operate at ease. Ultimately, the war ended in 43 days as the coalition land forces evicted Iraqi forces from Kuwait in only 100 hours remaining under the protective shield of air power. In the Gulf War-1991, air power dominated the war and drew the line between the victory and the defeat.

Background

2. On 02 Aug 90, Iraqi troops crossed the border into Kuwait. Three Iraqi Republican Guard (RG) divisions virtually wiped out the tiny Kuwaiti Armed Forces. Iraq captured the entire Kuwait in less than 24 hours. By another 48 hours, Iraqi troops were massed along the Kuwaiti-Saudi border. On 08 Aug 90, Iraq declared Kuwait as her 19th province. Age old territorial dispute and economic disparity between the countries were the contributing factors, which persuaded Iraq to invade Kuwait.

3. Saddam Hussein, the Iraqi president always believed that Kuwait came into being because of the mischievous politics of British during the post WW-I era. He and other leaders of Iraq perceived Kuwait as part of Iraq, having originally existed as Gaza (lesser district) in the Vilayet (province) of Basra. The invasion was, therefore, correcting an historical injustice. However, it was not only territorial boundary which led Iraq to invade Kuwait.

4. During the time of invasion, Iraq was in serious economic crisis. Iraq's eight years long war against Iran was expensive. It had cost Iraq some $102 billion in military hardware with an additional loss of $106 billion in oil revenues. Her foreign debt for the war amounted to $80 billion, which was mainly contributed by Kuwait. Once the war was over, Iraq not only declared a freer on all war debts to Iraq, but also demanded an additional grant of $30 billion from the Persian states. Moreover, she also accused

Kuwait of stealing Iraqi oil from the Rumailla oilfield and violating quota on oil production. As compensation, she further demanded $2.4 billion from Kuwait. Kuwait and other Gulf States continued to reject Iraqi propositions. Ultimately, in a desperate attempt to come out of the economic quagmire, Iraq invaded Kuwait on 02 Aug 90 and became the owner of 20 per cent of World's oil reserve. However, Iraq's move to become wealthy overnight was not meant to succeed because of the resistance from all over the world.

Formation of Coalition

5. The US and UK led the effort to create a coalition to force Iraq to leave Kuwait. When the Saudi King invited US to deploy in KSA, support was solicited from other nations to form a coalition. With overwhelming support from all over the world, nearly 50 countries made contribution. Among those, 38 countries deployed air, sea, or ground forces. Together, they committed more than 200,000 troops, more than 60 warships, 750 aircraft, and 1,200 tanks. Many countries contributed financially by donating billions in cash to the United States.

Coalition Strategy

6. **National Objectives of the United States**. Within a week of Iraqi invasion, the president of the United States outlined four national objectives as follows:

a. Securing the immediate, unconditional, and complete withdrawal of Iraqi forces from Kuwait.

b. Restoring the legitimate government of Kuwait.

c. Assuring the security and stability of the Persian Gulf region and;

d. Protecting American lives.

7. **Military Objectives**. While formulating the military objectives, both Central Command (CENTCOM) and coalition planners made use of the Concept of 'Centres of Gravity' as advocated by Carl Von Clausewitz. The military objectives of the coalition were:

a. Destroy Iraq's military capability to wage war.

b. Gain and maintain air supremacy.

c. Cut off Iraqi supply lines.

d. Destroy Iraq's chemical, biological, and nuclear capability.

e. Destroy Republican Guard forces and;

f. Liberate Kuwait City.

8. **Air Strategy**. To achieve the military objectives, air campaign planners devised four overlapping phases to employ air power:

a. Phase I: Strategic Air Campaign.

b. Phase II: Air Supremacy in the KTO (Kuwait Theatre of Op).

c. Phase III: Battlefield Preparation.

d. Phase IV: Ground Offensive.

Coalition Air ORBAT

9. Coalition air ORBAT consisted of 1875 combat aircraft, 75 per cent of which were from the United States. Coalition air ORBAT also included around 970 combat support aircraft. Besides numerical superiority, coalition forces also enjoyed a marked advantage over Iraq in terms of technological advancement. A prime example of technological superiority was the Lockheed F-117A 'Stealth Fighter', the first aircraft in the world to be designed specifically to avoid radar detection.

Iraqi Air ORBAT

10. IQAF was the largest in the Middle East in August 1990. The quality of the aircraft and aircrew, however, was very uneven. Its effectiveness was constrained by the conservative doctrine and aircraft systems limitations. Iraq had more than 700 combat aircraft in its inventory before the invasion of Kuwait. Fewer than half of these aircraft were either third generation or fourth generation and were flown by pilots of marginal quality, compared with US aviators. These aircraft included the Soviet MiG-29, MiG-23, MiG-25, Su-24 and the French Mirage F-1. The French-built F-1s and their pilots were the IQAF elites. Iraq had also acquired a wide range of weapons and electronic warfare gear for the F-1, including laser-guided air-to-surface missiles. Iraqi aircraft were deployed at more than 24 primary and 30 dispersal airfields throughout the country.

Conduct of Operations

11. Operation Desert Storm was a sustained 43-day air campaign from 17 Jan 91 to 28 Feb 91. As per the OpO of Desert Storm, the conduct of the operation was planned in four overlapping phases with specific objective to be achieved at the end of the each phase. The planned phases were as follows:

a. **Phase I - The Strategic Air Campaign**. First phase was estimated to require 06 to 09 days to meet its objectives. The objectives were to destroy Iraq's Vital COGs, offensive and defensive air capabilities, national communications, NBC weapons research and production capabilities, war production potential and transportation system.

b. **Phase II – The Attainment of Air Superiority in KTO**. Second phase was estimated to begin sometime between day 07 and day 10 and would require 02 to 04 days to complete. The ultimate goal of this phase was to achieve air supremacy in the KTO by attacking aircraft/airfields, air defence weapons and C2 systems of Iraq.

c. **Phase III – Battlefield Preparation**. Phase III was estimated to start sometime between D+9 to D+14 and would require 06 to 08 days to complete. The objective of the phase was to cut Iraqi supply lines, destroy Iraqi NBC capability, and reduce Iraqi combat effectiveness in the KTO by at least 50 percent. Attainment of the objectives would allow ground forces to initiate offensive operations against a confused and terrorized Iraqi force in the KTO. Targets included Iraqi ground forces, armour and artillery, bridges and C3 system in Southern Iraq.

d. **Phase IV – The Ground Offensive**. Phase IV was also known as CAS phase. It had no estimated concrete start day since it was dependent on the achievement of the goals of the first three phases. The objective of the phase was to win the air/ground campaign by providing intelligence, massive firepower and protective air cover for friendly ground forces.

Application of Coalition Air Power

12. **Strategic Air Operations**. Strategic air operations were the nerves and spines of Desert Storm. The main punch of strategic air operations were delivered within the first 24 hours of the air campaign. As the dead line imposed by UN was over without any sign of compliance from Iraq, coalition air campaign started against Iraq on 17 Jan 91 at around 0300 hours. Altogether, 668 aircraft attacked Iraq on that night. B-52 bombers carrying ALCMs, F-117A Stealth fighter bombers with LGBs and TLAMs from US Warships carried out surgical attacks against Iraqi leadership, C3I network, strategic air defence system and NBC warfare capabilities. Simultaneously, AH-64 attack helicopters, F-15E Eagle fighter, and GR-1 Tornado fighter-bombers neutralized Iraqi radars, SAMs and the C2 network to create safe passage for successive non-stealth aircraft to operate. Within minutes of attack, lights went out in Baghdad and did not come on until well after cease hours. Microwave towers, telephone relay exchanges, cables and land lines had been transformed into rubble. By second week, Saddam Hussein was reduced to sending orders from Baghdad to Kuwait by messenger, which took 48 hours. Hundreds of coalition aircraft marked by precision, successfully isolated Iraqi leaders from their troops and rendered the whole country into extreme sufferings by cutting off electricity, water and other daily necessities.

13. **OCAO**.

a. **SEAD**. Towards the beginning of the air campaign, one of the prime requirements of the coalition air forces was to suppress and destroy the Iraqi air defence system. Initially, coalition forces used a pair of F-117As to attack the SAM sites, where one aircraft acted as illuminator. As the air defence capability of Iraq gradually drained out, F-15E, EF-111A, A-7 Corsair II, F-4G Phantoms and TALDs were employed in packages to destroy the SAMs. Using the Israeli tactics of Bekka Valley War (1982), coalition forces employed TALDs to turn on the SAM radars and then use AGM-45 Shrike or AGM-88 HARM to destroy the SAM sites. Because of the number and mobility of enemy anti-aircraft systems, SEAD continued throughout the war.

b. **Air Field Attack**. Initially, RAF Tornados and French Jaguars carried out attack against Iraqi airfields. RAF Tornados attacked Iraqi airfields at LL using JP-233 runway catering bombs. As the IQAF showed no inclination to engage the coalition in the air, Iraqi aircraft were destroyed on ground inside HAS using PGM. As a result, IQAF moved their air assets closed to the residential areas and to Iran. However, the aim of OCAO was achieved as long as IQAF did not contest coalition aircraft in the air. As such, the Coalition Commander declared air supremacy on 22 Jan 1991. During the war, an estimated 290 (40 per cent) of Iraq's 724 fixed-wing aircraft were destroyed in the air or on the ground by the coalition. Another 121 escaped to Iran, leaving 313 (43 per cent) intact and inside Iraq at the end of the war. Coalition aircraft also destroyed or severely damaged 375 HAS out of a total of 594.

c. **SCUD Hunt**. The objectives of the scud Hunt were to locate, attack, destroy or suppress mobile scud launchers and associated support equipment. Scud Hunt missions were of tactical priority as the use of scud missiles against Israel threatened the unity of coalition, had Israel retaliated. About 25 per cent of F-15Es, seven percent of A-10s, 25 per cent of LANTIRN-equipped F-16s and eight per cent of F-111Fs were dedicated to the Scud hunt. Moreover, F-117s, B-52s, Navy A-6Es, F/A-18s, KC-130 and RAF GR-1 Tornados were also used occasionally. Despite all-out effort, Iraq continued to employ scud missiles until the last day of the war totalling 86 launches.

14. **Air Interdiction (AI)**. The objectives of AI missions were to shape the battlefield to help coalition ground forces achieve their objectives. AI missions started in the first days of the air campaign, when key C3 centres in Baghdad and elsewhere were taken out. Tornado, F-111, Jaguar, A-6 and A-10 aircraft were used for AI missions. AI missions were carried out 24 hours a day attacking rail links, bridges and supply depots. Out of 45 principle bridges, coalition forces effectively destroyed 44 bridges, often rendering a bridge inoperative by firing single missile. With the help of JSTARS, coalition forces also carried out a clean sweep of Iraqi transport network.

15. **CAS**. The final phase of the air war aimed to support the ground offensive to liberate Kuwait. As ground forces advanced into Kuwait and southern Iraq, unprecedented level of CAS was available to them. It can be even argued that the CAS provided was actually out of proportion to the threat posed by a demoralised and badly mauled Iraqi Army. Employing A-10 aircraft, coalition forces were quite successful in destroying Iraqi tanks and artillery pieces in KTO. At the end of the war, although disputable, coalition forces claimed to have destroyed 1508 artillery pieces and 1210 APCs of Iraqi forces. B-52 bombers were also used in CAS role to carpet bomb the front line Iraqi troops.

16. **Combat Support Air Operation**

a. **Air to Air Refueling**. Desert Storm is also widely known as 'Tanker Dependent War'. Virtually every type of strike and direct combat support aircraft required air to air refuelling. During Desert Storm, at least 339 US in-flight refuelling tankers off-loaded more than 800 million pounds of fuel. For Air Force tankers alone, there were approximately 60,184 recorded refuelling events. On average, there were 1,399 refuelling events per day or approximately 58 in each hour.

b. **EW**. Platforms that conducted electronic combat missions or EW in a combat-support role included EF-111s, EC-135s, EC-130s, and EA-6B aircraft. These aircraft conducted missions involving jamming or destruction of radar sites. For jamming and destruction of radars, TALD and HARMs were used respectively. Electronic combat support missions enabled primary strike aircraft to conduct attacks on targets. A total of 160 coalition aircraft participated in EW during the entire air campaign.

c. **CSAR**. During 'Desert Storm' Air Force Special Operations Command, CENTCOM was responsible for the management of CSAR assets. Aircraft supporting CSAR were located at five bases in KSA and at two bases in Turkey. MH-53 and MH-60 of USAF and UH-60 and CH-47 of US Army were the only helicopters capable of penetrating high threat environment for CSAR missions. Central Command's CSAR guidelines required reasonable confirmation of a downed crew's survival and location before a CSAR mission launch. The CSAR system was set-up so that once a crewman ejected and reached the ground, fighters would be diverted to the designated area. The JRCC then alerted AFSOCCENT to execute the mission. Due to dense enemy concentrations on the battlefield and Iraqi use of radio direction-finding equipment, downed pilots were frequently captured immediately after parachuting to the ground. As a result, only seven CSAR missions were launched, resulting in three saves.

d. **PSYOP**. Coalition forces employed a wide variety of air assets in tactical PSYOPs. MC-130, HC-130, EC-130 Volant Solo aircraft, B-52s, F-16s, Marine F/A-18s and Navy A-6s regularly participated in various PSYOP like radio transmission, loudspeaker broadcasts and leaflet dissemination. The aims of PSYOPs were to reduce the morale and combat efficiency of enemy troops and to convince enemy forces to take actions favourable to the coalition forces. B-52s employed in leaflet dissemination mission, dropped around 29 million leaflets to persuade Iraqi soldiers to surrender. This was quite successful as thousands of soldiers of RG were influenced and surrendered even without any fight towards the end of the campaign.

Iraqi Operation

17. **Air Operation**. During the two weeks before the war, IQAF flew around 100 sorties daily, including about 60 combat sorties. It sustained a good effort for the first several days of the war, considering the state of its air defence, C2 and the damaged airfields. On the first day it flew 96 sorties, including 53 combat sorties. On second day, its sorties surged to 118, although combat sorties dropped sharply to 23. The number of combat sorties remained the same on the third day, but the total number dropped to 42. On the fourth day, combat sorties accounted for 58 out of 60 sorties flown. Thenceforth, the number of sorties fluctuated but remained low until sixth day, when it stopped. During the war, Iraq had lost 35 aircraft in air to air combat, while the coalition forces suffered no loss. The first half of these was lost early in the war and by 21 Jan 91, Iraq had lost 17 fighters (08 MiG-29s, 06 Mirages, 02 MiG-25s and one MiG-23) in aerial engagements. Other 18 were lost when Iraqi fighters fled to Iran. Besides, it is estimated that further 227 aircraft were also lost on ground.

18. **PSYOP**. The objectives of the Iraqi PSYOP campaign were to rationalize the invasion of Kuwait, gain the support of the Arab masses, discourage nations from participating in the U.N. embargo, and discourage or hinder military attacks on Iraq. Strategically, Saddam met with some early successes. He used Scud missiles to attack Israel and Saudi Arabia. As political and psychological weapons, Scuds were useful in diverting coalition attention and military effort away from the main battlefield. While the impact of the Scuds was militarily negligible, they did produce emotional and psychological effects. The disparity between the small number killed by Scuds and the enormous coalition effort devoted to anti-Scud operations highlights the importance of the psychological effects.

Conclusion

19. Gulf War-1991 was a milestone in the history of air power. The air campaign of Gulf War-1991 was planned in four overlapping phases. The air campaign commenced on 17 Jan 91 and ended after 43 days on 28 Feb 91. During 'Desert Storm', coalition forces had distinct technological, numerical and qualitative advantages over the Iraqi Forces. Stealth aircraft enabled coalition forces to attack deep inside Iraq right at the onset of the war. Almost simultaneously, OCA missions were launched to establish the control of the air. Coalition forces gained air supremacy on 22 Jan 91; only 04 days after the war had started. Thereafter, air power was skillfully applied to isolate the Iraqi commanders from their troops in the battlefield. Similarly, basic air defence units were also isolated from the commander resulting in meager and non-unified Iraqi effort in utilizing the air power. Air Refuelling, Stealth and PGMs acted as 'Force Multiplier' and increased coalition's capability manifold. However, Iraqi mobile Scuds, AAA and SAMs remained as multiple source of potential threat to coalition.

TOPIC-5

OPERATION DELIBERATE FORCE

Introduction

1. The history of airpower is much younger than the history of war. Not even a century has passed since men used powered flight as a weapon platform. Today's war without air power cannot be thought of. Air power, today, with the introduction of modern technologies, is making the impossible possible. Now-a-days air power alone is deciding the fate of a battle or even a war. As happened in the Balkans, air power almost alone brought the stability and peace in the region with a classic endeavour called "Operation Deliberate Force". "Operation Deliberate Force" was planned to degrade BSA's military capability that threatened UN forces and the 'Safe Areas'. However, in later stage both the operations were integrated into "Operation Deliberate Force". The operation was carried out in between 30 August and 20 September 1995, involving 400 aircraft and 5000 personnel from 15 nations.

Background

2. In June 1992, UNPROFOR, which had originally been deployed in Croatia, had its mandate extended into Bosnia-Herzegovina, initially to protect the Sarajevo International Airport. To counterbalance the siege, the Sarajevo Airport was opened to UN airlifts in late June of 1992. Sarajevo's survival became strongly dependent on them. In September, the role of the UNPROFOR was expanded in order to protect humanitarian aid and assist in the delivery of the relief in the whole Bosnia-Herzegovina.

3. The second half of 1992 and first half of 1993 were the height of the Siege of Sarajevo. Various atrocities were committed during the heavy fighting. Serbian forces from outside the city continuously shelled the government defenders. Meanwhile, some Serbs from inside the city had joined the besiegers. Reports indicate an average of approximately 329 shell impacts per day during the course of the siege, with a high of 3,777 shell impacts on July 22, 1993. The shelling of the city took a tremendous toll on lives.

4. Along with UNPROFOR, NATO began operating its air wing in the region. Those operations were as follows:

   a. **Operation Sky Monitor**. NATO started "Operation Sky Monitor" on 17 October 1992, following UNSCR 781 with an aim to stop all military flights over Bosnia-Herzegovina in support of UNPROFOR. But the operation failed to stop the Serb's aircraft violating the airspace as NATO had very limited authority to challenge the intruder.

b. **Operation Deny Flight**. NATO initiated "Operation Deny Flight" in order to stop all the flights over Bosnian airspace with a tougher mandate (UNSCR 816) in April 1993. It was granted the authority to intercept and shoot down the intruders and conduct limited CAS mission. However, later on, limitations were imposed on shooting down of fixed wing aircraft. "Operation Deny Flight" was also generally ineffective in its missions and could not deter Serb aggression in the safe areas due to limitations of ROE imposed on the airmen by UN and NATO.

5. In 1995 the situation in UN Safe Areas was deteriorating and it led to a diplomatic crisis which culminated in "Srebrenica massacre", one of the worst atrocities in Europe since the WWII.[i] Moreover, the Serbs apprehended 300 UN peacekeepers and shot down a USAF F-16. NATO was planning to degrade the Bosnian Serbs' IADS (by Operation Dead Eye which was integrated into "Operation Deliberate Force" and its military capability (by "Operation Deliberate Force"). Then the triggering action "Markale marketplace massacre"[ii] took place in which Serb militants killed 68 civilians and wounded 200 others. This ultimately resulted in NATO's intervention in Bosnia-Herzegovina named '"Operation Deliberate Force"' with some specific objectives to be achieved.

Objectives of UN and NATO

6. The UN and NATO communities agreed on few strategic political objectives for "Operation Deliberate Force" which were:

a. To reduce the threat to the Sarajevo safe area and deter further attacks there or on any other safe area,

b. Force the withdrawal of Bosnian Serb heavy weapons from the 20km total exclusion zone around Sarajevo,

c. Ensure complete freedom of movement for UN forces and personnel as well as non-governmental organizations, and

d. Ensure unrestricted use of the Sarajevo airport.

Bosnian Serbs' Objectives

7. As there is no articulated objective of the Bosnian Serbs found, the study of the war suggested that they wanted to continue with their aggression on the Bosnian Bosniaks and on the deployed UNPF. To fulfill these objectives NATO derived some air strategy keeping in mind the various limitations imposed by UN and various countries.

Air Strategy of UN and NATO

8. Air Strategy of the NATO forces was to conduct a robust air campaign which would adversely alter the BSA's advantage in conducting successful military operations against the Bosnian Army. The ultimate aim was to compel the Bosnian Serbs for cessation of military operations, comply with UN mandates, and sit in the negotiation table. The overall air strategy may be further illustrated as follows:

a. Isolate leadership and attack concentrated, time-sensitive targets.

b. Isolate fielded forces and attack supply/logistics base.

c. Attack fielded forces and selected infrastructure.

Bosnian Serbs' Air Strategy

9. The study of the war suggested that Bosnian Serbs did not utilize their fighters to counter the NATO attack. Rather they used their GBAD and organic essentials to counter the NATO air attack. Considering their past history of communist rule it may be assumed that their strategy evolved the former USSR doctrine. NATO's air strategy was derived keeping in mind the ORBAT of both NATO forces and that of the Serbs.

10. **UN NATO Force**. UN NATO Forces had over five thousand personnel from 15 nations and over four hundred ac (including 222 fighters) available at any one time. There were approximately 260 land-based ac; out of which 40 percent based at Aviano Air Base, Italy. Air operations were conducted from 18 air bases in five countries across Europe and up to three ac carriers in the Adriatic Sea. Countries included USA, UK, France, Italy, Germany, Spain, Netherlands, Turkey and so on.

11. **BSA**. The ORBAT of BSA was as follows:

a. **Army**. BSA had strength of approximately 80,000 personnel, 250 heavy weapons and 185 tanks[iii].

b. **Bosnian Serb (Srpska) Air Force**. Srpska Air Force consisted of ac like Super Galeb G-4, J-21, J-22, An-2, An-26, Cessna-172, UTVA-75, Mi-8, Gazelle etc of unknown quantity.

c. **GBAD**. Following the break-up, a portion of the GBAD of the former Yugoslavia fell into the hand of BSA. BSA's GBAD posed a formidable threat to NATO ac. The Serbs' GBAD included the following:

(1) **SAM**. The Serbs had approximately 7 SA-2, 6 SA-6, 12 SA-9 and unknown quantity of MANPADS (SA-7, SA-14).

(2) **AAA**. There were approximately 1,100 AA guns of 20 mm, 30 mm, 40 mm and 57-mm calibers.

12. The ORBAT of the 15 nations as stated above was placed under a very different type of ROE which demands an elaborate discussion.

13. **C2 of UN and NATO**. "Operation Deliberate Force" was characterized by a dual C2 system exercised by NATO and UN:

a. **NATO Command Structure**. NATO was then commanded by Willy Claes. Under NATO's military committee Gen Joulwan was SACEUR. Under him Adm Smith was CINCSOUTH. Lt Gen Ryan dealt with the air power aspects as he was the COMAIRSOUTH, HQ situated at Naples, Italy. Under him Lt Gen Fornasiero acted as head of 5 ATAF. For the "Operation Deliberate Force" CAOC was set up at Vicenza in Italy headed by Maj Gen Hornburg as director.

b. **UN Command Structure**. UNSC was the hub to deal with all the resolution to be applied in the war. SRSG was Yasushi Akashi being positioned at Zagreb. Lt Gen Janvier was commander UNPF with HQ at Zagreb. Lt Gen Smith was Commander UNPROFOR positioned at Bosnia-Herzegovina. Under him there was AOCC and a good number of TACPs.

c. **Execution of the Command**. The NATO chain of command extended from the fighter ac through an ABCCC in C-130 to the CAOC. The NATO Forces ACC in the CAOC was the approving authority for employing ordinance. He was answerable to CINCSOUTH. The UN chain of command on the other hand extended from the FACs on the ground to the UNPROFOR HQ in Sarajevo to UNPF HQ at Zagreb. An exchange of representatives between the CAOC and UNPF HQ in Zagreb and UNPROFOR Bosnia-Herzegovina HQ in Sarajevo provided coordination between NATO and the UN. These liaison officers ensured a continuous exchange of information between NATO and UNPF. The effective coordination between NATO and the UN ensured that the operation was executed with little or no operational difficulties.

d. **Difficulties in NATO UN C2**. NATO's over emphasis on collateral damage control brought many problems to the C2. Those were:

(1) **Response problem**. On 30 August SEAD commander detected threat emission and gave appropriate call but neither E-3 nor HARM assets acknowledge the call. By the time it was acknowledged the window of opportunity had diminished.

(2) E-3 'Magic' and ABCCC 'Bookshelf' were used for close control of air assets. As a result multiple and contradictory instructions were passed at the beginning of the operation. But the problem reduced as the operation got its pace.

14. **Bosnian Serbs' C2**. Radovan Karadzic was the head of Srpska Republika (land of Bosnian Serbs) which was formed within the integral territory of Bosnia-

Herzegovina. Its military, BSA, was commanded by Gen Ratko Mladic. However, BSA was overwhelmingly supported by JNA, the neighbouring Serbian Army, controlled by Slobodan Milosevic. C2 overwhelmingly shaped the overall conduct of air operation in “Operation Deliberate Force”.

.**Planning Phase**

15. NATO’s first true “Air Campaign,” Deliberate Force was, in fact, the product of years of planning. The air campaign was carefully planned and executed to achieve both explicit and implicit objectives that originated from the NAC and the UNSC over the course of years of involvement in the Balkans. Lt Gen Mike Ryan, USAF, was COMAIRSOUTH and was designated as CFACC. Most of the senior leadership in the CAOC consisted of USAF colonels. The collegial relationship between the COMAIRSOUTH and CAOC staffs eased Gen Ryan’s task of planning and executing air operations.

16. To fully understand the Deliberate Force air campaign plan one needs to examine the progression of the various related and supporting plans that resulted in the first weapon delivery on 30 August 1995. This involves moving through several key events in the development of the Deliberate Force air campaign plan.

17. During 1993, in response to UNSCR 836 which authorized the use of force to protect UNPROFOR and the safe areas, NATO planners developed the operational options for air strikes in Bosnia-Herzegovina. There were various limitations in using force to solve the crisis. So depending on the degree of intensity and area to be covered three options were formulated:[iv]

a. **Option One**. This was the most limited option in terms of scope and duration. For example, if attacking artillery batteries of the BSA (participating in the siege of Sarajevo) would end the war option one would be followed.

b. **Option Two**. Option two included tougher and wider air action than that of option one. Attacking BSA’ heavy artillery, supply points, C2, EW and SAM sites were the targets in option two.

c. **Option Three**. Option three was the toughest option. It included option two plus military-related petroleum, oil, and lubricants, counter air threats, and CAS. It would include outside immediate area under siege and required additional political approval.

18. Throughout 1994, NATO military and civilian leaders continued to encourage their counterparts in the UN to take a broader view of the potential impact of an air campaign to achieve stability in that region. Moreover, the atrocities and their subsequent projection on different media like BBC; CNN drew the world attention to this part of the world. All these assisted planners at NATO to plan for a tougher air action with an intention to affect the BSA’s COG.

19. During May 1995 the situation intensified further when NATO forces attacked Pale ammunition depot and on the other hand Bosnian Serbs took UN personnel hostage. By mid August, therefore, NATO had developed plans to deal with a variety of contingencies and tasking like:

a. Isolate leadership and attack concentrated, time-sensitive targets.

b. Isolate fielded forces and attack supply/logistics base.

c. Attack fielded forces and selected infrastructure.

20. On ground, for air action the whole Bosnia-Herzegovina was divided into SE and NW ZOA. The SE zone contained the safe areas of Sarajevo and Gorazde, while Bihac lay in the NW ZOA. The Tuzla safe area was in both the ZOAs.

21. With the completion of the various contingency plans for protection of the safe areas the implementation of any of them now awaited for some triggering actions. The marketplace mortaring on 28 August served to pull the required trigger. Adm Smith turned the NATO key immediately and Lt Gen Rupert Smith, Commander of UNPROFOR in Bosnia-Herzegovina and General Janvier's subordinate turned the UN key on 29 August. NATO ac flew their first missions at the end of that tasking day. Thus (the execution of) the Deliberate Force started.

Execution Phase

22. "Operation Deliberate Force" was briefed by Adm Smith and Lt Gen Ryan to Willie Claes, NATO Secretary General, and General Joulwan, SACEUR on 03 Aug 95. A "Dual-Key" decision was made by CINCSOUTH and Commander UNPF to initiate air strikes. Subsequently, COMAIRSOUTH (call sign-Chariot) directed 5 ATAF, Lt Gen Fornasiero, to launch NATO forces with an execution time planned for not earlier than 0200 CET on 30 Aug 95.

23. The operation was actually an extension of Operation Deny Flight in which high value air assets such as ABCCC, EC-130E, NAEW and AAR tankers established medium altitude orbit over the Adriatic sea(Feet Wet). ABCCC was in north and NAEW was in south and tankers were stationed centrally. Land and sea based ac would take- off, check in with CAOC or ABCCC and go 'Feet wet' to rendezvous with their assigned tankers prior to penetrating Bosnia-Herzegovina air space.

24. Once cleared by Chariot, 43 strike ac escorted by 14 ac took off from Aviano Air Base and from USS Roosevelt for SEAD mission in SE of Sarajevo. It was followed by 4XF-16 to attack radio relay station at Pale, Sarajevo and SA-6 site. First bomb impact was at 0212. Pre-strike and post-strike recce, SEAD coverage for all packages, CAS, and UN RRF artillery fire were coordinated for entire period. Round the clock, coverage was provided by CAP, AAR, NAEW, ABCCC, and ELINT/ESM ac. At 1716, Ebro 33, a

French Mirage 2000K was shot down by a man-portable SAM, 20 NM SE of Pale. Two good chutes were observed; efforts to locate and rescue the downed aircrew continued around the clock, supported by a wide variety of NATO and National assets but failed. In subsequent days there were a lot of bombing halt to have a political settlement but all attempt failed. Key figures like Holbrook, Gen Janvier were in favour of the halt but W. Claes, Gen Joulwan were worried about the process as they considered that it might turn into a second 'Rolling Thunder'. From 5 September 95 attack resumed but was interrupted by bad weather on many occasions. In between, search for the Mirage pilots continued but failed who were later freed by the BSA. During the bad weather as well as the bombing halt numerous combat support mission were carried out. Necessity for all-weather stand-off weapon was felt as such TLAM and SLAM from F-18 were fired. Considering the high threat, bad weather and fear of collateral damage F-117s were called in but later was sent back as Italy denied letting them operate from her base due to some political dispute.

25. On 14 Sep 95 at 2200 CET, all missions except AEW and AAR were suspended in response to an FC UNPF letter to CINCSOUTH; representatives of the warring factions had agreed to the conditions set out in the UN-brokered Framework Agreement. On 20 Sep 95 UN NATO agree Deliberate Force objectives met, mission accomplished and end states achieved (Safe Areas no longer threatened or under attack) with a loss of only 25 Serbs' life. Adm Smith and Gen Janvier therefore agreed that "the resumption of air strikes is currently not necessary." Finally Dayton Agreement was signed on 14 December 1995 among the warring factions. In the execution phase air power was applied to perform various operations with mixed success and failure in order to achieve the objective set by both UN and NATO.

Types of Air Operation

26. In Deliberate Force, air power was applied in various roles to accomplish different tasks. Operation wise they may be divided into two broad categories:

a. Counter Air Operation.

b. Combat Support Air Operation.

27. **Counter Air Operations**. Counter air operations included CAP, SEAD and Offensive Air Operation:

a. **CAP**. France, Netherlands, Turkey and the UK provided the primary CAP ac, with the US ac filling in as required. Platforms included Mirage 2000C, NF-16, TF-16, FMK-3 Harrier, FA-2 Sea Harrier, F-14 D, F-16 and F-18C. The purpose of this CAP missions were two fold: enforcement of the no-fly-zone and defensive counter air operation for high value target.

b. **SEAD**. In “Operation Deliberate Force” SEAD missions were mainly flown against the Serbs’ IADS which were the primary responsibility of the “Operation Dead Eye”. Six different platforms were used in this respect like F-18C Hornet, EA-6B Prowlers, F-16 HTS, F/A-18D Night Attack Hornet, EF-18A Hornet and ECR Tornado. Successful SEAD missions assisted NATO air power to achieve air superiority which was the pre-requisite for different types of air operations.

c. **Offensive Air Operation**. CAS, BAI and AI missions are included in this category. 18 different types of ac were used to complete a total of 1365 sorties. 8 different nations contributed ac like F-16, A-10, F-15E, AC-130, F-18C, Jaguar, TF-16, Tornado GR-7, EA-EB etc. Gen Ryan and Gen Janvier both were very much cautious about these missions and approvals were given only after a detailed scrutiny.

28. **Combat Support Air Operation**. Shooters could not perform their mission without the extra ordinary support by the support ac. Missions AAR, ISR, ABCCC, CSAR, Air Transport etc.

a. **AAR**. Tankers mainly orbited over the Adriatic Sea and provided the necessary refueling. US provided the majority of the sorties (80.9%) while other participants were UK, France and Italy. Ac included (220) KC-135, KC-10, L-1011, IB-707, KC-130 etc.

b. **Air Transport.** With the establishment of 7490th composite wing at Aviano AB in Italy air transport activity increased tremendously. Ac included C-5 Galaxies, C-17 Globe masters, and C-141 Star lifters. A limited numbers of C-21, C-130 and CASA-212s provided intra theatre airlift to sustain the operation.[v]

c. **ISR**. Five nations employed 13 different manned or unmanned recce platforms mainly to monitor the movement of heavy weapon of BSA in the TEZ.[vi] Ac included F-1 CR, M2000D, NF-16R, HARRIER-2, U-2R, UAV-2, NIMROD, EF-111, E-2C, E-3 sentry etc. NATO commanders kept them at various places and alert state to ensure the utmost utilization. They had been the integral part of planning the strike-packages.

d. **ABCCC**. ABCCC functioned as the direct extension of the CAOC. By flying near the scene of the operation ABCCC ac ensured continuous C2 over NATO ac by linking them and the CAOC by radio or by exercising some direct control. For example in EC-130E there had been 16 staffs in the capsule with the comm system like UHF, VHF, HF, and FM radios. During the operation there had been 32 sorties from Aviano Base using 12 hour shift 24 hours a day.[vii]ABCCC helped the conduct of all missions specially the force packages.

e. **CSAR**. CSAR mission drew attention in Operation Deny Flight with the rescue of Capt Scott O' Grady.[viii] As the "Operation Deliberate Force" started, the same tempo continued though the rescue of the Mirage 2000 pilot, call sign Ebro, was not a success. MH-53J Pave Low, HC-130P were the main platform, situated at Brindisi, Italy.[ix] CSAR assisted in retaining the morale of the allied personnel.

29. The above mentioned air operations expended different types of munitions of which PGMs are the most remarkable ones. During the conduct of the operations participants faced different types of problems. So it is needed to make an analysis of the air operation.

Analysis of Air Operations

30. **Summary of the Sorties and Munitions**. During Deliberate Force, ac from eight NATO nations plus the alliance's own assets combinedly flew a total of 3,515 sorties of which 2,470 were combat sorties (70 percent of all sorties) and were1065 support sorties (30 percent of all sorties). Ratio of combat to support sorties was 2.3:1. The United States led all nations in the number of both combat and support sorties flown. It accounted for a total of 1,026 munitions expenditures (excluding HARM, rockets, and guns). This number included 708 (69 percent) PGMs and 318 (31 percent) non PGMs (Annex C). For the first time in the history of air power PGMs were used so extensively. The use of PGMs assisted NATO in achieving the objective with minimum collateral damage.

31. **Difficulties Faced**. Ac of the US Air Force, Navy, Army, and Marine Corps flew 2,087 air-strike and 1,499 air-support missions or 71.8 percent of which were air strikes. Some people heralded Deliberate Force as a model of inter-service cooperation. But there were some difficulties as well:

a. Navy was frustrated with the Air Force's centralized control of the mission tasking, especially with ATO specifying the type of ordnance to be used on particular targets.

b. Rivalry over which service and ac should fly bombing missions because everyone wanted a piece of the action.

c. Unfamiliarity of Marine aircrews with Air Force's flight-line rules, especially entry-controlled points.

Tactics of UN and NATO

32. The experience of Gulf war (success of PGM) gave the planners in "Operation Deliberate Force" to adopt a tactics that can be generally called as close control stand-off tactics in order to avoid collateral damage and minimize allied attrition. Special instructions (SPINS) were issued from CAOC that controlled and directed most of the

air operations in and out of the tactical area of operation (TAOO). However, the tactics in operation and tactical level often got blurred as Gen Ryan and his staffs in CAOC (who were in operation level) often determined the use of weapons and tactics in the field level. Some of the tactics followed by NATO forces are described below:

a. The air space over Bosnia-Herzegovina was called as “feet dry” and that over the Adriatic Sea was called as “feet wet”. Ac at feet dry was controlled totally procedurally while at feet wet ac followed a relaxed procedural control. Procedural control assisted ac not to be confused by the enemy.

b. Ac entered and exited the TAOO via special transit corridors defined by latitudes and longitudes. Establishing the corridors helped an orderly flow of traffic in the fog and friction of the war.

c. In CAS and BAI missions, ac had to report to the tactical air control point (TACP) defined by coordinates. This helped ac to get the latest info to conduct the missions successfully.

d. All ac had to follow SPINS inside the TAOO. SPINS assisted CAOC to implement the tight ROE asked by the UN.

e. The primary tactic of the CAP fighters was visual identification. The aim was to avoid fratricide.

f. Low altitude was designated for helicopter operation as medium altitude was used by other platforms.

g. There were “windows” established for entry and exit of the SEAD package. Closing of the windows was controlled by the NAEW. This procedure protected the secrecy of the operation and helped avoiding fratricide.

h. Ac used to change the corridor time to time to avoid being too predictable at arrival and departure point, thus reducing vulnerability.

j. TACPs for CAS were defined by geographical features and coordinates. TACPs helped the safe and orderly flow of traffic.

k. The jammers’ mission tactics included stand-off jamming, close-in jamming and direct support. The types of jamming mainly depended on the mission profile itself and the perceived threat. The various types of jamming assisted ac to operate safely under high threat condition, thus reduce the risk of allied attrition.

33. The observance of the tactics assisted the operators to avoid fratricide and implement rational use of force as asked by the ROE. But it was the technology that helped NATO to implement the tactics.

Technology of UN and NATO

34. Having been matured in Gulf War 1991 technology played a significant role in "Operation Deliberate Force". Most important technologies were PGM. With good comm and ISR system that made it possible to adopt a tactics that was not effective earlier.

35. **AGM-65 Mavericks**. Maverick is a US-made ASM with a shaped-charge warhead designed for attacking armored vehicles or other hardened targets. Prior to launch, an EO- or IR-guided variant of the Maverick missile acquires its target, after which the missile guides autonomously, providing tactical-standoff "launch and leave" capability at beyond-visual ranges. During Deliberate Force, A-10s fired all 23 of the Mavericks. It assisted in target acquisition in darkness, bad weather and in camouflaged condition. Thus armoured vehicle and other hardened targets were easily destroyed which assisted to achieve the end state.

36. **AGM- 84E Standoff Land-Attack Missile (SLAM).** It is a 1,385 lb variant of the US Navy's Harpoon anti ship missile designed for standoff strikes against heavily defended land targets and ships in harbor. In Deliberate Force, carrier based US Navy F/A-18s fired 10 AGM-84Es against BSA defenses around Banja Luka. In bad weather this stand-off weapons achieved the kill without possible attrition to the allied ac.

37. **GBU-15 Modular Guided-Weapon System.** It is a USAF glide bomb with interchangeable guidance (EO or IR), fusing, and control systems selected according to the needs of a particular mission and fitted to either an MK-84 2,000 lb GP bomb or a BLU-109 penetrator bomb. This stand-off weapon destroyed several highly defended key targets around Banja Luka which would be very difficult to neutralize without it.

38. **Cruise Missile.** Tomahawk land-attack missile (TLAM), the US Navy's conventionally armed cruise missile for attacking land targets, is carried aboard cruisers, destroyers, and submarines. With a nominal range of six hundred nautical miles TLAM is a highly accurate, autonomously guided weapon that navigates using a TERCOM system. On 10 September 1995, in support of NATO air operations in northwest Bosnia, the cruiser USS Normandy, afloat in the Adriatic Sea, fired 13 TLAMs against IADS targets in and around Banja Luka. Although TLAMs represented only 1.9 percent of all PGMs , their employment in support of "Operation Deliberate Force" represented several firsts: the first Tomahawks used on European Command theater targets ; the first used in an integrated suppression of enemy air defenses (SEAD) mission with coordination of tactical air operations; and the first used in direct support. Cruise missile proved its worth by destroying the heavily defended IADS in and around Banja Luka destruction without which would cost a lot of allied attrition.

39. **TALD**. TALD, a US Navy and Marine unpowered-drone glide vehicle, is usually launched by an F-14 Tomcat, F/ A-18 Hornet, or EA-6B Prowler to confuse enemy radars. The drone has a radar cross-section-enhancement payload and/or an electronic countermeasures-enhancement payload. TALD flew a wide spectrum of

mission profiles, including variations in speed, range, and altitude thus confusing the Serb's IADS. During Deliberate Force, US Navy ac launched a total of 47 TALDs against the Bosnian Serb IADS.

40. **EA-6B Prowler**. Prowler is the Navy's land or carrier-based electronic combat platform, capable of 530 knots at sea level, a combat ceiling of 38,000 feet, and a combat range of 1,099 miles. The E-6's SEAD weapons load consists of four to six HARMs. The Prowler flew 183 SEAD sorties, 58 from the USS Roosevelt and 125 from Aviano. Equipped with five ALQ-99 tactical jammer pods, the Prowler detected, sorted, classified and dealt with electronic threats across a broad spectrum of frequency bands in this operation that helped other allied ac to operate safely.

41. **General Dynamics F-16 HTS**. It is the USAF's new single-seat "Wild Weasel," incorporating an ASQ-213 HTS. The standard F-16 HTS configuration consists of two HARMs, two AIM120 AMRAAMs, and two AIM-9 L/ M IR missiles. The F-16 HTS made its debut in Deliberate Force and fired HARMs for the first time in combat where they flew a total of 176 SEAD sorties against the Serb's IADS.

42. **Panavia ECR-Tornado (ECRT***)*. Germany's two-seat, tandem, ECR version IDS Tornado, is capable of a maximum speed of Mach 2.2 and a ceiling of over 50,000 feet. The ECRT's normal combat load includes two AGM-88s, two AIM-9s, as well as an ECM pod, chaff/ flares, and two drop tanks. Germany based eight ECRTs flew 28 SEAD missions to degrade the Serb's IADS.

43. **Predator UAV**. The USAF's Predator UAV was used for surveillance, reconnaissance, and target acquisition. NATO planners at various levels used images from the Predator. Commanders watching the video downlink screens see pictures less than two seconds old—what the military calls near real time. During Deliberate Force a US Army unit launched 15 flights (17 were attempted), 12 of which were effective, logging over 150 hours of coverage over Bosnia-Herzegovina. A prime demonstration of Predator's value occurred on 5 September 1995, as Adm Smith and Gen Janvier pondered whether or not to resume bombing. Their decision hinged on whether the Serbs were withdrawing their heavy weapons from the Sarajevo safe area. Thus it assisted in making the decision by the commanders.

44. **USAF/ Lockheed EC-130E**. USAF C-130Es were the only dedicated ABCCC ac flying during "Operation Deliberate Force". With battle-staff members in their capsule, these ac could communicate via UHF, VHF, HF, and FM radios; secure teletype and voice communication systems; and automatic radio relay. USAF ABCCCs are unarmed. During the operation, four EC-130Es flew 32 sorties from Aviano, each usually involving a 12-hour shift on patrol station for 24-hour coverage. Ac had to contact ABCCC before they enter the Bosnian airspace. ABCCC provided the ac with necessary information like vectoring to the tankers, targets information, threats around etc. Thus it assisted in the smooth conduct of the operation.

45. **Power Scene**. It is a system that provided a three-dimensional perspective of navigation routes, target run-ins, and threat bubbles. In power scene, pilot can fly like an aircraft or a helicopter allowing for exceptional view of attack axis. Pilots used to get situational awareness and practice of original mission even before going to operation area. The system has unique ability of measuring target coordinates within 75 feet laterally and one to two hundred feet vertically. The preview of situational awareness proved extremely valuable and greatly assigned mission planning at the unit and force level.

Tactics and Technology of the Bosnian Serbs

46. There is no written document available about the tactics of the Bosnian Serbs but it may be assumed that their tactics would be similar to that of the former USSR. Their technology and weaponry were all eastern-block type.

47. Along with the classical usage of tactics and technological marvels, “Operation Deliberate Force” bears some special significance.

Significance of Deliberate Force at a Glance

48. In “Operation Deliberate Force” NATO launched its first sustained air strikes operations that included several operations and weapons-employment. Many of the members used their ac and weapon system effectively for the first time. The events were:

a. First air campaign to predominantly employ PGM (69%).

b. First employment of TOMAHAWK missiles in European Theater of Operation.

c. First sustained use by USAF F-16s of both GBU-12 and GBU-10 LGB in combat.

d. First sustained use by USAF F-15 Es of GBU-15 in combat.

e. First use by USAF F-16s of HARM targeting system and first firing of AGM-88 HARM in combat.

f. First employment of predator UAV in combat.

g. First deployment of Luftwaffe in the combat after WWII.

h. First deployment of modern Spanish Air Force units into combat.

j. First contribution by Italian Air Force units to NATO.

k. First delivery by French Mirage 2000 D/K and Sepecat Jaguar of Matra 1,000 lb LGB and GBU-12s in combat.

49. In addition to the primary objective of “Operation Deliberate Force” air power was utilized by many nations to check the effectiveness of their airborne platforms and munitions. This also had value in terms of joint operational tactics and doctrinal concept development for many nations like Germany. However, it had its limitations and weaknesses as well.

WEAKNESSES OF DELIBERATE FORCE

50. “Operation Deliberate Force” brought a quick victory for the allied forces and compelled the war lords to sit for a negotiation. Air power did a splendid job there but it was not free from criticism and weaknesses as well. Some of those are discussed below:

Weaknesses of Leadership

51. **Over Controlling.** On many occasions, pilots up in the air for an attack mission were informed about the change of their target sets. Gen Ryan preferred this approach in which he retained excessive flexibility in terms of DMPI. He believed that such approach of using military force would foster political ends. But critics said that the “on-again-off-again” system might cause misapplication of air power.[x]

52. **Reach Down Method**. Gen Ryan, on many occasions, was accused of handling the minute details of the squadrons during the operation. The involvement of CAOC in the flying tactic was not welcome by many squadron pilots. Some opined that as the scope of war was too small so Gen Ryan and his staff could do such.[xi] In a broad front like “Operation Desert Storm” such control could not be thought of.

53. **ROE**. On some occasion Gen Ryan ordered his crew not to drop weapon on the first hot pass over the target to reduce collateral damage. But this ultimately increased the possibility of attrition to a great extent. However, the decision was reversed subsequently.

54. **Lack of Foresightedness**. At some point the flight line at Aviano could not accommodate necessary load specially the ammunition load. So during the operation the line had to be extended on an emergency basis. So the question remains regarding the preparedness of the authority.

Lack of cooperation and coordination

55. **Coalition or American Show**? CAOC and the planning side was mostly American dominated. Many non-US officers complained that the operation was little more than an American show and that they were just along for the ride (Country wise sortie flown and percentage is given at Annex C).

56. **Deployment of F-117**. Request for the deployment of F-117 by the NATO at Aviano air base was rejected by the Italian govt (due to some political constrains) which was viewed as a matter of strained relationship between NATO and Italy.

57. **Lack of Coordination**. JSOTF and USN launched CSAR to rescue the downed Mirage pilot without necessary coordination in between them.

58. **Fog and Friction**. On several occasions NAEW ac was not at abreast with the scenario. One force package had to return to deck due to lack of fuel as its priority was not acknowledged by the NAEW to vector it to the tanker. Same type of problem was also encountered by the staff at CAOC.

.**Administrative Weaknesses**

59. **Inappropriate Sitting of Airbase**. At Aviano the base was separated in different areas by civilian settlements in between. Moving munitions from the storage to the flight line via civilian area needed permission of the local civilian authority. At times it created unwanted delay.

60. **Family Issue**. Base like Aviano quickly turned from peace time base to war front. Family members of the air crews at Aviano provided a whole hearted support to the crews. But some feared that had the war gone to an indefinite period of time or the casualties went too high it would be difficult for the crew to participate the war with very positive support from the families. Probably authority did not put a lot of attention to the matter.

Miscellaneous Weaknesses

61. **Lack of Doctrine**. NATO was designed to conduct air campaign in broad front. So the planners found it difficult to follow the doctrine for a limited scale operation like “Operation Deliberate Force”. Again US doctrine did not aptly cover OOTW from which planners could take a guide line. So the planners faced difficulties in formulating a plan on the basis of an established doctrine. More over in CAOC there were no BDA doctrine and initially, no combat assessment group.

62. **Over-Stress**. Col Turner, Commander of both 31st and 7490 operational group found it impossible to over-see both flying and 1st line maintenance. So after the 1st night he had to hand over the maintenance supervision to Col Stringer. In many occasions air crew had to go for a 12-hour shift job after their landing from a stressful mission. Some of the staffs of Gen Ryan at CAOC had to work “30-hours” a day. Critics say that the system would have collapsed had the war continued for long time.

63. **Shortage of 24-Hour All Weather Stand-Off Weapon**. High threat and bad weather caused a disruption on the progress of the operation. So 24-hour all weather stand-off munitions like GBU-15, AGM-84 were required. But high cost and lack of suitable platform put a barrier on their availability.

Conclusions

64. “Operation Deliberate Force” was a short, intensive and classic application of air power in the context of modern day’s warfare that brought regional stability in the Balkans. The multi-ethnic society of the former Yugoslavia was a critical place for possible conflicts that the rulers from the beginning anticipated. In the midst of atrocities and mass Killing UN got involved. But the adamant Serbs, on many occasions, attacked the UN personnel, took them as hostages and threatened the UN declared safe areas. With the assistance of NATO, UN imposed ‘Operation Sky Monitor’ and then with a tough mandates ‘Operation Deny Flight’. Later on, ‘Operation Dead Eye’ was conducted to suppress the Serbs’ IADS. With the second mortar attack on a market place called ‘Markele’ massacre both UN and NATO planned for a tougher retaliation and ‘“Operation Deliberate Force”’ was conducted. Objectives were to force the Serbs to follow the UN terms like respecting the UN safe areas, stopping attack on the Bosniaks, safe operation of the Sarajevo airport etc. The achievement of air power in “Operation Deliberate Force” was manifold. For the first time, air power was handled maturely under the umbrella of NATO and the outcome was decisive. Air power with its inherent characteristics of height, speed and reach coupled with tremendous advancement in technology will continue to play a vital role in all future wars. Trends suggest that the employment and exploitation of air power are likely to be the determinant of success in future wars.

TOPIC-6

OPERATION 'SAFEDSAGAR'

Background

1. The use of air power by any nation to achieve military objectives is a significant step with international ramifications. While the IAF was employed in the offensive role during 1948 in Jammu & Kashmir, it was not utilised offensively during the operations against intruding Chinese forces in 1962, which would have significantly and decisively altered the outcome of that sorry debacle. In subsequent operations during the Indo-Pak wars of 1965 and 1971, the profound effects of the judicious use of air power was exhibited repeatedly, whether at Chamb in 1965 or Longewala during 1971.

2. The induction of the IAF in the Kargil conflict on 26 May was intended to achieve the national objective of throwing out the Pakistani regular forces and other armed intruders across the LOC. The IAF was thus drawn into this battle fought over some of the highest terrain on earth. Never before has any air force been tasked to achieve such military objectives; not to mince words, therefore, this operation by the IAF is, by professional standards, a trailblazer. The types of targets required to be engaged were not conventional target systems that air forces all over are trained to engage. No mobile forces or armored columns, neither industrial targets, nor power plants or railway yards here. No runways to neutralise, or communication networks to paralyse. The targets were simply intruders, lightly burdened individuals well trained in the art of mountain warfare, well motivated and mobile. They were familiar with high altitude operations and were firmly ensconced on the many vital heights in the area. No traditional command posts or well - marked logistics supply lines (the common targets of air power) existed. The intruders were near invisible humans well dug-in into hideouts with well stocked stores in a well planned operation which preceded their occupation of positions on various hilltops and slopes. Only their tents and earth - work structures were identifiable and these too, barely so from the air. The ubiquitous black and white colour combination of the terrain broke up outlines and provided natural camouflage, to the extent that one could look at a photograph for minutes before realising that one was looking at a bunker! Frequent snow-falls effectively shrouded stores and supplies under a uniform white blanket. It is a significant fact that the biggest target engaged during Op Safedsagar was (as the air operations in the Kargil area were called) the supply camp at Munthodhalo, would normally have been the smallest target considered for the use of air power during a normal all-out war! Lucrative targets were available only on the other side of the Line of Control (LoC), which was an area that the airforce scrupulously avoided, as per the mandate given them by the Government. Such targets simply do not commend themselves to many types of armament and weapon delivery systems on the inventory of any air force. The IAF, therefore, selected targets with the intention of inflicting as much damage on personnel and weapons as on supplies. Such relentless attacks effectively reduced the enemy's will and capacity to fight. The attacks were followed up by army assaults to clear the area. The targets were widely dispersed and in many pockets all over the region, besides being very mobile; this necessitated practically individual attacks. Stores, once located, were effectively engaged but the effects of the enemy's losses, obviously, were felt only over a period of time. The IAF

was first approached to provide air support on 11 May 99 with the use of helicopters. This was followed by a ‘go ahead’ given on 25 May by the Cabinet Committee on Security to the IAF to mount attacks on the infiltrators without crossing the LoC. While there was considerable pressure from outside the IAF to operate only attack helicopters, the Chief of Air Staff succeeded in convincing the Govt that in order to create a suitable environment for the helicopters, fighter action was required.

Effect of Environment

3. The severe degradation of aircraft and weapon performance is difficult to completely appreciate. No aircraft has yet been designed to operate in a Kargil-like environment. At high altitudes, a crucial factor in aircraft performance is the reserve of power available, which, for the MiG and Mirage fleets, was a strong point in their favor. In comparison, the Fairchild A-10, widely quoted as being the ideal platform, would have been a misfit. It is widely (and incorrectly) stated that using Mach 2 aircraft would not produce results; however, a Mach 2 capability does not necessarily imply an inability to operate at lower speeds; further, all air-to-ground attack speeds are approximately the same (750-950 kmph) for fixed-wing aircraft.

4. Due to the very different attributes of the atmosphere at that altitude, even weapons do not perform as per sea-level specifications. Variations in air temperature and density, altering drag indices and a host of other factors (which have never been calculated by any manufacturer for this type of altitude) cause weapons to go off their mark; for the same reasons, normally reliable computerised weapon aiming devices gave inaccurate results.

5. In the plains, a 1000 pounder bomb landing 25 yards away from the target would still severely disable, if not flatten, it. In the mountains, however, a miss of a few yards would be as good as the proverbial mile, due to the undulating terrain and masking effects. In addition, due to the variation in elevation the "miss" would be greatly magnified in the linear dimension, further exaggerating the "inaccuracy" of the weapon/delivery. While this would lead to apparent inaccuracies in weapon delivery, there is, paradoxically, a need for pinpoint accuracy in conditions where that very attribute is severely degraded by the factors mentioned above.

The First Few Days

6. The loss of one fighter and one Mi-17 chopper to enemy action indicated the need for a change of tactics, resulting in withdrawal of armed helicopters and employment of fighters in modified profiles out of the Stinger SAM envelope. By itself, the change of tactics is nothing unusual, and is an inherent part of the qualities of flexibility and adaptability; in fact, a far more serious lapse would be a dogged tendency to persist in sacrificing assets when, clearly, there was a need for a re-assessment. It is, perhaps for this reason that NATO, after deploying 100 Apache attack helicopters in Greece, reconsidered bringing them into Kosovo till the shooting was over, as they felt the environment didn't justify it. Unfortunately, IAF Mi-25/35 attack helicopters were not able to operate in this terrain.

7. One of the many facts that have emerged clearly is that target acquisition by the pilot is the bottom line. Totally unfamiliar surroundings in the Kargil area made target recognition difficult from the ground, let alone from a fast moving aircraft. As a result, the initial few sorties from high levels were not effective as desired. However, once revised and modified profiles, tactics and manner of system usage had been perfected, the accuracy of the airstrikes improved dramatically. Any time the target was spotted, a very high success rate invariably resulted.

Three Main Steps in Neutralising a Target

8. Far from being an off-the-cuff quick reaction affair, each airstrike is the end result of a carefully planned chain of events spanning several areas of specialisation. Broadly speaking, an airstrike would have the following components:-

a. Recce mission(s).

b. Airstrike mission(s).

c. Battle Damage Assessment (BDA) mission(s).

d. If so dictated by results of BDA, or by follow-up recce, repeated airstrikes.

9. Effective reccee regularly pre-empted the enemy's attempt to continue operations from an earlier target; a good example is the enemy supply camp near Pt 4388, in the Dras sector, attacked earlier by four Mirages dropping 24 high explosive 1000 lb bombs (amounting to 12 tons of high explosive churning up a restricted area)! This was followed by an equally heavy airstrike against this camp the next day. The weight of attack put into these airstrikes were formidable, and greatly influenced the conduct of the ground operations.

10. **Photography in the Optical Wavelength**. This can be done by cameras which point either vertically down, or sideways at a variable angle. While the sideways looking cameras possess the obvious advantage of staying on one's own side of the LOC/border while "peeking" into the enemy's territory, it has other implications like the variation of scale with distance from the platform, definition at extreme ranges etc, which create complications during subsequent interpretation of the film. The IAF uses MiG-25s, Canberras and Jaguars for optical photography from medium /high altitude. Satellites can also be used, but the IRS series do not provide the resolution required for the kind of information wanted during Op Safedsagar, namely, location of enemy bunkers, tents/camps and tracks/paths. Satellites do exist, however, with this capability, which would demand a resolution of less than a meter. Optical photography can also be done from low level as demonstrated by MiG-27s during the annual Ex Vayushakti (live firepower demonstration) using the Vicon equipment.

11. **Infra- red (IR) and other Wavelengths**. Platforms can also carry sensors to detect IR signatures - some sensors can detect IR signatures of aircraft types about 10-15 minutes after they have taxied out from the tarmac!

12. **Interpreting the Result**. This is the bottom line - its all in the interpretation. A skill acquired through a specialised photo-Interpretation Course, the Photo Interpreter (PI) is a very scarce, and an extremely valuable commodity. There is a great demand on his skills. After the reccee aircraft scans the stipulated sector in a number of swaths, these photographs are then fitted together to form "mosaics" of closely integrated photographs which are related to a large scale map. The PI then goes through each and every feature of the photograph - in this process, skill and "gut feeling" also play a major role, as especially in mountainous terrain like during the Kargil Ops. For example, if a group of tents is found, a pattern of tracks would logically emanate from it leading on to bunkers and ground positions; the reverse would also be true.

A Coordinated Air Campaign

13. An air war is a complicated business, requiring the coordination of different types of missions. The exact proportion or mix would change with the situation. While it is an acknowledged fact that the IAF operated largely in an environment of air superiority as far as air opposition was concerned, the large proportion of air defence missions, perhaps, played a significant part in bringing this about. Air Defence missions included escorts which flew along with every strike force as well as air superiority fighters that operated independently to ensure that the specified portion of airspace was sanitised for the specific time period, both by day as well as by night.

14. As of 12 Jul 99, IAF fighters had flown approximately 580 strike missions, supported by around 460 Air Defence missions like Combat Air Patrol and escorts and about 160 reconnaissance sorties, amounting to a total of approximately 1200 sorties. Helicopters accounted for a total of approximately 2,500 sorties transporting more than 800 troops, almost 600 casualties and close to 300 tons of load besides flying scores of operational missions like strikes. Added to this were many sorties by the IAF transport fleet, bringing in supplies and troops and evacuating men and material from the forward airbases near the war zone.

The Increasing Effects of Airstrikes

15. As a result of the IAF’s airstrikes, severe damage to enemy personnel and equipment became apparent in various areas. It is summarised that airstrikes contributed to a significant portion of the enemy's casualty list, as apparent in the numbers. However, the most telling effects on the ground were from intercepts of enemy radio revealing severe shortage of rations, water, medicines and ammunition. Losses due to airstrikes and inability to evacuate their casualties were also mentioned in the intercepts. This was the actual manifestation on the ground of the result of effective airstrikes by the IAF.

IAF Air Strikes: The Results

16. The IAF has always approached its targeting solutions espousing the concept of target systems, rather than targets in isolation. This concept proved its worth during the operations; for example, the Tiger Hill target system consisted of four components:

a. Enemy HQ on top of Tiger Hill.
b. Scattered enemy positions on the hill feature.
c. Enemy supply camp approximately 2.5 kms west of Tiger Hill.
d. Another enemy camp to the North near the LOC, forming a link to areas beyond the LOC.

17. Systematic engagement of three of these components (the scattered enemy positions on the hill were ignored) in a planned manner was directly responsible for the fall of Tiger Hill. In general, IAF air strikes against enemy supply camps and other targets yielded rich dividends. A noteworthy fact is that there was not a single operation on ground that was not preceded by airstrikes, each and every one of which was the result of coordinated planning between 15 Corps and the AOC, J&K.

Lessons Learnt

18. one of the valuable lessons that emerged was the need for joint Army-Air Force planning and consultations from the very beginning, where the Air Force would be able to contribute by rendering advice on targeting which could, at the very outset, be incorporated into the Army plan of ground operations. This would prove far more effective than a case where the Army proceeded as per its own plans made earlier in isolation, and called for air support when they felt it was required or ran into difficulty. Some of the more glaring lessons which emerged from Operation Safedsagar are discussed below.

a. Firstly, in the area of interdiction of enemy supplies, the successful and incessant attacks on the enemy's logistic machine had, over the last few weeks, culminated in a serious degradation of the enemy's ability to sustain himself in an increasing number of areas. The series of attacks against Pt 4388 in the Dras sector was an excellent example of how lethal airstrikes combined with timely reconnaissance detected the enemy plans to shift to alternate supply routes which were once again effectively attacked. In this the IAF succeeded in strangling the enemy supply arteries, amply testified to the enemy radio intercepts. The primacy of interdiction targets as opposed to Battlefield Air Strikes (BAS) targets was clearly brought out, as also the fact that air power is not to be frittered away on insignificant targets like machine gun posts and trenches, but on large targets of consequence (like the supply camp at Muntho Dhalo or the enemy Battalion HQ on top of Tiger Hill). Gone are the days of fighters screaming in at deck level, acting as a piece of extended artillery. The air defence environment of today's battlefield just does not permit such employment of airpower anymore, a significant fact that needs to be understood by soldier and civilian alike.

b. The second major impact of air power in this operation was in the area of casualties. Normally, an enemy defending a well fortified position (in this case, Pakistan) would suffer between 3-6 times less casualties than does the force on the offensive. However, this operation has seen the reverse, with the enemy casualties far in excess of those suffered by IAF. One significant fact must not be lost sight of; of the two warring sides, it is the Pakistani Army that suffered air strikes, which, obviously, contributed significantly to its casualties. It is felt that without the use of air power, IAF/Indians casualties could have approached if not exceeded four figures.

c. The third aspect is that of attack chopper operations. IAF dedicated attack choppers like the Mi-35 were incapable of operating at that altitude, which prompted the use of armed and modified Mi-17s for the role. Besides the capability of the machine itself vis-a-vis the area of operation, the creation of the right air defence environment is a crucial factor which would determine the employment of this platform. Effectiveness versus vulnerability would need to be examined; during Op Safedsagar, the abundance of man portable SAMs in all enemy-held areas precluded the effective employment of attack choppers. As a result, whether Army or IAF, choppers were constrained to operate in SAM-free areas. Nevertheless, IAF Cheetahs were instrumental in carrying out front line roles like providing a platform for the Airborne Forward Air Controller (FAC), a fighter pilot who guides the fighters in to the attack against ground targets.

d. The fourth major impact of air power is in the enormous difference it made to the ground operations, no better example of which exists than the message from the HQ of a field Army unit, stating that " as a result of the precision airstrikes on Tiger Hills our troops have literally walked over the entire Tiger Hills area. The enemy is on the run.."

e. Fifthly, night operations were carried out using ingenuity and imagination; at times, excellent results were achieved by aircraft like MiG-21s using little else but a stop watch and a GPS receiver. These operations had a significant effect on the enemy’s resilience, stamina and very will to fight.

f. Sixthly, the effort put into air defence escorts and area Combat Air Patrolling by day as well as night proved an effective deterrent which ensured total air superiority. At times, PAF F-16s orbited a scant 15 kms (on their own side of the LOC) from strike formations attacking Pakistani targets, kept at bay air defence fighters flying a protective pattern above the strike.

g. The seventh aspect is the high degree of imagination, flexibility and IAF-Army coordination which marked every phase of the operation.

h. The eighth aspect concerns attrition and its present day acceptability. During all out wars, the attrition rate that would have been accepted even a

decade ago would not be acceptable today. Political nuisance and public pressure, together with the shrinking of time frames and greater visibility due to strides in technology, have greatly lowered the acceptable threshold of attrition in an air war.

j. In the final analysis, the effective application of air power has indisputably saved further casualties as well as compressed considerably the timeframe in which our Army has made such progress on the ground. In this context, the basic functions of air power have been repeated, though on a much larger scale, when compared to the IAF's operations in this area during 1947-48, when IAF Tempests carried out staffing and rocket attacks on the intruders and Dakotas ferried in as well as Para dropped troops and supplies. As then and now, when called upon by the nation the IAF has joined as an equal partner to the Army to meet the national objective.

Conclusion

19. One of the first conclusions that any analysis of the air operations during the Kargil Operations would come to is that Operation Safedsagar saw the employment of air power in totally unconventional ways. Because the operating environment was so different from any environment encountered before in the history of military aviation, formerly accepted doctrines and tactics on the employment of airpower had to be thrown out of the window and brainstorming resorted to in order to arrive at newer, more effective methods of air warfare.

20. This new operating environment prompted the need to redefine operating paradigms of the use of air power. It was not a question of modifying a tactic or two, but of evolving a totally new philosophy of operation to meet the stringent and largely unfamiliar set of limitations which emerged in almost every area of air operation. This required a large amount of flexibility of thought as well as procedures, as the bottom line was innovation and ingenuity.

21. Almost from the very beginning of the operations, IAF intellects were busy ticking over in a near constant brain-storming session aimed at deriving lessons from Operation Safedsagar. Being an ongoing process, the immense experience gained from this operation would stand in good stead in the times to come. These lessons would be applicable to all the world's Air Forces, for it is the first time in the history of military aviation that such an air operation took place in such an environment. While conventional long-accepted air power theories no longer held good, a new set of operating paradigms had to be evolved almost overnight to cope with the situation.

22. This is the first time the IAF fought a limited war, hitherto thought to be an unlikely eventuality, as air power and escalation to an all-out war were thought to be synonymous. The deterrent effect of air power has been enhanced by this fact, as the prospect of decisive air action is now a proven possibility in even a LIC (low intensity conflict) situation. Operation Safedsagar was, therefore, a turning point in the history of military aviation, and an operation that will, no doubt, be discussed and dissected for the next few years.

TOPIC-7

OPERATION 'ALLIED FORCE'

Introduction

1. 'OPERATION ALLIED FORCE' is the largest air war in Europe since World War-II. It began on 24 Mar 1999 to compel Yugoslav president Slobodan Milosovic to accept the conditions formed by UN Security Council for providing real autonomy to Kosovo within Yugoslavia. Strategically, it was carried out to prevent a dictator from redrawing the map of Europe in his bid to create a Greater Serbia. Militarily it was threat upon an alliance in the throes of major changes who is seeking to re-orient itself to a new strategic environment. The operation launched by the allied forces consisted by nineteen NATO countries, fourteen of them directly contributed aircrafts. The air war was dominated by a series of strict rules of engagement, drawn up by politicians across the NATO alliance before the first shot was fired. The operation will remain as a significant one due to its unique characteristics. This is the operation where air power alone made a decisive victory without any loss of human life of allied forces. The operation was a great success in the field of interoperability, in use of PGMs and applying many new technologies. The operation lasted unexpected 78 days though it was a success.

Background

2. Kosovo is the southern province of Serbia in the Federal Republic of Yugoslavia, overwhelmingly populated by Ethnic Albanians. The ethnic problem of Kosovo has a long history. The Serbs regard Kosovo as their birthplace and cultural cradle and the Albanians say that Kosovo is the place where their ancestor lived. The present problem started after the death of president Tito once the Serbs took off the autonomy of Kosovo. The Kosovo Assembly organized a referendum in Sep 91 on sovereignty and voted for independence. The Yugoslav Government did not accept it and started ethnic cleansing. In early 1998, a large scale fighting broke out resulting in the displacement of some 400,000 people. A peace conference, held in Paris, but it broke up on 19 March 1999 with the refusal of the Yugoslav delegation on accept a peaceful settlement. Operation allied force was a NATO contingency response aiming at ensuring full compliance with UN Security Council resolution 1199. All most all the NATO countries took part except Luxemburg and Iceland who do not have air forces.

Overall Objectives and Air Strategy

3. **The Overall Objectives of NATO Air Strikes.** The overall objectives of NATO were as follow:

a. Ensure a verifiable stop to all military action and the immediate ending to the violence and repression in Kosovo.

b. Ensure withdrawal from Kosovo of the Serbian military, police and Para- military forces.

c. Secure agreement to the stationing in Kosovo of an international military presence.

d. Ensure agreement to the unconditional and safe return of all refugees and displaced persons and unhindered access to them by humanitarian aid organizations.

e. Provide credible assurance of Serbian's willingness to work on the basis of the RAMBOUVILET ACCORD in the establishment of the political framework agreement for Kosovo in conformity with the international law and the charter of the United Nations.

4. **The Overall Military Strategy.** The overall military strategy of the NATO's 'OPERATION ALLIED FORCE' was to degrade and damage the military and security structure that Yugoslav president Milosovic has used to depopulate and destroy the Albanian majority in Kosovo.

5. **Air Strategy.** The NATO forces air strategy planned a 5-phase operation but with the aim of using minimum or no force at the beginning to compel the Serbian Armed forces, Police and Para- military forces to withdraw from Kosovo and then comply with the UN resolution 1199 of sep 1998. Phase zero was used as "Signaling", when NATO air forces were shifted to their operational bases for preparatory exercises. Phase one operation was titled " Limited Air Response". It aimed at employing counter-air-action strategy to achieve the objectives. The strategy of phase two was to launch strategic air offensive to hit the Center of Gravity of the Yugoslav military infrastructure, using the Colonel John Warden's 5 Rings model, it was aimed at hitting the leadership, Command and Control, telecommunication installations, ammunition depots, fuel production and storage facilities etc. Phase three was to expand the air operation in wider range all over the Federal Republic of Yugoslavia. Phase four and five were for support of stabilizing and redeployment operation respectively.

Air Operations

6. **Orbat.** The total number of aircraft deployed for 'OPERATION ALLIED FORCE' varied time to time as combat aircraft in the same theatre assigned to other operations and responsibility. However the total number of aircrafts at the end reached to about

1055, US contributing 730 aircrafts. The types of aircraft were used by NATO are as follows:

a. **United States**.

(1) B-2 Stealth Bomber.

(2) B-52 Strategic Bomber.

(3) F-15 E strike aircraft.

(4) F-16 CJ jets/ F-16 CG jets.

(5) F-117 Nighthawk stealth fighter-bomber.

(6) AH-64 Apache helicopters.

(7) EA-6B prowler (EW aircraft) of US navy.

b. **France**.

(1) Jaguars.

(2) Mirage 2000C.

(3) Mirage 2000D.

(4) E3F aircraft.

(5) C-135 aircraft.

c. **United Kingdom**.

(1) L-1011 aircraft.

(2) E3D AB EW aircraft.

(3) Harrier GR7 aircraft.

d. Tornados, AMX and F-104 aircraft from Italy.

e. Tornadoes from Germany.

f. KDC-10 aircraft from the Netherlands.

g. EF-18 and KIC-130 from Spain.

h. Various versions of F-16s from several countries.

Serbs

7. The Serbian Air Force had 240 combat aircrafts including MIG-21 and Mig-29s and 48 attack helicopters. The air defence fighter was mainly of two types. However, the Serbian Air Force has fol air aspects::

a. 17-19 MIG-29 FULCRUM

b. 64 MIG-21 FISHBED

c. 18 MIG- 21 R

d. 30 J-22 Orao (A indigenous designed fighter)

e. 44 SA-342L Gazelle armed helicopter, 3 MI-14, 3 Ka -25 and 2 Ka-28 armed ASW helicopter, SA-341, SA-341A, MI-8 HipC and Mi-17elicopters.

Conduct of Air Operation

8. At 1900 hrs GMT on 24 Mar 1999 NATO forces began air operation over Yugoslavia, constrained by the directive that collateral damage was to be avoided as far as possible. The campaign did not begin the way that American normally would apply air power-massively, striking at strategic centres of gravity. The phased concept did not apply principles of military operations such as surprise and concentration of force. Bad weather and cloud obstruct the operation a lot. Flying inside or above the cloud was restricted due various reason including commitment to ensuring strikes against only military and military related target. Flying below cloud was dangerous due to tactical SAM, AAA and small arms fire. NATO statistics show that a total of 37,465 sorties were flown between 24 Mar and 10 Jun 1999. Of the total, 14,006 were strike and SEAD missions, of which 10,808 were dedicated strike missions. On 03 Jun 1999, President Milosovic accepted peace terms presented by EU and operation was over by 10 Jun1999.

Counter Air Operation

9. NATO gave high priority to attack on the Serbian air force and Serbians land-based air defences at the start of the war. Keeping in view of this strategy NATO carried out bombing from F-15, F-16, Harriers, F/A-18 and use of precision stand off weapons to hit Yugoslav integrated AD system. Initial air operations were at or above 15000 ft, appropriate to avoid air defence threat of AAA and SHORAD. The attack aircrafts flown only at night and were instructed to make only a single pass over the target to avoid risk. The allied had SEAD package. The Navy EA-6B radar-jamming planes and AF radar killing F-16cjs scour the skies for electronics clues betraying SAM radars. By 22 April, NATO had destroyed 50 percent of Serbia's front line fighter, severely degraded her ability to sustain its aircraft and surface-to-air missiles and hit hard at its Command-and-Control and sensor system.

Strategic Air Offensive Operation

. The strategic air offensive campaign started in phase two. The attack grew with the decision of NATO Summit on 23 Apr 1999 to expand the campaign and target to petroleum, lines of communication, electrical grids, and command-and-control targets. The command and control facilities NATO targeted include residence of president, key leadership targets, the socialist party headquarters, and major security forces facilities and headquarters. Also includes radio, television, microwave and telephone targets. NATO strikes severely damaged these structures with minimal collateral damage. US military used three types of heavy bombers B-1, B-2 and B-52 and cruise missiles. NATO claims to destroy 100% of Serbia's oil refinery and 57% of oil reserve. Targets destroyed or significantly damaged include:

a. Eleven railroad bridges.

b. Thirty four highway bridges.

c. Fourteen command posts.

d. Over one hundred aircraft and ten military aircraft.

e. Twenty nine percent of all Serbian ammunition storage.

Combat Sup Air Operation

11. **Air Transportation.** Air mobility played a crucial role by enabling and sustaining the air war. Allied Force demanded continuous air-mobility reinforcement and sustained effort until the end of hostility. It grew to ten from three air expeditionary wing since the war started. The integrated effort between theatre mobility forces and Air Mobility Command produced one of the smoothest air-mobility operations in Air Force history.

12. **Air-to-Air Refuelling.** The US Force provided 90% of the NATO tanker force. The total force of 112 active and 63 Reserve-component tankers flew over five thousand sorties to enable nearly 24,000 combat and combat support sorties. Altogether they supplied 250 million pounds of fuel by air-to-air refuelling. The KC-10 and KC-135 tankers were mainly used.

13. **Aerospace Surveillance and Reconnaissance/Airborne Early Warning.** E-3 AWACS and E-2C radar planes, E-8 JSTARS ground surveillance planes, RC-135 Rivet joint planes and drones were used in support of 'OPERATON ALLIED FORCE'. They searched the sky and the ground of the enemy, feed targets to pilot and keep allied war planes safely apart. To locate the target and know the enemy position NATO carried out a massive spying in space, in the air and on the ground. The NATO forces exploited unprecedented reconnaissance capabilities. Broad range of sensors was used like photographic and return beam video TV cameras, multi spectral scanner, visible and IR radiometers and microwave synthetic aperture radars.

Technologies Used in the War

14. **New Technologies.** Some of the new technologies, which were put to effective use during the war, are as follows:

a. **Joint Directed Attack Munitions (JDAM).** JDAM is a strap-on GPS guidance kit for the ordinary iron bombs delivered by the modern aircraft. The unexpected bad weather increased reliance than expected on JDAM.

b. **AGM -86C Conventional Air Launched Cruise missile (CALCM).** The US B-52 bombers used CALCM, targeting particularly at air defence nodes in the Serb SAM chain and at command and control centres.

c. **Multilateral Reconnaissance Architecture.** NATO heavily relied upon multi layered reconnaissance architecture in the battle extending from radar imaging and electro-optical imaging spacecraft all the down to unmanned aerial vehicles (UAVs). The Serbs were forced to hold back firing a large number of their medium range SAMs for fear of having all their AD sites located and picked off in the first wave of NATO air strike.

d. **Improved Data Modem and LANTIRN.** Data modem has been fitted on *F-16, the A-10A and certain other combat aircraft, giving the capacity to transmit* targeting data rapidly from intelligence gathering aircraft such as Joint STARS. The biggest single capability improvement in the USAF F-16 fleet since 1991 has been a cluster of modifications centred on cockpit vision goggle compatibility and Land Navigation Targeting Infra Red for Night system and pods that allows pilots to fly and fight 24 hours a day.

e. **Sensor Fused Weapons (SFW)** SFW dispenses sub munitions over a large target area to seek out and destroy individual armour targets.

15. **C^4I^2.** Modern C^4I^2 is the most important contribution that the EM spectrum has made to the conduct of modern warfare. These assets were used for optimum efficiency in force management in fast and fluid combat scenario. The allied forces harnessed data processing and formed a command and control HQ to meet its C^4I^2 needs. Computers were extensively used to handle large amounts of data, its transmission, collation and analysis. It also assisted in military decision. Warfare was increasingly automated.

16. **World Wide Military Command and Control System (WWMCCS).** At the strategic level, the NATO has employed this highly responsive, global, on line data processing and communication network which linked National Military Command and the Pentagon with the forces in the field. Many commands can interact simultaneously and integrate their plans into a composite one.

17. **Sentinel Byte.** It provides automated receipt and dissemination of data and imagery for tactical air forces mission planning. It provides battle intelligence down to wings, both graphically and with images.

18. **Information Warfare.** It was Serbia, after all that initiated "information Warfare" by hacker attacks on NATO's web pages. In contrast, NATO's massive air attacks may have been wasteful, inefficient, and unfocused in terns of this particular enemy in this war. Most military forces do not rely on the intensity and consistency of communications required by the US. On the other hand, NATO's primary target was Serbia's Integrated Air Defence System. The USAF used its nascent information warfare assets to shut down Serb computers used in Command and control of the air defence network.

Command and Control

19. NATO's command structure was compartmented along regional lines and key aspects of the strategic targeting and strike effort were left largely with US control. The US and NATO chains of command remained separated. This affected the unity of command, the tactical operation and faced serious problem in agreeing on and implementing the strategic aspects of the campaign. NATO's political-military command structure played an important role in the planning and the execution of the operation. Despite the overall success of NATO's process, it needs to develop an overarching command-and-control policy and agree on procedures for the policy's implementations.

20. General Wesley K. Clark, the Supreme Allied Commander Europe delegated authority for the implementation of 'OPERATION ALLIED FORCE' to the Commander in Chief of Allied Forces Southern Europe (CINCSOUTH), whose headquarters is in Naples, Italy. CINCSOUTH delegated control of the operation to the Commander, Allied Air Forces Southern Europe, also based in Naples. Operational conduct of day-to-day missions was delegated to the Commander 5th Allied Tactical Air Force, at Vicenza, Italy. Lieutenant General Mike Short was Combined Forces Air Component Commander.

Exploitation of Characteristics of Air power

21. **The Strengths of Air Power.** This operation exhibits both positive and negative use of the air power characteristics. Major strengths and limitations of air power applicable for this operation are discussed below:

a. **Height**. The spectrum of height was effectively used in this operation to reduce attrition. Once it was found that lower height is dangerous due to SAM and AAAs, the attacks were conducted at 15,000 ft or above to remain safe from air defence weapons. Also higher height provided reconnaissance aircraft safe conduct of their operation.

b. **Speed**. Two of the basic principle of height, rapid projection of military power and greater speed allows larger number of mission to be completed within a given period could not be used due to the incremental use of power as decided by the political leader. However, at tactical level, tactics of single pass with high speed reduced the exposure to hostile environment.

c. **Reach**. This was an extraordinary exhibition of the air power strength of reach. In general air-to-air refuel was used through out the operation to increase the reach and carry out attack on the Serbian targets. But the one has given the Americans huge confidence and wonder for others is the missions carried out by the B-2 bombers from the mainland USA crossing the Atlantic and returned safely after carrying out the mission without any landing in between.

22. **Limitations.** Air power limitation cannot be over ruled as a whole but it was overcome by huge resource and technology of the NATO countries. The air-to-air refuel fleet reduced the effect of impermanence. B-2 bombers carried out attack mission from the main land USA to Serbia without making a landing with the help of several air-to-air refueling.

23. **Other Consideration.** The war was very costly due to huge involvement of PGMs to reduce collateral damage and conduct of operation without attrition. Weather was a big hindrance particularly in the beginning. NATO could only operate 15% of the time due low cloud. But the new and improved technology made the victory easy and without mentionable losses.

Critical Analysis

24. **Objectives.** Understanding the following analysis and having a critical look at the salient events of the 'OPERATION ALLIED FORCE' will immensely benefit the future war planners on both the side of an asymmetric war.

25. **Undoubted Success for NATO**. Though there were many omitting and errors in the planning and conducting of the operation, but as a whole it was a clear victory for the NATO. The aim was not to destroy armour, kill troops or to demolish infrastructure but to compel Milosovic's forces to leave Kosovo. This was achieved through precise and careful application of air power. The task was very difficult due to media coverage. The whole operation took place under the public eye-live on world television 24 hours a day. There were no margin for error; the smallest of mistakes would be replayed on the same day in TV. Another challenging requirement was no collateral damage and no allied loss of life but where as enemy were concealed amongst the very people NATO trying to protect. It required surgical accuracy onto extremely demanding targets with last minute political constrains.

26. **Interoperability of Nations.** Undoubtedly the high standard of interoperability of NATO forces made the victory possible. This is no easy commitment; it needs to sacrifice individual efficiency for alliance commonality and combined interoperability. As per General Jumper "Aircraft from 14 countries comes from 41 bases in Europe merged with air to air tankers from different nations, took fuel, formed into distinct, well marshaled packages and went to their assign targets. All returned successfully." Interoperability in air operation means the followings:

a. The ability to air-to-air refuel each other aircraft.

b. The discipline to use standardized words with precise meaning.

c. The use of NATO common brevity operation.

d. The will to share individual nations strength for the greater efficiency of the combined operation.

e. Pooling resources to achieve true synergy.

27. **Asymmetric War.** The mighty USA and her powerful allies in Europe targeted Serbia that is no match to allies. But Serbia proved that an asymmetric war could be made very difficult relying on dispersal and concealment to avoid air attacks. Enemy can use civilians and civilian facilities to shelter in. Most ground force movement occurs too quickly too unpredictably, and too small a set of concentrations, to ensure that air and missile power cannot successfully attack. The targeting of ground forces remains a major problem, and the difficulties posed by weather, they need to operate at standoff ranges. PGMs were made ineffective by fog generator over the target.

28. **NATO as A Single Body.** NATO was formed on 4 April 1949 as a defensive alliance, 12 founder members signed the Washington treaty. This operation brought a success of being together. The nations of NATO did indeed reach consensus to take military action against a dictator and in defence of an oppressed people. This is the most significant facet of 'OPERATION ALLIED FORCE'. This is the very essence of success as an alliance in bringing air power to bear and is the legacy of interoperability that NATO's 50 years training and history has left.

29. **Underlying Strategy.** Apparently 'OPERATION ALLIED FORCE' was launched to stop Milosovic from his military actions and humanitarian disaster in Kosovo. Actually it was to test the new strategic concept of globalization, retention of strategic influence, economic interest of USA and test of high technology weapons. The Chinese considered that the 'OPERATION ALLIED FORCE' is for removing obstacle to NATO's eastward expansion, reducing Russians sphere of influence, and using NATO as a tool for Global Hegemony.

30. **Unique Nature of the Operation Due Political control.** To reduce the collateral damage and keep the attrition minimum, the control of the war was with the political leaders. This adversely affected the outcome of the operation. The operation did not executed generally as an air operation start. The air power was used with gradual increment instead of massive action. The phased concept of operations did not apply principles of military operations such as surprise and the use of overwhelming force, and this cost time, effort, and potentially additional casualty, the net result being that the campaign was undoubtedly prolonged. As such, NATO did not succeed in this initial attempt to coerce Milosovic through air strikes to accept its demands.

31. **Operating Height**. The standard Lo-Lo-Lo attack profile that was used in earlier war to evade radar detection is now virtually out. The very high density and lethality of air defenses specially shoulder fired SAMs and ZU-23 class of air defence SAMs has made low level bombing a prohibitively expensive. So the Allied force was bound to fly higher, preferably at 15000 feet or above. This created difficulty for target acquisition and success rate. So PGMs were the solution making the war very costlier. But PGMs are susceptible to cloud, fog and concealment. Tactical deception made the op even critical. Three NATO bombers were hit and one F-16 crashed with engine failure over Serbia as result of lower height caused by antiaircraft fire.

32. **Merging of Tactical and Strategic Role.** It was clear throughout the war that the traditional distinction between strategic and tactical aircraft had little meaning. Bombers were often used against tactical targets, and strike fighters against strategic targets.

33. **World-Under Hegemony of the Single Super Power.** In the uni-polar world of today and with no real competition to the US in the near future too, the world might end up being a hostage to the hegemonic intent of the US and her allies. With the dwindling status of the UN, the actions of these nations will by and large go unquestioned. Their intervention in the internal matters of sovereign states, in the grab of a humanitarian war, might become the order of the day.

34. **Role of Media.** The way the media influenced the war in Kosovo ushers in a new era where the media will play an increasingly predominant role. Media could cover the Serbian ethnic cleansing so clearly and vividly that they could win world opinion very quickly. Another great role played by it was to keep the alliance of nineteen nations together at all times, the loss of any one of which would have been a disaster. Media, unhesitatingly, can be heralded as the new hero of any campaign won or lost.

35. **Limitation of NATO.** Though the mighty Super Power, and all the NATO developed nations fought the war, still it seemed running short of aircrafts. NATO was not ready to perform EW. Later USA pulled EA-6B EW aircraft from all over the world. As a result it took several weeks to build up the kind of attack and air defense capability NATO needed. Also a problem faced with the NATO aircraft's not having EW compatible equipment.

36. Kosovo showed that modern air and missile power can not secure medium to low altitude for air attacks even against a relatively weak force. It must rely heavily on standoff attacks and unmanned intelligence, targeting and damage assessment system. This raises serious question as to how much Kosovo really says about an air war in which the opponent has more modern surface-to-air missiles, sensors, electronic warfare and battle management systems. If the opponent has a larger and more modern airforce, surface-to-air missiles like Russian S-300 and S-400 series and matching combat electronics.

37. Weather remains a major enemy of air and missile power, in spite of new avionics and sensors. The use of advanced radars, other sensors, GPS-guided weapons, and smart terminal guidance may eventually change this situation. It did not succeed in doing so in this campaign, and the US and NATO may have over relied on laser guided bombs and weapons with limited electro-optical capabilities. A reluctance to take losses and the inability to predict where air defenses are present made the situation even critical. On 07 May NATO bombed the Chinese Embassy mistakenly. This created huge hue and cry and NATO stopped selecting target close to Belgrade.

Tenets of Air Power

38. **Centralized Command and Decentralized Execution**. NATO's command structure worked well, but parallel US and NATO command-and-controls complicated operation planning and unity of command. The sanctity of centralized command and decentralized execution was followed keeping General Wesley Clark as the Supreme Allied Commander Europe (SACFOR) and Lieutenant General Mike Short as Combined Forces Air Component Commander.

39. **Flexibility and Versatility.** 'OPERATION ALLIED FORCE' being a politically controlled operation, there existed very limited scope of flexibility in the hand of military commanders. However, there were examples of flexibility in the tactical level of operation.

40. **Synergistic Effects.** The operation started with incremental use of air power to coerce Milosovic to be complied by UN resolution. As such initially it failed to bring any result. But at the later stage, when sortie rate was increased and number of targets were widen, Yugoslavia did not have any other choice than to accept UN resolution.

41. **Persistence.** NATO remained strict with its aim to oblige Milosovic to abide by he UN resolution. It is the persistence attack by the NATO, which broke the patience of Milosovic and finally his morale collapsed and he accepted the UN resolution 1199.

42. **Concentration.** There was no positive result in initial days in "OPERATION ALLIED FORCE" as the attacks were light and scattered in nature. But once the volume of attacks were increased to average 600 sorties a day from 150 sorties a day in initial days, the impact on the Milosovic was positive. He agreed to accept UN resolution under such pressure.

43. **Priority.** Air assets are not enough even for the super powers that were well proved in this operation. At the later stage of the operation, there was tremendous shortage of PGMs even the production was increased by four times in some of the industries. So target selection as per priority was very important as all the targets are accessible by the air power.

44. **Balance.** Balance between risk involved to carry out a mission and its achievement was quite insignificant, as the allied force did not take any chance to lose an aircraft or human life. But that made the operation extremely costly even for the developed nations.

Application of Principles of Air Power

45. In OPERATION ALLIED FORCE air power was not used as it is suppose to be. It was decided to use incremental force to compel Milosovic to accept UN resolution. Surprise and overwhelming use of force was almost absent. However, important principles affected the operation are discussed below:

a. **Selection and Maintenance of Aim**. The aim of OPERATION ALLIED FORCE was to secure the land of Kosovo from the Serbian security forces and compel president Milosovic to accept the UN resolution. The aim was selected correctly and it was maintained through out the operation. That brought the success of the operation.

b. **Maintenance of Moral.** Morale of the NATO forces was very high because of having modern aircraft, weapon and technology. More so the war conducted with extreme caution to keep the attrition and casualty minimum. The total war saw only two loss of aircraft and the pilots were rescued. There was not a single human casualty in the whole operation. The NATO's Search and Rescue were the best in the world, which positively influenced the morale of the crew.

c. **Offensive Action**. OP Allied Force was basically an offensive action op. All through NATO carried out offensive attacks. On the other hand the Serbian forces were in defensive posture. As such they could not win/sustain the war. As the Napoleon pointed out – “He who remains in his trenches will be beaten”. NATO carried out SEAD mission by ALCM’s and Stealth aircraft and forced the Serbs virtually to remain in the trenches. The Serbs forces could not secure any command of the air.

d. **Economy of Effort**. A reluctant to take losses prolonged the war and made it most uneconomical by air and missile war. Also incremental use of air power contributed to it. At the end NATO ran short of PGMs.

e. **Flexibility.** Though the operation was controlled by the will political leaders', there were lots of scopes to conduct tactical operation by the commanders.

f. **Administration and Cooperation**. NATO enjoyed cooperation form all her allies. And in the op and tactical level commander enjoyed benefit of cooperation. About 19 countries participated and 14 countries gave their aircraft. There were no major problems in this arena as most of the NATO countries are in Europe.

Lessons Learnt

46. "OPERATION ALLIED FORCE" is a recent air operation and as such it left many important lessons for the airmen to be considered while planning and conducting future wars. Some of these lessons are listed below:

a. War now can be decisively won by only applying air power without the help of surface forces.

b. Air commanders of future are to conduct their air operation in front of public eye under direct intervention of political leaders with minimum collateral damage and loss of life.

c. The lethality and density of modern air defences will force all air attacks to be delivered from the mid to high altitude envelope.

d. Coalition or alliance warfare needs a clear decision-making and command chain to implementing strategic bombing and that political decision makers need to be trained to play an effective wartime role in setting policy and making real time decision.

e. Future wars will be fought in form of alliance and asymmetric in nature.

f. Weather remains as a barrier for successful prosecution of air and missile war in spite of new avionics and sensors. Smoke/ cloud is effective degrader for LGBS.

g. Effectiveness of PGMs can be greatly reduced by fog generator, by dispersal, by ECM and by monitoring the satellite movement and putting the emission off.

h. Air and Missile power still faces significant problems in attacking any force that is not forced to mass and fight in ways that expose its target base.

j. In the air and missile war, B-2 bomber, F117A Stealth fighter and cruise missiles have become the debut weapons for any air campaign for the USA.

k. The ability to rapidly differentiate between friend and foe is crucial to the success in multinational airborne operation.

l. PGMs are the weapons of choice for surgical operations to prosecute political will with out loss of life and minimal collateral damage.

Conclusion

47. 'OPERATION ALLIED FORCE' is the only example in the history of air power to win a war absolutely based on air power. It was a war conducted by the military under close control of political leaders. The air campaign that started slowly but gather momentum as it went on became systematically damaging to entire Serbian military infrastructure. The pounding of last week had to have a huge impact on the determination of Milosovic to continue the fight. It had a big impact on the morale of Serbian forces. Desertion was increasing due lack of food, fuel, will, morale and increasing dismay with the leadership. On the other hand it is observed for the first time that an overwhelming superior allied force was stymied by its inability to bomb through clouds, buy its perilously low stocks of smart weaponry and by an enemy whose most effective tactic was to sit tight in the face of intense aerial bombardment and do nothing.

48. NATO won the conflict without a single life lost in combat operation on its own side. It depended heavily on US air power and technology to fight and win a war that took place in the heart of Europe. NATO's command and control was parallel and need an established structure. It also can be called a war of air and missiles due to its heavily dependence on PGMS. Many new technologies were used first time in the war including Boeing JDAM. This operation left many lessons as discussed above for the future commander. The fundamental factor in the conclusion of 'OPERATION ALLIED FORCE' was NATO's unity and resolve. It maintained its aim through out the campaign.

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TOPIC-8

OPERATION 'ENDURING FREEDOM'

Introduction

1. On 11 Sep 01, almost 3000 innocent Americans were killed by suicidal attacks on World Trade Centre and Pentagon. This was an extreme case of terrorism. Immediately thereafter Osama Bin Laden's videotape asserted strong support for the attacks. Al-Qaeda terrorists declared a holy struggle against America. World leaders immediately denounced the attack. Eventually, Operation "ENDURING FREEDOM" started on 07 Oct 01, against international terrorist organisation (Al-Qaeda) and the government that supported them (Taliban).

2. The Operation was an unprecedented combination of massive air power with small numbers of Special Forces and indigenous troops on the ground, (Taliban opposition forces in Afghanistan). By mid December, the operation had achieved its initial goals: Breaking the terrorist friendly Taliban power and eliminating its ability to support and protect the al Qaeda terrorist network. The success of Afghan air campaign came in the face of widespread critics. Afghanistan was viewed as a nation with few traditional infrastructure and military targets hardly valuable to bomb through air power. Unique characteristics of air power and its appropriate exploitation by commanders' eventually performed the monumental task, as such the air campaign in Afghanistan becomes an unique and unprecedented in the history of air power. It was unique because of its first such employment against an enemy; with no geography; no territory and no conventional military hardware. The asymmetry between the opponent is one significant factor which must be kept in mind, while to analysing the air campaign.

Background

3. Before the terrorist attack on the world trade centre, US citizens and installations were also attacked in many occasions. In 07 Aug 98, terrorist bombings struck the United States embassies in Nairobi, and Tanzania, killing about 250 people and wounding more than 5500 others. On retaliation, US cruise missile struck against targets in Sudan and Afghanistan. All these targets were reportedly connected to international terrorist ring run by Osama bin Laden. Bin Laden was also been linked to the 1993 World Trade Centre bombing in New York City and a plot to bomb the US Embassy in Albania in August 98. He may also have been involved in bombings against US military personnel stationed in Saudi Arabia in 1995 and 1996. Thus Osama bin Laden a Saudi descendant is suspected as the mastermind of all these terrorist activities. His terrorist organisation al Qaeda is also alleged for the same. Osama bin Laden was conducting training and controlling the total network from Afghanistan under the patronisation of Taliban leader Mullah Mohammad Omar.

4. The terrorist attack on World Trade Centre and Pentagon was the most intense and horrifying act of terrorism in the history of mankind. Following the attack, US government and world community thus launched an all out war against terrorism. The war in Afghanistan is a prelude to the overall objective of eliminating terrorism.

Air Strategy

5. Coalition.

a. **Objective.** The coalition forces had three immediate military objectives:

(1) To deny Osama Bin Laden and the Al Qaeda network the ability to train overtly in Afghanistan;

(2) To pressurise the Taliban regime to end its support for Osama Bin Laden and Al Qaeda;

(3) To set the conditions for a subsequent military operation to maintain this pressure.

b. **Strategy.** In order to attain the above-mentioned military objectives, the coalition adopted the strategy to capture different airports, Destroy Command and Control centres and Isolate and eliminate Al-Qaeda leadership.

c. **ORBAT.** Four major US Battle Groups were committed to the campaign. There were also arrangements for basing bombers and refuelling planes in Bahrain and Oman. B-52 and B-2 bombers, flying from the USA mainland and the Diego Garcia, were also serviced by tankers flying out of Thailand. Direct military assistance was offered by Australia, Belgium, Britain, Canada, Denmark, France, Germany, Italy, Jordan, the Republic of Korea, the Netherlands, New Zealand, Portugal, Romania, Singapore, Spain, Thailand, Turkey and Ukraine.

6. **Taliban:**

a. **Objective**. The Taliban objective was to keep attrition to minimum from allied air attack and to hold control of Afghanistan.

b. **Strategy**. In consonance with the objective, the Taliban strategy was to protect different administrative centres in major cities and avoid contact to wear down US troops with a protracted hit and run tactics.

c. **ORBAT**. Taliban forces did not have sophisticated military equipment; they were believed to have inherited US Stinger missiles and a range of Russian fighters, fighter bombers, transport helicopters, Cargo planes, surface to air and Scud missiles.

Coalition Command & Control

7. **USA.** US-led military action was under the operational control of General Tommy Franks, Commander in Chief of the Central Command (CENTCOM), headquartered in Tampa, Florida. General Franks is a veteran of both the Vietnam and Gulf wars. Under the CENTCOM are four separate components, of which the Joint Forces Air Component Commander (JFACC) was Lt. Gen Charles Wald. Lt Gen Wald was succeeded by Lt Gen Michael Moseley in mid Nov 01. All air assets assigned to the theatre are controlled by JFACC through Combined Air Operations Centre (CAOC) in the region.

8. **Combined Air Operations Center.** The Combined Air Operation Centre (CAOC) had access to high-bandwidth commercial satellites and served as a collection point for data coming in from all intelligence sources and interpretation points. Because of this CAOC, bombers could be launched and given their target information while en route to a site. This greatly reduced the time required to mount an attack. The CAOC was also able to direct Predator “streaming video” directly into the cockpits of aircraft. In the command centre, The JFACC and its targeters were able to look at imagery coming live from U-2s and at the same time hear specialists at California, interpret the imagery.

Conduct of Air Operations

9. The coalition air campaign is broadly categorised in two major operations:

a. Air strikes focused upon airfields and air defence sites, command and control facilities and terrorist training camps, which can be termed as independent air operations. This also includes Psychological Operations such as dropping of leaflets and broadcasting of radio messages.

b. Once the Taliban air defences had been degraded, strikes on Taliban and al-Qaeda troops were conducted to assist the ground offensive. This phase of operation may be termed as air operation in support of ground forces.

Independent Air Operations

10. Independent air operations were conducted throughout the period, but the main thrust was during 07 Oct 01 to 05 Nov 01. The targets included early warning radars, ground forces, command and control facilities, Al Qaeda infrastructure, airfields and aircrafts. The operation aimed at severely weakening and disrupting Taliban military activity and to reduce threat to US air operations.

11. Navy jets flew 500 miles each way from carriers in the Arabian Sea. Air Force bombers flew six-hour round-trip missions from Diego Garcia and fighter bombers flew from bases in the Persian Gulf. B-2 stealth bombers flew round trips from Missouri, USA. Initially, it was calculated that it might take as long as five months before a ground offensive against Kabul could be launched. But, within only 20 days of air strikes, Northern Alliance forces began their march towards capital, and captured it within next 24 hours. A summary of the first 76 days (07 Oct-23 Dec) of operation is listed in Table 1 below:

Events	Results
Total strike missions	6500 sorties.
Carrier-based aircraft flew	4,900 sorties. (75% of 6500)
Land-based fighters flew	950 sorties. (15% of 6500)
B-1 and B-52 bombers flew	650 sorties. (10% of 6500)
Munitions expended	17,500 pieces.

Table1: Summary of first 76 days air operation

Operation in Support of Ground Forces

12. After the initial achievement of air superiority, air effort was committed to support ground battles. Allied aircraft targeted Taliban troops that stood in the way of ground offensive. They also provided air and logistic support. Besides providing conventional offensive air support missions by various aircraft, they made innovative use of high endurance, slow flying and armoured protected AC-130 Spectre gunships.

13. In order to better support the ground offensive, coalition forces used “flex-targeting” tactics. Geographically, the ground battle area was divided into several engagement zones. Specific air assets were detailed for each zone. Strike fighters and gunships continued round-the-clock patrol on enemy territory and immediately engaged targets as directed by the FAC. In a revolutionary step, US has incorporated hellfire missiles on armed predator in combat. This provided a new dimension in Close air support (CAS).

14. Many such offensive air support operations were conducted throughout the campaign. The weight of these operations increased, as the independent air strikes brought successful results and the environment on ground was conditioned in favour of the coalition. Besides assisting ground offensive, these operations were broadly aimed to achieve the ultimate military objective.

15. Some of the significant ground operations that received widespread media coverage are: Operation Anaconda, Operation Torri, Operation Snipe and Operation Condor. The aim, duration and country involved in this operations are shown on table 2.

Name of Operation	Aim	Country Participated	Duration
Operation Anaconda	To neutralise the al Qaeda and Taliban fighters holed up in the caves and mountains of Shah-I-Kot.	USA	02-18 Mar 02
Operation Snipe	To clear the area before handing it over to allied Afghan forces.	British Commando	29 Apr -14 May 02
Operation Torri	To search and locate Al Qaeda leaders.	Canadian Troops	6 –13 May 02
Operation Condor	To sweep the ground terrain for pockets of Taliban resistances.	Australian Special Forces, British Royal Marine commandos and U.S. air support.	17-24 May 02
Operation Buzzard	To hunt for Taliban leader Mullah Omar.	British Special Force	29 May 02 to present day

Table 2: Significant Ground Operations

16. **Operation Anaconda.** Operation Anaconda was the largest ground offensive of Operation Enduring Freedom. The aim was to neutralise the al Qaeda and Taliban fighters holed up in the caves and mountains of Shah-I-Kot. The Air Force provided airlift of troops into location using MH-47 Chinook and subsequently provided CAS, during the ground attacks. Al Qaeda fighters staged their heaviest counterattack during Operation Anaconda. At one point, two Chinook bringing in support forces were ambushed. Several soldiers from the friendly forces were wounded. Another two Chinooks were brought in immediately for combat SAR operation. However, Taliban forces continued with heavy firing, which caused one of the Chinook to crash resulting in 7 fatalities. The 11 remaining troops of the grounded Chinook continued the ground battle. Due to nightfall, the coalition forces could not bring in further support. The next day, four MH-47 were sent in to rescue the ground troops and recover the 7 dead soldiers. During Operation Anaconda, there were intense resistance from Taliban forces. Coalition ground forces needed strong air support, which was provided by B-52s, AC-130, AH-64, AH-1W, F-15Es and MH-47. Hundreds of al-Qaeda's most experienced fighters and terrorists were killed during the offensive. The base of terrorist operation was destroyed. Anaconda was declared over with the official US estimate of 800 enemy fighters dead during the offensive.

Technological Impact on the Employment of Air Power

17. **General**. Air power operates at the cutting edge of technology. Technology gave the Coalition Forces the mobility, precision and battlefield awareness. In Enduring Freedom, 200 sorties a day hit roughly the same number of targets with 3,000 sorties in Desert Storm. A single aircraft was used to take out two targets on average in Enduring Freedom, while it took 10 aircraft for a single target in Desert Storm. This shows the enormous impact of technology in the Afghan air campaign. Some of the high

technology weaponry used that have influenced the air war were JDAM, Daisy Cutter, Predator, Global Hawk, PGM and real time information flow.

18. **Joint Direct Attack Munitions (JDAM).** The satellite guided JDAM had only been used previously by the B-2 bombers. This war showed a first widespread employment of the JDAM, used by naval and air force fighters and bombers. It improves the accuracy of unguided, general-purpose bombs in any weather condition. At one instant, US Special Forces and Northern Alliance troops were unable to advance north of Kandahar because of mortar fire from Taliban soldiers. US Special Forces called for immediate close air support. A forward air controller located the Taliban position using GPS targeting device and transmitted it to the B-52 aircraft. Within minutes, B-52s dropped 2000 lb JDAM bombs, which broke the Taliban resistance.

19. **Daisy Cutter.** A 15,000 lb bomb known as daisy cutter was used against the caves of Tora Bora. It caused tunnel-collapsing concussion and created an oxygen vacuum. The sudden eruption of the fireball resulting from the bomb's detonation can suck the oxygen out of the air in a radius of 600 feet in all direction. The blast can kill the cave's occupants or cause them to die of asphyxiation. Ground operations against caves are often dangerous and can cause prolong battles. With the use of daisy cutter ammunition during Enduring Freedom, Air Power surmounted the indomitable caves of Tora Bora.

20. **Predator and Global Hawk.** Operation Enduring Freedom saw the first operational use of an armed Predator UAV. It uses an electro-optical infrared camera to pick up images at night and synthetic aperture radar to see objects through clouds. Its sensors can recognize supply dump and identify vehicles smaller than tank. Combined with the use of an armed hellfire missile, the Predator was used to decisively engage the Taliban ground forces. This war also showed the first combat deployment of the Global Hawk UAV. The main advantages over the Predator were its longer endurance and a higher resolution camera. It can loiter above 60,000 feet for excess of 24 hours, having a comparative capability of the manned U-2 recce aircraft. In the Air Campaign against Afghanistan, the Global Hawks were especially successful against emerging targets.

21. **Precision Guided Munitions (PGM)**. More than 72% of the ammunition that the US Air Force dropped during Enduring Freedom first two months was PGM. This includes laser, TV or satellite-guided munitions. These explosives wiped out military bunkers, buildings and barracks. Afghan war reconfirmed that precision weapons possess a near single bomb target destruction capability. On the night of 17 Oct 01, a single PGM successfully destroyed the mosque where Mullah Mohammad Omar started

his Taliban movement. A comparative figures between Operation Allied Force, Operation Desert Storm and Operation Enduring Freedom on the use of PGM is shown in the table below:

Operations	**% of PGM Used**
Operation Desert Storm	9%
Operation Allied Force	35%
Enduring Freedom (first two months)	72%

Table 3: Comparative use of PGM.

22. **Real Time Information Flow**. In the Afghan air campaign, high volume of human intelligence were combined with the take from multiple intelligence, surveillance and reconnaissance sensors to deliver unprecedented situation awareness. Predator video feeds, Global hawk surveillance information and direct input from US Special Operation Forces on the ground improved the Combined Air Operation Centre's (CAOC) ability to track the most immediate tactical threats. The CAOC for Operation Enduring Freedom was wired with as many as 100 T-1 lines, carrying floods of data into and out of the operation centre. It had complete connectivity with all strike platforms, even if they were in the Arabian Sea or in Diego Garcia. Regarding the information flow, Lt Gen Wald commented that "the information available to him in the first days of enduring freedom was equal to the information available to Operation Desert Storm air commander Gen Charles A. Horner after six months of preparation."

Essential Characteristics of Air Power

23. **Height, Speed and Range**. The ability of air platform to operate over a spectrum of height, speed and reach gave the coalition forces the ability to observe and dominate activities on the surface. At the onset of the campaign, four US Navy Battle Groups were projected far in the northern Arabian Sea to launch fighters northward throughout Afghanistan. Additionally, a fleet of B-2s flew record-setting, 44-hour long missions directly from Whiteman AFB, Missouri to bomb targets in Afghanistan. The initial Taliban threat to US aircraft, its integrated air defences, fighters and C2 systems, was eliminated within the first 15 minutes or so. Within thirteen days of the first attack on Afghanistan, virtually all the air defences and early warning systems in the country had been destroyed by air strikes. Air picture over Afghanistan was continuously and accurately provided by the U-2 at height above 80,000 feet, and supplemented by Predator and Global Hawk. Considering the range and the vast area of coverage involved in the operation against the Taliban, the speed at which air superiority was achieved once again demonstrated the ubiquity of Air Power.

24. **Flexibility.** For the first time in combat, B-52s and B-1Bs followed the lead of the B-2s and linked into the net of updated information, to take new target co-ordinates

in real time. Bombers did not have their entire load of weapons designated for fixed targets. Instead, bomber crews headed for their first pre-planned targets and then were on call redirected to other targets. This use of B-52 against emerging targets in a close air support role was transformational, and it illustrates the flexibility and freedom of manoeuvre characteristic of Air Power.

25. **Responsiveness.** The requirement for quick responsive action in the battlefield took on a new dimension in the Afghan air campaign. To degrade the Taliban military effectiveness, a new level of performance in handling time-critical targets was required. Planners in the CAOC blended long-range bombers, land-based fighters and carrier-based aircraft into a force capable of handling emerging targets on demand and 24 hours a day. The CAOC was able to provide real time target information to bombers and fighters en route via voice communication (within 3 mins), exploiting the dimension of responsiveness in employing air power. For the fighters, a standard mission was to take off and fly to an assigned engagement zone. Once on station, the fighters were provided with the most recent information that enabled them to take on pop up targets successfully. A technique that was termed as ‘flex targeting”. This characteristic of responsiveness is unique to air power, and was fully optimised in this campaign.

Adherence to Principles of War

26. Principles of war are a universally recognised general guidance for the employment of forces in war. Historically many nations have been paid heavily for not complying it. Let us examine the Afghan War in terms of principles of war.

27. **Selection and Maintenance of Aim**. Selection and maintenance of aim is the most important principle of war. In the Afghanistan war, a broader strategic aim could have been to eliminate terrorism. Yet, the USA more specifically selected the central aim to deny Osama Bin Laden and the al Qaeda network, the ability to train overtly in Afghanistan. This aim was clearly understood by the military commanders and all efforts were channelled to achieve this aim. Operation Enduring Freedom successfully ousted the Taliban regime, who gave unequivocal support to the al Qaeda fighters. The aim remained focused even at the political level, where all efforts were in place to set up an interim government who would continue to deny Osama Bin Laden and his terrorist network from operating in Afghanistan. By correctly selecting and maintaining the aim throughout, the Coalition Forces were able to conduct a successful campaign.

28. **Concentration of Force.** Maximum possible force should be concentrated at the right time and place to achieve the objective. At the onset of the campaign, two additional battle groups (Roosevelt and Kitty Hawk) were brought into the Arabian Sea to strengthen both the Enterprise and Vinson battle groups. The Coalition Force further projected their air power at various air bases in Pakistan, Czechoslovakia and Diego Garcia. From these air bases, concentrated air attacks were carried out against Taliban

location and military power. Using the advantage of range, B-52 bombers were flown directly into the conflict region (more than 7,000 miles return journey) to concentrate maximum firepower on the enemy. As the battle continued, forward operating bases were established inside the Afghanistan territory. These bases enabled them to concentrate forces in the frontline. Due to the concentrated attack, Taliban lost its military capability within few days and was driven out of Afghanistan in two months.

29. **Surprise.** US-led allied forces successfully exploited the principle of surprise both tactically and technologically. Attack on Taliban forces on 7 Oct 01 2001 was a tactical surprise. At the outset, many critics were suspicious whether airpower could be effective against Afghanistan. Even the Taliban themselves did not expect the Coalition Forces to strike with such a massive concentration of force within three weeks. Furthermore, the Taliban thought them to be invincible due to their terrain features. In particular the Tora Bora Caves, which the Russians had found impenetrable during their disastrous occupation of Afghanistan, which provided the Taliban a sense of apparent security. Employing technology, US Air Force developed the Daisy Cutter bombs against caves, which came as a surprise to the Taliban. The element of surprise, both tactically and technologically, provided the air power with the decisive edge against the Taliban.

30. **Co-operation.** The Army, Navy, Marines, and Air Force had the unprecedented cooperation among the services that has produced much success in this campaign. In the early phase of the battle, most of the fixed targets were quickly neutralised. The focus then shifted to the emerging or pop-up targets, which required real time intelligence and immediate response. Spotters on the ground were able to provide target coordinates directly to the planes overhead, thereby reduced the response time by half. Equally important was the cooperation between nations. In the Afghan war, cooperation with the Northern Alliance was challenging. In the series of Northern Alliance assault, after the fall of Mazar-i-Sharif, the city of Taloqan remained a Taliban stronghold. A well-coordinated attack was crucial. US Special Forces made a thorough planning by night with the Northern Alliance. Together, they made a offensive operation and captured the Taloqan within a day. The excellent coordination and cooperation among the services and nations was the key to Coalition success.

How Commanders Exploited the Air Power

31. President Bush in his 11 Dec 01 speech to the nation said, “No one would ever again doubt the value of strategic air power”. Let us now see how commanders’ exploited the air power in this campaign.

32. **Humanitarian Daily Rations (HDR).** Besides conducting air strikes over Afghanistan, air power was also employed to drop humanitarian aid. Air Force C-17 cargo planes dropped HDRs. By early Dec 01 more than 2.5 million humanitarian daily

rations were dropped successfully. These were dropped from high altitude and initially escorted by fighters. President Bush further announced to send an additional $320 million worth of food and medicine to the region. The provision of HDR by air allowed to gain the confidence of general Afghan mass and a wider support from the Islamic world, which surely contributed in the overall outcome of the campaign.

33. **Diplomatic Effort**. US defence secretary Rumsfeld once said, the fight against terror “undoubtedly will prove to be a lot more like a cold war than a hot war In the cold war it took 50 years. It involved continuous pressure. It involved co-operation by a host of nations”. As a result US continued to gather international support. Washington signed a forces agreement with many countries. US have also secured two Pakistani bases, at Pasni on the Arabian sea and at Jacobabad, where a fleet of US helicopters and marine contingent have been stationed. Turkey, Azerbaijan and Turkmenistan also granted over flight privileges. Former adversaries offered over flight and even basing privileges. Bulgaria played host to dozen KC-135s. The contribution of diplomatic effort in the air campaign could be summarised by quoting a statement of Lt Gen Charles F Wald, “the strategic key to the campaign’s rapid-fire success lay in having an understanding of the culture of the region and maintaining the support of the neighbouring nations and allied parties”.

34. **Hitting the Centre of Gravity.** The US commanders correctly identified the Taliban centre of gravity. American land and sea based aircraft struck key operational elements throughout Afghanistan. The runways, surface to air missiles and gun sites, warning radar, armoured vehicles, and concentration of troops, were considered the keys to the Taliban’s ability to maintain control of Afghanistan. The destruction of appropriately identified enemy centre of gravity helped in the quick fall of Taliban government.

35. **Tie with Taliban Opposition Forces**. As the conflict developed, the US began co-operating with Northern Alliance fighters. provided supply, provisions and CAS. This aid allowed the Northern Alliance fighters to survive attacks from Talibans and in turn capture Kabul, Kunduz and finally Kandahar. US C-17s and C-130s supported troops in forward areas with drops of M-16 and AK-47 ammunition, warm clothes, and boots. One important support was the rescue of Hamid Karzai in mid Nov 01. Karzai and his men were rescued from Taliban ambush by US choppers. This has further assured the Taliban opposition’s support in favour of USA. Good co-ordination between Northern Alliance forces and Coalition air effort brought exemplary result in the total campaign.

36. **Intelligence.** Intelligence gathering was the most vital for the successful air campaign. It was not only emphasised and gathered throughout the campaign, but also

carried out prior to the air operation. Later, once Taliban and al Qaeda forces were hiding in the Tora Bora complex of caves, the B-2, which was earlier withdrawn, returned to Afghanistan, to precisely map the complex of canyons and caves. Again, information from commandos, Taliban cell phone conversations and defectors were further exploited. The intelligence information were such accurate that the ammunition trucks dressed up as civilian vans were blown, but real moving vans were not scratched. The intelligence gathering and the dissemination of real time information contributed large extend on the success of many CAS missions.

37. **Use of Electronics and Media.** After destroying the radar threat US forces used electronic warfare and signals reconnaissance aircraft to jam the enemy's cell phones, or eavesdrop on communications to locate the commanders and al Qaeda fighters. They also broadcast messages to the Afghan people, assuring them that the US was after military targets; the Taliban and al Qaeda, and not prosecuting a war against Afghanistan itself. They also dropped more than 50 million leaflets. This helped to keep the popular opinion in favour of the coalition.

How Commanders Failed to Exploit the Air Power

38. Besides coalition air power's ability to paralyse Taliban air defence, they had serious limitations in the areas of reduction of collateral damage, avoidance of fratricide and economy of effort as discussed below:

c. **Collateral Damage.** Despite an increase use of sophisticated and precision munitions, the coalition had quite a few collateral damages. Pentagon estimates that, till 05 Nov 01, 85% bombs and missiles have hit their targets. That means 450 or more may have gone astray, regularly hitting civilian structures and residential neighbourhoods. Rumsfeld agreed in one instance that, a 450 kg bomb from US F-18 accidentally damaged a hospital in Herat. The US has also acknowledged dropping two 225 kg bombs in residential area near Kabul. On 02 November 2001, US warplanes successfully levelled a target selected by pentagon planners. But it was a Red Cross warehouse – the same one the US had hit by mistake 10 days earlier. Commanders failed to reduce the collateral damage in this campaign.

b. **Fratricide**. The air campaign in Afghanistan saw the use of state of the art technology and superior firepower, but still could not avoid fratricide. On 05 Dec 01, a B-52 dropped 2000 lb Joint Direct Attack Munitions (JDAMs) in response to a request for CAS by army green berets. The bomb hit within 100 yards of US Special Forces and Northern Alliance fighters, killing 3 green berets

and 5 Afghans. A commander's worst nightmare in any war is to have fratricide, which in this campaign could not be avoided.

c. **Lack of Economy of Effort.** Two factors were responsible to keep the target to ordnance delivery ratio higher. Those factors are:

(1) **Lack of Initial Intelligence Information.** Coalitions failure to gather intelligence on the existence or location of certain critical targets was most prominent. They could never locate Bin Laden or Mullah Omar. Although al Qaeda camps in Afghanistan had been hit earlier, not much of the Taliban's order of battle had been established by fall of 2001. A clear picture of Taliban capabilities was not available until a couple of days prior to the initial attacks on 07 Oct 01. U-2 flights in the first days of Oct 01 provided the necessary detail. As such the prime suspects had enough opportunity to go under cover, this directed many of coalitions effort and till to date they remained undetected.

(2). **Emerging Targets.** After all the fixed targets listed were struck, the focus of the operation shifted to what Pentagon called "emerging targets". Many aircraft were sent to areas where targets were expected to pop up but did not. This caused some Navy ac to return with their full load of weapons, which was a misuse of effort. As such, Lt Gen Wald opined that the naval fighters generated many sorties but accounted for a relatively small percentage of munitions on target or total tonnage.

d. **Lack of Decentralised Execution.** All air assets in the campaign were executed by the JFACC through CAOC under the command of CENTCOM. At CAOC the real time picture of the battle space was available through various intelligence means. But the predator UAV's were under the control of CIA who needed to take approval from CENTCOM in the event of engagement. This arrangement was beyond the tenets of air power. On one occasion CIA was controlling a Predator with Hellfires, when the UAV spotted a car and truck convoy transporting Mullah Omar. The Predator operators watched the convoy to halt and Omar and his guards thereafter entered a building. But the CIA needed approval from CENTCOM to fire missiles. By the time they got the approval, the Predator missile hit the parked car and meanwhile Omar's convoy left. The failure was due to lack of decentralised execution.

Analysis of Talibans Weakness

39. The greatest weakness of Taliban's military posture lay in the regime itself. Taliban did not consider air power as an essential element. Taliban's solely depended on the guerrilla strategy. In the absence of any offensive vision, the Taliban leaders were even ill prepared to defend against air attacks. The end results being the quick fall of the regime.

Lessons Learnt

40. Following lessons can be learnt from the Afghan air campaign:

a. Gaining and maintaining the required degree of control of the air is key to any successful conduct of operation. Coalition forces in Afghanistan maintained the control of the air throughout and eventually dominated the campaign. So, it is once again proved that no state will loose a war while it had air superiority.

b. On the contrary, lack of Taliban air power reflected that no defence can sustain itself against an enemy who had air superiority.

c. The enormous close air support provided to the special operation forces at different crucial moment shows that, employment of air power in support of ground forces provides decisive result especially if friendly forces are in danger.

d. Appropriate selection and thereafter destruction of Taliban centre of gravity reflects that, offensive action on enemy's centre of gravity can have far-reaching effect.

e. The repeated use of bombers on the destruction of vital targets shows that air power needs to be employed persistently.

f. The integration of various sources for real time intelligence gathering by coalition forces highlights that, intelligence is vital for any successful operation.

d. Failure to take on Mullah Omar re-emphasises that, air power assets should be decentralised for effective execution.

e. The successful use of modern and high-tech weapon systems and equipment by coalition forces shows that, technological achievement can have a major impact on the warfare.

j. Afghan air campaign proved that air power can be effectively employed in Counter-Terrorism Warfare.

Conclusion

41. The result of Afghan air campaign reminds us the famous remarks made by former USAF Chief of Staff after Gulf War, " airmen may or may not be decisive; they will surely be indispensable." It is indeed proved once again in the formidable terrain of Great Afghans. Air power was successfully utilised in the Afghan war by the Coalition forces. The inherent characteristics of air power exercised during the Operation Enduring Freedom through force projection and force multiplication glorified the air power as a global power with global reach.Technology influenced the conduct of war in such a fashion that air power, technology, and principles of war become interrelated and inter-activated. Introduction of JDAM, armed UAV with PGM made a significant shift of concept of air strategy on effects versus destruction. The integration and distribution of information through RPV's, U2's and E-8 JSTARS provided the coalition absolute superiority over the Taliban Forces.

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TOPIC-9

OPERATION 'SHOCK AND AWE'

Introduction

1. In the history of armed conflict, there are very few conflicts that would match up to the recent operations in Iraq in terms of the employment of aerospace power and impact of technology. The operation though widely criticized for its political objectives or lack of it can be termed a technology demonstrator as far as new concepts and new war fighting techniques are concerned. The operation was popularly known as OP SHOCK AND AWE, especially during the planning and initial phases of execution though officially the Americans termed it as Operation Iraqi Freedom (OIF). The name of this Operation for the British troops was Operation Telic and the Australians called it Operation Falconer. The name 'Shock and Awe'[xii] came about since the operations were planned to be executed in accordance with the doctrine of Rapid Dominance developed by Mr Harlan K Ullman and Mr James P Wade. This doctrine was formulated in September1996 in the form of a paper for the National Defence University, USA and the authors named it 'Shock and Awe'. During the later phases of the operation, the term 'Shock and Awe' was used less frequently, and OIF was a more commonly used term. Though the operation is officially not yet over, considering that the coalition forces have not yet withdrawn from Iraq, what remains is probably the administrative aspects of the operation.

2. OIF was lauded for being extremely "joint," with conventional ground forces playing a role more prominent than had been seen in years. The war's daily progress tended to be measured on the ground. Newly "embedded" TV crews produced riveting footage of American soldiers and marines taking fire and shooting back. By contrast, coverage of the air war was rare. Even so, this was an airpower war. Pre-war planning fine-tuned air and ground coordination mechanisms from the tactical to the operational level, all to produce the optimum level of joint firepower. Credit goes to the joint and coalition force for a stunning operation. However, it was the recent developments in airpower that put in place the entire framework for victory.

3. The air war is significant in the history of warfare since it was a unique operation in more ways than one:

a. It was an unequal war with the sole superpower in the world along with an erstwhile superpower pitted against a weak developing nation.

b. It was a war that displayed true joint ness in operations and the synergy that is created by jointmanship.

c. It was a war in which technology played such a key role in operations and the conduct of operations saw a paradigm shift from mere power projection or brute force to effect based operations.

4. Study of any war is of relevance to us as men in uniform. However, this war presents a wide spectrum of aerospace related factors, the study and analysis of which would provide excellent nourishment. The air operation marks a new era in war fighting with new concepts being tried and tested by the allied forces. The war can also be considered a technology demonstrator considering the fact that the Iraqi opposition was almost non-existent and the Allied forces utilised the operation as a launch pad to test and validate their new war fighting potential.

BACKGROUND

5. Post 'Desert Storm', after the expulsion of Iraqi forces from Kuwait in 1991, UN resolutions imposed strict conditions on Iraq in order to remove the threat Saddam Hussein's regime posed to neighbouring countries. These included the destruction, removal or rendering useless of Iraq's Weapons of Mass Destruction (WMDs) under the supervision of inspectors from the UN and the International Atomic Energy Authority (IAEA). Iraq was not cooperating with the inspection regime.

6. On 11 Sep 2001, the world witnessed one of the most daring and outrageous terrorist strikes when the twin towers of the World Trade Centre came crashing down. This added to the insecurity of the already paranoid Americans and a war against terror was declared by President Bush. Against the background of this war against terrorism, it was argued that Iraq possessed Weapons of Mass Destruction and these were perceived as a threat by the western countries.

7. One year later, UN Security Council Resolution (UNSCR) 1441 was unanimously adopted, declaring Iraq to be in material breach of previous resolutions, and setting out new procedures for the conduct of inspections. The resolution provided a final opportunity for Iraq to comply with its disarmament obligations. However, reports by inspectors from the UN and the IAEA showed clearly that not only was Iraq failing to offer active co-op but it was engaged in a systematic pattern of concealment and deceit.

8. On 24 February 2003, the UK, the US and Spain tabled a draft resolution, making it clear that Iraq had failed to take the opportunity provided in UNSCR 1441. Despite significant diplomatic efforts, it was reluctantly concluded that a Security Council consensus on this new resolution would not be possible. Faced with continuing Iraqi intransigence, coalition forces commenced military ops against the Saddam Hussein regime on the night of 19 March 2003.

MILITARY OBJECTIVES AND STRATEGY

Military Objective

9. The military objective of the coalition forces were as follows:

a. Defeat or compel capitulation of Iraqi forces.

b. Neutralize regime leadership.

c. Neutralize Iraqi TBM / WMD delivery systems.

d. Control WMD infrastructure.

e. Ensure the territorial integrity of Iraq.

f. Deploy and posture necessary forces for post-hostility and humanitarian assistance ops for the Iraqi people.

g. Set military conditions for provisional/permanent government to assume power.

h. Maintain international and regional support.

j. Neutralize Iraqi regime's C2 & security forces.

k. Gain and maintain air, maritime and space supremacy.

Air Strategy

10. To achieve the military objectives, air campaign planners formulated the Air Strategy as follows:

a. Break the 'Will' of the Iraqi regime and people through Shock and Awe ops.

b. Maintain Air and Space Supremacy.

c. Destroy Iraqi military's ability to control the movement of its ground forces.

d. Prevent Iraqi effort to employ WMD/TBM.

e. Provide Close Air Support to coalition ground forces.

f. Support CFMCC to Maintain Maritime Supremacy.

Iraq's Objective and Strategy

11. The Iraqi regime's overall defensive plan for Baghdad is unclear because it failed so quickly that it is not possible to fully characterize Iraqi intentions. Since available information does not in any way indicate Iraq's objectives or strategy, it would not be possible to spell out the same in this paper.

AIR CAMPAIGN PLANNING

Planning

12. The planning for the operation was done in US CENTAF in Florida. The plan evolved over time, and was sufficiently flexible to respond to changing circumstances. Since coalition aim was to achieve Iraqi compliance by diplomatic means if possible, it was not certain when actually the operation would take place. Despite these variables, the essence of the plan remained consistent, with the focus on mounting a rapid, synchronised and precise campaign to overwhelm Saddam Hussein's regime and its security forces and minimise the risk of civilian casualty or damage to Iraq's essential services.

Early Preparations

13. Support diplomacy while preparing to use force if that diplomacy failed, presented difficult choices and required a fine balance to be struck. US did not wish to prejudice the UN process by making overt military preparations too soon. In late November 2002, an initial assessment of the possible requirement for reservists, the need for additional mil equipment and specific modifications was reviewed. Further preparations included approaching the shipping market in mid-December to tender for transport vessels, and improving the readiness of troops by undertaking specific training and reducing the NTM of some units.

Intelligence

14. Intelligence played a vital role in planning the coalition's air campaign. Assessments of Iraq's military capability depended on intelligence gathered over more than a decade of surveillance and containment. Tactical intelligence from a wide diversity of technical and other sources played an invaluable part in the campaign itself. Modern Intelligence Surveillance and Reconnaissance assets helped to provide urban situational awareness.

Target Selection

15. Planning for the air campaign included the development of a list of potential targets that would help the coalition to achieve its overall objectives. Over 900 potential targets areas were identified in advance. All targets were derived from the campaign plan and were selected to achieve a particular military effect. Coalition had to take legal advice before finalising the target to comply with international humanitarian law. Extensive scientific support included detailed computer modelling was used in assessing potential targets.

Media

16. Coalitions had to take the media into consideration for planning the operation. The operations in Iraq attracted unprecedented levels of media interest, both at home and across the world. Building on the experience gained in previous conflicts, the coalition had a system of accredited war correspondents. Some 700 journalists were “embedded” with coalition forces. The planning aspects of the operation even included the indoctrination of these war correspondents.

Command & Control

17. Command & Control (C2) played the nerve role to execute such a huge air operation. CENTCOM HQs was established at Tampa, Florida whereas the national command remained at Washington. General Tommy Franks was the Commander in Chief CENTCOM and coalition forces. Lieutenant General T Micheal Moselay was the Coalition Force Air Component Commander (CFACC). The Combined Air Operations Centre (CAOC) was established in Saudi Arabia. The coordination between these HQs was possible due to real time flow of info by satellites, GPS and data link through fibre optics. The key factor of the war was the ability to exercise joint command over all the coalition services, and allied forces, at distances as great as 7,000 miles.

CONDUCT OF AIR OPS

The Initial Thrust

18. The air operations were conducted under the code name of ‘Iraqi Freedom’. ‘D’ day of the operations was on 19 Mar 2003 and the operations continued up to 08 Apr 2003. It was not until the night of March 21-22 that the full force of coalition air power would rain down on Baghdad. On the very first night, coalition aimed to shock the Iraqi C2. The numbers tells the story of the massive air assault on Baghdad throughout the night. The coalition launched 600 cruise missile and flew 1500 missions over the night. 700 strike aircraft hit approximately 1000 targets. The reach

of coalition air power can be understood by the bases from which its aircraft were launched. The missions covered full spectrum of air operations ranging from offensive counter air to strategic air offensive campaign. No defensive counter air operations missions were flown as Iraq could not get a single sortie airborne.

Destruction of Iraqi C2

19. In the next three days there was distinct change in targeting from the first day. In this period, Iraqi forces managed to fire a few SAMs but none with tracking radar. Iraq also managed to fire a ballistic missile which was successfully intercepted by a patriot battery. More number (800) of strike sorties were flown but numbers of pre-planned targets were dropped by nearly fifty percent. The number of cruise missiles fired, dropped by nearly one third. Sorties were allotted in the air to support ground forces in contact with Iraqi forces. These targets were provided by JSTARS. From the 25th March 2003 onward a dust storm or 'Shamal', started to blow which gave Saddam and his associates an opportunity to move his ground forces to engage coalition troops. Throughout the three days of 'Shamal' JSTARS and long range UAVs watched the Iraqi troops and coalition aircrafts struck Iraqi forces as they were deployed to attack marines and soldiers on the ground. The number of sorties flown in this period is approximately 6000 and most of them were for destroying Iraqi C2.

CAS to Ground Troops

20. After the 'Shamal', as coalition forces closed in to Baghdad, the air campaign shifted its focus to support ground troops. Two thirds of strike sorties now targeted The Republican Guards or the Fedayeen. By the first week of April 2003 coalition devoted 85 percent air effort to support ground forces. As coalition ground forces approached Baghdad, the air and ground forces merged into a single, conjoined force. Even though the emphasis of the air campaign was on support ground forces, air strike continued to knock out C2 centres in Baghdad. On 07 April 2003 a bunker buster bomb was dropped from 20000 feet over a location suspected to house Saddam Hussain. The message was clear and on 08 April 2003 air operations stopped.

APPLICATION OF AIR AND SPACE POWER

Air Power

21. **Strategic Air Op**. The coalition air operation started on 19 March 2003. Two F-117 aircraft armed with 4 x EGBU -27 and 40 Tomahawk Land Attack Missiles were used in a dawn attack targeting Iraq's top leadership at 05:34 hours Baghdad time on 20 March 2003. The main blow of the Strategic Air Operations was delivered on the night of 21 March, when hundreds of Coalition aircraft and cruise missiles targeted leadership, command and control structures and other military targets in Baghdad and other various cities. On 21 Mar 2003, the coalition launched

about 500 cruise missiles and 1700 attack sorties by 700 attack aircraft against 1000 targets by precision weapons. B-52 bombers, B-2 stealth bombers and F-117 stealth fighter-bombers along with Tomahawk cruise missiles continued to attack the targets across Iraq during the following days. The attacks were so precise that the electricity never went off in Baghdad throughout the war, collateral damages were min and only the leadership was isolated. During the war, about 20,000 PGMs were used mainly for Strategic Air Operations.

22. **Offensive Counter Air Operations**. Certain aspects of Offensive Counter Air operations are discussed below.

a. **SEAD**. The Iraqi Air Defence capability was reduced considerably during the 12 years war of attrition. However, towards the beginning of the air campaign, SEAD missions were given due priority. In total about 2500 sorties were flown to suppress and destroy Iraqi Air Defence and SAMs. F-15E, EA-6B, C-130 and F-117s were used for this purpose. The United States alone fired more then 400 AGM-88 high-speed anti-radiation missile in SEAD missions. The SEAD missions were so effective that the Iraqi's were afraid to switch on their radars even for launching SAMs. To neutralize the AA guns, coalition used the target drone to attract the attention and when the guns started firing at the drones, the F-117 flying in the darkness above destroyed it using their precision weapons. The SEAD missions reduced considerably after 23 March 2003.

b. **Air Field Attack**. The 'No fly zone' imposed after the Gulf war 1991 allowed coalition to utilize their ISR aircraft along with the 'Recreational Bombing' by the Tornados and F-15s to keep most of the military airfields non operational. However, during the initial phase of the war the Iraqi airfields were targeted with precision weapons and subsequently captured by the ground force which was later used as Forward Operating Base (FOB) for the coalition.

c. **Ballistic and Cruise Missile Launch Site**. During Operation shock and awe, the Iraqi's were able to fire only six of their Ababil -100 tactical ballistic missile on the night of 20 March 2003. The intelligence gathered before and during the conflict allowed coalition to destroy missile sites at the very beginning and after that night the Iraqi's could not fire any Ballistic Missiles.

23. **Air Interdiction & CAS**. The first air attack over Baghdad was on 19 March 2003 but the main air punch was on 21 March 2003 because on 22 March the coalition air power was utilized to assist the ground forces beginning their move inside Iraq. This supports the concept of shock and awe, which is not only about

using air power to create shock but allow rapid dominance as a whole. The OCAO during the initial phase of the operation allowed the Coalition to leap from air supremacy to total air dominance over Iraq and after three days of Strategic and OCAO, the air power priority was shifted to AI and CAS. The coalition flew the majority of the mission for AI and CAS totalling about 15,600 missions which is about 78% of the total mission with an apportionment of about 51%. This happened because the versatile airpower was employed to such an extent and tempo that the strategic portion of the air campaign crossed the limit of different areas. It was airpower which created a conducive ground battle environment and the coalition ground forces encountered burning tanks and artillery pieces rather then engaging them.

24. **Combat Support Air Operation**. Shock and Awe was not all about blind offensive operations. To effectively deliver the required concentration of shock and awe, combat support air operations played a crucial role. Some of the facets of support operations are discussed below.

a. **Air to Air Refuelling**. Tankers were the backbone of the coalition operation. The only asset considered inadequate was the tankers despite having 268 tankers for air to air refuelling. During the operation, the total tanker sorties flown were about 10,000 whereas the fighter sorties were 20,000.The coalition tanker forces included KC-1, KC-10, KC-130 and KC-135s from US Air Force, Navy, Marine Corp and Royal Air Force. Despite such a huge air to air refuelling effort, one interesting aspect of their missions is that a shortage of refuelling tankers forced two-thirds of the F-117 missions flown during the first major night of strikes to cancel their mission before they launched their weapons.

b. **CSAR**. During the operation coalition air planners agreed to put a certain number of aircraft “on call”. This arrangement was made to rescue personnel or isolated reconnaissance patrol which got trapped behind enemy lines during the early stage of the fight. The CSAR operation during the operation was the largest joint CSAR in history involving 191 rescue missions by 72 aircraft and saving 73 personnel. The rescue missions were coordinated by Joint SAR centre.

c. **Air Mobility**. Air mobility dominated the entire operation of the coalition force right from the beginning. A total of 466,985 personnel of active, guard and reserve were air deployed from all over the world together with cargo and weapons. The air mobility operation became even critical when Turkey refused basing and over fly facilities for the coalition force for waging attack in Iraq. However, the global reach of the USAF made it possible utilizing the strategic and tactical air lifter and flying about 7500 sorties by about 150 aircraft during the operation.

Space Power

25. **Space Operation**. Space power acted as a critical force multiplier for coalition forces. More than 50 satellites in the space supported the operations in Iraq. Space provided a wide range of intelligence, targeting, and battle damage assessment capabilities. Space Satellites monitored infrared flashes to provide early warning of Iraqi missile attacks. It was the key to effective command and control and connected global military communications. It allowed timely transfer of targeting information to air, land and sea forces and offered a near real time assessment of the battle area. In addition GPS played a very vital role in the overall conduct of the entire operation. It provided guidance for the weapon, navigation information for the aircraft and most importantly formed one of the basic elements of the Network Centric warfare.

ANALYSIS OF AIR OPERATIONS

New War Fighting Concepts

26. **Rapid Dominance**. The operation Shock and Awe is all about Rapid Dominance in all the spheres of warfare. The concept includes four Core Characteristics. These are as follows:

a. **Knowledge**. Rapid Dominance requires maximum knowledge of the environment, the adversary, and own forces on political, strategic, economic and military/operational levels. A good situational awareness and operational intelligence is the key to Rapid Dominance. Superior air and space technology allowed the coalition force to acquire the required knowledge for rapid dominance.

b. **Rapidity**. Rapid Dominance must have capabilities that can be applied swiftly and relatively faster than the enemy. Rapidity must be achieved in the sense of time and space. The inherent strength of height, speed and reach integrated with the highly mobile and lightly armed land force of the coalition was designed for rapidity.

c. **Environment**. Rapid Dominance seeks to achieve total control of the environment in terms of 'signature management' of both friendly and enemy's information and intelligence to deceive, disguise, and misinform the enemy. The coalition achieved total control of the environment even before the beginning of the war due to the technical superiority over Iraq.

d. **Brilliance/ Intensity**. Rapid Dominance aims to achieve new level of operational competency and intensity by empowering individual soldiers, sailors and airmen to direct and apply crucial and decisive force which was evident during the entire operation.

27. **EBO**. The operation shock and awe was aimed at creating an overwhelming effect so that the adversaries understand that there was no alternate other then to fight and die or surrender. In this operation all the components of effect based operation was applied. The effect based strategy, effect based planning, effect based targeting and effect based operation all were intended to paralyze the Iraqi regime and their supporter while limiting the collateral damage and mass destruction. During the operation shock and awe the CENTCOM had about 50,000 targets and the effect sought through the use of air power i.e. whether the target to be destroyed or neutralized. For example, during the Operation none of the bridges around Baghdad were destroyed but to deny their use by Iraqis the approach and the crossing points were attacked.

28. **Time Sensitive Targets (TST)**. Time Sensitive targets are the high value mobile targets, neutralising which within a specified timeframe, is of prime importance for the achievement of overall strategy. During this op a Time Sensitive Target cell in the (CAOC) was established to “find, fix, track, target, attack assess damage. The cell also integrated time sensitive operation with other operations. It helped to plan the rapid strikes on Saddam Hussein and the Iraqi leadership on March19 and April 7th. Besides leadership, other TST like terrorists and WMD were also attacked and the coalition flew total 156 TST missions across Iraq.

29. **Network Centric Warfare**. 'Net-centricity' played the most important role in the entire operation starting from day one. A complex setup of most of the aircraft in the air, UAVs, sensors in the space and even the army units on the ground were linked to the CAOC through a high speed network. This allowed commanders who were even outside theatre to have real time image and control the events on the battle or redirect aircraft to a higher priority task. Similarly the Blue Force Trackers, a GPS tracking devise for the army units gave the location and identification to the CAOC every 2-5 min, improved the capability and reduced the risk of friendly fire. It also increased the situational awareness and allowed the commanders a smaller OODA loop.

30. **Embedded Press**. For the first time in the history people saw live telecast directly from the battlefield as the war was being fought. It was a very big propaganda machine and an important tool for the information warfare. During the operation about 600 journalists from American and international news agencies were embedded in the coalition military units. These embedded journalists traveled with the soldiers, saw what the soldiers saw and were under fire when the troops were under fire. They brought live televised coverage of the war into the living room around the world. The embedded journalism was important in a number of ways apart from being a psychological warfare instrument; they proved the claims about what was happening in the battlefield, the advance of the coalition troops, the effect of the precision weapons and were especially important to counter the claims of Iraqi information Minister during the operation.

Tactics

31. Coalition force developed many tactics taking lessons from the OPERATION DESERT STORM and OPERATION ENDURING FREEDOM. Moreover, to fight the new war fighting concept innovations in the field of tactics paid dividend in achieving Shock and Awe. The tactics are :

a. **Changes in Air Combat Packages.** It was clear from the operation that substantially fewer air defense and electronic warfare escorts were needed and that the number of electronic intelligence aircraft dedicated to given packages could be reduced because of superior netting, intelligence platforms, and multipurpose aircraft. On the other hand, there are some indications that the number of refuelling missions went up because Coalition aircraft had fewer bases near Kuwait, flew longer mission distances, and loitered longer.

b. **Attack Profile**. Addition of GPS guidance and improved reliability allowed coalition force to be much more accurate and to fly a much wider range of attack profiles. The profiles flown were designed to stay out of enemy ground defences without compromising on accuracy. With modern technology available with the coalition Air Forces, most of the attacks were with adequate stand off capability.

c. **Change in Role of the Bomber**. The change in the role of bombers is considered as change in the tactics. B-1, B-2, and B-52 all used as a precision strike system with stealth penetration or stand-off delivery capability to hit large numbers of targets with precision weapons in a single sortie.

d. **Urban Close Air Support**. A variety of UAVs were used for surveillance and targeting, including the Predator and highflying Global Hawk. CAS missions in the urban area required precision weapons and correct profiles to be flown to minimise collateral damage.

Technologies

32. Coalition's success in achieving Shock and awe effect was largely contributed by their overwhelming superiority in modern technologies. A few of the technologies those were used in Operation Iraqi Freedom are as follows:

a. **Stealth**. Both the B-2 and F-117 played an important role in the Iraq War. For example, the 12F-117 stealth strike fighters based at Al Udeid Air Base in Qatar flew 80% of the roughly 17,000–20,000 sorties classified as strike missions. While the numbers were limited, all of those missions were against heavily defended targets in the greater Baghdad area and struck at key targets like the air defenses, important headquarters, and radio relay stations.

b. **JDAM.** The Joint Direct Attack Munition (JDAM) is a conventional dumb bomb fitted with a tail kit. Since it was developed to meet both USAF and Navy needs, the prefix 'Joint' is given to the munition. The tail kit with Inertial Navigation and Global Positioning System (INGPS) guidance has converted the dumb bomb into an accurate weapon with all-weather capability. The 1,000-pound variant of JDAM is designated the GBU-31, and the 2,000-pound version of the JDAM is designated the GBU-32. JDAM variants for the Mk-80 250-pound and Mk-81 500-pound bombs are designated GBU-29 and GBU-30, respectively.

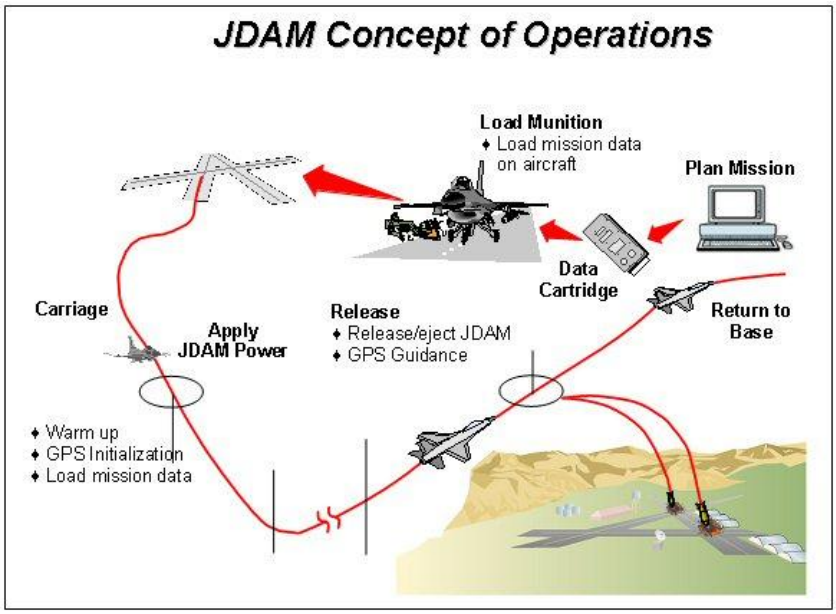

Figure 3: JDAM Concept of Operations

c. **ISR**. During the 21 days operation of the 1,801 aircraft used 80 aircraft were dedicated to the ISR mission. They included RQ-1 Predator and RQ-4 Global Hawk UAVs, EP-3, P-3C "Orion", U-2, E-8C Joint Surveillance Target and Radar System (JSTARS), and RC-135 "Rivet Joint" (collecting signals intelligence) aircraft, to name a few. They flew approximately 1,000 sorties and collected 3,200 hours of streaming video, 2,400 hours of SIGINT, and 42,000 battlefield images.

d. **PGM**. During the operation 68 Per Cent of the munitions used were PGM. Out of the 19948 PGMs expended in OIF, 8382 were LGBs, 1737 were HELLFIRE, JSOW, MAVERICK missiles, 408 were ARMs and 958 were cruise missiles. Use of PGM was quite effective in reducing collateral damages, especially while attacking targets around the crowded area of Baghdad.

e. **GPS Jammers and Countermeasures**. First time in the operation an endeavour had been made by the Iraqi to jam the coalition GPS, which was a technological breakthrough. Iraq had at least four jammers designed to jam the Coalition GPS system, these seem to have been destroyed early in the war and to have had little operational effectiveness. According to one

press report, the jammers were successfully attacked by B-1Bs and F-117s; at least some seem to have been attacked with GPS- guided weapons. The very fact such jammers existed, however, is a warning that eventually there is a countermeasure to virtually every tactic and technology.

f. **Unmanned Aerial Vehicles (UAVs)**. The Coalition used more than a dozen types of UAVs in the conflict, building on the U.S. success in using such systems in Afghanistan. In the Iraq War, the Coalition made use of new tactical systems like the U.S. Army Hunter and Shadow, the Marine Corp's Dragon Eye, and the USAF Force Protection Surveillance System. The change was particularly important in the case of field commanders, who had only one type of UAV available in the Gulf War but had 10 types available in the Iraq War.

Analysis on Air Power Characteristics

33. **Shock Effect**. A combination of nationwide air and missile strikes and the speed and scale of the Coalition land advance certainly had a powerful psychological impact on Iraqi forces and the Iraqi regime. The regime clearly was never able to respond coherently to the Coalition attack—the shock of airpower led many Iraqi units to disintegrate or largely avoid combat, and the shock of the land advance and initial land operations in the greater Baghdad area helped lead to the collapse of any last efforts at urban warfare.

34. **Flexibility /Versatility**. There were many instances where the Flexibility the characteristics of air power were exploited in OIF by the coalition forces. After the first few days of air operations, strike aircraft would get airborne without any specific pre-planned target. These aircraft provided a great amount of flexibility to the air commanders to utilize them depending on the emerging air and ground situation. For example a B-1 would be orbiting with weapons available. Based on inputs from the JSTARS, coordinates for a new "priority leadership target" in Baghdad would be passed to the aircraft. With SAM killing F-16CJs patrolling nearby and EA-6B Prowlers along to jam air defences, the bomber would move in to drop its JDAMS on the new target.

35. **Mobility**. A truly strategic use of airpower came from mobility forces. Active, Guard and Reserve airmen joined forces to support a rapid global set-up for the campaign and keep it functioning. Once again, early preparations paid off. Airlift put people and supplies in place so the President could act when he wanted to, without going through a mobilization effort. With the Coalition members shifting right up until the last moment, it was up to the Air Force's mobility troops to move cargo, weapons, and personnel to sustain the fight. Tankers and air lifters accounted for 56 percent of the Air Force's 24,196 sorties flown from March 19 through April 18, 2003.

The Air Force flew 7,413 airlift sorties for OIF. That included globe-spanning airlift missions controlled by the Tanker and Airlift Control Center at Scott AFB and in-theatre missions, flown mainly by C-130s.

36. **Responsiveness.** Air power is highly responsive. It can be deployed or redeployed as part of diplomatic initiatives. In war, aircraft can be redirected to respond to sudden changes in circumstances, on widely dispersed front, to synchronize firepower and complement the manoeuvre of surface forces. In all, the coalition claimed to have struck 156 true TSTs and another 686 "dynamic" targets. It was a display of strategic airpower at a level of precision and responsiveness that could scarcely have been imagined only a decade earlier. Instead of delivering a massive blow, the air component provided rapid response to meet the commander's intent. It was possible due to higher speed, range and payload capabilities of the coalition ac. B-1B ac carried out this task for the coalition.

Failure/Weak Areas of Allied Forces

37. **General**. As the period of active hostilities progressed, the United States military continued to target members of the Iraqi leadership in so-called "decapitation strikes," or strikes against high value military targets thought to bring about a swift end to the war as to conform with the Rapid Dominance concept. During the war, the United States launched fifty attacks against Iraqi leadership. None of these attacks resulted in the capture or death of the 55 "most wanted" from the Baathist leadership. Instead, these attacks resulted in dozens of preventable civilian deaths. Moreover, coalition flawed in BDA, Intelligence gathering, Fratricide and finally achieving the Shock and Awe. The failures of the Coalition are discussed below :

a. **Targeting**. In attempting to kill or capture members of the Iraqi leadership, the coalition forces utilised faulty methods of targeting. This directly contributed to the number of civilian deaths that occurred during these futile attacks. The main method by which Iraqi government officials were targeted was through their use of satellite phones. However the GPS system of the satellite telephones is accurate within a 100 meter radius. Such inaccuracies in targeting especially in densely populated areas are not desirable.

b. **Intelligence**. The operation, despite its much success, showed classic limitations in intelligence. The intelligence report claiming the presence of WMDs which was the genesis to the entire operations itself proved incorrect. Thereby wrongly WMD sites were targeted. Though the coalition forces had technologically superior intelligence gathering assets, HUMINT remained a major weak area in the operations.

. **Fratricide.** During 1991 Gulf War no cruise missile, small airplane, or UAV threats existed. Thus, coalition air forces could afford to establish highly restrictive ROE, which effectively shut down patriot batteries against everything but the ballistic missile threat. This in turn, prevented friendly fire accidents from occurring. But because a cruise missile and UAV threat had materialised by the time of second Gulf War, comparably narrow ROE were apparently not implemented. As a consequence, an American Patriot unit inadvertently shot down a British Tornado fighter three days into the war, killing two crew members. The next day, to avoid the same fate, a USAF F-16 destroyed a patriot ground-based radar after it mistakenly painted the friendly aircraft. In spite of efforts to tailor patriot ROE after these incidents, yet another friendly aircraft, a US Navy F/A-18, was shot down and its pilot killed on 2nd April.

38. **Failure in application of Shock and Awe**. For various reasons, the much hyped 'Shock and Awe' operations did not produce the anticipated results. As per the proponent of the shock and awe doctrine Mr Ullman, the operation produced far less shock and was half as awesome as it ought to be. The reasons were as follows:

a. Shock and Awe to be effective, needs to be applied whole-heartedly. In OIF, the application of dominant manoeuvres was a half hearted effort, primarily due to fear of hurting global sentiments.

b. Critical targets were not hit on many occasions due to fear of collateral damage. This was especially so when the warfare moved into the city of Baghdad.

c. Even with restricted targeting, the coalition forces inflicted some damage to civilian population which in fact turned the tide against them. Instead of breaking the will of the opponents, it ended up strengthening the Iraqi resolve to fight the intruders.

Failure/Weak Areas of Iraqi Forces

39. Many of the lessons regarding Iraqi failures have already been discussed in talking about the advantage of US and British forces. Iraq's military faults are virtually the reverse image of US and British military capabilities. There are, however, some lessons that are worth mentioning:

a. **Popular Support**. There was almost no evidence of broad popular support for Saddam Hussein, although the Iraqis scarcely showed an overwhelming welcome to US and British forces. This meant that Saddam could not develop a popular defence of Baghdad, and his cadres could only fight in scattered areas and without cohesion and coordination. The regular army showed far less commitment to the regime than the Republican Guards.

b. **Compartmental Forces.** Iraq's overlapping structure of forces and security elements were often better at watching each other and securing the regime than fighting. There was little coordination except at the local level, and command and control could not direct cohesive action.

c. **Ineffective Command and Control.** It is unclear just how much of the Iraqi collapse was the result of attacks on its C4ISR assets. Iraq was driven out of balance by the speed of US manoeuvre. Once the US approached Baghdad its decision-making cycle fell steadily behind the realities on the ground. By the time the US entered Baghdad, it had lost force cohesion and committed its best forces, the Republican Guards, in a piecemeal way in meeting engagements that virtually ensured its destruction.

d. **A Blind Force As Well As One Without a Brain**. Iraq had no satellites, minimal UAV assets, no survivable reconnaissance assets, no other airborne intelligence assets, and conducted minimal active reconnaissance. If its C4I problems deprived it of a functioning brain, its lack of modern ISR assets effectively left it blind in most aspects of combat beyond visual range.

e. **Ineffective utilisation of Missiles.** Missile, like bombs, are not terror weapons unless they can be used in sufficient numbers or with sufficient lethality to have major killing or destructive effects. Iraq was never credited with more than 12-25 surviving Scuds and its Al-Samoud-II and Ababil missiles and rockets lacked the range, accuracy, and lethality to be much of a threat. Missile defences and attacks on delivery systems further degraded a largely symbolic capability.

Lessons Learnt

40. **Use of Air Power**. Despite limited information being available, certain lessons about military fundamentals and the integration of these fundamentals with new technologies is clear. In many areas, the allied forces had an overwhelming advantage over the Iraqis which overcame the traditional advantages of fighting on the defensive, on home ground, and with internal lines of communication. Some of the lessons learnt from analysing the war are discussed below:

a. **Competence and Flexibility in War Planning**. The coalition forces began with a war plan reflecting extraordinary professionalism and experience. When elements of that plan failed during the war, they rapidly adapted. When new Iraqi tactics and capabilities emerged, they responded. This professionalism and adaptability in planning was greatly aided by major advances in computerization and integration at every level.

b. **Situational Awareness and C4ISR**. The US had vastly improved every aspect of its intelligence, targeting, and command and control capabilities since the last Gulf War. It also spent some 12 years in surveillance of Iraqi operations and military developments. The combination of imagery, electronic and signals intelligence gave it a high degree of situational awareness both by day and night. This proved vital in the conduct of operations.

c. **Synchronicity, Jointness, and Combined Arms**. The US had an almost incredible advantage in terms of its ability to bring together land and air operations and support them from the sea and friendly bases at very high tempos of coordinated operations. The issue was far more than Jointness per se, it was the coordination and sheer speed of operations at every dimension of combat. Compared to the first Gulf war which saw a 38-day air bombardment, in this ground and air operations began on day one. The US forces advanced within 50 miles of Baghdad on Day 8, entered Baghdad International airport on Day 16, and were in the center of Baghdad on Day 20.

d. **The Value of Training and Readiness**. The value of training and readiness emerged clearly in every aspect of US and British operations. The almost incredibly low accident rates, the ability to sustain constant combat operations over some 20 days, the ability to manage extremely complex air operations, the high quality of joint warfare and combined arms are all tributes to the quality of pre-war training and readiness. It is important to note in this regard that US and British forces were able to operate effectively even when in a protection mode against chemical and biological weapons, and emerged with far better training for urban warfare than their Iraqi opponents.

e. **The Human Factor**. Truly professional men and women, trained as fighters, rather than garrison forces or military bureaucrats, had a massive superiority in professional skills and unit cohesion over conscript and heavily politicized forces.

f. **Technology**. The US and British forces had technical superiority in virtually every area of combat over an Iraqi force that had seen only minimal modernization since the summer of 1990, and that too in the form of erratic deliveries of smuggled arms.

g. **24x7 Capability**. US and British forces could both fight and manoeuvre at night and largely in the dark. US operations also continued in spite of major sand storms, cloud cover, and rain.

h. **Sustainability**. While it gets little attention, very few military forces in the world can sustain sufficient combat and service support forces to maintain nearly 24x7 operations with minimal time for rest and regrouping. For example, the US flew some 6,850-tanker sorties and delivered some 42.5 million gallons in aerial refuelling. Coalition forces consumed some 40,000 gallons of water a day.

j. **Logistics and Power Projection**. Major advances in logistics at every level from support vehicles to new forms of packaging for shipping and transponder readable coding allowed the US to fight half way around the world with an unparalleled tempo of operations. The ability to refuel aircraft, move fuel and water to manoeuvring units, maintain and repair equipment in the field, and rearm was critical to every aspect of operations.

41. **Coalition Forces.** There is never a clean break between the lessons of war that emerged in the Trojan War or those proposed by Sun Tzu and the lessons specific to a given conflict. However, some aspects of the Iraq War do seem to pose unique lessons:

a. **Study of the Enemy**. The US had used space and other intelligence assets to study and target Iraq for more than 12 years from the summer of 1990 to the beginning of 2003. They carried out major strikes in Desert Fox in 1998. This provided a unique degree of situational awareness before the war began.

b. **Suppression of Enemy Air Defense (SEAD)**. The US and Britain had some four years of operational experience in suppressing Iraqi air defences, and were able to use the No fly Zones to sharply reduce Iraqi capabilities before the war began. The wartime suppression of Iraqi air defences was remarkably well carried out and rolled up the Iraqi defences in key areas, reducing their numbers to a point where they lost much of their low altitude air defence effectiveness.

c. **Air Dominance**. The ability to paralyse the Iraqi air force and systematic suppression of Iraqi air defences achieved nearly total air dominance – a level of air superiority the US had never enjoyed in any previous major war.

d. **ISR and Real Time Information Flow and Targeting**. At this point, there is no way to analyse the relative role of space, UAVs, fixed wing aircraft, SIGINT, ELINT, imagery, Special Forces, and human intelligence. It is clear, however, that the mosaic of intelligence and sensor data was far better than in the Gulf War, and was processed and disseminated far more quickly.

e. **Precision and Focus**. Rather than simply shock and awe, a combination of new ISR assets, new precision weapons, and much better avionics allowed all-weather precision strike operations with excellent targeting, an emphasis on “effects based” strikes with careful limitation of collateral damage. Not only did the US make copious use of precision guided weapons, it was able to target them with far more focus and effect.

f. **Landpower Reinforced Airpower and Vice-Versa**. The Iraqi land forces were forced to expose themselves by the speed of land operations and then hit hard from the air, which in turn sharply reduce the Iraqi threat to US and British land forces. Joint ness took on a new practical meaning.

g. **Urban Warfare**. Much of the concern over urban warfare depends on fighting house-by-house or street-by-street. The US demonstrated that it is possible to use the new degree of situation awareness to conduct armoured patrols with helicopter and air support. UAVs were effectively employed in urban warfare. The US conclusively showed that modern air power can target and strike even in cities with great effect and minimal collateral damage.

h. **Limiting Casualties and Collateral Damage**. Even Iraqi claims indicate that the US and UK inflicted negligible civilian casualties and collateral damage in historical terms. It is difficult to generalize, but the one key irony behind the increased lethality of modern weapons and tactics, is that they can be used to defeat the enemy with far fewer secondary costs.

CONCLUSION

42. With lightning speed and technological prowess US-led forces in the Iraq war have given a preview of how wars may be waged in this new century. Superior technology, including satellite-guided bombs and unmanned spy aircraft, coupled with speedy ground forces and secret special operations overwhelmed the Iraqis. Iraq War provides us important lessons about the continued value of military fundamentals and the need for the successful integration of these fundamentals with new technologies and tactics.

43. Operation Iraqi Freedom brought in new concepts in war fighting wherein the concept of ‘Shock and Awe’ was tried out by the allied forces. The rapidity with which the war was waged is something unheard of in earlier wars. At the same time, the imbalance in military assets and technology between the two sides also is something that was witnessed for the first time in the recent past. With the technological and material superiority that the American and British forces enjoyed over the Iraqis, the

allied forces were able to overwhelm the Iraqis. Had the Iraqis possessed some comparable technology to counter the superior allied technology, probably the outcome of the war would have been different. Notwithstanding this fact, there are certainly very important lessons that have emerged from this air operations.

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TOPIC-1

AVIATION IN FIRST WORLD WAR

Introduction

1. World War I was the first war in which aircraft were deployed on a large scale. Tethered observation balloons had already been employed in several wars, and would be used extensively for artillery spotting. Germany employed Zeppelins for reconnaissance over the North Sea and strategic bombing raids over England. Aeroplanes were just coming into military use at the outset of the war. Initially, they were used mostly for reconnaissance. Pilots and engineers learned from experience, leading to the development of many specialized types, including fighters, bombers, and ground-attack aeroplanes. Ace fighter pilots were portrayed as modern knights, and many became popular heroes. While the impact of aircraft on the course of war was limited, many of the lessons learned would be applied in future wars.

Pre-War Development

2. About 10 years after the Wright brothers made the first powered flight, there was still much to be improved upon. Because of limitations of the engine power of the time, the effective payload of aircraft was extremely limited. They were made mostly of hardwood (braced with steel wires) and linen fabric doped with flammable liquid to give them the stiffness required to form a wing surface. Aside from these primitive materials, the rudimentary aviation engineering of the time meant most aircraft were structurally fragile by later standards, and not infrequently broke up in flight especially when performing violent combat manoeuvres such as pulling up from steep dives.

3. In 1911, Captain Bertram Dickson, the first British military officer to fly and the first to engage on an aerial reconnaissance mission in a fixed-wing aircraft during army manoeuvres in 1910, predicted, in a submission to the UK Technical Sub-Committee for Imperial Defence, the military use of aircraft and the ensuing development and escalation of aerial combat: "In case of a European war, between two countries, both sides would be equipped with large corps of aeroplanes, each trying to obtain information on the other... the efforts which each would exert in order to hinder or prevent the enemy from obtaining information... would lead to the inevitable result of a war in the air, for the supremacy of the air, by armed aeroplanes against each other. This fight for the supremacy of the air in future wars will be of the greatest importance...".

4. The first operational use of fixed-wing aircraft in war took place on 23 October 1911 in the Italo-Turkish War, when Captain Carlo Piazza made history's first wartime reconnaissance flight near Benghazi in a Blériot XI. The first aerial bombardment followed shortly thereafter, on 1 November, when Second Lieutenant Giolio Gavotti dropped four bombs on two oases held by the Turks. The first aerial photography flight took place later in March 1912, also flown by Captain Piazza.

The Early Years of War

5. Front page of the New York Times Mid-Week Pictorial, January 1st 1917. Caption reads: "A German Fighting Monoplane Flying Very Near the Ground Photographed from Directly Underneath." The aircraft is of the Taube type, either a Rumpler Taube or a copy from one of the other manufacturers involved in Taube production. From the very start, there was some debate over the uses (or usefulness) of aircraft in warfare. Many senior officers, in particular, remained skeptical.

6. In Germany the great successes of the early Zeppelin airships had largely overshadowed the importance of heavier-than-air aircraft. Out of a paper strength of about 230 aircraft belonging to the army in August 1914 only 180 or so were of any use.[4] The French military aviation exercises of 1911, 1912, and 1913 had pioneered cooperation with the cavalry (reconnaissance) and artillery (spotting), but the momentum was if anything slacking.

7. Great Britain had "started late" and initially relied largely on the French aircraft industry, especially for aircraft engines. The initial British contribution to the total allied airwar effort in August 1914 (of about 184 aircraft) was three squadrons with about 30 serviceable machines. The American army and navy air services were hopelessly behind; even in 1917, when the United States entered the war, they were to be almost totally dependent on the French and British aircraft industries for combat aircraft.

8. The initial campaigns of 1914 proved that cavalry could no longer provide the reconnaissance expected by their generals, in the face of the greatly increased firepower of Twentieth century armies. It was quickly realised, on the other hand, that aircraft could at least locate the enemy, even if early air reconnaissance was hampered by the newness of the techniques involved. Early scepticism and low expectations quickly turned to unrealistic demands beyond the capabilities of the primitive aircraft available.

9. Even so, air reconnaissance played a critical role in the "War of Movement" of 1914, especially in helping the Allies halt the German invasion of France. On 22 August 1914, British Captain L.E.O. Charlton and Lieutenant V.H.N. Wadham reported German General Alexander von Kluck's army was preparing to surround the BEF, contradicting all other intelligence. The British High Command listened to the report and started a withdrawal toward Mons, saving the lives of 100,000 soldiers. Later, during the First Battle of Marne, observation planes discovered weak points and exposed flanks in the German lines, allowing the allies to take advantage of them. The Germans' great air "coup" of 1914 (at least according to contemporary propaganda) was at the Battle of Tannenberg in East Prussia where an unexpected Russian attack was reported by Lts. Canter and Mertens, resulting in the Russians' being forced to withdraw.

Early "Western Front" Reconnaissance Duties

10. Late in 1914 the lines between the Germans invading France and the Allies stretched from the North Sea to the Alps. The initial "War of Movement" largely ceased, and the front became static. Three main functions of short range reconnaissance squadrons had emerged by March 1915.

a. The first was photographic reconnaissance – building up a complete mosaic map of the enemy trench system. The first air cameras used glass plates ("Kodak" cellulose film had been invented, but did not have sufficient resolution).

b. Artillery "spotting" enabled the ranging of artillery on targets invisible to the gunners. Radio telephony was not yet practical from an airplane, so communication was a problem. By March 1915, a two seater on "artillery observation" duties was typically equipped with a primitive radio transmitter transmitting the dots and dashes of a Morse key, but had no receiver. The artillery battery signaled to the aircraft by laying strips of white cloth on the ground in prearranged patterns. These duties were shared with the observation balloon, tethered to the ground. Balloonists could communicate directly with their batteries by field telephone, but were obviously far less flexible in locating targets and reporting the fall of shot.

c. "Contact patrol" work attempted to follow the course of a battle by communicating with advancing infantry while flying over the battlefield. The technology of the period did not permit radio contact, and methods of signaling were necessarily crude, and included dropping messages from the aircraft. Soldiers were naturally reluctant to reveal their positions to aircraft, as it was difficult for them to distinguish between friend and foe.

Early Bombing Efforts

11. Typical 1914 aircraft could carry only very small bomb loads – the bombs themselves, and their stowage, were still very elementary, and effective bomb sights were still to be developed. Nonetheless the beginnings of strategic and tactical bombing date from the earliest days of the war. Notable are the raids by the RNAS on the German airship sheds at Düsseldorf, Cologne and Friedrichhafen in September, October and November 1914, as well as the formation of the Brieftauben Abteilung Ostende (or "Ostend carrier pigeon detachment", cover name for the first German strategic bombing unit), which mounted the first token raid over the English Channel in December.

The Dawn of Air Combat

12. As Dickson had predicted, initially air combat was extremely rare, and definitely subordinate to reconnaissance. There are even numerous stories of the crew of rival reconnaissance aircraft exchanging nothing more belligerent than smiles and waves. This soon progressed to throwing bricks, grenades, and other objects, even rope, which they hoped would tangle the enemy aircraft's propeller. The first aircraft brought down by another was an Austrian reconnaissance rammed on 8 September 1914, by Russian pilot Pyotr Nesterov in Galicia in the Eastern Front (both planes crashed as the result of the attack killing all occupants). Eventually pilots began firing handheld firearms at enemy aircraft. On October 5, 1914, French pilot Louis Quenault opened fire on a German aircraft with a machine gun. Quenault reported history's first air-to-air kill. The era of air combat proper began as more and more aircraft were fitted with machine guns.

1915: The Fokker Scourge

13. The first purpose-designed fighter aircraft included the British Vickers F.B.5 – machine gun armament was also fitted to several French types, such as the Morane-Saulnier L and N. Initially the German Air Service lagged behind the Allies in this respect, but this was soon to change dramatically. In July 1915 the Fokker E.I became operational – this was the first type of aircraft to enter service with a "synchronisation gear" (often referred to mistakenly as an "interrupter gear"), which enabled a machine gun to fire through the arc of the propeller without striking its blades. This constituted an important advantage over other contemporary fighter aircraft. This aircraft and its immediate successors – also commonly known as the Eindecker (German for "Monoplane") – for the first time supplied an effective equivalent to Allied fighters.

14. The very first successful engagement involving a synchronized-gun-armed aircraft occurred on July 1, 1915, just to the east of Lunéville, France when Lieutenant Kurt Wintgens, one of the pilots selected by Fokker to demonstrate the small series of five Eindecker prototype aircraft, forced down a French Morane-Saulnier Type L "Parasol" two seat observation monoplane behind Allied lines with his Fokker M.5K/MG Eindecker production prototype aircraft, carrying the IdFlieg military serial number "E.5/15". Some 200 shots from Wintgens' aircraft had hit the Gnôme Lambda rotary engine of the Morane Parasol, forcing it to land safely in Allied territory.

15. By late 1915 the Germans had achieved air superiority, making Allied access to vital intelligence derived from continual aerial reconnaissance more dangerous to acquire. In particular the essential defencelessness of Allied reconnaissance types was exposed. The first German "ace" pilots – notably Max Immelmann – had begun their careers. The number of actual Allied casualties involved was for various reasons very small compared with the intensive air fighting of 1917–18. The deployment of the Eindeckers was less than overwhelming – the new type was issued in ones and twos to existing reconnaissance squadrons – and it was to be nearly a year before the Germans were to follow the British in establishing specialist fighter squadrons. The Eindecker was also, in spite of its advanced armament, by no means an outstanding aircraft, being closely based on a pre-war French racer.

16. Nonetheless, the morale impact of the fact that the Germans were fighting back in the air, and effectively too, created a major scandal in the British parliament and press. The ascendency of the Eindecker also contributed to the surprise the Germans were able to achieve at the start of the Battle of Verdun – the French reconnaissance aircraft failed to provide their usual cover of the German positions.

17. Fortunately for the Allies, two new British fighters were already in production that were a match for the Fokker—the F.E.2b and the D.H.2. These were both "pushers" and could fire forwards without gun synchronisation. The F.E.2b reached the front in September 1915, and the D.H.2 in the following February. On the French front, the tiny Nieuport 11, a tractor biplane with a forward firing gun mounted outside the arc of the propeller (on the top wing) also proved more than a match for the German fighter when it entered service in January 1916. With these new types the Allies re-established air superiority in time for the Battle of the Somme, and the "Fokker Scourge" was over.

18. The Fokker E-III, Airco DH-2, and Nieuport 11 would be the very first in a long line of single seat fighter aircraft used by both sides during the war. Very quickly it became clear the primary role of fighters would be attacking enemy two-seaters, which were becoming increasingly important as sources of reconnaissance and artillery observation, while also escorting and defending friendly two-seaters from enemy fighters. Fighters were also used to attack enemy observation balloons, strafe enemy ground targets, and defend friendly airspace from enemy bombers.

1916: Battle of the Somme

19. In the aftermath of the Fokker Scourge the need for a larger, better equipped RFC became obvious, and the process of raising many new squadrons was started. In the short term creating new units was easier than producing aircraft to equip them, and training pilots to man them. When the Battle of the Somme started in July 1916 most ordinary RFC squadrons were still equipped with the BE.2c – the same aircraft that had proved such an easy target for the Fokker Eindecker. New types such as the Sopwith 1½ Strutter had to be transferred from production intended for the RNAS. Even more seriously, replacement pilots were being sent to France with pitifully few flying hours.

20. Nonetheless, air superiority and an "offensive" attitude facilitated the greatly increased involvement of the RFC in the battle itself, in what was known at the time as "trench strafing" – in modern terms close support. For the rest of the war this became a regular routine, with both the attacking and defending infantry in a land battle being constantly liable to attack by machine guns and light bombs from the air. At this time, counter fire from the ground was far less effective than it became later, when the necessary techniques of deflection shooting had been mastered.

21. Allied air superiority was maintained during the battle, and the increased effectiveness of Allied air activity proved disturbing to the German High Command. A complete reorganisation of the German Luftstreitkräfte followed. This reorganisation eventually produced the German strategic bombing squadrons that were to produce such consternation in England in 1917 and 1918, and the specialist close support squadrons (Schlachtstaffeln) that gave the British infantry such trouble at Cambrai and during the German Spring offensive of 1918. Its most famous and dramatic effect, however, involved the raising of specialist fighter squadrons or Jagdstaffeln. By the end of 1916 these units, equipped with the new Albatros fighters, had reestablished German air superiority, in spite of being formed a full year after similar units had become part of the RFC and the French Aéronautique Militaire.

1917: Bloody April

22. The first half of 1917 marked a period of German air superiority. These were successful months for the jagdstaffeln and the much larger RFC suffered significantly higher casualties than their opponents. While new Allied fighters such as the Sopwith Pup, Sopwith Triplane, and SPAD S.VII were coming into service, at this stage their numbers were small. On the other hand, the jagdstaffeln were equipped with the new Albatros D.III, which was, in spite of some structural difficulties, "the best fighting scout on the Western Front" at the time. Meanwhile, most RFC two-seater squadrons still flew the BE.2e, a very minor improvement on the BE.2c.

23. This culminated in the rout of April 1917, known as "Bloody April". The RFC suffered particularly severe losses, although Trenchard's policy of "offensive patrol", placing most of their flying on the German side of the lines, was maintained. During the last half of 1917, the British Sopwith Camel and S.E.5a and the French SPAD S.XIII became available in numbers. The ordinary two seater squadrons in the RFC received the R.E.8 or the F.K.8, not outstanding warplanes, but far less vulnerable than the BE.2e they replaced. The F.E.2d at last received a worthy replacement in the Bristol F.2b. On the other hand the latest Albatros, the D.V proved to be a disappointment, as was the Pfalz D.III. The exotic Fokker Dr.I was plagued, like the Albatros, with structural problems. By the end of the year the air superiority pendulum had swung once more in the Allies' favour.

Up to 1918: the Final Year of War

24. The final year of the war (1918) saw increasing shortages of supplies on the side of the Central Powers. Captured Allied aircraft were scrounged for every available material, even to the point of draining the lubricants from damaged engines just to keep one more German aircraft flyable. Manfred von Richthofen, the famed Red Baron credited with 80 victories, was killed in April, probably by an Australian anti-aircraft machinegunner (although Royal Air Force pilot Captain Arthur Roy Brown was officially credited), and the leadership of Jagdgeschwader 1 eventually passed to Hermann Göring.

25. Germany introduced the Fokker D.VII, both loved and loathed to the point that the surrender of all surviving examples was specifically ordered by the victorious Allies. This year also saw the United States increasingly involved. While American volunteers had been flying in Allied squadrons since the early years of the war, not until 1918 did all-American squadrons begin patrolling the skies above the trenches. At first, the Americans were largely supplied with second-rate weapons and obsolete aircraft, such as the Nieuport 28. As American numbers grew, equipment improved, including the SPAD S.XIII, one of the best French aircraft in the war.

Impact

26. By the war's end, the impact of air missions on the ground war was in retrospect mainly tactical – strategic bombing, in particular, was still very rudimentary indeed. This was partly due to its restricted funding and use, as it was, after all, a new technology. On the other hand the effect of artillery, which had perhaps the greatest effect of any military arm in this war, was very much affected by the availability of aerial photography and aerial "spotting". By 1917 weather bad enough to restrict flying was considered as "putting the gunner's eyes out". Some, such as then-Brigadier General William "Billy" Mitchell, commander of all American air combat units in France, claimed "the only damage that has come to [Germany] has been through the air". Mitchell was famously controversial in his view that the future of war was not on the ground or at sea, but in the air.

Anti-aircraft Weaponry

27. Though aircraft still functioned as vehicles of observation, increasingly it was used as a weapon in itself. Dog fights erupted in the skies over the front lines – aircraft went down in flames and heroes were born. From this air-to-air combat, the need grew

for better aircraft and gun armament. Aside from machineguns, air-to-air rockets were also used, such as the Le Prieur rocket against balloons and airships. Recoilless rifles and auto-cannons were also attempted but they pushed early fighters to unsafe limits while bringing negligible returns. Another innovation was air-to-air bombing if a fighter had been fortunate enough to climb higher than an airship. The Ranken dart was designed just for this opportunity. This need for improvement was not limited to air-to-air combat. On the ground, methods developed before the wars were being used to deter enemy aircraft from observation and bombing. Anti-aircraft artillery rounds were fired into the air and exploded into clouds of smoke and fragmentation, called archie by the British.

28. Anti-aircraft artillery defenses were increasingly used around observation balloons, which became frequent targets of enemy fighters equipped with special incendiary bullets. Because balloons were so flammable, due to the hydrogen used to inflate them, observers were given parachutes, enabling them to jump to safety. Ironically, only a few aircrew had this option, due in part to a mistaken belief they inhibited aggressiveness, and in part to early aircraft being unable to lift their significant weight.

Bombing and Reconnaissance

29. As the stalemate developed on the ground, with both sides unable to advance even a few hundred yards without a major battle and thousands of casualties, aircraft became greatly valued for their role gathering intelligence on enemy positions and bombing the enemy's supplies behind the trench lines. Large aircraft with a pilot and an observer were used to scout enemy positions and bomb their supply bases. Because they were large and slow, these aircraft made easy targets for enemy fighter aircraft. As a result, both sides used fighter aircraft to both attack the enemy's two-seat aircraft and protect their own while carrying out their missions.

30. While the two-seat bombers and reconnaissance aircraft were slow and vulnerable, they were not defenseless. Two-seaters had the advantage of both forward- and rearward-firing guns. Typically, the pilot controlled fixed guns behind the propeller, similar to guns in a fighter aircraft, while the observer controlled one with which he could cover the arc behind the aircraft. A tactic used by enemy fighter aircraft to avoid fire from the rear gunner was to attack from slightly below the rear of two-seaters, as the tail gunner was unable to fire below the aircraft. However, two-seaters could counter this tactic by going into a dive at high speeds, aided by their heavy weight. Pursuing a diving two-seater was hazardous for a fighter pilot, as it would place the fighter directly in the rear gunner's line of fire; several high scoring aces of the war were shot down by "lowly" two-seaters, including Raoul Lufbery and Robert Little.

Strategic Bombing

31. The first ever aerial bombardment of civilians was during World War I. On 19 January 1915, two German Zeppelins dropped 24 50-kilogram (110 lb) high-explosive bombs and ineffective three-kilogram incendiaries on Great Yarmouth, Sheringham, King's Lynn, and the surrounding villages. In all, four people were killed, sixteen injured, and monetary damage was estimated at £7,740, although the public and media reaction were out of proportion to the death toll.

32. There were a further nineteen raids in 1915, in which 37 tons of bombs were dropped, killing 181 people and injuring 455. Raids continued in 1916. London was accidentally bombed in May, and, in July, the Kaiser allowed directed raids against urban centres. There were 23 airship raids in 1916 in which 125 tons of ordnance were dropped, killing 293 people and injuring 691. Gradually British air defenses improved. In 1917 and 1918 there were only eleven Zeppelin raids against England, and the final raid occurred on 5 August 1918, which resulted in the death of KK Peter Strasser, commander of the German Naval Airship Department. By the end of the war, 51 raids had been undertaken, in which 5,806 bombs were dropped, killing 557 people and injuring 1,358.

33. The Zeppelin raids were complemented by the Gotha G bombers from 1917, which were the first heavier than air bombers to be used for strategic bombing. It has been argued that the raids were effective far beyond material damage in diverting and hampering wartime production, and diverting twelve squadrons and over 10,000 men to air defenses. Calculations performed on the number of dead to the weight of bombs dropped had a profound effect on attitudes of the British government and population in the interwar years, who believed that “The bomber will always get through”.

Observation Balloons

34. Manned observation balloons floating high above the trenches were used as stationary reconnaissance points on the front lines, reporting enemy troop positions and directing artillery fire. Balloons commonly had a crew of two equipped with parachutes: upon an enemy air attack on the flammable balloon, the crew would parachute to safety. Recognized for their value as observer platforms, observation balloons were important targets of enemy aircraft. To defend against air attack, they were heavily protected by large concentrations of antiaircraft guns and patrolled by friendly aircraft. Blimps and balloons helped contribute to the stalemate of the trench warfare of World War I, and contributed to air to air combat for air superiority because of their significant reconnaissance value. To encourage pilots to attack enemy balloons, both sides counted downing an enemy balloon as an “air-to-air” kill, with the same value as shooting down an enemy aircraft. Some pilots, known as balloon busters, became particularly distinguished by their prowess at shooting down enemy balloons. Perhaps the best known of these was American ace Frank Luke: 14 of his 18 kills were enemy balloons.

TOPIC-2

THE PACIFIC AIR CAMPAIGN

Introduction

1. The road to World War II in Asia and Pacific was largely independent of the European conflict. Only the loose tie of facing common enemies held the axis power together. The threat and the reality of, war in Europe played a major role in creating opportunities for Japan, but perhaps not a decisive one. The Pacific War arose out of Japan's attempt to conquer China and secure the domination of East and South-east Asia. The pacific phase of World War II was in many ways a unique struggle, with powerful effects. The theater of war was the largest of any in history. Unlike the previous wars, the outcome of the war was decided largely by fighting in the air and under the sea. Air power not only contributed to amphibious or land operations but also attained the strategic effect by exerting direct pressure on the enemy's capability and will to wage war. Ironically, Americans played a major role in the modernization of Japan and thus helped make the war possible.

2. The Pacific war was fought between Japan and the Allied power within the period of 1941 to 1945. At the heart of this campaign was to gain secured locations through air superiority for the operation of land based aircraft. This campaign was also driven by geography, distance and requirement of logistics. In this Great War, airpower was linked closely with sea power and emphasis was given on aircraft carrier and naval aviation to a great extent. Unlike the previous wars, the outcome was decided largely by fighting in the air. The cumulative efforts of strategic bombing became prominent in this campaign, which ended with the dropping of atom bomb. Therefore, the Pacific War offers a great scope for the airpower enthusiastic to understand its contributions and the lessons concerning air power.

Background

3. Japan had profited from WW I, but during 1920s, her economy was relatively stagnant. By 1929, she faced grave financial and social crisis as she was lacking the raw materials for her rapid industrialization. As such, Japan planned a concept of a "New Order" in to a "Greater East Asia Co-Prosperity Sphere" where not only China but Southeast Asia and some part of Australasia to brought under her control. Subsequently, Japan went for a radical solution by invading the mineral rich Manchuria in 1931. This aggression became a great concern to the world specially USA because of her interest in China.

4. In 1937, Japan launched an all out assault against China rising further tension with USA. To resist Japan, USA took measures to weaken their economy by freezing all Japanese assets in USA and imposed an almost total embargo. By July 1941, Japanese industrial survival was at stake due to the crisis of raw materials specially oil. Japan regarded this policy as an unfriendly act and was looking for some way out of this crisis. Only option left with Japan was to withdraw completely from China as demanded by USA or expand towards South West to secure new sources of oil and raw materials. Eventually Japan chose the second option and regarded the US Pacific fleet positioned at Pearl Harbour to be the greatest obstacle for their southward venture. As such, Japan attacked Pearl Harbour marking the beginning of the Pacific War.

Japanese Objectives and Strategy

5. Japanese objective was to establish their domination in the region by establishing a defensive perimeter quickly. They estimated that they could seize Southeast Asia and thereby overcome the effect of sanctions imposed upon them. Keeping the objectives in mind, Japan took extreme offensive strategy depending on the use of airpower.

Allied Objectives and Strategy

6. Before attack on Pearl Harbour, Allied had no significant strategy against Japan. To counter the Japanese aggression, Allied objective was to disrupt the sea supply line to Japan and to launch an all-out offensive against them to make sure that they accept an unconditional surrender. Keeping these objectives in mind, the Allied primarily pursued an offensive air strategy to take the war to the Japanese mainland and carry out strategic bombing against Japan's industrial bases. Therefore, except for the initial period of the war the Allied primarily pursued an offensive air strategy.

General Outline of The War

7. In accordance with their strategy, the Japanese Army was given primary responsibility for conquering Philippines, Malaya, Sumatra and Burma. The Japanese Navy was assigned the primary responsibility for an attack on Pearl Harbour and then launching operations in the Philippines, Borneo, Celebes, Java, northern New Guinea, the Bismarck Archipelago and out to the Gilbert Islands and Wake. The Japanese started the war on 07 Dec 1941 by carrying out a pre-emptive strike on Pearl Harbour. At the same time Japanese attacked and captured Malaya and Philippines. Following the initial successes in these areas, Wake, Guam and Rabaul were occupied shortly thereafter. At the end of 4 months of war, they had carried out the substance of their initial program. The magnitude of these successes encouraged the Japanese planners to consider expansion beyond the original perimeter to south of the Bismarck Archipelago. This would have threatened America's communications with Australia. Allies decided to hold Port Moresby and a line

north of Espiritu Santo and the Fiji Islands. At the same time, Allies started giving a lot of importance to the intelligence. This helped them to counter Japan's threat in the Coral Sea and Midway. This was the turning point in the pacific.

8. From here onwards, the Allies decided to go on the offensive and planned a two-pronged offensive. One was through the SouthWest Pacific via the north coast of New Guinea to the Philippines and the other across the Central Pacific through the Marshalls to Okinawa. Basically, the advance was for the purpose of projecting Allied Air Power to points which cut Japan's supply lines to the south and were within striking range of the Japanese home islands. These amphibious steps along the two principal lines of advance toward Japan were well timed and mutually supporting. After the liberation of the Philippines and the capture of Okinawa, oil imports into Japan were cut off, its industries had collapsed and it was only a matter of time before Japan would surrender. The long-range bombing offensive from the Marianas was initiated in November 1944. Japan had been critically wounded by military defeats, destruction of the bulk of her merchant fleet, and almost complete blockade. The Naval aircraft, Army aircraft and B-29s operating from China and Marianas took part in the strategic bombing offensive. This offensive culminated in dropping of two atom bombs over Japan. At this stage Japan unconditionally surrendered to the allied forces.

JAPANESE AIR CAMPAIGNS

Attack on Pearl Harbour

9. **Objective**. Objective of the air operation was to destroy the pacific fleet at the very start of hostilities.

10. **Air Strategy**. Air Strategy of this operation was as follows:

a. To achieve maximum destruction through surprise attack.

b. To launch two separate wave in two different route to avoid interference.

c. To make TOT 0740 to catch the Americans unprepared, as they were on the way to their office.

11. **Air Operation**. Admiral Takijiro Onishi, the Chief of Staff of 11th Air Fleet were instructed to carry out feasibility study of the attack. He, along with his Staff Commander Minoru Genda stipulated that only possibility of gaining success was by maintaining complete secrecy. Japanese Force Package was a constituted with two Battleships, six Aircraft Carriers, two heavy and one light Cruisers, nine destroyers, three submarines

and eight tankers. As per the plan, Japanese forces, under the command of Vice-Admiral Nagumo, left Kuril Island at 0600 on 26 Nov 41. To achieve surprise, they chose the route via north so that they were not being detected. At 500 miles north of Oahu the task force fuelled at sea on 6 and 7 Dec screened by a dense low cloud. On 7th Dec at 0600 hrs Japanese intelligence could not trace American aircraft carriers. But still Japan persisted on their plan and went on with the attack. The first wave was launched with 183 aircraft of various types of bombers along with the superb Zero fighters from a position 230 miles north of Pearl Harbour. At 0702, an Army mobile radar set at Opana reported the incoming planes which was misinterpreted by the Army Aircraft Warning Service Information Centre as a scheduled flight of B-17 coming from the main land California. Thus, the attack could achieve complete surprise with devastating effects. A second wave of 170 aircraft arrived after 45 minutes. Within 02 hours, the Japanese crippled 18 battle ships, destroyed 285 aircraft and killed or injured about 3581 American personnel. On the other hand, Japan lost only 29 aircraft, 06 submarines and about 100 lives. But the Pacific Fleet's priceless fuel and ammunition reserves, repair stocks, dry docks and submarines pens and more importantly four careers were untouched. Despite the request for mounting the second attack, Admiral Nagumo ordered his task force to set course for home thinking of retaliation from the American Career and Land-base aircraft. This failure to exploit the initial success at Pearl Harbour restricted the Japanese achievement to a tactical victory what could have been a long term strategic gain.

12. **Analysis**. Although it was an astonishing tactical victory for the Japanese but in political terms Pearl Harbour was a disaster for them. Winston Churchill rightly understood that after the attack United States would fight it his side, for that he said: "So we have won after all! Hitler's faith was sealed. Mussolini's faith was sealed. As for the Japanese, they would be ground to powder. All that rest was merely the proper application of overwhelming force." The revisionist historians argued that as Roosevelt was not getting the support of American First Committee, 800,000 members strong, to engage in war. So there exists a kind of conspiracy to take United States into the war by provoking Japanese surprise attack. But American military planners never thought that Japanese could reach to Hawaii. Japanese Air Offensive in Pearl Harbour is characterized by the following:

a. **Surprise**. The attack on Pearl Harbour was a classic example of achieving surprise. Japan could successfully deny information to the Americans. They were able to keep total plan secret. Even they choose such route to obscure them from any kind of detection. Americans never expected any attack from the north of Hawaii. Again at the time of attack, selected by the Japanese, the Americans were on the way to there office. Thus, Americans were totally caught unprepared. So denying information, choosing an unexpected approach route, fuelling under cloud cover, and selection of the TOT was the core factors in achieving surprise.

b. **Concentration of Force**. Japan could successfully concentrate forces on Pearl Harbour. They employed their superior Kate and Val dive bombers for attack role and Zero Fighters for escorting. They rightly identified Pacific Fleet positioned at Pearl Harbour as COG and employed over 350 aircraft for air offensive, which was a perfect match for the target. The time frame was perfect for the attack, as at that time Americans were preparing to come to office. So concentration of superior force against Americans at decisive time and place was the key to success.

c. **Reach**. Air vehicles can project military forces over great distance. This was well proved when Japanese war planes launched air attack on Pearl Harbour from a distance of 230 nm and safely returned to there carriers. That was a unique projection of air power's strength. Because of the reach of air power, Japanese carriers could remain much away from the target and achieved surprise.

d. **Versatility**. Versatility, one of the most important characteristics of air power, was exploited effectively on pearl harbour. Japanese employed the Zero fighters' primarily for escorting the bombers. Ones the attack force reached over Pearl Harbour uninterrupted, Zeros successfully conducted ground offensive against the targets. This was the classic example of Airpower's Versatility.

e. **Intelligence**. Intelligence plays a vital role when it is produced in right time. Admiral Nagumo was informed about the absence of US carriers in Pearl Harbour, but that was too late. By that time he was too close to the target (230 miles north of Pearl Harbour). He had no time to delay the attack as there would be possibility of being detected, weather would turn bad and element of surprise would be lost. In time intelligence would give him chance to re-decide his plan. So due to poor intelligence Japanese could not destroy the Priceless US Pacific Fleet carriers, Lexington and Yorkshire, which played decisive role for US in subsequent battles.

f. **Persistence**. Persistency offers less reaction time to the enemy and thereby provides opportunity to destroy the enemy's war potentials completely. Admiral Nagumo failed to anticipate the need for sustained attack. Despite having the initial success and having reached so close to Pearl Harbour with enormous fire power capability and having gained complete air superiority after the destruction of Pacific Fleet, Japanese could not capitalise on it and destroy the remaining high value targets.

13. **Assumptions**. Through the above discussion following assumption can be made about the objective that Japanese commanders wanted to achieve:

a. Japanese wanted to give a decisive blow by a surprise attack and compel them to come for a negotiation.

b. Though Japanese intelligence could not trace American aircraft carriers still they persisted on their plan. This was because they wanted to paralyse the US Pacific Fleet before they invade Philippine in the same date which we will discuss subsequently.

Attack on the Philippines

14. **Objective**. The Japanese objective was to capture the Philippines to have a new source of industrial raw materials and also to gain a stronghold in the region.

15. **Air Strategy**. Considering the above objective Japanese had the following air strategy:

a. To concentrate maximum force to neutralise Allied strength.

b. To gain control of the air to facilitate the amphibious landing.

16. **Air Operation**. Japanese plan was to first neutralize the Allied air power in the Philippines, gain control of the air and then carry out the amphibious landing. It is to be mentioned here that Japanese Army Air Corps fighters had only 350 miles of combat radius whereas distance from Formosa to Manila was 550 miles. So Zero's engines were modified to increase their combat radius to escort the bombers up to Manila from Formosa. This was a technological surprise to the allied force. On 08 Dec 41 Japanese launched about 500 bombers and Zero fighters from Formosa base. The planned TOT was shifted due to dense fog over Formosa. As the attack was carried out just after few hours of attack on Pearl Harbour, the allied force was expected to be alert for any Japanese air raid. But still the Japanese could successfully cripple the US air element in the Philippines by destroying 160 aircraft including B-17s. Finally Japan captured Manila on 02 Jan 42.

17. **Analysis**. Following factors warrant especial mention with regard to the air operation in the Philippines:

a. **Co-ordination**. Cooperation entails the co-ordination of all activities to achieve the maximum combined effort. Japanese displayed beautiful co-ordinated effort by the air and ground forces in this campaign. Following the air attacks by the Japanese air elements, ground forces moved in to capture the island.

b. **Offensive Action**. Offensive Action is the chief means to influence the outcome of an operation. Japanese took the initiative to carry out offensive action in the Philippines. Within few hours they crippled the US air elements and gained control of the air which paved the way for the ground forces to invade the islands. It would be impossible for Japanese to invade Philippines without suppressing the Americans air power.

c. **Control of The Air**. Control of the air is essential to deny enemy to inflict damage to the friendly forces. Japanese Air offensive could successfully gain desired degree of control of the air to allow friendly land forces unhindered amphibious landing. This ultimately contributed to the capture of Philippine.

d. **Concentration of Force**. Japanese realised the need to destroy the American air power at their base. For that they employed most of the superior fighters in this operation. They used over 500 aircraft to launch the Air Offensive and achieved complete destruction of B-17s and other air defence aircraft at their bases. It was a well planned concentration of force in time and space which allowed the successful amphibious landing of ground troops.

Battle of Coral Sea

18. **Objective**. Objective of this operation was to capture Port Moresby and cut American line of supply with Australia.

19. **Air Strategy**. Keeping above objective in mind Japanese adopted the following strategy:

a. Employ superior carrier force in the south-west pacific to create deterrence.

b. To maneuver both their carriers under the cloud cover to evade US air attacks.

c. To launch massive air attack on the Allied carrier fleet.

20. **Air Operation**. Japanese campaign began on 03 May 42 with the invasion of Tulagi. By 04 May 42, the Japanese assembled a formidable naval force in Rabaul and set course for Port Moresby with two fleet carriers; the Zuikaku and Shokaku under the command of Vice-Admiral Takagi. Admiral Nimitz, Commander of US Navy Pacific theatre, was aware of the Japanese advance, since US code-breakers deciphered the Japanese naval code. He promptly sent 02 carriers, Lexington and Yorktown, to the Coral Sea under the command of Rear Admiral Aubrey Fitch and Rear Admiral Frank Fletcher respectively. On 07 May 42 Takagi was reported about the presence of US carrier some

200 miles south. He launched a major attack by a total of 78 aircraft including bombers and Zero Fighters and destroyed a tanker Neosho (which was thought to be a US Carrier) and a destroyer Sims. Fletcher also launched major attack against Japanese support group thinking as main force. Small little battle continued throughout the day and both side suffered minor losses. On 08 May at 0722 hours, spotting the Japanese Carrier Strike Force, Fletcher ordered an attack by deploying 82 aircraft. Zuikaku managed to escape a counter strike taking the advantage of a rainsquall but Shokaku got badly damaged and left the battle front. On the other hand, the Japanese also launched aerial attacks against the US Fleet with 69 aircraft. US carrier Lexington was sunk and Yorktown got damaged and returned to Pearl Harbour. Both side suffered heavy losses because of inexperience crew.

21. **Analysis**. The Battle of Coral Sea was the first ever career-vs-career battle[xiii] in the history of warfare in which no one knew how best to use them. In this battle both side suffered heavy losses but neither side could attain a comprehensive victory. However, the Allies foiled the Japanese invasion of Port Moresby and hence considered a strategic defeat for the Japanese. The battle of Coral Sea can be better analysed from the observance and non-observance of the following principle of wars:

a. **Security**. A degree of security by information denial is essential to all operation. Japanese successfully secured their plan of attacking Pearl Harbour but this time they failed to secure their information. With invention of 'Magic' – the decoding device, American achieved access to the Japanese secret plans. Ultimately, Japanese could not proceed with operation and were instead led into a carrier battle unprepared. Japanese failed to maintain the secrecy of information in successive battles too and paid heavily.

b. **Sensitivity to Weather**. Bad weather remains as a prime limitation of Air Power. The Japanese successfully exploited air power's sensitivity to weather. They maneuvered both the carriers under the cloud cover to evade US air attacks. Thus, they were successful is saving 'Juikaku' and subsequently number of air offensive missions were carried out from this carrier.

c. **Offence-Defence Balance**. It is pertinent make a balance between offensive and defensive action to win a battle. But in Battle of Coral Sea, both the forces resorted to offensive posture leaving inadequate fighters to defend their carriers. As a result, the carriers of both the sides were vulnerable to air attacks and suffered heavy losses and ultimately the battle turned into a Tactical Draw.

d. **Economy of Effort**. The air power weapons systems need to be matched to the task. But, due to wrong identification, Japanese used massive force for

destroying the fleet tanker thinking that it was a US career. On the other hand US launched major attack against Japanese support group assuming as the main force. This was completely a wasteful expenditure of effort.

22. Ones again Japanese failed to attain their objective. Had they be able to seize Port Moresby, US would loose the gateway to New Guinea and Australia and that could have had really depressing effect on United States. On the other hand success in defending Port Moresby with relatively untrained force had boosted the moral of United States.

Battle of Midway

23. **Objective**. Capture Midway and establish control in the central pacific.

24. **Air Strategy**. In persuasion of the objective Japanese had the following air strategy:

a. Make diversionary move towards the Aleutian Island to confuse the allied force.

b. Concentrate massive force to inflict maximum attrition to Allied force.

25. **Air Operations**. When Admiral Nagano advocated attack against Australia, Admiral Yamamoto warned of the dangers presented by the still intact US carrier. He planned to attack Midway with a diversionary attack on Aleutian Island, 200 miles north of Midway. The main carrier force, consisting of 04 large carriers, advanced to capture Midway. But this time US was fully prepared and they learned about the Japanese plan by using ‘Magic’ (Communication code breaking system) thus they positioned 03 carriers north of Midway much before. On 03 Jun 42, US patrol aircraft sighted the Japanese invasion force and US fighter engaged them from Midway without much effect. On 04 Jun 42, the first wave of US torpedo aircraft attacked the Japanese carriers. The Japanese fought back with all they had. They used up valuable ammunition and fuel, and sent their air cover out to fight leaving the fleet unprotected. Much to their shock, a follow-up wave of Wildcats and Dauntless dive-bombers then arrived. By the end of the day, the Japanese lost all 04 carriers.

26. **Analysis**. The result of this battle had far reaching strategic effect. The Japanese plan of capturing Midway was abandoned, thus halting Japanese expansion across Asia Pacific. Japanese failure in the Battle of Midway can further be analyzed in terms of the following factors:

a. **Surprise**. Surprise remains a key principle throughout War in Pacific. Japanese achieved success by denying information during the attack on Pearl Harbour but this time elements of surprise achieved by US ‘Magic’ played havoc to

the Japanese. Nimitz successfully surprised the Japanese by a vigorous attack with the help of carrier-based air power and inflicted heavy damage though the US force was inferior in quality and quantity. So surprise action can achieve results out of all proportion to the effort expanded.

b. **Concentration of Force**. It is pertinent to concentrate forces to attain goal. Japan successfully did that in all previous encounters but failed to do so where it was most necessary. Japanese planner made the most devastating error by dispersing their forces with an unsuccessful attempt to distract the Americans. Had the Japanese force been concentrated to take Midway, the result could have been very different. Thus concentration of forces in decisive time and place remains as an important tool to commander.

c. **Security and Intelligence**. Failure to secure intelligence by Japanese and success in attaining the useful intelligence has a profound impact on the out come of the war. Nimitz came to know Nagumo's battle plan due to Japanese failure to secure their communication system and were well prepared with his own plan. On the other hand, Admiral Nagumo concentrated sufficient forces but could not capitalize them because of not knowing the enemy's presence.

Causes of Japanese Set Back

27. Japan was superior in quality and quantity of their war plans. She had comparatively fast and heavily armed and more sophisticated aircraft carriers.

Again Japan had the initiative and initial success. But still as the war progressed, they started shrinking in quality, moral courage and strength because of the following:

a. They always had the intention of containing Americans, not to defeat them. For that they never stretched out to their full capacity and exploited the opportunities.

b. Japanese were inferior in terms of intelligence gathering. Americans exploited their superior intelligence technology to the fullest and could achieve the success. Even in the present day warfare, intelligence is seen to play a forefront role.

c. Japan failed to maintain good co-operation with Germany where she could have expected some support from Germany. Had they be able to form an ally, they could be much stronger than they were as individual. Present days multinational force concept indicates the need for the formation of ally.

ALLIED AIR OFFENSIVE

28. **Japanese Strategy**. Since losing the Philippines meant the loss of all oil and other supplies from Southeast Asia, the Japanese decided to protect the Leyte Gulf in the Philippines.

29. **Allied Strategy**. The allied offensive was a series of island-hopping jungle campaigns, revolving around the capture or construction of airfields. Aircraft careers were scarce, so the range of land-based fighters limited the length of the amphibious jumps. They planned to go into offensive and set out for a two-pronged advance to take the war on the Japanese mainland. One was through the Southwest Pacific via the north coast of New Guinea to the Philippines led by General Mac Arthur and the other across the Central Pacific through the Marshalls to Okinawa led by Admiral Nimitz. Both pronged of offensive required tremendous air support. After the Allied captured Marianas and Okinawa, they concentrated long-range bombing offensive. The Allied offensive ended by dropping of two atom bombs over Japan resulting Japanese unconditional surrender. However, the first initiative by the Allied was the raid over mainland Japan carried out by Col James Doolittle on 18 April 1942 which is widely known as Doolittle Raid.

Doolittle Raid

30. **The Raid**. Col James Doolittle conducted the raids with sixteen B-25 aircraft from US carrier HORNET about 700 NM from Japan. The aircraft were armed with 500 lb demolition and incendiary bombs. Their targets were oil storage depot, factories, generating plants, military buildings over Tokyo, Nagoya, Osaka, Kobe, Yokohama and Yokosuka. The premature take off and failure to properly coordinate preparations with China caused the loss of every plane except one that flew to Siberia.

31. **Analysis**. The Doolittle raid was insignificant but raised Allied morale, which had tremendous psychological effect. This was precedence of projecting air power on Japanese sky by US for the first time. The attack led to the following subsequent actions:

a. The raid had strategic impact on Japanese, which compelled them to expand their defensive perimeter.

b. Realizing that Japan was well within the reach of Allied air strike, Japanese committed their fighter groups to defend the mainland that would have been better used else where.

Advance from Central Pacific

32. **Objective**. The Allied forces objective was to capture Saipan and Guam of Mariana Islands from where Japan would come within the range of land based strike aircraft.

33. **Air Strategy**. Considering the above objective Allied had the following air strategy:

a. To outflank the Japanese in New Guinea through best exploitation of land based strike aircraft considering it to be the shortest way.

b. To advance in a step-by-step approach with individual islands providing the steps. As one step was occupied it could be converted into a base which would support the next step forward.

c. Capturing the islands would make the logistic supply to the southern Japanese forces difficult. To do so, Nimitz decided to make the best use of air and sea power in the Central Pacific Campaign.

34. **Seize of Tarawa**. Tarawa is located at the Gilbert Islands. It was necessary to capture these islands as a first step towards Tokyo because they were important Japanese sea-bases in the Central Pacific. On 20 Nov 43 heavy air bombardment struck the Gilbert Islands. The heavily defended Tarawa was captured on 23 Nov 43 at the cost of 3300 US Marines.

35. **Fall of Marshalls**. Taking lessons from the Gilbert operations, the US navy and marines fought the battles at the Marshall Islands. On 29 Jan 44, the Americans bypassed the outer ring of the Marshall Islands to strike at Kwajalein at its centre. Two American divisions were committed, with heavy and accurate naval gunfire and air support. Truk was not only the reputed centre of Japanese naval strength but was also the base from which air reinforcements could have been flown into the Marshalls. The American carrier strike on Truk on 17 February 1944 was one of the most effective strategic air operations of the war achieving complete surprise. Heavy bombardment by Allied forces followed by amphibious landing resulted in destroying 250 Japanese aircraft against 25 aircraft from Allied. The line of communication to Rabaul was cut successfully and the operation ended on 22 Feb 44.

36. **Capture of the Marianas**. The Mariana islands had a tremendous strategic value for the larger islands of the group – Guam, Saipan and Tinian – offered bases from which B-29s could bomb Japan. More importantly they were the Japan's line of

communications. The allied Task Force 58 commanded by Admiral Spruance sailed for invading the Marianas. Spruanc's counterpart in these islands was Jisaburo Ozawa with nine carrier fleet against allied fifteen and half the planes, 473 to 956 of allied. To offset this, Japanese took the initiative. On the morning of June 19, 1944 Ozawa launched his attack approaching from south-west direction. American flying boat spotted the carrier at 1:15 a.m. Four waves of planes struck Task Force 58 during the late morning and afternoon. They were intercepted, and the result was a total disaster for the Japanese; the Americans called it the "Marianas Turkey Shoot." It was one of the biggest air battles in the war, and one of the most one-sided. Only a single bomb hit one of the American battleships and that was the only real damage to the Task Force 58. Japan lost 243 planes against the allied loss of 31.

Advance from South West Pacific

37. **Objective**. The objective of the advance was to seize bases from where air force could extend the bomb line.

38. **Air Strategy**. Considering the above objective Allied had the following air strategy:

a. To defend vital military areas to prevent the Japanese advance, and to mount air offensives against enemy forces.

b. To proceed from south-west Pacific up the north coast of New Guinea to the Philippines and then to Okinawa for an air offensive on Japan.

c. MacArthur delegated full authority on his able air component commander Lieutenant General Kenny for air superiority over the areas of operation.

39. **Invasion of Guadalcanal**. The island was a key point to protect Japan's major base at Rabaul, threatening Allied supply and communication lines, and establishing a staging area for possible future offensives. Capturing it would allow it to be used as a starting point to isolate the Japanese base at Rabaul. The Battle of Guadalcanal started from 07 August 1942 with the landing by US Marines. They captured the undetected airfield which the Japanese were constructing and completed it. JNAF strength at Rabaul reduced to 100 from a total of 200 after this battle with 36 shot down at the end of January 1943 as they tried to cover the evacuation of Japanese forces from Solomon Islands. American authorities declared Guadalcanal secured on 09 February, 1943, after more than six months of combat. In this battle, the Allies lost 615 aircraft and 29 ships on the other hand the Japanese lost 683 aircraft and 38 ships. Throughout this battle, the Allied forces received continuous supply of nearly 2200 tons of rations, vehicles and

medium artillery delivered by air. Japanese plans for further offensives in South and Southwest Pacific were stopped. They became clearly defensive.

40. **Attack on Wewak**. Kenny always favoured the idea that, the best and the cheapest place to destroy the enemy was on ground by airfield attack. The Japanese were caught by surprise with over 150 aircraft on the ground, out of which 120 were destroyed. The effectiveness of low level attacks on airfield was much improved by the use of parachute-retarded fragmentation bombs. More so, the interdiction missions on Japanese supply lines severely restricted their mobility. During September 1943, in the midst of the operation, the Americans broke the Japanese Army's codes. Based on this intelligence Kenny secretly built an airfield at Tsilli Tsilli, while 2 fake airfields were created close to Japanese positions at Wewak using ground troops. This eventually diverted Japanese attacks; and when the Japanese detected the real airfield, it was too late to prevent the US surprise attack by 200 bombers that destroyed about 175 Japanese aircraft on ground. Only 22 American planes were lost and the Japanese could not interfere with the next Allied move.

41. **Philippine Campaign**. For subsequent operations, the Americans chose to capture the Philippines as adjudicated by President Franklin Roosevelt which lay across the supply lines to Japan. The plan was complex and aggressive ignoring Japan's strategic immobility due to lack of oil. The Task force-38 of Third Fleet struck Japanese aircraft, airfields and shipping in the Philippines. MacArthur's troops landed on Leyte Gulf on 20 Oct 1944. Few Japanese air attacks occurred up to 24 October, but on that day half of the total 396 aircraft of JNAF and JAAF approached the beach-head only to suffer 66 shot down. Meanwhile the Japanese Fleet was detected and attacked by 150 Allied bomber sorties, but with discouraging results. Although the monster Japanese battleship 'Mushashi' was sunk, only one other ship was forced to turn back. Five battleships and seven heavy cruisers continued while the air battle went on elsewhere and the naval battle resolved by conventional ship versus ship combat in Surigao Strait. Ultimately, the Japanese were defeated due to lack of expected land based air support and air reconnaissance. The invasion of Leyte Gulf and recapture of Philippines allowed the Allied force to cut off any supply from Southeast Asia including oil. Ultimately after the loss of Philippines, the Allied closed in on inner defence of Japan. The Battle of Leyte Gulf destroyed Japanese naval power and opened the way for the advance to the Okinawa.

42. **Kamikazes**. In the fall of 1944, the Japanese recognized the ineffectiveness of the usual form of the air attack. The Naval air Command suggested using conventional planes as suicide weapons. The Japanese provided another tactical surprise during this battle that is the 'Kamikazes'. The first Carrier victim of this 'Kamikaze' was the large escort carrier 'Santee', hit by a 'Zero' which dived through the flight deck and set her on

fire. It is believed that 2525 Navy and 1388 Army fliers died in the suicide attacks; they sank fifty seven ships and damaged hundreds. The Japanese, however, vastly overestimated the losses caused by all the suicide weapons.

43. **Capturing Okinawa**. The capture of Okinawa would give the Americans complete control of the East China Sea and complete the blockade of Japan. It was wanted mainly as a forward base for an invasion of Japan. Code-named Operation ICEBURG, the invasion of Okinawa began on April 1st, 1945, when 60,000 troops (two marine and two army divisions) landed with little opposition. The battle proceeded in four phases. Although the first three phases encountered only mild opposition, the final phase proved extremely difficult because the Japanese were deep underground and naval gunfire support was ineffective. The fleet lost 763 aircraft. The total American casualties in the operation numbered more than 12,000 killed and 36,000 wounded. This invasion of Okinawa fully justified with the overall strategy of the Allied Force.

Analysis

44. Several important principles of war and characteristics of air power were observed during the Allied air offensive, which are discussed below:

a. **Coordination and Cooperation**. Lack of coordination was quite evident during the battle of Marianas where Japanese launched another raid and lost valuable air assets without knowing the outcome of first attack. On the other hand, sound planning, close cooperation and coordinated operation were the important factors in achieving victory for the Allied. It was significant during the fall of Marshalls where the Allied air bombardment was followed by the amphibious landing of the US Marines.

b. **Concentration of Force**. Having understood the importance of capturing the Marianas, the Allies concentrated 15 carriers along with 956 aircraft against Japanese 9 carriers and 437 aircraft. Because of the tremendous loss of Japanese aircraft and trained pilots in Lette Gulf, they could not concentrate required amount of force at Marianas. Although the Japanese took the initiative at the beginning but they could not continue due to overwhelming concentration of force by the Allies, thus they lost the battle.

c. **Security**. The Japanese wide spread deployment caused them to fail in securing their vital supply routes as well as the airfields under their control. This facilitated the Allies to capture the airfields at Guadalcanal, Wewak and Truk without much of resistance from the Japanese ground forces.

d. **Use of Ground Forces To Achieve Air Superiority**. Gen Mac Arthur believed, once the air superiority is achieved, the other operations can go unchallenged. The operations of neutralising the strong Japanese concentrations at Wewak and Guadalcanal signify that the ground forces contributed greatly to gain air superiority.

e. **Lack of Aim**. Though Kamikaze tactics could inflict heavy toll on the allied forces but fell short of achieving a clear aim. This was proved in the battle of Leyte Gulf where many aircraft were committed for Kamikaze without any fruitful result but those aircraft as well as the pilots could have been preserved for Okinawa campaign.

f. **Airfield Attack**. The cheapest and most effective way of destroying enemy aircraft is when those are on ground i.e. by airfield attack. Airfield attacks on Rabaul and Wewak by Allied forces has justified it.

g. **Versatility**. B-29s were used to support amphibious operation while securing Mariana. After that, it was used for bombing on Japanese home islands. B-29s were also used to mine Japanese water for maritime blockade. The multi purpose use of B-29s demonstrated the versatility of air power.

Strategic Air Offensive

45. **B-29 Campaign**. So far in the Pacific campaign, air power was used in support of land or naval operation. The B-29 campaign was marked for the first major sustained use of air power in the Pacific Campaign with its independent role. The initial strategic air offensive by B-29s from China could reach only a small portion of southern Japan up to Nagasaki. Subsequently, all the bombers were shifted to the Marianas and the bomb line could be extended to cover almost the entire Japan. The strategic air offensive against Japan began on June 14, 1944 in a small scale. The main air offensive campaign started in late November 1944 by 21st Bomber Command, based in Marianas. Initial attacks were on Japan's steel industry and aircraft plants form high altitude but results were poor. Later on Curtis Lemay changed the strategy and started incendiary area attacks from low altitude at nights. On March 10, 1945 Lemay sent 334 bombers to attack Tokyo.

46. **Atom Bomb Attack.** On July 25, the strategic air command in the Pacific was ordered to lunch the atomic attack as soon as weather allowed after August 3, 1945. On August 6, 1945, the first atom bomb named Little Boy was dropped by B-29 over Hiroshima. This uranium bomb was equivalent to 14000 tons of TNT and caused 70,000 immediate deaths. Second one was a plutonium bomb named Fat Man, dropped on Nagasaki on August 9 and killed at least 40,000 people. The use of atomic bomb was one of the most controversial aspects of WW-II. On August10, President Truman ruled

that no more bombs should be used until further notice. On August 15, Japan announced its surrender. The formal surrender was signed on September 2, aboard the battle ship Missouri in Tokyo bay, ending the Second World War.

47. **Analysis**. The following analysis can be made:

a. **Air Power as Shock Action**. The shock of aerial bombardment induced panic on Japanese population and destroyed their morale to continue the war.

b. **Effect on Target Population**. A comprehensive bombing strategy can have profound effect on civilian morale and divert the opponent's military effort away from offensive operation to home defence.

c. **Reach**. The Allies could utilize the reach of air power effectively. B-29s, from their new position at Mariana, were able to burn and destroy any part of Japan, which no one could believe possible before the attack took place.

d. **Offence-Defence Balance**. Due to an all out offensive effort at the beginning, the Japanese ran short of trained aircrew to defend their motherland. This poor air defence system could not inflict maximum attrition to the Allied forces during the strategic campaign causing a humiliating defeat for them.

e. **Persistence**. Persistent bombing by the Allied over Japanese mainland crippled their industrial base from which they could not recover.

f. **Air Power Can Achieve an End State**. Dropping of atom bombs on the Japanese soil and the effect there after proved that air power can bring a decisive end to a conflict.

COMMAND AND CONTROL

The Japanese C2

48. There was no separate Air Force in Japan during WW-II. Army and Navy had own Air arms virtually with no cooperation. Therefore, the air assets were never employed under a centralized control. On many occasions, it resulted in failure to adequately coordinate the operations as well. Admiral Yamamoto was the commander of the Japanese combined fleet. Emperor was the supreme head of the Army and Navy Air arms. By Imperial ordinance, it had been decreed that the posts of Minister of War and

Minister of Marine shall be held only by generals and admirals. Thus a Government cannot be formed unless officers are available and willing to fill these posts.

The Allied C2

49. Allied command was activated on 15 January 1942 under Field Marshal Sir Archibald Wavel. It was named American, British, Dutch and Australian Command (ABDACOM). This combined command structure was not very effective due to the strategic disputes of individual interests. However, it was dissolved leading to the geographical division of responsibility. In the Pacific, General MacArthur and Admiral Nimitz were given the responsibility of Southwest Pacific and Central Pacific respectively.

50. In March 1942, General MacArthur took command of new 'South West Pacific Theatre' and Admiral Chester Nimitz assumed command of the Central Pacific Fleet. The air element was grouped under Allied Force Commander George C Kenny who had the Royal Australian Air Force, Dutch Task Force73 and US fifth Air Force under him. There was no unified command structure in the Pacific, but had two separate commands.

Analysis

51. **Japanese Strengths and Weaknesses**. Japan's governmental structure provided no effective civilian control of her Army and Navy for obtaining effective coordination between the services. Military policy was inconsistent with the foreign policy of the cabinet. The Japanese Army and Navy tending to make their own foreign policy in accordance with their individual aims, capabilities and requirement. One of Japan's greatest military weaknesses was the bitter rivalry between the Army and the Navy. Japanese Army was traditionally a stronghold of the Coshu clan while the Navy was traditionally dominated by the rival Satsuma clan. During the war bureaucratic rivalry between her Army and Navy impeded coordinated strategic and tactical planning, the proper employment of her air power, the development of adequate logistics and the efficient utilization of her economic resources. The existence of joint or combined organizations as the Supreme War Council, The Board of Field Marshals and Fleet Admirals, the Imperial Headquarters served mainly to hide the fact that real unity, integration and coordination were conspicuously lacking. It was almost as if the war was fought by two uneasy and distrustful allies rather than sister services of a single nation. In fact within the whole spectrum of Japanese air campaign they didn't have any strength in their complicated command and control structure.

52. **Allied Strengths and Weaknesses**. Logically, the pacific was overwhelmingly a naval theatre and MacAurther should have been under Nimitz but inter service jealousies and MacAurther's ego and prestige were such that the sensible solution was not

followed. However this rivalry was a weakness on the Allied part but it had less effect on the courses of the war. Due to democracy in USA and civilian control over the military, each theatre commander used the air, ground and sea forces assigned to him as an integrated or coordinated team. Coordination and compromise among theatre commanders was largely achieved in all major respects. This centralized control and decentralized execution was the strength of the Allied command and control structure. The lessons of the Pacific war strongly support that form of organization which provides unity of command, capable of clear and effective decision at the top, strengthens civilian control and thus provides integration of military policy with foreign and domestic policy. This favours a high degree of coordination in planning, intelligence, and research and development.

TACTICAL EVOLUTION

53. Pacific war had the varied nature of targets and geography which caused the development of new methods and innovative tactics of airpower by the both participants:

a. **Low Level Skip Bombing**. General Kenney introduced the low-level 'Skip Bombing' to sink ships and obtained parachute fragmentation bombs for low-level strikes on the land targets.

b. **Dive Bombing and Thatch Wave**. Allied pilots were instructed that they could shake a Zero off their tail with a split-S to the right. Likewise, the recommended attack procedure was a diving attack followed by a sharp turn to the right. The US Navy developed cooperative tactics such as the Thatch Wave that took advantage of the better radio communications gear carried by Allied fighters.

c. **Kamikaze**. Admiral Takaziro Ohnishi, the naval air commander in the Philippines, recognizing the ineffectiveness of their usual forms of attack, suggested for suicidal attack. It was well known as Kamikaze Tactics which proved quite effective in the final phase of the pacific war.

IMPACT OF TECHNOLOGY

54. Japan entered the war with better arsenal than the allied force but could not keep pace with the technological development in course of time. The yamamoto was the largest and most powerful battle ship in the world at that time. Japanese carriers lacked catapults and were somewhat lacking in underwater protection, but otherwise they were equal to their American counterparts. Japanese cruisers and destroyers were lacking in

antiaircraft protection, but were armed with the deadly long lance torpedo, which was far superior to anything in the allied arsenals.

55. Japanese aircraft shocked the West when they were first encountered. The Zero fighters were faster, more maneuverable, and had a longer range than most Western aircraft of 1941. However, the Zero had a number of weaknesses that become evident only after several months of combat. It lacked self-sealing fuel tanks and making it a firetrap. The zero required an overhaul every 150 hours of flight time but Japanese often stretched this to 200 hours or more with unhappy results. The Zero's armament was better in paper than in practice. Besides, the Zero was equipped with a poor radio that was often removed by its pilot to save weight. Japanese bombers were long-ranged, but vulnerable, and Japan never created a true strategic bomber. But Japanese light attack aircraft, such as the Kate and the Val, wrought havoc on Allied shipping.

56. Japans biggest edge at the start of the war was not quantity or even quality of weapons, but the superb preparation and training of its solders, sailors and airmen. Japans subsequent military decline can be traced to the loss of its best warriors, and the failure to train adequate replacements, in the long battles of attrition.

Allied

57. New weapons for air warfare were developed during Pacific Campaign. Notably napalm, rockets, primitive guided weapons, smart bombs, radar guided glider bomb. A Navy drone, the TDM was used with some success against the Japanese at Rabaul in 1944. The most dramatic development of the war was the atomic bomb; but this affected only the end of the war. The US invention of the signal code breaking system (Magic) had contributed immensely to the outcome of the war. In mid 1944, US began to deploy the Boeing B-29 aircraft in the Pacific. It was mainly constructed keeping in mind about the requirement of attacking the mainland Japan. It could travel 6000 km and carry 10 tons of bombs.

58. Radar was a war-winning advantage for the Allies in the Pacific. Though not unknown to the Japanese, the Allies were far ahead in both theory and practice and remained so throughout the war. Another breakthrough was the radar proximity fuse, Known as the VT fuse at that time. Both the Japanese and Allies developed radar countermeasures during the war, but Japan radar counter measures trailed behind those of the Allies. Electronic superiority over the Japanese was a key to the effectiveness of American submarine and antisubmarine operations and powerfully affected air warfare.

LESSONS LEARNT

59. The following lessons can be derived from the Pacific Air Campaign:

a. **Control of the Air**. Gaining and maintaining the required degree of control of the air is crucial for any successful air, sea or land operation. In the initial part of the war, the Japanese took the advantage from the control of air while the Allies capitalized from the same at the later part of the war. In Philippines, the Americans Far East Air Force's strength was cut in half by the first day of the war and the Japanese could secure their control of the air, which resulted in a very successful invasion of Philippines by their land forces. The same fact was proved by the allied forces for carrying out strategic offensive bombing over Japan during the last phase of the war.

b. **Surprise**. Mass attack when combined with surprise gives the best result. Attack on Pearl Harbour by the Japanese is a unique example of surprise.

c. **Persistent Attack**. Air power needs to be employed persistently to achieve effective result. Due to lack of persistent attack on Pearl Harbour by the Japanese, the USA could rebuild her forces soon. On the other hand, relentless bombing by B-29s from Mariana and Okinawa compelled the Japanese to surrender.

d. **Reach**. Americans perceived no threat at Pearl Herbour. Japanese thought their mainland was very secure. Both were proved wrong and had to pay the price. The air war in the Pacific once again proved the fact that to air power no target is invincible.

e. **Security and Intelligence**. Security and intelligence are crucial for any successful operation. Due to intelligence failure, Allies got a surprise at Pearl Harbour. Conversely, in the Battle of Coral Sea and Midway the Japanese paid a great price owing to their failure to maintain the secrecy about the forthcoming operation.

f. **Concentration of Force**. Air power should be used in mass at decisive time and place and not in piecemeal basis. Japanese success in Pearl Harbour and Allies success in Wewak are the examples of concentration of force.

g. **Centralized Command and Decentralized Execution**. Centralized command allows achieving the unity of purpose. Again, decentralized execution allows achieving responsiveness and tactical flexibility. For example, General Mac Arther had the centralized command over the Southwest Pacific Theatre. But he gave full authority to his air component commander General Kenny for achieving air superiority. Therefore, General Kenny delegated authority to his subordinate commanders in the Southwest Pacific by which the Allies achieved the air superiority that complemented to the ground invasion.

h. **Offence-Defence Balance**. A correct offence-defence mix is required for a balanced strategy. The Japanese failed to maintain an effective defence, which made their homeland vulnerable and gradually squeezed their offensive capacity.

j. **Offensive Actions**. Offensive action on enemy's centre of gravity can have a far-reaching effect. Doolittle raid on Japanese mainland resulted in gaining strategic effect more than the physical destruction that it caused.

k. **Co-opeartion and Co-ordination**. Co-operation and co-ordination between air and surface forces can produce synergistic effect. Mac Arthur's South West Pacific offensive proved that, as he used the ground forces to seize the bases from where the air forces could extend their bomb line. On the other hand, the Japanese Army and Navy fought almost independently in an uncoordinated manner which caused them to loose the islands in Southwest pacific.

l. **Flexibility**. Flexibility, a primary strength of air power, was significant in many occasions during this campaign. The Zero fighters had its primary role to escort the bombers. As there was no resistance from the opponents during the raid on Pearl Harbour, they shifted from defender to attacker role.

m. **Technology**. Technology can have a major impact on the warfare. Japanese Zero fighters, US B-29s, JN-25 Magic and atom bomb signify that.

n. **Priority**. Setting appropriate priority is essential for success in any campaign. Mac Arthur's prioritizing air superiority for his campaign in Southwest Pacific is the example.

p. **Airfield Attack**. The cheapest way to destroy enemy's air power is to attack them on ground**.** Air field attacks on Philippines by the Japanese and at Wewak by the Allied are the examples.

q. **Sustainability**. Reinforcement of logistics is a must for any sustained operation. Japanese could not ensure sustained operation in Wewak and Philippines due to less logistic reinforcement, hence they were beaten.

r. **Versatility**. B-29s were used to support amphibious operation while securing Mariana. After that, it was used for bombing on Japanese home islands. B-29s were also used to mine Japanese water for maritime blockade. The multi purpose use of B-29s demonstrated the versatility of air power.

s. **Air Defence**. The importance of having a strong air defence network was evident through out the Pacific Air Campaign. The Japanese took a great toll of the American forces in the Philippines. On the other hand due to the lack of sufficiently strong air defence coverage, Japanese had to accept a devastating defeat when the Allies started bombing over their homeland.

t. **Air Power can Produce Strategic Effect**. The unique characteristics of air power can influence strategic decisions. Attack on Pearl Harbour brought the US in to the war, on the other hand Doolittle raid on Japanese homeland compelled the Japanese to engage their fighters for home defence.

u. **Air Power can Achieve an End State**. Air power is not only a means to end but also an end in itself. Japanese unconditional surrender following the dropping of atom bombs on the Japanese soil proved that air power itself can bring an end to any conflict.

CONCLUSION

60. On the morning of December 7, 1941, the Second World War in the Pacific was begun with an attack by Japanese naval aviation against the American held island of Oahu, Hawaii and its main port, Pearl Harbor. Within hours of this dawn attack, a meticulously planned campaign was launched against key American and British forces in the Philippines, Thailand, Malaya and China, the ultimate goal of which was Japanese control of eastern Asia and the western Pacific, including the priceless natural resources of the Dutch East Indies. The Japanese government believed that once these regions were firmly under their control, the Allies, and especially the United States, would sue for peace rather than fight a bloody war in distant lands.

61. Getting success in the Coral Sea and Midway, the Allies decided to go on the offensive. A persistent two-pronged offensive across the central and south west Pacific steadily pushed the Japanese back. By mid 1944, the backbone of Japanese Pacific defence was broken when Marshalls Islands and the Marianas were seized. Subsequently, Okinawa, the last island before Japan, was also captured. After the capture of Mariana and Okinawa, systematic long-range bombing offensive over Japan got underway. The twin specters of nuclear bombardment over Hiroshima and Nagasaki forced Imperial intervention and the end of war. Projection of power, mainly through air power, was the key concept of this campaign. The use of air power resulted in the defeat of Japan without an invasion and it indicated that, in a future war, ultimate defeat or victory could be determined by air battles.

TOPIC-3

BATTLE OF BRITAIN

Introduction

1. The Battle of Britain was the first major campaign fought in the air. This battle turned out to be a classic air battle in which victory was achieved mainly by defensive actions. As such, air campaign planners of today will quote this campaign as a positive example of good defensive posture.

2. During Second World War, Hitler intended to establish his authority on Europe. By 1940, only the British stood in his way. Therefore, Hitler decided to attack Britain immediately after the fall of France. As England was separated from continental Europe by the English Channel, a massive amphibious landing across the sea was essential for the German forces to achieve their aim. The invasion plan was developed, and its code name was “Operation Sea Lion”. However, before the land invasion could take place, the Germans rightly assessed the necessity to gain control of the air by Luftwaffe.

3. On 10 July 1940, Hitler ordered the Luftwaffe to destroy the RAF in the shortest possible time. As the RAF faced a numerically superior Luftwaffe, she was forced to adopt a defensive posture. The air campaign over the skies of Britain lasted about thirteen weeks, from July to October 1940. Britain’s victory in this defensive battle not only changed the course of World War II, but left many lessons to be learnt.

Background of the Battle

4. In 1919, after the First World War, the Treaty of Versailles was signed between the victorious Allies and the Germans. This treaty imposed numerous restrictions on the size and capability of the German Armed Forces, and was seen by the Germans as a humiliation of their defeat. Morale of the German people was at its lowest ebb during the period following the war. However, this soon changed when Adolph Hitler came to power. Having experienced both triumph and defeat in World War One (WW I) as a soldier in German Army, Hitler promised his people that he would restore everything that was taken away from Germans, despite the conditions of the treaty. He reorganised and built up the military, and set about conquering the whole of Northern Europe. The World War II commenced on 01 September 1939 when Hitler's army invaded Poland. The sheer audacity of Hitler took everyone by surprise. One by one, countries fell to the German Army; Czechoslovakia, Denmark, Norway, Luxembourg, Holland, Belgium and finally France.

5. By June 1940, only the British stood in the way of German domination of Northern Europe. In Britain, whatever precious time was spent putting as many new

fighters and trained pilots into service as possible; to guard against the attack everyone knew was coming. By the beginning of July 1940, the RAF had built up its operational strength to 600-700 fighters while the Luftwaffe had total 2250 bombers and fighters. The stage was set. In the skies above South East England, the future of Britain was about to be decided. As the British Prime Minister, Sir Winston Churchill put it; "What General Weygrand called the Battle of France is over, the Battle of Britain is about to begin".

German Strategy

6. On 30 June 1940, Reich-Marshal Goering signed an operational directive for the air war against England. Luftwaffe estimated that it would take four days to defeat Fighter Command, followed by another four weeks to eliminate the RAF. The strategy of the Germans for “Operation Sea Lion” was as follows:

a. To neutralize the RAF in the air and on the ground to gain control of the air;

b. To interdict the British supply lines by attacking ships and ports;

c. To cross the Channel and invade Britain.

British Strategy

7. After World War I, the British developed a carefully planned integrated air defence system to defend the homeland from adversaries. While this put her in good stead to mount an effective defence against the Germans, the RAF was nevertheless numerically inferior to the Luftwaffe. Thus, the British strategy in the Battle of Britain was:

a. To fight a defensive battle by means of an integrated AD defence network.

b. To protect the war potential.

c. To ensure aircraft production is higher than attrition.

Phases of the Battle

8. The Battle of Britain was fought in four phases as described in the subsequent paragraphs.

Phase 1 – The Battle for the Control of the Channel (10 Jul 1940 - 12 Aug 1940)

9. The Germans launched their offensive attacks to test the RAF during this phase. Most of the attacks concentrated on shipping in the English Channel. The idea was to bring the Fighter Command for battle over sea. This phase of the battle also saw the Germans probing British defences, and conducting reconnaissance flights over various airfields. During this phase, RAF lost 96 aircraft whereas Luftwaffe lost 207.

Phase 2 – The Battle for the Air Superiority (12 Aug 1940- 06 Sep1940)

10. After the first phase, Goering thought that the British early warning system had been destroyed. As such, Luftwaffe began the next phase of the battle on 13 August by launching massive raids on the airfields of 11 Group. The aim was to destroy the RAF, either in the air or on the ground. To keep up the pressure, Germans began night raids to stop the defenders repairing damage overnight. Just when the Luftwaffe was beginning to overcome the RAF with the destruction of her airfields, the RAF was given a much needed break to recover as the Germans decided to change its strategy from attacking airfields to cities. During this phase, RAF lost 295 fighters and 171 badly damaged whereas the Luftwaffe lost 380 aircraft.

Phase 3 - The Battle to Break Britain's Morale or The Blitz (07 Sep 1940 – 05 Oct 1940)

11. The third phase of the battle came to be known as the Blitz. On one night-raid, Luftwaffe aircraft bombed London by mistake. In retaliation, the British bombed Berlin. This enraged Hitler. Because it seemed that the attacks on airfields were not destroying enough RAF fighters, he ordered a change of targets by attacking cities, industries and other strategic targets instead. This gave the British defences the much needed respite to re-group and re-build. During this phase, RAF lost 216 aircraft and on the other hand, Luftwaffe lost 181 fighters and 194 bombers.

Phase 4 – The Night Raids (06 Oct 1940 - 31 Oct 1940)

12. As the long, hot summer ran into October, the German daylight bomber losses became too heavy. Realising the task to be difficult and the toll becoming too high at daytime, the Germans planned to attack the cities at night. The damage they caused to Britain's cities was enormous, including 42,000 civilian casualties. However, as the RAF pilots became familiar with the raiders' course of action towards London and other cities and their operational experience increased, the success in night interceptions also improved. As such, the RAF began to counter the Luftwaffe's nightly raids.

13. By late October, the weather began to worsen and the German losses accumulated. Soon, the Germans realised that the RAF could not be defeated. As such, they postponed 'Op Sea-Lion' indefinitely and concentrated on 'Op Barbarossa', the invasion of Russia. This marked the end of the Battle of Britain.

Major Tactics That Evolved During the Battle

14. While carrying all these offensive and defensive operations during the Battle of Britain, many new tactics were evolved by both the air forces. Some important tactics are discussed below:

a. **Big Wing**. Big Wing was a tactic developed by Squadron Leader Bader of 12 Group. He suggested that the aircraft of five or more fighter squadrons be flown together to engage the enemy en-masse.

b. **Jabo (Jagd bomber).** The tactic was developed by the Germans to carry out nuisance raids during the day. Modified Me 109 fighters, loaded with 250 lbs bombs, were made to cover as much area as possible before a full-fledged night operation to stretch the RAF fighter pilots during the day. The aim was to tire the RAF pilots before the night attacks.

c. **High Level Bombing.** Luftwaffe changed their tactics of bombing from medium level to high level to minimize attrition. RAF fighters faced much difficulty intercepting these bombers at higher altitude because of less reaction time to climb. However, Germans had to trade off accuracy as a result of this tactic.

Effective Use of Intelligence Means

15. Like any other campaigns, intelligence played a key role in Battle of Britain. The British possessed a superior intelligence service. The code name for the British effort to crack the German military Enigma cipher machines was called Ultra. It was one of the most closely guarded secrets of the War. It was conducted at a country estate called Bletchley Park. With the help of the Polish intelligence, the British began working on the Enigma code machines that the German military used for radio communications. The RAF intelligence agency was responsible for covering two specific aspects of Luftwaffe; firstly, the German ORBAT and Organization and secondly, immediate intelligence on Luftwaffe operation. British intelligence could easily extract information from R/T conversation of Luftwaffe and knew exactly where they were heading for and at what number. This information helped Fighter Command to plan the scramble in time.

16. In contrast, the German intelligence was ineffective. Although there were eight Luftwaffe intelligence agencies, they were fractured as a result of rivalries. By 1940, there were few or no German agents operating in Britain. As a result, the Luftwaffe did not possess recent knowledge of the workings of the RAF's air defences, particularly on the critical command and control system that ACM Dowding developed before the war. Thus, more often than not, the Luftwaffe was caught by surprise. For example, for the period of 12 – 19 Aug, German intelligence claimed that RAF lost 644 aircraft but actual figure was 141 aircraft. Even on those occasions when intelligence was fairly accurate, the Luftwaffe higher command would choose to ignore it if it does not conform to what they would like to believe. This severely hampered the Luftwaffe’s ability to prosecute an effective air campaign against the RAF, particularly a well-entrenched defensive force.

Technological Innovations

17. Battle of Britain is the first air campaign where the offensive and defensive counter air operation concepts were shaped by the development of new technologies.

18. **War in Electronic Spectrum.** Both British and Germans exploited the electromagnetic spectrum to a great extent to deceive each other. The British built an invisible electronic wall as part of their defence, and the Germans tried to break it. Churchill termed this electronic spectrum as “The Wizard War”. Significant electronic warfare (EW) measures included:

a. **Knickebein**. Knickebein was a blind bombing aid of Germany. A steerable beam was projected over the target. The pilot then flew along the beam using the audio tones to stay on the centreline until a second intersecting beam was heard and this indicated that the aircraft was now over the target. The British countered this by sending a false signal called masking beacons.

b. **Triangulation Method**. The German pilots used to tune to BBC radio stations to find their fix course by calculating relative bearings from to two or three BBC radio stations by triangulation method. Discovering this, British ordered all stations to use same frequency for transmission to confuse German pilots.

c. **Airborne Cigar**. The Airborne Cigar was a jamming device used by RAF. This equipment could interfere with enemy RT Channel in the 20 – 30 MHZ and 48 – 52 MHZ at a range of 50 miles.

d. **DUPPEL.** DUPPEL was a German ECCM method. Strips of silver paper were dropped to confuse the British radars, which is similar to present day chaff.

e. **Radio Paris**. Another radio station used for military purpose was Radio Paris. This was transmitted by the Germans in occupied France, and it offered round-the-clock program of songs interspersed with Nazi propaganda. The Radio Paris transmission was through highly directional antenna aimed at the city to be bombed. The German pilots would thus be directed to London or Liverpool simply by listening to French songs transmitted by Radio Paris. The British took long time to detect the system. When they did, they came up with a counter measure called “BROMIDE”. This consisted re-transmitting of Radio Paris programme on the same frequency using Omni-directional antenna. With this ECM German bombers got disoriented and flew haphazardly over Britain bombing at random.

f. **Radar.** In the 30s, the Air Ministry engaged scientists to look for means to 'see' the enemy before they arrive at the coast. One such scientist, Robert Watson-Watt, suggested the possibility of using radio signals that were bounced back from aircraft to detect their presence. Hugh Dowding, who was then Air member for Research and Development, was enthusiastic for the idea. On 26th Feb 1935, a full test was arranged, and this gave birth to what we know today as 'radar'. After further developments and refinements, a network of radar stations was built along the English coast in 1939. Known as Chain Home (CH), the system consisted of transmitting and receiving towers 250 to 350 feet high. Operating in the frequency band of 22 to 30 MHz, the system had a range of about 120 miles. To complement these tall towers, a more complicated Chain Home Low (CHL) system was also installed. This provided the RAF with low-level detection of 5000 feet and below.

g. **IFF/High Frequency Direction Finding System.** In order to have an effective air defence system, one must not only be able to detect enemy aircraft but also be able to accurately assess the position of friendly aircraft. Hence, the idea of an IFF system was born. This soon evolved into the High Frequency Direction Finding system (HFDFS), also known by its codename as 'Pip-squeak'. All British fighters had a TR9D transmitter receiver installed in this system. The unit had two channels; one for voice communication with the Sector command station and the other for the IFF system. By transmitting on this second channel at regular intervals, the Sector command station could automatically track the movement of the friendly aircraft.

h. **Computers.** The Battle of Britain also saw the use of computers for quick calculation of the compass course on which to send fighters for accurate interception, as well as breaking of Enigma coded messages. The use of computers for these purposes cannot be over-stated. Without these machines, the timeliness of response to the threats presented to Fighter Command would not have been there. As such, one can argue that they helped the RAF to achieve economy of force when engaging the enemy, and concentrate her forces at decisive points of the battle. This was extremely crucial for the RAF, since they were numerically inferior to the Luftwaffe.

Conclusion

19. The Battle of Britain was the only defensive battle which brought the success in favour of the defensive forces. The battle also brought the air commander in a common table to think about defensive posture for protecting the country.

TOPIC-4

AIRPOWER IN THE KOREAN WAR

Introduction

1. The Korean War was the first conflict after WW II that marked the beginning of the cold war episode. It began in early hours of 25 June 1950, when North Korean troops crossed the 38th parallel and invaded South Korea. In an immediate response, United Nation (UN) Security Council adopted a resolution proclaiming North Korean Army (NKA) attack a breach of world peace. The UN asked its member states to assist South Korea in repelling aggression. On the call by UN, 18 countries under the banner of UN engaged themselves against North Korea in the Korean peninsula in one of the furious wars of the history. At a later stage Chinese Communist Forces (CCF) joined North Korean forces. Though limited in resources and objectives, the Korean War blindly involved several million men in a hard and bitter struggle. It began as a 'police action' by the UN and developed in to a war of great magnitude. Finally, it ended in a stalemate manner, which gave no joy to either side.

2. Air Power had a major role in the Korean War where the United States Air Force (USAF) had the leading role. Emerging as an independent force only three years back, USAF had an objective to prove that air power alone would be able to bring a decisive result in the Korean War. The Air war in Korea ranks as a major air campaign and embraced the entire range of air operations. During the three years of fighting, victory or defeat often depended on the availability and application of Air power. There was a great disparity in the strength of Air power of the two sides, both in numbers and modernity. On one side were the Air Forces of North Korea and China. The other side was the United Nations Air Force (UNAF) mostly comprising USAF and some aircraft of Britain and Australia.

3 Air power had both success and failures in Korean War. Many ground commanders of UNF admitted that close air support in Korea was so important that without it Army would not be able to stay in Korea. Thousands of interdiction missions flown by UNAF in the initial months were priceless. North Korean Air Force hardly had any available air assets to challenge the UNAF. Whatever they had were destroyed either on ground or in the air within the first month of the war. It was Chinese Communist Air Force (CCAF) which emerged with MiG – 15 and challenged the air supremacy of UNF. Many air battles took place: both sides had gain and loss. There was also a threat of using nuclear weapon by USA which took the Korean War into verge of 3rd WW. Finally, a massive offensive air op named as 'Dam Burst' brought the North Korea in

to the negotiation table. An armistice was signed in 1953 amongst the UN, the USA, China and North Korea. South Korea refused to sign the armistice, which left the two Koreas separated till to date.

Background

4. Korea was divided in half along the 38th parallel, between the Soviet Union and the USA at the end of the WW II. In 1947, Soviet troops withdrew, followed soon after by the American forces. The people of Korea were left on their own. Governments were formed in each half– communist in the north, democrats in the south.

5. The withdrawal of American and Russian troops created a military void resulting in increased number of border incidents. The situation became worse every day. Finally, on 25 June 1950, the North Korea launched an attack on South Korea with the ultimate motive of unifying Korea under a socialist banner.

Strategy

6. In Korean War, the grand strategy of UNF was influenced by the USA. On the other hand, China and Russia influenced the grand strategy of North Korea.

7. **Grand Strategy.**

a. **UNF Strategy**. The UNF's strategy was 'rolling back of communism and liberating North Korea. When the Chinese entered the war, the previous strategy was abandoned and a new strategy of 'containing communist expansion' was adopted.

b. **Communist Strategy**. Conquest of South Korea was the only grand strategy of North Korea as well as CCF.

8. **Air Strategy.**

a. **UNF Strategy**.

(1) Gaining control of the air by destroying enemy air bases, supporting facilities and aircraft in the air and on the ground, was the primary campaign objective.

(2) Providing close support to surface forces operations.

(3) Destruction of resources of raw material and factories which were considered to be the North Korean war making potential such as the chemical plants, oil refinery, munitions factory, hydro-electric system etc.

(4) Isolating the battle fields by destroying North Korean road and railway lines, bridges, communications and supply centres.

(5) Destruction of irrigation dams which were vital for North Korean irrigation system and thereby production of rice.

b. **Communist Strategy**. North Korea lost their small air force within 1st month of the war leaving no room for the effective employment of air power. However, Chinese developed a huge Air Force with soviet aircraft which had following air strategy during the war:

(1) Establish control of the air over a substantial part of North Korea by attacking enemy aircraft in the air and not attacking the UNFon ground.

(2) Deny the UNF Strategy of precision daylight bombing over an important part of North Korea close to Yalu River.

War on the Ground

9. **North Korean Thrust**. The NKA invaded South Korea in the early hours of 25 Jun 50 and Seoul fell on 28 Jun 50. The first UN troops landed in Korea on 30 Jun 50. The NKA advance was halted in the South Easterly tip of the peninsula around the port of Pusan.

10. **UN Drive to Yalu River**. Having been adequately reinforced, the UNF broke out from the Pusan perimeter in conjunction with a massive amphibious landing at Inchon on 15 Sep 50. With pressure mounting both from the front and the rear, the NKA fell back in disarray. Seoul was recaptured on 26 Sep 50. At this stage China entered the war.

11. **The Chinese Thrust to South**. The Chinese struck on 26 Nov 50. The UNF were taken completely by surprise. They were pushed back with heavy losses. By the end of the year, the Chinese had reached below 38th parallel. On 01 Jan 5l, the Chinese army launched a concerted attack and occupied Seoul on 24 Jan 51.

12. **The War of Attrition**. With fresh reinforcements, the UNF wrested the initiative and went on the offensive. Seoul was retaken on 15 Mar 51, changing hands for the

fourth time in less than 9 months. The Chinese launched a counter attack in Apr-May 51 and UN troops in Jun 51. The front stabilized at north of 38th parallel. A cease-fire proposal was made in the UN on 23 Jun 51 and the negotiations started on 08 Jul 51. Subsequently the fighting continued on a reduced scale and the negotiations haggled for 25 months before the armistice was signed on 27 July 1953.

Phases of The Air Battle

13. Though the ground battle in Korea had four phases, the air battle had six distinct phases. First four phases were in commensuration the phases of the ground battle. When the ground battle came into a stalemate during June, 1951 the air war continued and ultimately proved to be decisive on 6th phase. The phases of the air battle are described below:

a. **Phase I**. During phase-I, the UNF were very much concerned about the defence of the Pusan perimeter. So, the main focus was on the close air support to help the ground troops. At the same time control of the air over friendly areas was accomplished by the UNAF. As soon as the defence of the perimeter hardened, an increasing amount of resources were diverted to interdiction attacks on the North Korean supply lines. It was vital in halting the NKA advance towards Pusan.

b. **Phase II**. Phase II of the air operation developed with the advancement of UN ground troops to the Yalu. It continued destroying the enemy aircraft in the air and on the ground including the hostile air bases and supporting facilities. MIG-15 of CCAF appeared for the first time in this phase over North Korea on 01 November 1950. While fighting the MiG in the air, the strategic destruction of enemy sources of raw material, factories and the associated transportation system was precluded.

c. **Phase III**. Phase III of the air battle is related to the CCF advance to the South. During the early weeks of phase three of the war the main emphasis of the Fifth Air Force and of Bomber Command reverted to the close support role as in the early days of the war. The strategic objective of this phase was to halt the Communist advance and to force the beginning of armistices talks.

d. **Phase IV**. With the delegations meeting for negotiation, the necessity for close air support declined with the gradual arrival of the stalemate war on the ground. In June 1951, the UNAF initiated an all-out strategic air interdiction campaign with the object of isolating and paralysing the communist armies in the field and so forcing an early end of armistice talks. Concurrently, a determined

attack was launched at the Communist airfield-building programme in North Korea. In response, operations from beyond the Yalu were stepped up. It was thus in the air to air fighting that the new strength of CCF began to be felt. There were many dogfights between MIGs and F-86 during this phase. Both sides suffered attrition. Many B-29s were shot down. Finally this phase could not make the communist signing the truce.

e. **Phase V**. As the interdiction campaign could not bring the desired result, the UNAF switched to attacking on strategic targets. The phase opened on 23 June 1952. Among the strategic targets were hydro-electric systems at Suiho, factories, barracks and airfields of Pyongyang, oil refinery at Aozi and many other industrial plants. It appears that the UNAF failed to determine the right Centre of Gravity for the adversary.

f. **Phase VI**. Even after these massive strikes there was no indication that the communists were abandoning their stand to sign the truce. So, a series of strikes was initiated against the North Korean irrigation dam which supplied 75% of water for rice production. Five of total 20 irrigation dams were attacked between 13 and 16 May 53, which impaired the efficiency of the irrigation system. In addition it achieved spectacular tactical success since the main road and rail communication running north from the capital were cut by the floods. At last the agreement was signed by North Korea.

Emergence of New Weapon Platform

14. **Helicopter**. One of the remarkable innovations during the Korean War was the immergence of Helicopter as a battle ally. During the WW II, the advances made in the development of the helicopter were experimental. It was in the Korean War only the full potential of the helicopter was exposed and exploited. The helicopter was used extensively for the reconnaissance, liaison purposes and conveying of commanders. More over the helicopter was used to transport ammunition, equipment and to air lift troops to the front line. The other plus factor being the evacuation of casualties and has been responsible for saving many lives. The rescue by sling hoist was developed during this war. The UN Air Forces helicopter fleet included SIKORSKY H-5 and H-19.

15. **Jet Fighter Aircraft.** Though Jet aircraft made their first appearance in WW II, it was Korean War where jet aircraft made its significant presence with first jet to jet air combat. The swept wing MiG-15s and F-86 Sabres dominated the peninsula's skies during the war. The other jet aircraft were F-80 Shooting Star, F-82 Twin Mustang and F-84 Thunder jet.

Conclusion

16. After three years of hard fighting with the confines of Korea the combatants ended what they had started on 25 Jun 50. Both sides had tremendous loss of man, material and equipment. The cost was completely out of proportion to any benefits that may have been gained by either side. Economic and social damage to the Korean peninsula was incalculable, three years of bombing left hardly a modern building standing in the north.

17. At the beginning of the war the UNF rather US strategy was to roll back communism from the whole of Korean peninsula. But with the intervention of Chinese that was confined to the containment of communism only. Initially UNAF made a list of 18 strategic targets and continued intense bombing on those. But the amazing repair capability of the North Koreans made the air effort insignificant. In many events due to lack of unity of command the air efforts were wasted. Two unique facets of the air war in Korea were the emergence of the helicopter and the jet aircraft.

18. The air campaign in Korea was fought relentlessly around the clock until the last moment. It was air power which saved the day for the UNF. In spite of the limitations imposed on its use the air power played a very significant and decisive role in Korean War. However, it was clear that air power alone by itself could not end the fighting. In last two years, the Korean War was essentially an air war. Thus within five years of the end of the WW II, the air war in Korea reaffirmed that only air power has the fire power and flexibility to cope with the complexities of a modern war.

TOPIC-5

ARAB ISRAEL WAR

SIX DAYS WAR: 1967

Historical Background

1. The reasons for the 67 war are deeply rooted in history of Palestine since 721 BC. The Muslims and the Jews both had claims to the Palestine's Jerusalem as holy ground for both the community. The claim continued without any solution, rather it turned into clash and physical conflict between these two communities. The Jews drew attention and blessings of other Jews of the developed countries. The UN intervened the matter and maintained a peacekeeping force since 1957. The neighboring Arab countries supported the Muslim Palestine to restore their land. Jews expansion continued and the number of Jews grew to a great extent. To counter the growing Zionist threat, the Arab league was formed in 1945. The Arab countries refused to acknowledge the Jewish state "Israel" in Palestine.

2. The conflicting claims of Palestine ultimately turned in to armed conflicts. By 1956, the Arabs and Israelis had fought two wars. The defeat in both the wars in 1948 and 1956 badly damaged the Arabs pride and grew avenge to their minds. They established good relation with the Soviet Union as the Israelis were backed by the western countries. Palestine became a land of business opportunity for the super powers. The defeat in 1948 and Arab League's failure to act effectively for a common goal grew resentment among the Arabs. The so-called leadership problem appeared to be solved by the emergence of Egyptian leader Gamal Abdul Nasser in 1952. His charismatic leadership fuelled the Arab hope to fight for Palestine against Israel. In 1956 Egypt fought another war with Israel and lost that too.

3. The Palestine Liberation Organisation (PLO) was established in 1958 for the cause of the Palestine. The Arab countries especially the Egypt and Jordan supported the Palestine Fedayeen (guerrillas). PLO had blessings of the Arab countries special of Egypt and Jordan. They used to attack the Israeli troops and civilians from the shelter in Egyptian controlled Gaza Strip or Jordanian controlled West Bank. Syrians also increased their support for PLO. The violent incidents increased along the Syrian-Israeli border. The Israelis responded to the PLO raids with hard-hitting retaliatory raids against neighbouring Syria, Lebanon and Jordan. This vicious circle of raids and counter raids continued with increased intensity. As a follow up, a minor border incident turned into a major tank battle on 7 April 67. The incident involved both the air forces and Israelis shot down six Syrian aircraft. Tension between the Israelis and Syrians reached to the breaking point. Although Syria had a defence agreement with Egypt, it followed a moderate course. President Nasser faced criticism from the Arab countries and especially from Syria and Jordan for not taking any military action against Israel. This criticism provoked President Nasser to take rapid and some visible actions. Nasser

openly declared to destroy Israel. Nasser actually did not have any workable plan for a war with Israel. He was gambling to recover his tarnished image to the Arab world. He did not want to attack Israel first to avoid the international criticism. He rather intended to provoke Israel for an aggression, so that he could have a retaliatory blow and destroy Israel thereafter.

4. On 18 May, Nasser asked the UN Secretary General to withdraw the UN peacekeeping force from Sinai desert. Egypt, Syria and Jordan massed their army to the Israeli border and on 22 May Egypt blocked the Strait of Tiran, a vital shipping corridor for Israel with links to the red sea and major sources of petroleum. That was the final step of provoking Israel. Israel considered it as an act of aggression. Israel was further alarmed when Egypt and Jordan signed a treaty on 30 May and placed two armies under a joint commander. Nasser was quite successful in provoking Israel. He even declared war on radio. The situation appeared perilous to the Israelis. They believed that their option is narrowing. With these frictions and fears on 03 June, the Israeli cabinet voted for immediate war against Egypt. But Egypt never could imagine what could be the result of the first blow from Israeli side.

Objective

5. The Arab forces objective was to destroy the Israel. On the other hand, Israel wanted to destroy Egypt's air power to make a military balance for their survival.

Air Strategy

6. The Israelis planned to employ air power to destroy the EAF on ground and bring a military balance on her favour. Subsequently it also planned to attack Syria and Jordan to gain total air superiority.

Independent Air operation

7. After having adequate intelligence and preparation, the Israelis were sure for the pre-emptive attack on the Egyptian air force on 5 June 67. They aimed to destroy the Egyptian air force at first, and then go for other air forces subsequently. The attack was unique in kind. The Israelis employed almost all her air assets for this Offensive air campaign. The total air campaign can be analysed in the following paragraphs.

The Israeli Air Operation

8. **Attack on Egyptian Air Field.** Israelis attained all the elements of surprise and exploiting that, they shocked the Egyptian Air Force. They grounded the Air Force by a massive air attack. Israel started its air attack over Egyptian airfield with Mirage,

Super Myste're, Fouga, Vautour and Ouragan aircraft. The first wave consisted of four fighter aircraft and they attacked the runway first.

9. The Israelis used "concrete dibber" (similar Durandal) to destroy the runway. They also used delay-fused bombs to disrupt and discourage the repair work. Simultaneously they attacked the parked aircraft with rocket and cannons. The first wave continued for ten minutes over the target. The second wave approached after 10 minutes and continued their weapon delivery for about ten minutes. There was always a wave for about ten minutes. This pattern continued for sixteen successive waves. Mirage, some Vautour and Super Mystere squadron had flown six sorties. By noon, the numerically superior Egyptian air force was destroyed on the ground. In barely three hours, the Egyptian lost 100 pilots and 300 aircraft.

10. **Attack on Syrian Airfield.** After grounding the Egyptian Air Force the Israelis attacked the Syrian Air Force at 1215 hours on the same day. Twenty-five minute pre-emptive air strikes destroyed the Syrian Air Force.

11. **Attack on Jordanian Airfield.** The Israelis continued its attack on Jordanian Air Force on the same day. Israeli aircraft destroyed 20 Hunters, six transports and two helicopters on the ground at Mafraq and Amman International airport.

12. **Attack on Iraqi Airfield.** Strikes against the Iraqi Air Force were limited to one airfield, known as H-3. In that attack the Israeli Mirages were flying at low level to avoid radar detection and they were bounced from above by Iraqi Hunters. In the dogfight, Israelis lost three Miages and shot down one Iraqi Hunter.

Tactics

13. By night of 5 Jun, the Israelis obtained air superiority in all three fronts at the cost of 1000 IAF sorties, and lives of 20 pilots. The loss was negligible considering the overwhelming air superiority. Their training and aggressive tactics helped them to achieve such a goal. Some of the tactics are discussed below:

a. Instead of flying directly towards the targets, the first wave of Israeli ac flew out to sea off the Egyptian coast. They flew just above the water and approached from the west. This was exactly the attack from opposite direction that Egyptian was expecting.

b. In many cases, to improve their accuracy, the Israeli pilots slowed down drastically by lowering their landing gear to fly as slowly as possible.

c. The Israelis used the delay fuse bomb named "Concrete Dibber" for runway demolition. It actually denied the Egyptian to reconstruct their runway.

d. The Israelis also used another guided bomb similar to the American “Bullpup”. It was actually used for the precision destruction of parked ac, without damage to surrounding installations. This was particularly useful for El Arish, the only base that’s R/W were not destroyed. The Israelis intentionally did not destroy it. They planned to use this airfield for their own use as a forward supply and casualty evacuation centre.

e. The Israelis delivered weapon from shallow dive angles that minimised exposure to the AAA guns.

f. The Israelis deceived the Arabs in many ways. During and after the initial attack Israeli radio operators transmitted in Arabic language into the enemy air defence radio comm. network. They were giving false orders, cancelling correct orders and generally causing confusion to the Egyptian.

Arabs Air Operation

14. **Egyptian Air Operation.** The Egyptian air forces’ role was combat air patrol along the Israeli Sinai frontier. They were engaged for defensive role rather than the offensive role. On 5 Jun morning, the Egyptians were surprised by Israeli air attack. When the attack begun, Egyptian pilots and ground crew rushed to the aircraft but the Israelis destroyed most of these aircraft. They also destroyed the aircraft were taxiing or taking off.

15. Despite the suddenness of the attack eight Egyptian Mig-21s managed to airborne. They intercepted and shot down two Israeli fighters – Bombers before being shot down by the Israelis. Twenty additional Egyptian fighters (12 Mig-21s and 8 Mig-19s) based at Hurghada were able to airborne, as their bases were not attacked. They flew towards north, towards the primary Egyptian bases near the Suez Canal. But on reaching, the MiGs found the bases are under attack. Subsequently the MiGs succumbed to Israeli fighters or crash-landed after running out of fuel before being able to provide any aid.

16. After the first day attack, the Egyptians still had 200 operational ac and a substantial number of pilots. Most of the intact ac were in Yemen or had been shifted to bases out of the range of the Israeli fighters. On day two: June 6, Egyptian MiGs conducted numerous ground attack missions. The most effective attack was on an Israeli supply point in the central Sinai. On day three, the Egyptian MiGs flew numerous close support sorties. Six MiGs strafed the Israeli Tal Ugda (division) in mid-afternoon as it was moving into position to seal off Ismalia Pass. On Day Four, Egyptian MiGs concentrated their efforts against an Israeli reconnaissance column approaching the Suez Canal. By mid-afternoon the Egyptians had flown 32 ground attack sorties against the Israeli formation. However may be the case, Egyptian's effort to close air support could not bring any fruitful result.

17. Egyptian anti aircraft gun tried to repel the Israeli attacker, but the speed of the attack and suppression activities by the Israeli aircraft neutralized their meagre efforts. The Egyptian anti aircraft fire had been lighter than expected. They could cause only little damage to the Israeli aircraft. The Egyptians fired a good number of SA-2 missiles but they could not shoot down any of the Israeli aircraft. These missiles were ineffective below 4000 ft as they would take long time to accelerate below that altitude. As the Israeli strike aircraft flew at very low altitude, these SA-2s did not pose any threat to Israeli aircraft.

18. **Jordanian Air Operation.** In response to the attack on Egypt, Jordan retaliated against Israel at around 11:00 am on 5 June 1967. Jordanian Hawker Hunter attacked on Israeli base at Netanya. Jordan claimed that the Hunters destroyed four Israeli ac, but Israeli officials admitted lose of only a single Noratias transport ac. In retaliation to that attack, the Israelis attacked Jordan and destroyed the Jordanian Air Force on ground. But to do that, Israel faced little obstruction from Jordanian Air Force. A PAF pilot later on the Gp Capt of BAF led the first interception mission with a Jordanian wingman at around 1200 hours from Mafraq Air Base. In that mission the then Flt Lt Saiful Azam and his wingman shot one Israeli Myste're each. Destruction of Jordanian air force aircraft on ground did not stop the spirit of the Jordanian fighters. They drove through the desert to fight from a Iraqi Air Base H-3 located about 40 miles inside Iraq's western border with Jordan, which was the only target airfield of Israel.

19. Syrian Air Operation. Half an hour later of Jordanian attack, 12 Syrian Mig-21s and Mig-17s attacked the Haifa oil refinery. They also attacked the Israeli airfield at Megiddo and destroyed few dummy ac. Two Mig-17s were shot down over the airfield and third over Tawafik. After this attack the Syrians virtually could not launch any attack against the Israelis, as they were totally wiped out by the Israelis.

20. **Iraqi Air Operation and Achievement of a Bengali PAF Pilot.** At dawn on June 6, an Iraqi Tu-16 bombed the Israeli town of Natanya, causing numerous casualties. However, Israeli antiaircraft gun shot it down when it flew over them. In retaliation to this attack, four flights of Israeli Mysteres bombed and strafed H-3, the Iraqi air base near Jordanian border. In addition, two flights of Mirages were sent against more distant Iraqi airfield. Here the Iraqi Hawker Hunter could catch the Israelis by giving them surprise.

21. Strikes against the Iraqi air base H-3 faced high attrition by the Jordanian contingent. Though the attack was small, but in a single mission Israel had a considerable amount of loss. Furthermore, this particular combat remained as a milestone with the contribution of Gp Capt Saiful Azam (the then Flt Lt of PAF). The Jordanian force led by the then Flt Lt Saiful Azam scrambled and waited at 25,000 ft with complete radio silence. Once the Mirages of Israel came over H-3 airfield, Flt Lt Saiful and his wingman engaged them. Flt Lt Saif shot one Mirage and a Vatour. The mission over H-3 had more success of Arabs by shooting down 3 Israeli aircraft but

loosing one aircraft flown by an Iraqi pilot. In the post war debrief, Col Eleizer Cohen IAF stated," The damage to H-3 was peripheral, and the losses- a killed pilot and navigator, two pilots captured and three aircraft downed- were heavier than at any other base."

22. **Lebanese Air Operation.** On June 6, Israel's northern neighbour, Lebanon, backed up its declaration of war by sending two Hawker Hunters into Israeli airspace north of the Sea of Galilee. The Hunters were immediately intercepted by the Israeli fighters, which shot down one ac.

Air Land Battle by Israeli Air Force

23. **The Sinai Front.** After destroying the Egyptian force in the first day, the IAF concentrated for Sinai battlefield. On the second day, Israeli air force flew close air support attacks and interdiction missions and destroyed the Egyptian forces in the open terrain on the Sinai. Because of the absence of air cover and poor communication, the Egyptian commander could not manoeuvre their units. The air support continued till the last day. Everywhere the Egyptians abandoned their vehicles to escape air attacks or because of they had run out of fuel. With the air cover, Israeli force pushed forward till the Suez Canal and accepted the cease-fire on 09 June.

24. **The Jordanian Front.** In the Jordanian front, numerically the Israeli and Jordanian forces were equal. But the Israelis got the upper edge by destroying the Jordanian Air Force on 05 June. They also knocked out the Iraqi armored brigade in the Jordanian front with a devastating air strike. The West Bank had natural defensive terrain and many of Jordanian units proved themselves equal to the Israelis. But the Israelis broke the Jordanian resistance with more than 800 air strikes in three days.

25. **The Syrian Front.** Israeli air power played a major role, preventing any maneuvering by Syrian units. During the two days offensive action against Syria, the Israeli Air Force flew more sorties than West Bank and Sinai front. In the last two days of the war, Israeli Air Force destroyed the AAA and went for the artillery brigade of Syria. The Syrian fortification at Golan Height, which was built by 19 years of construction, was destroyed by Israel air force in two days. That effectively ended the war on 10 Jun 67. This exemplifies how proper use of air power can speed up operation and help to achieve the objective by the ground forces.

Maritime Air Operation

26. The 6 days war did not have any contribution from the maritime air warfare. However, a small incident brought little excitement. The event occurred when a US electronic intelligence vessel, *the Liberty,* calmly gathering information off the Israeli coast. The Liberty was attacked by Israeli aircraft and suffered many casualties. The

incident did not disturb US-Israeli relations. Israel eventually offered compensation but did not admit to any feeling of guilt.

Offensive Action

27. **Israeli Offensive Action.** Israel considered its geographical disadvantage and numerical inferiority in terms of force and realised that they could not afford to act defensively. So they shifted from the defensive posture and adopted the "Offensive-defence" strategy. To do that, they had to go for pre-emptive attack. This concept of pre-emptive is particularly applicable for the country like Israel bounded by the enemy with no depth at all. Israel could not play defensive role in all three fronts. To make a force balance with her three enemies, Israel needed to neutralise the strongest enemy, i.e. Egypt's air capability so that she can support her land forces subsequently. Following the same plan for other two fronts Israel achieved an unprecedented victory.

28. **Arabs Offensive Action.** The Arabs were successful in provoking the Israelis for initiating the war. But, they could not sustain the Israeli first blow as they expected. Once the Israelis were busy with Egyptian airfield, other Arab allies could make an offensive action to disrupt the Israeli chain of actions. IAF analysis found out that, to close the runways with 90% probability, they would require more than 200 aircraft, which the IAF possessed. Rapid turnarounds and repeated attacks were therefore essential. If Egypt would manage to launch a small number of pre-emptive attacks, it would have disrupted the total Israeli plan. Because the Israeli pre-emptive attack was dependent on absolute synchronisation for its success. Thereafter, the sanctuary, which the IAF enjoyed to turn round its aircraft would have been jeopardised and affect the subsequent operation. The combined Arab forces failed to utilise this opportunity. The Arab force would have to face only 12 Mirages retained by the IAF to protect the homeland. The Arabs could not make such effort because of cumulative factors such as, coordination and cooperation, planning, adequate intelligence etc.

Surprise

29. **Israeli Force.** The main ingredient for the Israeli victory was surprise. Israelis used this element to overcome their numerical inferiority. Egypt and Syria were equipped with sophisticated Soviet weapons prior to the 1967 war, including MIG-21 fighters, SA-2 anti-air missiles, and the latest models (T-54 and T-55) of Russian tanks. The combined Arab armed forces were superior to the Israel Defense Force quantitatively and regarding weapons qualitatively also. Israel's biggest problem was the all-around threat from Arab air bases. Because of this capability, Israel planned and executed the pre-emptive strike with absolute surprise. To achieve the desired level of surprise, the mission was planned long before and rehearsed for the last few years.

30. **Arab Forces.** The combined Arab Forces having the advantage of numerical superiority could not sustain the war. Among many other factors for their defeat, they could not take the advantage of principle of Surprise. They overtly moved the forces and announced in radio about attacking Israel. They did not try to attain the surprise element, rather they were surprised. The success and failure of surprise for both the parties depended on security.

Security

31. **Israeli Force.** Security of information was one of the main elements for achieving surprise by Israel. Not only they formulated a plan, but also they maintained the secrecy of their plan. Israelis were rehearsing the pre-emptive attack for last three years with complete secrecy. Israelis concealed their whole plan, and they were successful to set up a unique example of launching surprise attack on Arab bases.

32. **Arab Forces.** On the other hand the Arabs failed to maintain security of their intelligence. Israelis had easy access to Arab intelligence. The Arabs also failed to secure their aircraft and equipment. Aircraft were arranged in the open tarmac in rows making an easy targeting for the Israeli pilots. Although the concept of Hardened Aircraft Shelter was not evolved that time, the other methods of securing the aircraft and equipment were not followed. Within one hour, Egyptians lost 200 aircraft on ground.

Concentration of Force

33. **Israeli Force.** Israelis calculated the OTR for the Egyptian airfield and planned for the strike mission accordingly. Israel employed all her assets for offensive action except 12 aircraft for AD role to achieve the desired result. A detailed and synchronised planning was required to employ that force effectively in the right time. The perfect execution of that plan deserves a hail and success of that attack bears no doubt about that plan. But employing only 12 aircraft for AD role was a bit of a gamble. Rather it can be better termed as a calculated risk. For the Israelis, this calculation meant “Survival”. This gamble should not be taken as an example for the other world. Because, a slightest break in that action chain because of Arabian air action, could be good enough to disrupt Israeli pre-emptive attack.

34. **Arab Forces.** As for the Arabs, they could not take the advantage of this delicate plan for concentrating force. The total lack in initiative of the combined Arab force in making a successful attack on the Israeli airfield allowed Israel to gain air superiority without any hitch.

Co-operation and Co-ordination

35. The Arabs had numerical superiority over the Israeli Defence Force (IDF). The Arabs needed to coordinate their operations to take advantage of their numerical superiority. But the joint command was established only one month before the war started. There was no joint contingency plan also. Practically, each Arab country fought alone and thereby they neutralised their combined strength.

36. The state of Arab command and control was best displayed in the Jordanian front. Israeli Premier Eshkol sent a note to King Hussein of Jordan just after the attack on Egypt stating that, Israel would not initiate hostilities against Jordan unless attacked first. The Jordanian force commanded by the Egyptian General, entered the war believing Egyptian radio communication claiming the destruction of the Israeli Air force, an imminent Egyptian offensive in the Sinai, and large-scale aid for Jordan from Syria, Iraq and Saudi Arabia. When these reports proved false, the general proposed for a withdrawal.

37. On the other hand the Israelis overcame their weak points by two factors. First, they had a far superior command structure. Furthermore all Israeli officers were trained and encouraged to exercise initiative, imagination, and responsibility.

Outcome of the War

38. The 1967 war is the classic example of the use of military coercion to gain political goals. Israel had tremendous victory over the Arabs. They killed 15,000 Arab soldiers, and wounded another 53,000, destroyed 1000 Arab tanks and completely destroyed the Egyptian, Jordanian and Syrian air forces. Israel occupied an additional 26, 000 sq. miles of Arab territory. They achieved all these with the expense of only 780 Israeli soldiers and 2,600 wounded. The balance of power in the Middle East shifted completely in Israel's favour. Israelis desired to gain recognition for the state of Israel out of the war. But the Six-Day War did not bring any immediate peace to the Israelis. The war made peace a more distant and difficult prospect. The Israeli victory further antagonised and humiliated the Arabs and weakened the influence of Arab moderates. Internationally, Israel's pre-emptive strategy cost her support around the world. Even the French condemned the Israelis for starting the war. They terminated a long period of French-Israeli friendship. It was important for the Israelis, because France had been the major arms supplier of Israel. However, the capture of Sinai desert by this war helped Israel to make negotiation with her main enemy Egypt for the political goal. On November 1977, Sadat recognised Israel as a state and declared his readiness to make peace. Israel gained her strategic goal.

Conclusions

39. The Arab-Israel war 1967 was the shortest war in the history of the Middle East. With the aim of a military balance, Israel planned to destroy the Egyptian Air Force on ground and subsequently to other allied Arab nations. In doing that, Israel executed a well-rehearsed pre-emptive attack on Egyptian, Syrian and Jordanian air force on 05 Jun 67. Geographically blocked and surrounded by enemy countries, Israel suffered from numerical inferiority. Intercepting the Arab intelligence about the massing of Arab forces against Israel, it quickly responded for a pre-emptive attack.

40. On the other hand, the Arabs did not want to initiate the war to avoid political crisis. They wanted to provoke Israel by closing the Strait of Tiran and planned to absorb the first blow form Israel. Israelis improved their training and rehearsed the pre-emptive mission well ahead and executed it successfully on 5 Jun 67. Israelis concentrated all her air assets (except 12 aircraft for AD role) to destroy 10 most important Egyptian airfields were vulnerable for Israel. Using “concrete dibber” bomb, gun and rocket, Israeli aircraft destroyed the Arab air assets on ground. The total air supremacy helped the Israeli army to penetrate the Arab defences. They captured all of Palestine, Egypt’s vast Sinai Peninsula and Syrian’s Golan Heights as well as the west Bank of Jordan.

41. With the superior command and control the Israeli Defence Force exploited the surprise, security, concentration of force, offensive action and quick response to achieve a complete victory. All though the six days war did not bring any immediate peace for the Israelis, but captured Sinai desert helped them to bargain for a strategic objective, i.e. the Arabs acceptance of Israel as a state. This short and decisive air war remained as a landmark in the history of air power. It was a great lesson for the Arab states and for the whole world.

TOPIC-6

AIR ASPECT OF 1971 WAR

Introduction

1. The story of Indo-Pak relations has been a story of conflict. 1971 Indo-Pak war was a power projection by the two countries to add another episode in the history of bitter Indo-Pak relation. This conflict emanated from a number of problems. Interests and objectives of ideology, image of each other and power struggle between the two countries formed the base of 1971 Indo-Pak war. In the history, this war goes by the name of Indo-Pak war but the essence of the war lies in the underlying urge of the people of Bangladesh for freedom. Liberation war comes when all means of negotiation fails, when the oppressing party is pushed to the limit and the existence becomes questionable. Liberation war of Bangladesh was no exception to that. But what makes Liberation war for Bangladesh uniquely different from other liberation war is the level of preparation by the people of East Pakistan for confronting a well-trained and sophisticated force. It could easily be compared to David versus Goliath story until India came in the action. India's entry in the liberation war brought about a new dimension which was also characterized by the influence of super powers.

2. 1971 Indo-Pak War was just not a reaction to situational crisis in former East Pakistan. In fact, it was outburst of the rival sentiment due to strains in Indo-Pak relations developed after 1965 war. Kashmir Issue, Border violation, interference in internal affairs, strengthening of Sino-Pak axis were the major reasons for growing tensions between the two countries after 1965 war. All these factors converged to the East Pakistan issue. Liberation war in East Pakistan created the right stage to establish the political agendas both by India and Pakistan.

3. After the military crackdown by Pakistan, India was morally obligated to help the freedom Fighters of Bangladesh. Indian assistance to the Bangladeshi "Freedom Fighters" made Pakistan Army's proceedings extremely difficult. Having sensed a futile end to the military crackdown, Pakistan waged full scale attack in the western border of India to bring international attention to the dispute. Pakistan hoped that it would soon bring UN involvement which would bring East Pakistan under the rule of western elite. India did what it had to Mrs Indira Gandhi declared in a broadcast on 04 Dec 1971 "The war in Bangladesh has become a war on India. This has been imposed upon me, my government and the people of India a great responsibility. We have no other option but to put our country on a war footing."- The declaration marked the beginning of the war between the two rival nations. The war continued for two weeks after which a new independent country named Bangladesh was born.

4. Air war played a pivotal role in 1971 Indo-Pak war. The first blow was provided by the PAF's pre-emptive attack on 3rd Dec 1971 on different Indian Airfields in the western border. India swiftly responded by counter attack. The surrender by the PAK army was accelerated due to the air superiority by IAF in the eastern theatre which allowed the advancement of friendly land offensive without any resistance by enemy air force. The

air war in the western theatre was intense, leaving a question about who won the air war. The air war in Indo-Pak war was characterized by the classic lessons of air power and the exploitation of its basic tenets were significant in the application and conduct of air operation by both IAF and PAF.

Background

5. The partition of the Indian Subcontinent in 1947 created two independent countries: India and Pakistan. The basis for such partition was religion. Most Muslim majority areas of undivided India went to the newly created Pakistan where as India was created on the basis of secularism. Pakistan was originally made up of two distinct and geographically unconnected parts termed West Pakistan and East Pakistan. West Pakistan was made up of a number of races including the Punjabis and others. East Pakistan, on the other hand, was much more homogeneous and had an overwhelming Bengali-speaking population.

6. Although the Eastern wing of Pakistan was more populous than the Western one, political power since independence rested with the Western elite. This caused considerable resentment in East Pakistan. The biased strategies and policies adopted by the western elites resulted in a disparity between the two wings of Pakistan, East Pakistan being the sufferer. Such disparity provoked the leaders of the East to embark upon the path of revolution. The confrontation started with the language movement in 1952 when Muhammad Ali Jinnah declared Urdu as the only state language. It was at the cost of blood to fight for the rights of mother tongue for the Bengalis in East Pakistan. In every sphere the Bengalis were neglected and their representation in the national level was meagre. Thus they did not have voice in the national decision making process and the confrontation became inevitable. In economic front, the divergence grew wider day-by-day. The people of East felt that they were being subjected to exploitations and internal colonialism and resented the fact that west was developing with money earned by the East. In 1960, the per capita income in West Pakistan was 32 % higher than that in the East, with a higher annual growth with such growing contrast, religion took a back seat and the Bengali nationhood surged under the charismatic leadership of Sheikh MujiburRahman. He forcefully articulated all these resentment by forming an opposition political party called the Awami-League and demanding more autonomy for East Pakistan within the Pakistani Federation. He manifested a 6 point demand in 1966 for provincial autonomy in matters other than foreign affairs and defence, which was refused by the rulers. In the Pakistani general elections held in 1970, Awami-League won the majority of seats, securing a complete majority in East Pakistan. In all fairness, Awami- League should have assumed the political power of the East Pakistan But West Pakistan's ruling elite were so dismayed by the turn of events that instead of allowing Bengalis to rule East Pakistan, they launched operation searchlight under the military leadership of General Tikka Khan on 25 March 1971 and massacred thousands of innocent Bengalis. The brutality displayed by the Pakistani army went past the Nazi extermination of Jews. The Bangladesh government was formed in exile on 17 April

1971 In Mujibnagar, (a village in Meherpur subdivision) Kustia. The Bangladesh Defence Forces (BDF) was formed and Colonel M A G Osmani was appointed as the Commander- in- Chief. People from all walks of life joined the struggle for freedom. The defected airmen from PAF initially joined the BDF. Later on, the Kilo Flight (air arm of BDF) was formed on 28 September 1971 which marks the embryo of today's BAF.

7. The genocide led by General Tikka Khan in the East Pakistan resulted exodus of more than 08 million refugees (more than half of them Hindus) to neighbouring India. West Bengal was the worst affected by the refugee problem. Repeated appeals by the Indian government failed to elicit any response from the international community and by April 1971, the then Indian Prime Minister, Mrs Indira Gandhi, decided that the only solution lay in helping Bengali freedom fighters, especially the MuktiBahini, to liberate East Pakistan, which had already been re-christened Bangladesh by its people.

8. Pakistan felt it could dissuade India from helping the MuktiBahini by being provocative. The Pakistan Air Force (PAF) in East Pakistan launched an air attack on 22 November against MuktiBahini camps located inside Indian Territory in the state of West Bengal. In the Western and Northern sectors too occasional clashes, some of them quite bloody, took place. Confident that another war would be as much of a stalemate as the 1965 Conflict, the Pakistanis got increasingly bold and finally on 3 December 1971 reacted with a massive coordinated air strike on several Indian Air Force stations in the West. At midnight, the Indian Prime Minister Mrs Indira Gandhi in a broadcast to the nation declared that India was at war with Pakistan. As her words came on in millions of Indian homes across the Subcontinent, the men at the front were already engaged in bitter combat.

Strategy

9. After the complete outbreak of the war, the political objectives of Pakistan and India could be summarized in the following manner:

a. **Pakistan's Political Objective**

(1) Turn West into main theatre of op.

(2) Deny any land territory to Indian forces in the East.

(3) Capture state of Jammu &Kashmir in a swift offensive.

(4) Ensure Indian troops are delayed so that its allies, China and US, could come to its aid.

b. **India's political Objective**

(1) Liberate as much territory as possible in the East to set up a provincial Bangladesh govt.

(2) Swift campaign of short duration as there was a chance of UN intervention.

(3) Ensure conditions in liberated portions of Bangladesh are conducive for the return of 08 million refugees.

Pakistan's Military Strategy

10. 1971 war was fought on the basis War Directive No.4, issued on 09 August 1969.This predicted that the main threat was from India, and that the secondary threat was from (Soviet-supported) Afghanistan; it would not expect any kind of substantial help from outside. The war with India would be intense and fought with great severity. This directive furthermore expected that normal communications between East and West Pakistan would be disrupted and that even if the war could start in the east, the major and decisive battles would be fought in the west. To compliment these directives, Pakistan's military strategy was aptly inscribed with the dictum "West fights for East" i.e. if India chose to attack East Pakistan, there would be an immediate response in the West. Therefore, a token force structure was deployed in the Eastern Wing, which was later reinforced with two additional lightly equipped infantry divisions. This reinforcement was not, however, deployed to face the Indian threat but to suppress the mass upheaval of the east while adhering to the concept that the crucial battle for the defence of East Pakistan would be fought in the west.

Pakistan's Air Strategy

11. Based on the political & military objectives, the Air Objectives for PAF as spelled out were:

a. Maintain an offensive pressure on the IAF by conducting sustained offensive counter air missions in the west till the land offensive starts.

b. To prevent IAF from interfering with the Pak Army's operations in the main sectors of the land battle, and to provide max air cover to a planned counter offensive in the west.

c. To provide limited CAS and reconnaissance to Army and Navy when urgently needed.

d. Interdict Indian line of communication in the West.

e. Provide transport support to sister services.

f. Provide AD of selective VAs and VPs in both wings.

India's Military Strategy

12. Central to the India's military strategy was to fight a holding , offensive - defensive ops in the West, while in the East, drive at maximum speed to force Pakistan to hand over the country to Bengalis. To meet this strategy the Indian Military leadership formulated the following directives:

a. Launch operation in winters to ensure China doesn't come to the aid of Pakistan.

b. Launch multi-pronged attacks in East Pak to deny Pak mil leadership any reaction or readjustment capability

c. Secure command centres and destroy enemy's command and control capabilities as subsidiary objective.

d. Offensive defensive operation - maintain defensive posture but resort to local offensive actions to gain tactical advantage.

India's Air Strategy

13. The then chief of IAF Air Chief Marshal PC Lal, in his book "My years with the IAF" listed the Air strategy on the priorities given to different air operations. The air strategy by IAF in 1971 complemented his directives which were as follows:

a. To attain and maintain air superiority in the eastern theatre.

b. To attain local air superiority over the land battle in the western theatre.

c. To provide air defence of selective VAs and VPs in both sectors.

d. To disrupt LOC and damage logistic bases in both fronts.

Bangladesh's Military Strategy

14. The "Taliapara Document' spells out the military strategy of the liberation war. It outlines that, first; a large guerrilla force would be raised and trained. Their task would be to clear up the collaborators of the Pakistani army, destroy communication lines to immobilize the Pakistani forces and engage in hit-and-run operations against convoys and isolated posts of Pakistan forces to create perpetual tension for them. Second, the regular units of MuktiBahini would be enlarged, divided into sectors troops and placed in different areas to give cover to guerrilla operations. Third, the best material among the regular units of the MuktiBahini and guerrillas would be recruited to form a regular force which would launch direct attacks on the Pakistani Army strongholds once guerrillas and sector troops have demolished them and cut off their lines of logistic support.

Although the strategy did not envisage the forming of an air wing, yet the BDF leadership was responsive to the idea of forming the Kilo flight with the objective of providing air support to the MuktiBahini.

Concept of Air Operation: IAF

15. The IAF concept of operation was based on a joint doctrine, which had its emphasis on air support for ground operations. Indians had developed this concept based on the tactics of Soviet Tactical Air Force Frontal Aviation Units. The priority in the west was to offset the imbalance in ground forces by the application of air power while fighting for attaining local air superiority and in the East the Indian operation was to achieve air superiority and thereafter continue providing air support to the land offensive. As a result over 50% of their sorties in the West were dedicated for the ground strike near the battle area while the remainder was divided between air interdiction and air defence missions.

Concept of Air Operation: PAF

16. The role of the PAF was to fight the air battle offensively, so to make it possible for the Army to operate without serious interference from the enemy air force. Furthermore, in essence the PAF was to provide limited close air support and reconnaissance support to the Army and Navy, but also maximum support in the case of a major battle on the ground; to coordinate all early warning systems; and to transport troops and equipment in both theatres of operations. It followed that a condition of air superiority would have to be achieved in the form of moving umbrella over Pakistan army's deep thrust.

17. To keep own losses low while inflicting maximum possible losses to the IAF, the PAF was to avoid a war of attrition. PAF planned to attack IAF at its weakest points while operating in favourable environments as often as possible; the PAF was to maintain a high state of air defence initially, in order to minimize the effects of likely Indian counter-air strikes saturating Pakistani airfields. The Pakistani aircraft were not to be unnecessarily exposed to small arms fire, AAA and SAMs until the results fully justified this: for example, the PAF was to launch strikes against forward Indian airfields in order to reduce the overall weight of attack that could be launched from these in return; also strikes against Indian radar stations were to be flown. With such concept, PAF launched a pre-emptive attack on 03 Dec 71 on five airfields and two radar sites in western India. Operations in East Pakistan were to be undertaken in such manner as to conserve the PAF force as long as possible.

Comparison of Air Order Of Battle: Aircraft

18. On the eve of the 1971 War, PAF had a total of 288 aircraft, Whereas the Indian Air Force had 1025 aircraft in its inventory, this gave the IAF an advantageous overall ratio of 4:1(10:1 in Eastern front).The ORBAT ratio in eastern front indicates the overwhelming numerical superiority of IAF due to Pakistan's poor mobilization of

resources in East Pakistan. Out of IAFs total 39 combat squadrons which were deployed in 20 airfields, 10 combat squadrons were deployed in East and rest on the West. Whereas, PAF had total 13 combat squadrons out of which only one F-86 squadron (No 14 squadron) was deployed in East Pakistan. IAF also had 4 helicopters Unit under Eastern Air Command.

Comparison of Air Order of Battle: Air Defence and Radar

19. PAF had three medium-level and five low-level radars. The coverage was not at all requisite because these radars provided only 25% of high level coverage. On the low level side only 7% of the desired coverage was available. The only thing that was adequate on the western side was the Mobile Observer Units, but on the Eastern theatre they also had to be removed due to the fear of MuktiBahini. Overall it can be said that on the western side the network left dangerous gaps in Kashmir sector, area south of Multan, between Sukkur and Hyderabad and Karachi region. On the eastern side, only one radar was available to cover all levels and sectors. Contrary to this, the Indian air defence system was greatly improved from that of 1965. This was made possible with the soviet assistance. The system consisted of a vast network of early warning and low level radars. The terminal defences at most of the airfields had also been upgraded with radar controlled AAA guns and SAMs. A lot had also been done for the passive air defence. Most of IAF combat aircraft could be dispersed over a number of airfields and housed in concrete pens.

Application of Air Power: Air War in the Eastern Front

20. **General**. The Air war in the East was brief and intense. It began on 22 November, 1971, several days before the formal declaration of war. PAF's four of the Sabre launched attack against the MuktiBahini positioned in Boyra, a place within the Indian territory of West Bengal. PAF's attack was swiftly responded by IAF Gnat fighters which marked the beginning of air battle between the two rivals. Finally, IAF took the initiative of launching full scale air attack in the east that began on 4th Dec 71.With a huge numerical superiority (10:1) of IAF; it took only few hours of air effort to obtain the eventual air superiority. On the other hand, PAF was handicapped by its poor strength which could only delay IAF's air superiority for two days.

21. **IAF Air Effort**. The IAF's Eastern Air Command (EAC) flew a total of 1978 sorties, of which 1178 (60%) were in direct support of the Army. The first three days of the war consumed a fair effort towards Counter Air and CAP missions. The subsequent effort was biased towards CAS, interdiction and Air Transport Operation. The high marks of the IAF campaign are undoubtedly the prompt CAO against the three airfields, virtually grounding the PAF in the first 48 hours of the war and its intimate support of the Army. The IAF Air Efforts are briefly discussed below :

a. **CAO**. Attacks were mounted on the night of 3 Dec by Canberras against Kurmitola, Chittagong and Tejgaon. These results were, however, indecisive as they were found to be repaired the next day. To obviate the vulnerability of the

slower Canberras by day, Hunters and MiGs attacked these airfields, by day, on the 4th, 5th and 6th. IAF was in the face of PAF's resistance on 4th and 5th. Both the side experienced attrition after intensive dog fight. IAF continued with the principle of persistence and PAF found it difficult to counter with their decreasing strength. This allowed IAF to damage the Tejgaon runway surface on 6th December which made PAF non-operational. Thereafter, PAF had given up its effort to repair these runways. Recce of runway damage was well carried out by Canberras and Sukhois. On 08 December, IAF launched 32 attacks against these bases unhindered by PAF. IAF continued with persistent attack till the end of the war.

b. **Air Defence**. Initially Gnats and MiGs were engaged for CAP and escort missions. The only AD encounter took place over Boyra was by three Gnats of IAF against four Sabres of PAF. Three F-86 Sabres were reported to be shot down by Indian Gnats. After gaining the air supremacy over East Pakistan, this effort was diverted towards CAS and interdiction.

c. **Close Air Support**. IAF's Hunter, Gnats, Sukois and MiG-21 carried out close air support mission in the east. Not a single request for CAS for army was turned down at any stage of the war. Movements of Pakistani troops during day time came to a virtual halt due to relentless IAF air attack. A few details of CAS, Ac wise, are listed below:

(1) **Hunter**. On 6 Dec, Hunter of No 37 Squadron provided massive firepower support for the ground force in the Battle of Hili. On 11 Dec, a significant contribution was made by attacks on Chafee tanks near Comilla.

(2) **Gnats**. 22 Sqn was intimately involved in CAS from 6th onwards, in areas of Jessore, Ishurdi, Barisal, GoalondoGhat, Hardinge Bridge and Sathkira. 24 Sqn aircraft carried out a spectacular neutralization of en Arty Op on a grain silo in Bhairab Bazar. The Gnats also carried out regular attacks on country boats in the numerous rivers, based on reports by MuktiBahini as well as by visual spotting.

(3) **Sukhois**. Su-27 provided CAS at Jessore and Jhendia on 5th, 6th and 7th December. The spectacular bombing of Hardingebr on 11 Dec prevented en retreat. The routine attacks against en positions in Kushtia area on 9th, 10th, and 11th helped soften the en resistance to advancing Indian Army.

(4) **MIG 21**. This effectively started from 11th onwards in areas around Comilla, Sonaimura, Maulovi Bazar, Lalmai and Mainamati. Their rocket attacks proved extremely effective against troops and gun positions. On the night of 10/11, the combined result of air attacks by MIG-21 and the blockade massacred the Pakistani Army. The climax of their action was

undoubtedly the 4-ac rocket attack on Governor Malik's residence in Dhaka on 14th. This had a tremendous psychological effect on the top brass. It not only led to the instant resignation by the governor, but also hastened Gen Niazi's surrender which materialized on 16 Dec.

d. **Interdiction**. While all fighter aircraft carried out interdiction, the most noteworthy action was the effective neutralization of river transportation by Gnat ac. The destruction of Hardinge Bridge by Su-7s and the numerous small bridges by MiGs deserves credit.

e. **Airborne Operations by IAF Transport Aircraft**. On11December, a Para battalion was dropped in daylight near Tangail. IAF transport aircraft, such as An-12, C-119 and DC-3 Dakotas carried out the operations. The descending paratroopers faced no interference from the enemy. Next day, further reinforcement and re-supply were flown in. The Paratroopers had cut-off the rear line of Pak Army units in Jamalpur-Mymensingh axis.

f. **Helicopter Operations**. Meanwhile, the helicopter fleet of the IAF played key role in two major operations. First, on 7 December a battalion of infantry was lifted to the border of Sylhet. These forces captured Sylhet virtually without a fight. The Pakistani forces scattered in disarray. Then on 10 December, while the Pak Army were in their dug-in position around Bhairab-Ashuganj area, elements of the Indian heliborne forces were transported by Mi-4 helicopters across the river Meghna and dropped in Narshingdi-Raipura area cutting the Pak Army's line of retreat. In the next 36 hours, over 110 sorties were flown. The Mi-4, which normally carried fourteen troops, carried as many as twenty-three on board. After securing Narshingdi, Indian forces captured Daudkandi and Baidder Bazar on 14 and 15 December respectively, both with helicopter assault. The skyline of Dhaka was soon visible in the distance.

g. **Maritime Air Operations**. The day war was declared, the INS Vikrant, which had been anchored off the northern-most tip of the Andaman & Nicobar chain of islands, moved towards the principal East Pakistani port, Chittagong. The first wave was mounted against Cox's Bazaar by Eight Sea Hawks on 4th December. The second wave attacked Chittagong. They carried out repeated attacks on the airfield. On 5th INS Vikrant sailed towards the Mongla-Khulna area. Next attacks were mounted on those harbors. Then it came back to Chittagong. A total of 400 sorties were launched from INS Vikrant.

22. **PAF Air Effort**. PAF air effort in the eastern front is described in subsequent paragraphs:

a. **AD**. Apart from being vastly outnumbered, PAF had ignored a few fundamental concepts. PAD measures taken by PAF were inadequate. The AD system was devoid of missiles and the radar system not very effective against LL

threats. A P-35 radar was shifted to West Pakistan in Nov71. Sabres of no 14 squadron managed to engage IAF attacker and could shot 9 aircraft with the loss of 3 sabres. People of Dhaka witnessed thrilling low-level dogfight throughout 4 and 5 December.

b. **OAS**. PAF's only one F-86 squadron was entrusted to provide air support to Army in the Eastern theatre. The situation was quite dismal in the eastern wing much before the initiation of war. Operations in support of Army had started as early as March 71. During March and April 170 sorties were flown to support army which was heavily engaged in fights with the freedom fighters of Bangladesh. In Nov PAF flew 100 sorties to assist army units. In later part of November, PAF in eastern theatre put all effort to impede the thrust of Indian infantry and amour penetration. After the formal declaration of war, the air support missions did not extend beyond 30 miles from Dhaka. The last air support missions from the east, for providing cover to army at 20 Miles northeast of Dhaka were flown on 6th December.

c. **Air Interdiction**. The only air interdiction mission PAF flew was on 22 Nov in Boyra to impede the MuktiBahini training activities. This was quickly responded by IAF gnats when the PAF F-86 started straffing on the MuktiBahini in their third wave. After that PAF did not carry any other sorties except few support missions to Pakistan Army.

Air Operations of BAF

23. **KILO FLIGHT Formation**. In the height of our liberation war the Kilo Flight was formed by the initiative of some dedicated airmen who left PAF to join the war of liberation. The aim of Kilo Flight was to provide air support to the MuktiBahini. The pioneer Bengali airmen included Group Captain Khondaker, Wing Commander Bashar, Wing Commander Mirza, Flight Lieutenant Rahim, Flight Lieutenant Sadruddin, Flight Lieutenant ShamsulAlam and Flying Officer NurulKadir. The proposal for forming the Kilo Flight was initially kept pending as the BDF had no aircraft in its inventory till then. After repeated persuasions and discussion with the Indians the Kilo Flight emerged in 28 September 1971. IAF Chief, Air Marshal PC Lai and Group Captain AK Khandaker Deputy Chief of BDF inaugurated the flight in a simple ceremony at Dimapur, Assam. The Indians gave one DC -3, one Alouette-III and an Otter. Nine officers and 47 airmen were absorbed from different sectors in the air element. Squadron Leader Sultan Mahmud was appointed as the commander. Flight Lieutenant Shamsul, Flying Officer Badrul, Civil pilot Capt Khaleque, Sattar, First Officer Sarfuddin, Akram and Mukit joined later.

24. **Training.** From September to the beginning of December the crews were trained in night supply and attack operation. Pilots were divided into three groups. Squadron Leader Sultan, Flight Lieutenant Badrul, and Captain Shahabuddin were in Alouette-III, Flight Lieutenant SamsulAlam, Captain Sarfuddin and Captain Akram was in

Otter, Captain Khaleque, Mukit and Sattar were in DC-3. There were no weapons fitted in the aircraft. The technicians modified the aircraft for attack and bombing role. Two rocket pods were fitted under the wings of the Otter, while the machine gun was kept inside the aircraft and arrangement was made to drop bomb. Alouette-III was also modified in the same manner as Otter. Dakota was assigned for transportation role. Several training missions were flown in the forest of Nagaland against dummy targets. The aircraft did not have any camera and gun sight. The target used to be aimed with the help of own marked 'red cross' on the windshield.

25. **Air Operations**. A number of air operations were carried out by the kilo flight during the war. Out of which night attack on fuel dump at Patenga and Narayanganj on 03 and 04 Dec 71 were prominent. The first air operation was on 03 Dec 71 by Otter at the oil refinery at Chittagong port area. The successful bombing mission with primitive weapons denied the oil supply to the Pakistani. The aircraft received few bullet hit but the dare devil pilot Flight Lieutenant Alam managed to evade the Pakistani anti-aircraft firing by low flying on the river of Karnafuli and land back safely. Soon after, the Otter carried out few more missions in Sylhet area. Squadron Leader Sultan Mahmud with his Alouette-III carried out the second successful mission attacking fuel storage at Godanail of Narayanganj area. During this mission the helicopter got a few bullets hit but could land back safety in the Base. DC-3 was dedicated for the transportation of forces and VIPs. The modest effort by the Kilo Flight with the meagre number of aircraft signifies the commitment of the Bengali airmen to the cause of our liberation war. This flight formed the embryo of today's BAF and bears the testimony of our predecessors who ceaselessly toiled against all odds to shape up a future Air Force for Bangladesh.

26. The very formation of Kilo Flight signifies the dedication, commitment and will of Bengali airmen for the cause of their liberation. The overall impact of the air operations on the conduct of the war was probably hardly significant, but they greatly contributed to the raising of the morale of the MuktiBahini and the people who supported them. The careful selection of the target also signifies the foresightedness of the Bengali airmen as it was chosen to maximize the effect through limited resources.

Conclusion

27. Emergence of Bangladesh as a nation is an epic history of blood bath and honour. It had the participation of People of all walks of life. The political manipulation, economic deprivation antisocial discrimination by the west pushed the people of east to as limit to for an arms struggle for freedom. Being separated by 1200 miles, the two wings had nothing in common except for religion. The 25 March crackdown eventually broke this thin line of common feelings, which resulted in arms conflict.

28. The rudimentary state of preparation to fight against the well-equipped Pakistani forces was actively supported by the Indians which paved the way for our victory. Initially the BDF was formed comprising freedom fighters, regular Bengali soldiers, sailors and

airmen defected from Pakistani forces. Later on the Kilo Flight, the air arm of BDF, came into being comprised of Bengali airmen. The Kilo Flight was the embryo of today's BAF.

29. The operational concept of the PAF was based of the thoughts that a degree of control of the air in the form of a moving umbrella would be required to conduct the land battle. Beneath the umbrella would be the additional need of some direct offensive support missions. The emphasis being in the West, the PAF launched pre-emptive attacks on the 05 Indian airfields in that sector at the outbreak of the war. The reasons of such pre-emption was rooted on PAF appreciation that the technologically inferior but numerically superior IAF could be scaled down through these attacks. The Pakistanis although had ascendancy in the type of aircraft and weapon system, lacked a coherent approach in the application of air power in air land battle scenario.

30. The Indians on the other hand capitulated from their Soviet style doctrine of air land battle, which had its emphasis on ground support missions. Although both contested fiercely for attaining the required degree of dominance of the air in the West, none became a clear Victor. In the East, however the Indians had achieved air superiority by the second day of the war. The grossly inadequate committal of air in the East caused the Pakistani's to cave in much before the crucial phase of the war. The Indian application of air power in the East was in harmony with their ground offensive. It hastened the Pakistani forces surrender during the critical part of the war. The Pakistani application was limited to some offensive counter air and air defence missions. PAF's effort to support the ground forces by interdicting Indian supply lines did not materialize as the Indians effectively destroyed the operating surfaces in the East. The air war signifies that to achieve the objective, the question of loss in crucial battle is secondary. Achieving the required degree of control of the air and providing support to the land forces cost the IAF dearly in 1971 but in the end managed to achieve complete dominance over the skies in the East and local air superiority in the West.

31. The enduring lesson that could be deduced from our war of liberation is that no military might be able to possibly suppress a nation when all its citizens are willing to fight till end the military appreciation of our liberation war makes it clear that geography of a country is the keystone of strategy.

TOPIC-7

AIR POWER IN VIETNAM WAR

Background

1. Vietnam War physically started in 1964, but it had a close interlink with the happenings from the end of World War ll. Before 1940 Vietnam was a part of French Colony for about 100 years. In World War II, Japan took control of Vietnam in 1940. At the end of World War II, the Vietnamese expected the Allies to support their claims for independence. But again, French took control of Vietnam with the help of British and United states. In 1946, Vietnamese started arms struggle against the French dominance that lasted for eight years. The French left Vietnam in 1954 when the North Vietnamese defeated the French decisively at the Dien Bien Phu under the leadership of Ho Chi Minh by bringing an end of France rule. In July 1954, the Geneva Agreements were signed, partitioning Vietnam into North and south along the 17th parallel. Thus Vietnam was divided into a Communist North and non-Communist South.

2. South Vietnam was always under the threat of its communist insurgents called the Viet Cong. By the end of 1964 Viet Cong forces controlled about 2/3 of the South. This time, both NATO and the Warsaw pact were in hard contest to extend their dominance all over the world. Since Ho Chi Minh was pre-dominantly a communist leader, the American became concern about the growth of Communism in that region. They feared that if South Vietnam left under the hands of Communist then soon Laos, Burma and subsequently the whole south Asia would fall in their grip. Accordingly, President Johnson sent two American destroyers USS MADDOX and USS TURNER JOY to the Gulf of Tonkin for search patrol. On 2nd Aug the famous Tonkin incident took place. North Vietnamese force attacked two American ships and in retaliation American bombed North Vietnamese Naval Patrol Boat, Bases and Oil Depots. With increasing hostilities the situation continued to deteriorate. Finally President Johnson ordered to take all necessary steps to use force on 7th Feb 65 which marked the start of long lasting war in Vietnam.

Air Strategy

3. **American Strategy**. Initially U.S. had three military strategies to attack South Vietnam. Firstly, the United States must “persuade” the North Vietnamese to abandon their invasion of South Vietnamese territory. Secondly, the U.S. military must disperse the Vietcong units operating in South Vietnam. Finally, the United States must implement continuous patrolling to disperse guerrillas. The U.S. air strategy was to achieve the political aim and support the military strategy. The conflict went on too long and it is difficult to simplify the air strategy of US in the Vietnam War. The American policymakers

did not have a clear focus on their political objectives and it was changed again and again with the changing situation of the war.

4. Thus, instead of being proactive, it was reactive to Hanoi's initiatives. Early in the war, the air commanders had rightfully prepared the list of strategic Centres of Gravity in North Vietnam. But the overall strategy in Vietnam was handicapped by theoretical, bureaucratic rigidity among military and civilian planners. But owing to selections of incorrect strategy, they were not allowed to use airpower to its fullest capacity. American strategic strength and power were never directed towards solving the political problems. The United States failed to develop an agreed upon strategy for success because it continued to attempt to impose a military solution on a political problem.

5. **Vietnamese Objective**. Hanoi on the other hand was following the strategy of revolutionary warfare by fighting a guerrilla war. A protracted war of this nature imposes heavy costs & wastage. A situation reaches when the revolutionary movement without winning any battle imposes unacceptably high cost on the enemy, which is the point of winning the war. The North Vietnamese had only one objective of occupying South Vietnam. Throughout the spectrum of conflict, they remained strict to their objective.

Air Campaigns

6. US air campaigns began in early 1965 with the Flaming Dart reprisal raids against North Vietnamese and concluded with Linebacker I and Linebacker II campaigns of 1972, although some bombing shifted to Laos and Cambodia in 1973. It has been estimated that all US air campaigns were finally terminated in Aug 1973. During the 10 years of the war, USA carried out massive operations through all dimensions. Air power was used extensively in different operations or battles in its entire role. However, the air campaigns can be segmented into two major categories:

a. **Independent Air Campaigns**

(1) Rolling Thunder.

(2) Commando Hunts.

(3) Line backer-l.

(4) Linebacker –ll.

b. **Air Campaign in Support of Ground Forces**

(1) Tet Offensive.

(2) Battle of The Sand.

(3) Helicopter Operation.

Independent Air Campaigns

7. **Operation Rolling Thunder (1965-1968).** Operation Rolling Thunder was a series of interdiction operation over North Vietnam, which began on 13 Feb 1965 and suspended on 31 Oct 1968. The operation involved Air Force and marine aircraft flying from the bases in South Vietnam, Thailand and Hawaii. Naval aircraft flying from carriers on the South China Sea were also involved. Operation Rolling Thunder was a highly restricted operation designed to build up gradual pressure on the enemy. First it was tasked to interdict North Vietnam supply routes. Later, it was expanded to include North Vietnamese ammo dumps, oil storage facilities, power plants, factories and airfields in the Hanoi and Hiphong area. Besides interdiction, fighter Sweep and close air support missions were also conducted. But the pressure was built up gradually and in between many breaks were given to allow the North Vietnamese for negotiation. So the operation failed to produce any sustained result. From 1965 to 1968 some 643,000 tons of bombs were dropped over North Vietnamese targets at the cost of 922 aircraft but hardly any significant of damage could be done to the North Vietnam. During this period North Vietnamese grew up AD network with the induction of soviet made SAMs and artillery guns.

8. **Achievement in Rolling Thunder.** The operation Rolling Thunder could not bring success due to following reasons:

a. Target selection in the initial stage was done from Washington, which barred the commanders to take action as per situation. Although the control was loosened at the later stage, it could not create positive impact.

b. The operation put gradual pressure to the North Vietnamese. Therefore, it otherwise, allowed the North Vietnam to build up their force and continued the war.

c. The North Vietnam fought the unconventional war while the US tried to defuse it through conventional application of air power.

d. The pilots were restricted to attack North Vietnam missile sites beyond 20th parallel despite it accounted huge losses of aircraft.

Commando Hunts (1968-1972)

9. Operation Commando began on 15 Nov 1968 and continued up to April 1972. The operation carried out as many as seven series of campaigns. The campaigns had two objectives:

a. To reduce the enemy’s logistical flow by substantially increasing the time needed to move supplies from North Vietnam in to the South.

b. To destroy trucks and supply caches along the roads, pathways, and streams and in the truck park storage bases along the trail.

10. In the Commando hunt interdiction campaign, B– 52 bombers dropped over 2 million tons of bombs to close the roads or divert the traffic on to specific direction. Despite these heavy efforts, North Vietnam moved men and supplies southward at a steady rate till spring 1972.

Line Backer-I (LB-I)

11. This campaign started won 8 May 1972 with the announcement of US president Nixon for a comprehensive campaign against North Vietnam. The objective of the campaign was :

a. To stem the flow of supplies into North Vietnam from its communist allies.

b. To destroy existing stockpiles in North Vietnam.

c. To reduce markedly the flow of materials from Hanoi to the South.

12. Some 41,000 sorties were flown during this mission using various kinds of air force ac including B-52 bombers, F-111s and F-4 phantoms. During LB-1 US bombing destroyed 10 MIG bases. In the face of heavy destruction, North Vietnam agreed for peace. In Oct 72 LB-I campaign was partially stopped to allow the North Vietnam to the negotiation table. LB-I succeeded, as President Nixon was decisive in his action and gave the military leader greater latitude in targeting. Air power had been used forcefully and appropriately with the use of modern technology like PGMs.

Line Backer II (LB-II)

13. The Negotiation that was brought through Line Backer-1 broke down by Dec 1972 and President Nixon ordered an all out air campaign against North Vietnam. US Air Force started an all-out air Campaign known as Line Backer-II against Hanoi area. During this operation America used carpet-bombing by B-52 aircraft and fighter Bombers against North Vietnamese targets. In 11 days 700 B-52 sorties and 1000 Fighter-Bombers sorties were carried out. A total of about 60,000 tons of bombs were dropped, of which more than 40,000 tons fell over South Vietnam. Liner backer-II could force the North Vietnamese to the negotiation table and North Vietnamese signed a peace accord. Thus the war was ended.

Air Campaigns In Support of Ground Forces

14. Numerous Operations took place in support of ground forces in the Vietnam war. Tet Offensive, Battle of Khe Sanh and Helicopter Operations are the three significant operations which merit consideration for the decisiveness they brought to the whole campaign.

15. **Tet Offensive.** During Tet offensive Air Power played a key role in denying the enemy from accomplishing his military objectives. Beginning on 31 Jan 1968, the Viet Cong and North Vietnam army launched simultaneous attacks on 36 of the 44 provincial Capitals and 23 airfields of South Vietnam. North Vietnam military Commander Gen Giap made several attacks with a hope to capture the whole North Vietnam. In response to that, American carried out 16,000 strike sorties between 31 Jan to 25 Feb 64 to support the American and South Vietnam ground forces. Air power denied the enemy any kind of sanctuary in South Vietnam day or night. Radar controlled fighter and bomb struck the enemy even in the bad weather. C-130 delivered supplies under all conditions. This resulted exceptionally heavy looses to North Vietnam and Viet Cong. Overall North Vietnam losses during the month long attack were 45,000 personnel. The extent of damage was so high that Viet Cong was never again a major factor in the war. Nonetheless, the Tet Offensive proved to be a political disaster for the Johnson administration. The battle failed to have the desired effect upon the South Vietnamese population. It caused Americans to doubt the possibility that the US could ever achieve its goal in Vietnam.

16. **Operation Niagara (Battle of Khe Sanh).** Operation Niagara was conducted by the American in battle of Khe Sanh, when Gen Giap sieged a Marine base at the Khe Sanh in Jan 68. He deployed about 3 North Vietnam infantry division in this venture. About 6000 troops were surrounded from all sides by the North Vietnamese force. The fighters of USAF, Marines and Navy provided a massive close air support. Thousands of supply sorties were flown to reinforce the troops. In every 90 min, a formation of three B-52 ac used to approach the area to bomb the enemy lines. North Vietnam forces suffered terribly and were forced to give up the siege. It was the air power, which helped the American to avoid another Dien Bien Phu at Khe Sanh.

17. **Helicopter Operations.** Helicopters were extensively used in Vietnam War mainly for Counter- Insurgency and Close Air Support Operations. Few major operations where the helicopters took part were IA Drang Champaign, Ops Attleboro and op An Lock. The IA Drang Campaign was the 1st Campaign where the air borne 1st cavalry Div took part with 400 helicopters. All these were conducted to destroy Viet Cong insurgency camps inside South Vietnam. The helicopters were also widely associated with the war in Vietnam carrying troops over difficult terrain, providing the gunship support, observing the enemy, evacuating the wounded and transporting supplies. Some helicopters were used for lifting artillery pieces and even armoured cars. The result was impressive air mobility. Though the helicopters showed stunning air mobility in the Vietnam War, but their comparative slower speed and lower altitude of flying made them very vulnerable to ground fire.Over 4869 helicopters were lost during the war.

Tactics and Technologies Involved and Evolved

18. The war was spread over a period of about 10 years, even longer than the World War ll. Vietnam was the ground where the then two Super Powers, namely USA and USSR, tested the effectiveness of their latest weapons and tactics. Various technology and tactics used by the super powers were as follows:

a. **Technology**.

(1) **AD System**. The major technological breakthrough during the Vietnam War was in the field of suppression of enemy air defence (SEAD). North Vietnamese air defence was assisted by the Soviet Union with the integrated air defence; the combination of interceptors, SAMs and AAAs; all of which tied up with early warning radars and MOUs, made a formidable integrated AD-network all over the North Vietnam. It was practically impossible to fly without being detected. By the end of '65, they downed 80 US ac.

(2) **Aircraft**. The technological development also took place in respect of ac. The Vietnamese used MIG-15, MIG-17 & MIG-19s, which could out-turn US fighters at, low level horizontal encounters. The latest supersonic Soviet MIG-21s dominated over the American fighters. The US started with A-1 Sky Raiders, F-100 Super Sabres, B-57 light bombers and F-104 Star fighters. However, these aircraft were later withdrawn. The principle strike ac of USA were F-105 Thunder Chief, F-4 Phantom, F-8 Crusader, A-3 SKY Warrior, A-4 SKY Hawk, A-6 Intruder and A-7 Corsair. Recce ac like RF-8 and jammers like EB-66 Brown Cradle, F-100F Wild Weasels and EC-121 AEW radar surveillance aircraft were also used. Helicopters were extensively used; they flew total 37 million sorties during the whole campaign with 16000 loss.

(3) **Anti-Aircraft Artillery**. North Vietnam's AAA threat was very effective against the US strike aircraft. Soviet built 37mm, 85mm &100mm AAAs played the most effective role inflicting about 75% attrition to the US ac. It was fatal to fly below 4000ft due to AAAs deployed all around. AAAs forced the US pilots to change attack tactics many times.

(4) **Surface to Air Missiles**. When flying at medium altitude, aircraft were exposed to the threat of surface to air missile. SA-2 system made its combat debut in Vietnam War and achieved approx 100 kills. Its technology gave a shock to the US pilots. It forced them to change flying tactics and introduce new counter technologies. SA-7 shoulder launched IR SAMs were introduced later which also claimed number of kills. Newly

introduced long range Tales missile was used by USS Chicago against MIG-21s.

(5) **Electronic Warfare**. ECMs were developed to jam the guidance of the missiles and radars. USAF introduced the stand-off EB-66 ac supplemented with ALQ series of jamming pods to jam the Soviet built SA-2, radar-directed AAA and acquisition radars. . The US marine introduced electronic noise suppression technology. F-100F, F105F/G and EB-66C equipped with ECM pods were used in SEAD role.

(6) **Airborne Early Warning**. To increase the air surveillance, EC-121 airborne early warning aircraft was introduced in Vietnam. This aircraft was able to compete with the North Vietnamese well-integrated GCI radar coverage.

(7) **Precision Guided Munitions (PGM).** Vietnam was the ground where for the 1st time American used Precision Guided Munitions like Wall-eye Glide bombs, Homing Optical Bombing System (HOBOS) and Laser Guided Bombs (LGB). This had an enormous impact on the outcome of war. Hundreds of HOBOS and Walleyes were used with remarkable effectiveness in Vietnam, destroying or severely damaging 70% to 80%of all the targets attacked. The destruction of Bridge on the Ho Chi Minh Trail was a classic example of the effectiveness of PGMs. Till 1972 about 1000 sorties were flown to destroy the bridge and about 95 ac were either lost or damaged while causing only partial damage to the bridge. On 27 Apr 72, only 14 F-4 Phantom could totally destroy the bridge using laser guided Bombs.

(8) **Aircraft Guns**. Another development in the air battle during Vietnam War was the aircraft gun. Initially, Phantoms were equipped only with air-to-air missiles and no guns. In many occasions, Phantoms ended up in close combat with the MiGs where missiles were ineffective. As such American introduced a new air-to-air Cannon named Vulcan Cannon in 1967. The introduction of Vulcan cannon in F-4 Phantoms improved the survivability of US aircraft in close combat. Phantoms scored three kills in the first month after the Cannon was introduced.

(9) **Air to Air Refuelling**. Another major development in the Vietnam War was in the field of air to air refuelling. Many strike missions were flown from Thailand and Hawaii. The aircraft were refuelled en-route to extend the radius of action.

b. **Tactics**

(1) The long war gave birth of many tactics to counter the new technologies which were applied during the progression of war.

(2) **Mild Jinking Manoeuvre.** The US adopted various tactics to counter the North Vietnamese AD network. Mild Jinking Manoeuvres were developed to make the AAA gun tracking difficult. These tactics improved the chances of survival, but did not make the aircraft completely immune to the AAA.

(3) **Employment of ECM**. US aircraft were equipped with Radar Homing and Warning (RHAW) system to alert the pilot about nearby SA-2 radar activity. US Navy used chaff dispensers and internally mounted deception / repeater ECM equipment in EA-6A, EA-3, and EA-1F ac. The US marine introduced electronic noise suppression technology. Radar warning receivers, coupled with the evasive manoeuvres allowed the US pilots to escape from the pursuing missiles.

(4) **Chemical Agents**. During the war, Americans extensively used chemical agents, mainly for defoliation and destruction of forestation. Total 18 million gallons of Chemicals were dropped affecting about 5.5 million acres of South Vietnam and part of the Ho Chi Minh trail. The main purpose of this was to deny the guerrillas using the jungle as a sanctuary.

(5) **Hit and Run Tactics of Vietnamese.** In the air-to-air battle, North Vietnamese fighters proved to be very effective. MiGs became a serious impediment to the US bombing campaign. The MiG pilots used hit and run tactics. Mig-21s had very fast rate of acceleration and a high rate of climb. They were vectored by the ground radars to the rear quarter of the enemy. By the time they were detected by the bomber pilot, they could close into the firing position and achieve a hit on the target. From 1965 to 1968 USA lost 55 aircraft in air combat with MiGs.

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(6) **Flying Tactics**. In addition to employment of new weapons the US pilots also devised and modified a number of new tactics. Manoeuvre like Jinking, tactical formation like Iron head flights etc are few among those. Height changes to evade AAA, SA-2 detection, low level pull up attacks with hit and run techniques, fractional attacks etc tactics were involved. A Sandwich interception technique of the Vietnamese was a unique invention. Tactics of batting troops to deceive enemy were used in various ways. Operation Bolo is the unique example where 7 MIG 21s were shot down with no loss.

(7) **Force Package**. The concept of force package was well developed in the Vietnam War. A typical Line Backer strike force-package consisted of 52 aircraft which included fighters, bombers and the refuellers.

Lesson Learnt

19. Following lessons may be drawn from the Vietnam War:

a. A firm political aim should be selected and maintained and this to be correctly translated into military objective to achieve success in any war. An obscure and dangling political aim leads a war to defeat.

b. The concept of gradual escalation of pressure did not work in the Vietnam War. This increased the wartime by years and gave the North Vietnam a scope of building their mil strength. So the lesson is that the enemy should be terminated in the fastest opportunity and shortest practicable time with concentration of force and economy of effort.

c. The North Vietnam military power was increasing throughout the spectrum of conflict. The American knew that the source of supply was coming from Russia and China. But they did not try to stop the supply source at the beginning rather they allowed it to disbursed deep into the theatre and then tried to destroy them, which was not effective to bring any positive result. So the lesson is that enemy's source of supply should be cut at the root before it can be brought to bear any effect.

d. American gave several pauses in between their offensive action to pursue the enemy to sit for negotiation but the North Vietnamese fought to win the war. This intermittent operation gave the North Vietnamese a scope to rebuild their forces and gather arms and equipment to counter the American. The lesson is that offensive action should be carried out continuously till the time decisive result is achieved.

e. In Vietnam War, the US field commander did not enjoy the flexibility to adapt with changing situation. Thus the result was disastrous. The lesson is that the field commander should be given sufficient authority to face the changing situation.

f. Lack of co-ordination among the American forces was evident almost entire period of the conflict, which led to the misuse of resources and prolonged the war. So, co-ordination among the forces or allies is a vital factor for wining a war.

Conclusion

20. Gentlemen, to conclude, Vietnam War was a long lasted war which spread over a period of about 10 years, longer than the 2nd World War. Vietnamese fought the war with a single aim of occupying South Vietnam. During the war they received all sorts of mil supply and other supports from the communist Russia and China. They could develop a strong AD network to counter the American air threat. They fought the war with full dedication and patriotic attitude under a unified commander. On the other hand, the American came to Vietnam with limited objective of supporting South Vietnamese. They used Air Power with gradual escalation and limited objectives at different phases of the war. Economic use of air power was hardly given any consideration. War was controlled by the politician of the Washington without any practical knowledge of the theatre. As a result American power through the sky failed in Vietnam. The flavour of failure was not in the sky above Vietnam, nor in the jungle of Vietnam, rather was it lost in the heart and mind of people.

21. The American learnt a good lesson from Vietnam War. Later they refined their Doctrine as well as tactics that were applied in the Gulf War. As a result Air Power alone could achieve the decisive victory. The dominance of air power was once again established.

TOPIC-8

FALKLAND WAR 1982

Introduction

1. The Falkland War was one of the most intensely fought air war in between 1973 Yom Kippur war and 1991 Gulf war. After many years of dispute over the Falkland Islands between Argentina and Britain, on 02 April 1982, Argentina invaded the Falkland Islands. It was an act of retaliation by Argentina against the British occupation. To recapture the islands, the British constituted a tri service task force to project military power 8000 miles away and evict the Argentine invaders from Falkland Islands. The Argentines also redeployed their forces, transferring some of their Air and Land forces to the Falkland Islands. Thereafter, the events progressed in quick time culminating in a major Air/Naval battle between the two forces. But it was the application of air power, together with naval assistance that resulted in the British recapture of the Falkland Islands only 74 days after the Argentine invasion.

Background

2. **History**. A Spanish voyager discovered the Falkland Islands in 1520. The islands had, at various times, been claimed and inhabited by the French, the Spanish and the British. Argentina has claimed the islands since 1820. In 1829, Argentina established a colony that lasted until 1833 when Britain reasserted control and evicted the Argentineans. Britain had occupied and administered the islands since 1833 and had consistently rejected Argentina's claims. Thereby, the Falkland Islands became a British colony. In 1945, Argentina reasserted its claim to the islands. Argentina invaded the islands on 02 April 82. Britain decided to recapture the island by force and the war became inevitable.

3. **Geography**. The Falkland Islands, a group of 200 islands, are situated in the South Atlantic Ocean, South East of the Argentine mainland. It is a combination of two main islands named East and West Falkland. Port Stanley and Goose Green are located in East Falkland, and Pebble Island is located in West Falkland.The average distance of Falkland Islands from Argentinean mainland is 400 miles and from Britain 8,000 miles. South Georgia is located 200 miles South East of Falkland Islands. Ascension Island, which was used by the British, as a forward base is 4,200 miles from Britain and 3,800 miles from Falkland Islands.

Strategy

4. **Argentine Strategy**. The Argentine strategy was to retain control of the Falkland Islands.

5. **British Strategy**. The British Task Force's strategies were to:

a. Establish a sea blockade around the Falklands.

b. Retake South Georgia for use as a secure base and transit area.

c. Recapture the Falkland Islands.

Air Strategy

6. **Argentine Air Strategy**. The Argentine Air Strategy was to support her forces with Close Air Support (CAS) and Maritime Air Operations from bases in Argentina and the Falklands.

7. **British Air Strategy**. The British air strategy was to destroy Argentine air assets, wherever possible, to achieve and maintain control of the air and support her forces. In light with the British goal, the use of air power was to accomplish three distinct objectives:

a. To protect the fleet from Argentine air attacks.

b. To provide CAS for the army and Royal Marines during the amphibious operations.

c. Establish air superiority in the area of operation.

Prime Events

8. The Argentine invasion of the Falklands commenced on 02 Apr 1982. Had the Argentine Junta postponed the attack by a few months, Argentine forces would have been better prepared and the approaching Atlantic weather would have prevented Britain from launching its attack. The major events of the war are shown below:

Date	Events
19 Mar 82	Argentina invades South Georgia.
02 Apr 82	Argentina invades Falkland Islands.
03 Apr 82	British Forces in South Georgia surrender.
05 Apr 82	British Main Task Force sets out for the Falklands.
07 Apr 82	Britain announces 200 nm MEZ around Falklands.
25 Apr 82	South Georgia re-captured by the British forces.
01 May 82	British air attacks on Falklands start.
15 Jun 82	Argentine forces surrendered to the British.

Air Operations

9. **Ground Based Air defence Weapons**. Argentine deployed AAA guns of 20mm, 35mm, and 40mm calibre. The SAMs include Blowpipe, Tiger Cat, Roland and SA-7 missiles at Stanley and Goose Green airfields.

10. **British Ground Based Air defence Weapons**. The British task force relied on a mix of systems for protection against the Argentine air threat. These systems included limited electronic detection systems, fighter aircraft, and different category of ship borne and ground based SAMs. The SAMs include area defence missile like sea dirt and short-range missiles like Rapier, and close-range point-defence systems like sea cat and sea wolf.

11. **Early Warning / Ground Control Interception Radars and their Roles**. The Argentines had Tactical surveillance radars like AN/TPS-43 and AN/TPS-44 and played a vital role in providing early warning. The protection of the British task Forces was in the hands of Fleet air arm. The RN's type 965 Long Range surveillance radar fitted in most ships provided limited coverage. However this was almost useless at the time Argentine raiders approached at a very low level. Sea King helicopters, besides its primary role, were also responsible for Over the Horizon radar warning. But crediting the Air Defence Control and surveillance through ship borne element is an important aspect too. Falkland had numerous close air combat in a persuasion of interception missions. British Forces had numerous CAP missions mostly under the ship borne GCI controllers' directives.

12. **The Airspace Control**. Both the sides were unable to plan and implement procedural airspace control. Argentina had poor Airspace management in their coastal areas and over the territorial water. The Argentine Roland had four successes, out of which two were their own Mirages. The British forces also had "Blue-on-Blue"; their own point defence Blowpipe missile shot one of their helicopters down. On 07 April Britain declared Maritime Exclusion Zone (MEZ) of two hundred nautical miles around the Falkland Islands. Britain warned that any Argentine war ship or vessel in that area would be attacked. They sent three submarines to enforce the Maritime Exclusion Zone. On 30 April the Maritime Exclusion Zone was declared as Total Exclusion Zone (TEZ). It meant that in addition to ships, Argentine civil and military aircrafts would also be engaged in Total Exclusion Zone.

Offensive CAO

13. The British forces flew a number of offensive counter air missions attacking Stanley and Goose Green airfields in the Falkland Islands. The air attacks by British forces on the Falkland Islands were commenced by a series of 'Blackbuck' counter air

missions by Vulcan long-range bombers, operating from Ascension Islands. These missions targeted Stanley airfield in the Falkland Islands with conventional bombs dropped from medium levels. These missions were flown over a distance of 8000 miles and involved numerous air-to-air refuelling enroute. These missions did not achieve the desired damage with only a few bombs hitting the Stanley runway. However, it signalled the British capability in attacking the targets located in the Falkland Islands. This forced the Argentineans to divert its air defence aircraft for defence of mainland Argentina.

14. After the Vulcan raids, Sea Harriers and Harrier GR 3 aircraft were used to attack Stanley and Goose Green airfields. But the desired results were again not achieved and Argentinean aircraft operations from these airfields continued.

Maritime Air Operations

15. **Anti-Ship Operations**.

a. **British Operations**. Since major Argentinian navy ships did not venture out after the sinking of 'General Belgrano' on 02 May, the British forces did not carry out extensive maritime operations against surface vessels. The role of heliborne anti-ship operations was very significant. Major British anti-ship operations were carried out by helicopters armed with missiles. Sea Harriers were also used for bombing and strafing. The combined operations destroyed 4 small ships and damaged 4 others.

b. **Argentinen Operations**. The Argentinean air force and the air arms of the other services fought a gallant battle against the British Task Force. Operating at the limits of its range and with technological inferiority, they inflicted heavy losses on the British Task Force. Argentinian A-4 Skyhawk, Mirage, Dagger and Pucara aircraft carried out attacks on ships with bombs, rockets and cannon. Five ships: two frigates, one destroyer, one support ship and one assault ship were sunk by free fall bombs.Seventeen other ships were also damaged. Out of these, six ships would have been destroyed if all the bombs that hit the ships exploded. Fewer than half the bombs that hit the ships exploded due to less arming time, owing to ultra-low level weapon delivery.A number of bombs did not explode due to shallow impact angles. Argentine Naval Air Arm's small force of Super Etendard aircraft flew 5 missions and fired five AM-39 Exocet Anti-Shipping Cruise missiles, which destroyed HMS Sheffield and HMS Atlantic Conveyor. If a few more of the bombs had exploded and few more British ships sunk, the result of the war may have been different. During these operations, the Argentineans suffered heavy losses due to lack in EW and radar cover, losing more than 100 aircraft to the British defences.

16. **Anti-Submarine Operations**. The British forces carried out extensive anti-submarine operations using ASW helicopters and other battleship weapon systems. Again due to non-engagement by the Argentinean submarines, missiles sank the Argentine submarine 'Santa Fe' from helicopters, during the recapture of South Georgia.

17. **Maritime Anti-Air Operations**.

a. **British Operations**. The British task force was singularly deficient of an air borne early warning capability. She tried to compensate this by creating a multi layered screen of defences around their task force and ground units with the help of radar picket ships for early warning and air defence alertness by Harriers. The 17 ships armed with Sea Cat, Sea Wolf, Sea Dart, Sea Slug and Rapier SAMs in collaboration with the Harriers provided area air defence and ships close in weapons systems. She also employed Harriers on CAP for air defence of her ships. Radar controller from ships vectored the Harriers. It degraded her overall employment of air power, as out of 1315 operational sorties flown by the Harriers during the war, as many as 1100 i.e. 84% sorties were CAP missions. The Sea Harriers proved its superiority in air combat, shooting down 18 Argentinian aircraft with Sidewinder air-air missiles and another 6 with cannon. The Sea Harriers did not suffer any losses in air combat. However, 10 Harriers were lost during the war, out of which 5 were due to AAA and Argentinean SAMs. The British surface to air defence weapon accounted for 22 Argentinean aircraft, out of which, 17 were shot down by SAMs. All this helped the British to attain a fragile balance in the air. Along with this the British employed Phantoms in Ascension Island for air defence through CAP.

b. **Argentinean Operations**. The Argentinean aircraft attempted escorting their strikes in the initial stages of the war. But due to lack of radar cover, ineffective tactics and range limitations, superior British Harriers shot down most of these aircraft. After this, the Argentineans did not attempt any other escort missions.

18. **British Operations.**

a. **Close Air Support**. During the ground offensive by the British forces and the amphibious landing, Harriers and different helicopters carried out a number of CAS missions.

b. **Other Operations**. Helicopters were used for air borne assault missions and special air operations during the process of recapturing the islands. Prior to that, they carried out a number of reconnaissance missions. For the deployment and support of ground and naval forces the British used transport aircraft and helicopter. In this conflict helicopters were also extensively used for SAR and MEDEVAC.

19. **Argentinean Operations**.

a. **BAI/Close Air Support**. A-4 Sky hawk, Pucara and MB-339 carried out numerous BAI/CAS missions in support of the land forces. Pucaras performed many CAS missions against British troops during and after the San Carlos landing, while MB-339A flew attack sorties from Port Stanley airfield.

b. **Other Operations**. In addition to supporting the combat, the Argentine forces carried out other operations like air transportation, SAR etc.

Combat Support Operations

20. **British Operations**.

a. **Air Reconnaissance**. Nimrod and Victor ac were used for long-range Maritime Reconnaissance missions from Ascension Island. Most of these mission's durations were up to 14 to 16 hours. Nimrods were also used as radio relays for submarines and to coordinate the numerous air-air refuelling missions. Almost 200 such sorties were flown from Ascension Island.

b. **Air-to-air Refuelling**. Since all British aircraft had to route via Ascension Island to the Falkland Islands, covering a distance of 8000 miles, air-air refuelling sorties by Victor tankers were flown extensively. A total of 600 refuelling missions were flown. Nimrods, Vulcan and Hercules aircraft were refitted with AAR probes.

c. **EW**. A few of the 'Blackbuck' missions were carried out with 'Shrike' anti-radiation missiles on the Argentine radars in the Falkland Islands. The British ships used Chaff clouds to decoy Exocet sea-skimming missiles.

21. **Argentinean Operations**.

a. **Air Reconnaissance**. Argentineans aircraft carried out numerous reconnaissance sorties with MB-339A ac throughout the conflict. They also carried

out maritime reconnaissance and target tracking with P-2 Neptune, B-707, C-130, F-28, Lear Jet and L-188 Electra transport aircraft. These MR aircraft guided many of its attacks against the British ships.

b. **Air-to-air Refuelling**. The Argentinean air force had only 2 KC-130 air-to-air refuelling tankers. With almost all their aircraft operating at the extremes of their ROA, they suffered a lot due to the lack of air-to-air refuelling tankers. Some of their aircraft like the Mirage and Canberra were not configured with refuelling probes.

c. **EW**. No Argentine aircraft had ECM equipment. Due to this they suffered heavy losses to British SAMs during the operations.

Logistics Support

22. The quality of the British Military response was a function of the numbers of men and material that could be transported 8,000 miles to the South Atlantic and then sustained in operational condition over an extended period. The extent to which this was achieved is one of the most remarkable logistical feats of modern times. The British forces used a large variety of military aircraft and ships to transport war material to the Falkland area. A large number of civil aircraft and merchant ships were also taken into requisition to sustain the enormous logistical requirements. The second important factor in the logistical effort was the British Ascension Island, located 3,800 miles from the Falklands Island, which was used as an operating base for transit of personnel and freight. Wideawake airfield in Ascension Island was the busiest in the world and handled 400 flights per day.

23. The Argentines were restricted to use the available runways due to short length. The Maritime Exclusive Zone of 200 nm radiuses around a point in the middle of the Island, declared by the British to protect the Falklands Island prevented the Argentines to provide a sound logistic support for the troops deployed in the Island. The logistic support for the Argentine Army and the Marine troops was provided by the Army aviation UH1H, CH-47 Chinook, Puma, A-109 helicopters and skyvan transports and helicopters from Argentine coast guards.

Conclusion

24. The Falkland war was one of the most intensely fought wars where air power had a major impact. Both the sides prosecuted the air war effectively. Almost all aspects of air power were flown and tested. Characteristics of air power like flexibility, ubiquity, reach, responsiveness and offensive action were validated. Some limitations of air power like impermanence; base dependency, infrastructure requirements, sensitive to technology and situational limits etc also manifested itself during the war. Force multipliers like air-to-air refuelling, standoff PGMs, sustained maintainability, EW etc were also used extensively. It also emerged that technology has a major impact on air power, but the basic strategic and tactical principles cannot be ignored for any future wars.

TOPIC-9

THE AIR CAMPAIGN OVER BEKAA VALLEY

Introduction

1. Air power, with its unique capability of exploiting the third dimension has the potential for use through many unique, innovative and flexible ways to shape the battlefield. Israel has fought 6 wars with the Arabs since the birth of the nation in 1948. The rapid growth of aircraft and missile technology had a significant influence on the application of air power in these wars. The war of 1967 demonstrated how a numerically inferior air force could achieve decisive result over her superior enemies by correct application of air power. The dominance of Israeli air Force (IAF) was seriously challenged by the Arabs in 1973 Arab-Israel War. The war also witnessed for the first time intense use of the high technology weapon system like precision guided munitions (PGM), electronic warfare equipment, space based satellite surveillance and communication systems. These systems influenced the success of air operations in the 1973 war.

2. The air campaign over Bekaa Valley was fought between 09 to 11 June 1982 between IAF and the Syrian forces. The Israelis conducted the air campaign using their electronic wits and tactics. The strategy and tactics used in this campaign were based on the concept of combining new technology with element of surprise. In this conflict, the Israelis utilized the entire range of electronic warfare (EW) equipment with an aim to silence the Syrian ground based air defence (GBAD) systems. This war introduced several new types of weapon platforms and support systems. The concept of ‘real-time’ warfare; use of Remotely Piloted Vehicle (RPV), electronic jamming etc were also exploited in this campaign.

3. The events of Bekaa Valley needs careful study by all the military commanders as this war gave an idea about the sketch of a modern battlefield. Such study would facilitate them to decide their plan of action for the effective employment of their forces in a complex EW environment. Because, the events of this war were carefully analyzed by the western world and the lessons were applied successfully by them in the subsequent wars. Bangladesh having a defensive posture and surrounded by technologically superior potential adversaries, needs to develop a strong air force for her defence. The study of this campaign is important for Bangladesh Air Force (BAF) to analyze various aspects especially the use of EW capabilities.

Background

4. The Lebanese Civil War started in 1975 between the Christian and Muslim front[xiv]. On 01 June 1976, Syrian military forces entered Lebanon to stop the Civil War. Since moving into Lebanon in 1970, Palestine Liberation Organization (PLO) gained strength by manpower, weapon and international recognition to their cause. Israeli strategy to keep pressure on PLO as a preventive measure resulted into many incidents of provocative attacks and retaliation between them.

5. On 28 April 1981, the IAF shot down 2 Syrian Arab Air Force (SAAF) Mi-8 helicopters, which were supporting Syrian troops in Southern Lebanon. In response, Syria started deploying Surface-to-Air Missiles (SAMs) at Bekaa Valley. The presence of Syrian forces in Lebanon and frequent incidents of PLO artillery attack on northern settlements led Israel to plan for a military offensive in Lebanon to drive out the PLO and Syrian troops. On 03 June 1982, Palestinian gunman attempted to assassinate Israel's Ambassador to UK. In retaliation Israeli Defence Forces (IDF) attacked PLO targets in Lebanon on 04-05 June 1982. PLO responded with a massive artillery and mortar attack on the Israeli population of the Galilee. In response, on 06 June 1982, Israel launched a land offensive "Operation Peace for Galilee". In support of the operation, on 09 June 1982, Israel launched an air campaign against Syrian forces in Bekaa Valley.

Air Strategy

6. **Israeli Air Strategy**. Considering this background, the national objectives and military strategy, the IAF adopted following air strategy for the Bekaa Valley air campaign:

a. To destroy the Syrian SAM sites at Bekaa Valley in order to gain air superiority.
b. To neutralize any incoming air threat from Syria in order to maintain air superiority.
c. To destroy the PLO bases, infrastructure and artillery capability in South Lebanon.
d. To provide offensive air support to the surface forces during 'Operation Peace for Galilee'.

7. **Syrian Air Strategy**. Syrians maintained an air strategy based on reliance on GBAD system consisting of SAMs and anti aircraft artillery (AAA) guns to counter Israeli air threat. Syrians did not intend to engage in war with Israel unless attacked.

Air Order of The Battle

8. **IAF**. The IAF used following aircraft and weapons during the Bekaa Valley Campaign:

a. **Air Assets**.

(1) **Reconnaissance Role**. RF-4E Phantom aircraft, Firebee and Samson Decoy Drones, Scout and Mastiff RPVs.

(2) **Suppression of Enemy Air Defence (SEAD) Role**. A-4 Skyhawk, F-4E Phantoms, Kfir and F-16 aircraft.

(3) **Air Cover to Attack Force**. F-15 and F-16 aircraft.

(4) **Offensive Air Support (OAS) Role**. Kfir and A-4 Skyhawk aircraft, AH-1 (Cobra) and MD-500 Defender helicopters.

(5) **Air Transportation Role**. C-130 aircraft, CH-53 helicopter.

(6) **EW and Airborne Warning and Control System (AWACS) Role**. Modified Boeing-707, F-15 and E-2C Hawkeye aircraft and CH-53 helicopter,

b. **Weapons**.

(1) **Anti-Radiation Missile (ARM)**. AGM-78 Standard and AGM-45 Shrike ARM and Israeli made Ze'ev (Wolf) surface-to-surface ARM.

(2) **Air-to-Air Missile (AAMs)**. AIM-7F Sparrow and AIM-9L Sidewinder AAM and Shafir 2 and Python 3 AAM (Israeli-modified versions of the AIM-7).

(3) **Air-to-Ground Weapons**. GBU-15 cluster bombs, AGM-65 television guided missiles, Mk 82 and Mk 83 laser guided bombs (LGBs) and tube-launched optically tracked wire command-link guided anti-tank missiles (TOW).

9. **SAAF**. The SAAF used following aircraft and weapons during the Bekaa Valley Campaign:

a. **Aircraft**. Mig-21, Mig-23, Mig-25, Gazelle, Su-7, Su-20 and Su-22.

b. **Surface to Air Weapons**. Fifteen SA-6 (mobile), 2 SA-3 (Fixed) and 2 SA-2 in Bekaa Valley with 200 ready-to-launch missiles and supporting AAA guns.

c. **AAMs**. AA-2 Atoll and AA-8 Aphid AAMs.

Planning And Preparation

10. **IAF Planning**. After experiencing heavy attrition to Arab SAMs in 1973 war, the IAF changed their doctrine by giving emphasis on defence suppression. Analyzing the threat posed from presence of Syrians SAMs at Bekaa Valley – located at short aerial distance from Israeli border – IAF strategists signified the importance of pre-emptive surprise attack. They planned to conduct a fast operation under electronic environment with some special tactics. Key to the plan was gathering electronic intelligence. Therefore, priority was given on acquisition and upgradation of modern aircraft, weapons and EW platforms.

11. **IAF Intelligence**. Prior to the campaign, the IAF used reconnaissance aircraft, drones and RPVs to collect detailed information on location of Syrian SAMs, radar and communications frequencies, and monitor movements of Syrian troops including reinforcements.

12. **IAF Preparation**. The IAF gave special emphasis on realistic training. Following were the highlights of the IAF preparation:

a. Aircrews practiced attack runs against dummy SAM sites in Israel's Negev desert in the form of war game.

b. The IAF conducted mock jamming of radar and ground communications to test the effectiveness of their EW capability.

c. Ground crews were trained well to reduce the turnaround time.

d. The experience gained in the previous wars provided the IAF pilots the most realistic training of all.

e. The IAF pilots were familiar with the area as they had been flying over Bekaa Valley for years prior to the campaign.

13. **SAAF Planning**. Analyzing the lessons of initial Arab success in 1973 war, Syrians followed the same strategy and relied on effectiveness of SAMs for air defence (AD). The Syrians heavily invested to rebuild GBAD system by procuring modern SAMs, radars and AAA guns. Syrians also acquired new aircraft including MiG-21MFs, MiG-23s, MiG-25 and SA-342 Gazzelle helicopters.

14. **SAAF Intelligence**. Syrian intelligence agency had prior information about the plan of Israeli invasion of Lebanon. But they mainly relied on their SAM system for effective AD.

15. **SAAF Preparation**. Besides the measures for GBAD, Syria also expanded its pilot training program to make up the losses of 1973 Arab-Israel War and enhance aerial tactics and flying skills.

Conduct Of The Air Operations : Counter Air Operation

16. **SEAD**. The IAF conducted the attack on Syrian SAM sites in a well-planned and coordinated manner. Just prior to the air attack, a commando raid was carried out to neutralize a control centre. On 09 June 1982, at 1414 hours, the air attack began with a force package of 96 ac. The information from EW platforms were used by F-4E aircraft to attack the radar elements of SAM sites using Maverick and Shrike ARMs from standoff distance. The A-4s and Kfirs then attacked other elements of the SAM sites with LGBs and cluster-bombs. The attack lasted for approximately 10 minutes destroying 10 SAM sites. The long-range artillery and surface-to-surface ARMs were used simultaneously during the attack. At 1550 hours, second wave of 92 IAF aircraft attacked the remaining radar and SAM sites. A third wave of IAF aircraft attacked late in the afternoon. On that day, 17 out of 19 SAM batteries were fully destroyed and 2 were partially destroyed. The following day, the IAF destroyed the remaining two SAM batteries.

17. **Air Cover to Attack Force**. Few SAAF aircraft were on patrol mission when the IAF launched the SEAD operation. Syrians had great confidence on the effectiveness of the SAM system. So they called back all their aircraft in the air and relied on SAMs to counter the IAF air threat. Destruction of the SAM sites compelled the Syrians to send a force of MiG-21, MiG-23, MiG-25, and Su-22 aircraft to attack an IAF force of unknown strength and location. Using electronic jamming of radar and communication frequencies, IAF aircraft on air cover countered the Syrians fighters. The SAAF pilots were taken by surprise, as their training was extensively ground controlled interception (GCI) dependent. The IAF fighters used AIM-7F and AIM-9L AAM for beyond visual range (BVR) attack remaining at standoff distance. The AAMs eventually accounted for 93 percent of all IAF kills. The air combat continued till a cease-fire came into effect at 1200 hours on 11 June 1982. The IAF claimed to have

shot down 80 SAAF fighters without loosing a single aircraft in the air battle. But SAAF claimed to have lost 85 aircraft in exchange for 21 IAF aircraft.

Offensive Air Support

18. The IAF fighters and attack helicopters provided support to the ground forces during the whole period of 'Operation Peace for Galilee'. The offensive actions enabled IAF to destroy 81 Syrian tanks using attack helicopters with TOW and fighters with LGBs. This prevented any possibility of reinforcement by Syrian ground forces in Lebanon.

Air Transport Operations

19. The IAF took control of Ansar airstrip near Beirut and used it for air transportation of men and materiel. Leaflets were also dropped from the air. The IAF used CH-53 helicopters for paratrooping under cover of smoke screen made by F-4E aircraft.

EW

20. **EW Platforms used by IAF**. The IAF used following EW platforms in the Bekaa valley air campaign:

a. **Decoy Drones**.

(1) Ryan Teledyne 1241 (AQM-34L) Firebee air-launched drone[xv] fitted with electronic and optical sensors.

(2) Samson, an air-launched unpowered drone fitted with electronic sensors.

b. **RPVs**.

(1) Scout RPVs equipped with various electronic sensors, television and wide-angle film cameras capable of carrying out real-time transmission.

(2) Mastiff RPVs, having a pusher-propeller twin boom configuration carried imaging sensors and electronic sensors for special reconnaissance/surveillance and airborne data relay.

c. **Aircraft**.

(1) Modified Boeing 707 was used for jamming radar signals, fighter-control networks and navigation aids, and for minimizing self-jamming of own frequencies. The aircraft had side-looking radar that allowed

detection of locations of SAM batteries and other systems, as well as enemy radar frequencies.

(2) The Bekaa Valley air campaign saw the first combat use of E-2C Hawkeye AWACS in the history of air power. It was capable of monitoring and controlling attack missions while remaining at standoff distance. It could monitor over 200 aircraft simultaneously, control up to 130 separate air-to-air engagements at ranges up to 250 miles and had a passive detection system that could pick up radar signals 500 miles away. This capability enabled the IAF to detect SAAF aircraft as they took off, allowing it to determine the number and direction of inbound hostile aircraft.

(3) CH-53 helicopters having standoff jamming capability were used in secondary EW role.

(4) F-15s were capable of sorting out engagements at shorter range. The IAF successfully used them as radar gap 'fillers' to assist the less radar capable F-16s.

d. **Electronic Self Protection Measures for Aircraft**. The IAF combat aircraft carried radar warning receivers (RWR), Chaffs and Flares and electronic countermeasures (ECM) pods (including the indigenously produced EL/L-8200 series pods) as electronic self-protection measures.

e. **Very High Frequency (VHF) Frequency Modulation (FM) Radio System**. The IAF used indigenously developed VHF FM radio system that changed radio frequencies across a 30 to 88 Megahertz band. The radio was designed with countermeasures against jamming.

f. **Deployment of Radar under Tethered Balloons**. The IAF also used Westinghouse low-altitude radars deployed under tethered balloons for surveillance.

21. **Conduct of EW by IAF**.

a. **Electronic Intelligence**. The information gathered through electronic intelligence prior to the air campaign allowed the IAF to 'fingerprint' the Syrian SAM sites at Bekaa Valley for electronic countermeasures.

b. **EW in SEAD**. The IAF began their SEAD operations in the Bekaa Valley with highly selective jamming by the Boeing 707 flying just off the coast of Lebanon. This severely degraded the EW radar and the communications of the Syrian integrated AD system. Then the decoy drones and RPVs were used to

pinpoint the SAM sites and pass the information to the Boeing-707. After thorough scrutiny in the computer, depending on the distance of targets, decisions were taken either to use the surface system or air platform. Provided with real-time, accurate target locations, the IAF next turned to actual destruction of the SAM sites.

c. **EW in Defensive Counter Air Operations**. As the Syrian AD radars in Bekaa Valley were destroyed, the Syrians were compelled to use long-range radars positioned inside Syria. E-2C guided the IAF interceptors to hold at low level between Lebanese hills. Once the SAAF fighters came closer to a pre-determined 'engagement zone', Syrian radars and their communication frequencies were jammed by the Boeing-707. Then E-2C vectored the fighters into "blindside" attacks on the SAAF aircraft. The EW environment of the battle was very crucial to the IAF success.

22. **SAAF**. The SAAF seriously lacked in EW and jamming capabilities. The SAAF MiGs had nose and tail-threat warning receivers only.

Command, Control, Communication and Intelligence (C3I)

23. **IAF**. The IAF C3I system was a key contributing factor to the success of the air campaign. The various data links and communication networks of the command post provided the commanders a real-time picture of the air battle. Data and photographs from various EW platforms were also downlinked. The IAF also set up two-way voice communications between the command post and the pilots to enable the commanders the flexibility in taking and disseminating decisions quickly.

24. **SAAF**. Syrian command and control system were disrupted due to extensive jamming and destruction of associated radar and communication elements of SAM sites. It compelled the AD elements to act in isolation. The Syrians could not make correct assessment of the capability of the IAF.

Tactics Evolved

25. **IAF**. During the air campaign, the IAF evolved some new tactics. Few are mentioned below:

a. During reconnaissance missions, the decoy drones were released from IAF F-4E Phantoms keeping the sun behind them. This denied the Syrians ability to track the drones optically and tempted them to switch on their radars. This allowed the accompanying RF-4E reconnaissance aircraft to collect electronic information.

b. During the air combat, the IAF tactics was to vector four-ship formations into the 'engagement zone', one at a time for conducting blindside attack on the Syrian fighters. Aided by EW aircraft, each air battle lasted one to two minutes. Then another formation would enter the engagement zone to follow the same tactics. The tactics resulted into the maximum number of air-to-air victory during the campaign.

26. **SAAF**. The SAAF followed GCI-based tactics, which made them more vulnerable under EW environment. Few SAAF pilots used innovative tactics[xvi], but to achieve limited success. Some of them are mentioned below:

a. In the engagement zone, many SAAF formations would ingress simultaneously, or in waves one closely behind the other. This way the later waves would still have the ability to use their radar and fire at the IAF interceptors while they were busy engaging the first wave. This tactics, however, proved very expensive for SAAF.

b. In another tactics, the aircraft would close at high speed, but just before entering the range of the IAF AAMs, the aircraft would turn away and then do that again and again, until the IAF aircraft would start to fire their missiles even outside the maximum range. Only then the SAAF aircraft would try to close into the range of own missiles, usually causing the IAF interceptors to turn away and try to avoid.

c. One of the SAAF pilots claimed to have succeeded in luring the IAF F-15s into SAM-ambushes and claimed that the aircraft was shot down.

Impact of Technology

27. **IAF**. The IAF used following new technologies that brought decisive results:

a. The IAF extensively used RPVs in various roles during the campaign. Although USA used RPVs in Vietnam War, they could not gain significant success. The IAF used these low-cost aerial platforms to gain maximum effect.

b. The provision of real-time picture of the battlefield in the command post assisted the commanders in deciding the best tactics suitable for any particular situation.

c. The IAF equipments included latest computer controlled equipment such as Head-Up Display (HUD), RWR as well as laser devices for target designation and computer-aimed cannons.

d. The high performance ARMs and AAMs increased the standoff capability of IAF aircraft. AIM-9L AAM having "all-aspect capability" enabled the IAF interceptors to attack the SAAF fighters from head-on or flank instead of manoeuvring to take position at the rear.

e. The Israeli research and development (R&D) capability acted as a force multiplier. For example, the IAF F-4 was modifies 600 times and the E-2C and Boeing-707 aircraft were specially modified to fit the unique requirements of IAF.

28. **SAAF**. Syrians lacked in capabilities in respect of indigenous technology. They mainly relied on procurement of various weapon platforms from the Soviet block. The modern weapon platforms included latest generation Soviet fighters and fighter-bombers and latest technology SAMs.

29. **Outcome of Technology**. In the Bekaa Valley air campaign, the IAF used western technology, while the SAAF used Soviet technology. The new technologies introduced in the campaign enabled IAF various tactical advantages like real-time targeting, BVR and all-aspect engagements, and choice of variety of weapons. With all these, IAF shaped the battlefield.

Application of Principles of War

30. **Selection and Maintenance of the Aim**. The IAF had selected their aim to destroy the Syrian SAM systems at Bekaa Valley. During the air campaign, all efforts were bent on its attainment.

31. **Maintenance of Morale**. Training, innovative use of superior technology, real-time targeting and dissemination of decisions from Command Post to aircraft in the air contributed in maintaining the morale of the IAF pilots. Similarly, the SAAF pilots also displayed a high degree of morale despite loosing many aircraft in the air battle.

32. **Offensive Action**. The successful air campaign by IAF in the Bekaa Valley demonstrated an example of how to achieve air superiority through offensive action. On the other hand, Syrians left the initiative to the IAF.

33. **Surprise**. The IAF achieved technological surprise through use of modern and sophisticated aircraft, RPVs, weapons and EW platforms. The IAF also achieved tactical surprise by applying various newly evolved tactics.

34. **Security**. Although the IAF was conducting realistic training for approximately one year prior to the air campaign, they maintained the security of their tactical plan till its execution. Syrians seriously lacked in securing vital information of their SAM deployment.

35. **Flexibility**. Technological superiority allowed the IAF the flexibility of using the aerial platforms for a variety of tasks. F-16, F-4 and Kfir aircraft were used for multiple roles like SEAD and air cover. F-15 aircraft were used for air cover as well as EW platform. The IAF also had the flexibility of using variety of weapons. The IAF did not use LGBs at the beginning. After eliminating the radars of SAMs using ARMs, LGBs were used to destroy the sites.

36. **Cooperation**. The Bekaa Valley air campaign is a classic example of cooperation between air force and the ground forces. The use of artillery guns and surface-to-surface ARMs during the attack on Syrian SAMs displayed the ability of surface forces to perform the SEAD role.

Application of Tenets of Air Power

37. **Centralized Control/Decentralized Execution**. The real time picture of the battlefield allowed the IAF commanders to control all air assets centrally from the command post. The IAF exercised centralized control through establishing priority, operational flexibility and unity of purpose. The IAF decentralized execution through effective span of control, responsiveness and tactical flexibility.

38. **Synergy**. In the Bekaa Valley air campaign attack force, RPV, reconnaissance and EW platforms acted in a synergistic manner. It allowed the best use of air power in decisive time and place.

39. **Priority**. The success in the Bekaa Valley air campaign was contributed by prioritizing the targets. Air power was at first used to destroy the AD systems and then was used to neutralize the SAAF air threats.

Exploitation of Characteristics of Air Power

40. **Tempo**. The IAF adopted a ‘fast war’ doctrine in the Bekaa Valley air campaign. All available air and ground assets were operated in concert to achieve a unique and decisive operational tempo.

41. **Lethality**. During the campaign, ARMs and LGBs proved to be highly lethal against the surface targets. Similarly AAMs were lethal against the aerial targets.

42. **Casualty Minimization**. During the air campaign exploitation of intelligence and use of PGM with high accuracy kept the casualty to the minimum. The extensive use of drones and RPVs reduced the risk of exposure of aircraft and pilots to the Syrian SAM threat.

Other Analysis

43. **Syrian Doctrinal Limitations**. The SAAF doctrine had a major drawback as they made a passive weapon system like SAM as their primary AD weapon. The SAAF was merely reactive to the IAF air attack. Moreover, Syrians ordered all combat aircraft to return to the base when the IAF air attack began. It indicates their over-confidence on their SAMs and unwillingness to utilize aircraft for AD.

44. **Syrian Weaknesses in SAM Deployment**. The Syrians did not analyze the weaknesses of their SAM systems for taking countermeasures. It was supplemented by poor handling of the SAM systems and contributed in giving away vital electronic information. Placing radars in the valley instead of the hills, keeping mobile SAMs in static locations for several months, using smoke screens as camouflage measures aided the IAF surveillance and detection efforts.

45. **Technological Shortcomings of SAAF**. The primary SAAF fighter was the relatively obsolete MiG-21. Although they had modern aircraft like MiG-23, Mig-25 and Su-20s, these aircraft did not have the full avionics and armament systems, as they were mainly stripped-down export models. Their main air-to-air missile was 1960s-era AA-2 having numerous operating limitations.

46. **Lack of Realistic Training of SAAF Pilots**. Syrian pilots were young and inexperienced. The SAAF pilot training procedures were more rigid as they were following Soviet doctrine. While IAF pilots were trained on BVR engagement, SAAF training system was based on visual engagements aided by GCI. Moreover, they lacked in training under electronic environment.

47. **Criticism of Performance of RPVs**. Few analysts opined that the success of RPVs was mainly achieved through the element of surprise. In their opinion, the RPVs were basically unreliable, could not fly at night, and the data link transmissions interfered with other communications system.

48. **Syrian Efforts that Could Have Changed the Outcome**. The Syrian SA-8 mobile SAM was equipped with fire control radar and missile launcher in the same vehicle. But the Syrians did not use SA-8. The Syrians could have deployed adequate number of early-warning radars in Bekaa Valley. Effective emission control would have hindered IAF success. Whether the Syrians could have defeated the Israelis is questionable; they could have caused heavy attrition to the IAF.

Lessons Learnt

49. **Lessons Learnt in General**. Following lessons are derived from the analysis of Bekaa Valley air campaign:

a. EW was successfully used by IAF in most the of air operations. It implies that, EW can play a vital role in gaining and maintaining air superiority. When combined with real-time targeting, EW can shape the battlefield.

b. Drones and RPVs can be used for various roles like surveillance and reconnaissance. These air platforms can be effectively utilized as force multipliers for gathering electronic intelligence.

c. Every weapon system has few inherent limitations which the adversaries may try to exploit into their advantages. Therefore, weaknesses of new weapon systems need analysis for effective countermeasures.

d. In the Bekaa Valley air campaign, surface weapon systems were controlled by IAF for destroying the Syrian SAMs. The effectiveness of GBAD elements can be enhanced if they are controlled by air force.

e. Israel developed many indigenous technologies and modified few weapon systems and air platforms to suit their operational requirements. This enabled them to gain overwhelming technological advantage over the Syrians. Therefore, R&D can act as force multiplier by modifying aircraft and weapon systems.

f. Syrian training system was very rigid. On the other hand, IAF planned and trained their personnel rigorously to suit their new equipments and tactics. This enabled them to gain superiority over the Syrians. As such, careful planning and realistic training proved to be an essential prerequisite for effective employment of airpower.

50. **Application of Lessons Learnt in Subsequent Air Warfare**. After the Bekaa Valley air campaign, the USA purchased Israeli RPV, invented new systems through R&D and utilized them in Gulf War, Afghan war and Iraq War. The allied forces in Gulf War used the lessons of Bekaa Valley air campaign for target acquisition and destruction of Iraq’s integrated AD.

Conclusion

51. On 06 June 1982, the Israel launched ‘Operation Peace for Galilee’ with an aim to neutralize PLO’s forces in southern Lebanon and drive Syrian forces out of Lebanon. The lessons learnt by the IAF from the 1973 Arab-Israel War forced them to change doctrinal priority to SAM-suppression. The IAF planned to conduct a fast pre-emptive surprise attack under EW environment. The IAF preparation included acquisition of modern aircraft and weapons including the EW platforms. Indigenous R&D facilities were utilized for inventing and modifying various aerial platforms and their capabilities. The IAF also emphasized on realistic training using newly evolved tactics to suit the new technologies. The air campaign over Bekaa Valley, although very limited in scope, area of operation, duration and the number of participants, takes a special place in the history of air power. Air power was applied in a decisive and innovative manner in this campaign. This showed the air strategists new dimensions of exploiting the unique characteristics of air power.

TOPIC- 10

APPLICATION OF AIR POWER IN THE GULF WAR-1991

Introduction

1. The proponents of air power always believed that air power is an inherently strategic force. Air power, operating in the third dimensions, is believed to be able to bypass the tactical surface battle and operate directly against the centres of gravity of an enemy. Thus, depriving an enemy of the political will and military power required to continue the war. Yet, protracted wars like WW-II and Vietnam failed to assert this contention without controversy. Such failure is suggestive of the lack of maturity of air power both in terms of its application and availability of technology. However, the Gulf War-1991 was different; it was the air power which dominated the war and drew the line between the victory and the defeat.

2. The stage for Gulf War was set on 02 Aug 90 when Iraq invaded Kuwait with an aim to end her economic sufferings utilising Kuwaiti oil and resources. Iraqi invasion sparkled wide spread criticism and opposition from almost every corner of the world. Western powers, most notably the USA demanded unconditional withdrawal of Iraq from Kuwait. In next five and a half months, intense political and diplomatic measures followed by massive concentration of military forces took place in Persian Gulf to persuade Iraq to quit from Kuwait. However, when diplomatic measures and military deterrence failed, coalition forces resorted to the application of military power against Iraq. Thus, the Gulf War-1991 had started on 17 Jan 91 with a planned and dedicated air campaign named ‘Desert Storm’. Well orchestrated offensive employment of air power not only rapidly drained out the Iraqi capability to wage war; it also prepared the battlefield for the friendly surface forces to operate at ease. Ultimately, the war ended in 43 days as the coalition land forces evicted Iraqi forces from Kuwait in only 100 hours remaining under the protective shield of air power.

3. During the Gulf War, air power played an important role. Latest technology, new tactics and a shift in the traditional paradigm of application of air power were the salient aspects of air power in the Gulf War. Concepts of EBO and parallel warfare emerged as key ingredients of air campaign planning. These new concepts were the testimony of a shift in the traditional paradigm of application of air power.

4. Despite the profound impact of air power in Gulf War, its application and success could not escape controversy. It may be argued that the application of coalition air power in Gulf War-1991 was monopolistic as it remained largely uncontested. In a closely contested war scenario, the outcome of air power might have been different. Conversely, it can also be argued that the failure of Iraqi air power to contest the capability of coalition was also an achievement of a well orchestrated air campaign

planning. While the debate may go on endlessly, a credible solution can only be obtained by analysing the use and abuse of air power in Gulf War-1991.

Background

5. On 02 Aug 90, Iraqi troops crossed the border into Kuwait. Three Iraqi Republican Guard divisions virtually wiped out the tiny Kuwaiti Armed Forces. Iraq captured the entire Kuwait in less than 24 hours. By another 48 hours, Iraqi troops were massed along the Kuwaiti-Saudi border. On 08 Aug 90, Iraq declared Kuwait as her 19th province. A map showing Iraq, Saudi Arabia and Kuwait is given at Figure-1. Age old territorial dispute and a recent economic disparity between the countries were the contributing factors, which persuaded Iraq to invade Kuwait.

Figure-1: Map showing Iraq, Saudi Arabia and Kuwait.

6. Saddam Hussein, the Iraqi president always believed that Kuwait came into being because of the mischievous politics of British during the post WW-I era. He and other leaders of Iraq perceived Kuwait as part of Iraq, having originally existed as Gaza (lesser district) in the Vilayet (province) of Basra. The invasion was, therefore, correcting an historical injustice. However, it was not only territorial boundary which lead Iraq to invade Kuwait.

7. During the time of invasion, Iraq was in serious economic crisis. Iraq's eight years long war against Iran was expensive. It had cost Iraq some $102 billions in military hardware with an additional loss of $106 billion in oil revenues. Her foreign debt for the war amounted to $80 billion, which was mainly contributed by Kuwait. Once the war was over, Iraq not only declared a moratorium on all war debts to Iraq,

but also demanded an additional grant of $30 billion from the Persian states. Moreover, she also accused Kuwait of stealing Iraqi oil from the Rumailla oilfield and violating quota on oil production. As compensation, she further demanded $2.4 billion from Kuwait. Kuwait and other Gulf States continued to reject Iraqi propositions. Ultimately, in a desperate attempt to come out of the economic quagmire, Iraq invaded Kuwait on 02 Aug 90 and became the owner of 20 per cent of World's oil reserve. However, Iraq's move to become wealthy overnight was not meant to succeed because of the resistance from all over the world.

International Response

8. **United Nations**. On 02 Aug 90, UN Security Council (UNSC) condemned the Iraqi aggression as a violation of UN Charter and demanded immediate withdrawal. On 06 Aug 90, UNSC imposed trade and financial embargo on Iraq and established a special sanctions committee. On 29 Nov 90, the UNSC authorized members to use "all means necessary" to enforce previous resolutions if Iraq did not leave Kuwait by 15 Jan 91.

9. **Western World**. On 02 Aug 90, US condemned the invasion and immediately froze all Iraqi and Kuwaiti financial assets in the United States to prevent Iraq from gaining access to this wealth. US military reaction to the invasion was immediate. USS Independence was ordered to move from near Diego Garcia in the Indian Ocean to the Gulf of Oman. Two Air Force KC-135 tanker aircraft in the United Arab Emirates (UAE) since 23 Jul 90 were ordered to remain in the area. US also expressed willingness to provide the forces needed to defend Saudi Arabia. In response, King Fahd invited the United States to send forces. European countries like UK, France, Italy and Russia also expressed solidarity against Iraqi Invasion.

Iraq's Reaction

10. Iraq's diplomacy was hallmarked by failure. Iraq failed to link its occupation of Kuwait to Israel's occupation of the West Bank and Gaza. It also failed to prevent UN resolutions and embargoes. Immediately after the invasion of Kuwait, Iraq began campaigning for public support. On 12 Aug 90, Saddam stated that he would not withdraw Iraqi forces from Kuwait unless Israel withdrew from the occupied West Bank and Gaza. The Iraqi leader also proposed defusing the current crisis by replacing US and Egyptian forces deployed to Saudi Arabia with UN troops. Iraq's another move was to reconcile with Iran. On 15 Aug 90, Saddam Hussein promised immediate exchange of prisoners of war and abandoned all claims to the disputed lands of Iran. Iraq also attempted to persuade the Soviets to adhere to the 1972 treaty of Friendship with Iraq. However, all moves by Iraq ultimately failed.

Formation of Coalition

11. The US and UK led the effort to create a coalition to force Iraq to leave Kuwait. When the Saudi King invited US to deploy in KSA, support was solicited from other nations to form a coalition. With overwhelming support from all over the world, nearly 50 countries made contribution. Among those, 38 countries deployed air, sea, or ground forces. Together, they committed more than 200,000 troops, more than 60 warships, 750 aircraft, and 1,200 tanks. Many countries contributed financially by donating billions in cash to the United States.

Coalition Strategy

12. **National Objectives of the United States**. Within a week of Iraqi invasion, the president of the United States outlined four national objectives. These were as following:

a. Securing the immediate, unconditional, and complete withdrawal of Iraqi forces from Kuwait.

b. Restoring the legitimate government of Kuwait.

c. Assuring the security and stability of the Persian Gulf region and

d. Protecting American lives.

13. **Military Objectives**. While formulating the military objectives, both Central Command (CENTCOM) and coalition planners made use of the Concept of 'Centres of Gravity' as advocated by Carl Von Clausewitz. The military objectives of the coalition were:

a. Destroy Iraq's military capability to wage war

b. Gain and maintain air supremacy

c. Cutoff Iraqi supply lines

d. Destroy Iraq's chemical, biological, and nuclear capability

e. Destroy Republican Guard forces and

f. Liberate Kuwait City

14. **Air Strategy**. To achieve the military objectives, air campaign planners devised four overlapping phases to employ air power:

a. Phase I: Strategic Air Campaign.

b. Phase II: Air Supremacy in the Kuwait Theatre of Operation (KTO).

c. Phase III: Battlefield Preparation.

d. Phase IV: Ground Offensive.

15. **Coalition Air ORBAT**. Coalition air ORBAT consisted of 1875 combat aircraft, 75 per cent of which were from the United States. Coalition air ORBAT also included around 970 combat support aircraft. Besides numerical superiority, coalition forces also enjoyed a marked advantage over Iraq in terms of technological advancement. A prime example of technological superiority was the Lockheed F-117A 'Stealth Fighter', the first aircraft in the world to be designed specifically to avoid radar detection.

Iraqi Strategy

16. **National Objectives**. In the face of an imminent attack, Iraq's national policy objective was a mix of political-diplomatic attempts to achieve the followings:

a. To fracture and undermine the U.S led coalition

b. To deter the coalition from going to war and

c. To undermine or circumvent the sanctions which had been imposed after the invasion of Kuwait

17. **Military Objectives**. Iraq's military strategy pursued her political-diplomatic strategy focusing on concentrating sufficient forces in the theatre to deter the coalition from going to war, or producing sufficient casualties in the event of war to fracture the coalition.

18. **Air Strategy**. Iraqi leaders believed that the decisive outcome of a war rested with the ground forces as air power was not decisive. As a result, Iraq's air strategy was devised to use air power as a supporting force to safeguard or defend ground forces. Iraq's air strategy was as following:

a. Utilize active and passive air defence measures to neutralize or degrade effectiveness of coalition attacks on COGs and ground forces.

b. Conduct hit and run or suicide operations against high value targets such as AWACS aircraft, large naval vessels in the Gulf and attempt to pick off straggling coalition aircraft.

19. **Iraqi Air Orbat**. IQAF was the largest in the Middle East in August 1990. The quality of the aircraft and aircrew, however, was very uneven. Its effectiveness was constrained by the conservative doctrine and aircraft systems limitations. Iraq had more than 700 combat aircraft in its inventory before the invasion of Kuwait. Fewer than half of these aircraft were either third generation or fourth generation and were flown by pilots of marginal quality, compared with US aviators. These aircraft included the Soviet MiG-29, MiG-23, MiG-25, Su-24 and the French Mirage F-1. The French-built F-1s and

their pilots were the IQAF elites. Iraq had also acquired a wide range of weapons and electronic warfare gear for the F-1, including laser-guided air-to-surface missiles. Iraqi aircraft were deployed at more than 24 primary and 30 dispersal airfields throughout the country.

Coalition Planning

20. **Instant Thunder**. Initial plan for an air campaign was prepared by Col John A Warden III, who was in-charge of a highly classified war gaming office in Pentagon known as 'Checkmate'. Col Warden and his planners called this plan 'Instant Thunder' to overtly contrast it from 'Rolling Thunder', the failed air campaign plan of Vietnam. 'Instant Thunder' was a radical shift in the traditional paradigm of application of air power. It was conceived to bring about a decisive outcome of the war by utilizing the strategic capability of air power. The plan was formulated conceptualizing Wardens five ring theory. Warden, in his five ring theory, depicted the modern battlefield as a dartboard (Figure-2). He argued that the prime target for any air campaign should be the bulls eye which represented the C3 and decision making ability of the enemy.

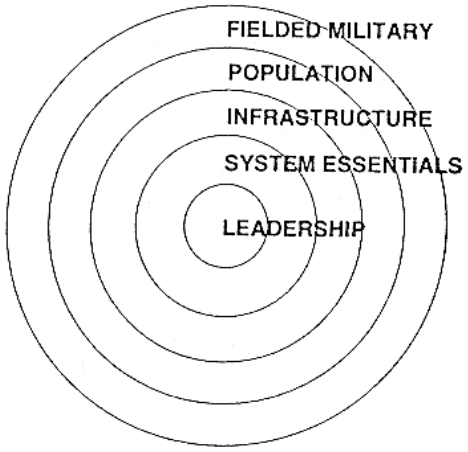

Figure-2: Warden's Five Ring Theory

A direct hit in the bull's eye could end the enemy regime's ability to stay in power or run the affairs of state, including its war effort. Other ring from centre to outward represented key production/organic essentials, national infrastructure, national population and fielded military forces. 'Instant Thunder' was a complete reverse prescription of Prussian military strategist Clausewitz's argument that war went from outside in e.g. from fielded military forces to other centre of gravity. John a Warden formulated a plan, where the Air Force would wage war from inside out, the first truly strategic air war. The plan initially recommended 84 targets in all. However, over the time the targets kept on growing and on 15 Jan 91 it stood at 476. 'Instant Thunder' was instantly rejected by many leading military planners and commanders including Lt Gen Charles Horner, JFACC CENTCOM. 'Instant Thunder' was objected because it did

not include any plan to engage Iraqi troops in KTO and instead, planned for application of air power over the mainland Iraq.

21. **Black Hole**. On 20 Aug 90, 'Instant Thunder' plan was presented to Lt Gen Charles Horner, JFACC CENTCOM. He virtually dismissed the plan and appointed a new team headed by Brig Gen Buster Glosson to formulate a new air campaign. This new team was later known as 'Black Hole'. One of the members of the 'Black Hole' was Lt Col Deptula who was also a member of 'Checkmate' with Col Warden. He succeeded in convincing Brig Gen Glosson on the merits of selectively targeting enemy Centre of Gravity as prescribed in 'Instant Thunder'. As such, with little modification, 'Instant Thunder' ultimately became the air campaign plan for the Desert Storm.

22. **Setting the Stage – Operation 'Desert Shield'**. During the time of Iraqi invasion, the US had only a token military presence in Middle East. CENTCOM's plan to liberate Kuwait or defend KSA depended on a rapid build up of forces in Middle East. As a result, operation 'Desert Shield' commenced on 07 Aug 90 to build up US and other coalition forces in the Gulf. Operation 'Desert Shield' was the most extensive projection of air power in history. It was conducted in two phases. First phase started on 07 Aug 90 and lasted for five weeks while second phase lasted from 08 Nov 90 to 15 Jan 91. Operation commenced when 48 F-15C of USAF flew 16 hours non stop to deploy in Dhahran, KSA crossing 7000 miles. During the operation, 482,000 people and 513,000 tons of cargo were airlifted from US to KSA. Within theatre 209,000 troops and 300,000 tons of cargo were airlifted.

23. **C2 Structure**. The air campaign in the Gulf War required planning, tasking, and execution of more than 2,000 sorties a day. The planning and execution of such a huge air effort required streamlined, simple and well coordinated C2 architecture. General Schwarzkopf, the Commander-in-Chief, CENTCOM made this complex task relatively easy by assigning Lt Gen Charles A Horner, USAF as the first ever Joint Forces Air Component Commander (JFACC) of US Forces since WW-II. Despite sporadic discontent between JFACC and other component commanders, the concept of JFACC was quite effective in coordinating dispersed air assets towards the achievement of a unified campaign objective. In Gulf War, JFACC played major role in providing safe separation of 2,000 to 3,000 aircraft sorties flown per day in the theater's limited airspace. He had operational control of Air Force units but only tactical control of aircraft sorties made available by the Navy and the Marines. Planning, coordination, allocation and tasking of air assets were done by a Tactical Air Control Centre (TACC), which Gen Horner inherited because of his appointment as Commander, CENTAF. As a whole, JFACC enabled air resources from many air forces and components to operate in harmony and unity to achieve a defined objective. The prime tool for JFACC to discharge his duty and assert authority over all air assets in the theatre was Air Tasking Order (ATO).

24. **ATO**. The daily ATO directed almost all Coalition fixed-wing aircraft sorties with varying degrees of control. Helicopters flying less than 500 feet above the ground and naval aircraft on over-water flights were exempted from direct JFACC control. ATO contained some 200 pages in standard message format and almost 800 pages on the digital format. A typical ATO included times, targets, altitudes, call signs, radio frequencies, and other necessary mission information.

Iraqi Planning

25. **C2 Structure**. Two key factors drove the organization of the Iraqi armed forces. First, it had to be centralized. Second, like everything else, supreme military authority rested solely in the hands of Saddam Hussein. For effective C2, Saddam needed to receive an immense amount of accurate information. A mainframe computer installed in the Iraqi Ministry of Defense centrally controlled the flow of information. The communication facilities of Iraq were quite modern, which included underground fibre optics back bone for networking, microwave relay stations, field radios and regular telephones. However, the heart of the Iraqi C2 system was KARI, a computerised air defence system built in France.

26. **Air Defence System ('KARI')**. French built KARI air defence system was the best technology available in 1970s that a third world country could buy. KARI combined different elements of the air defence system including early warning radars, ground controlled intercept radars, interceptor fighters, SAM and AAA into a cohesive system responsive to centralized direction. The highly centralized air defence structure relied on extensive and redundant connectivity. The system consisted of more than 400 observation posts in different bases, 73 radar reporting stations, 17 IOCs, 04 SOCs and one ADOC. The observers in the ADOC assigned air defence priorities, but did not directly control operations. The SOCs made all combat engagement decisions for their respective sectors, while the respective IOC controlled the use of SAMs or interceptors to carry out the engagement. The technical and tactical capabilities of its individual system components made this system a potentially serious threat to coalition air power. However, KARI had a number of limitations as well. KARI was basically designed to counter small raids of between 20 to 40 aircraft and each command centre could track 120 aircraft under optimal conditions.

27. **Surface to Air Defence**. Iraqi military was equipped with both heat seeking and radar guided missiles. Heat seeking missiles included Soviet SA-7, SA-9, SA-13 SA-14 and SA-16, while SA-6 and SA-8 were low altitude radar guided missiles. Iraq also acquired 200-300 French made Roland SAMs. Besides missiles, Iraq had 150 to 400 Swedish made Orelikon guns and thousands of foreign made other types of anti aircraft guns. During enemy raids, Iraqi AAA batteries did not try to track and shoot down a plane. Instead all guns in a battery set up a wall of fire in their sector and let the plane run into it.

Conduct of Operations

28. Operation Desert Storm was a sustained 43-day air campaign from 17 Jan 91 to 28 Feb 91. As per the OpO of Desert Storm, the conduct of the operation was planned in four overlapping phases with specific objective to be achieved at the end of the each phase. The planned phases were as following:

a. **Phase I - The Strategic Air Campaign**. First phase was estimated to require 06 to 09 days to meet its objectives. The objectives were to destroy Iraq's Vital COGs, offensive and defensive air capabilities, national communications, NBC weapons research and production capabilities, war production potential and transportation system.

b. **Phase II – The Attainment of Air Superiority in KTO**. Second phase was estimated to begin sometime between day 07 and day 10 and would require 02 to 04 days to complete. The ultimate goal of this phase was to achieve air supremacy in the KTO by attacking aircraft/airfields, air defence weapons and C2 systems of Iraq.

c. **Phase III – Battlefield Preparation**. Phase III was estimated to start sometime between D+9 to D+14 and would require 06 to 08 days to complete. The objective of the phase was to cut Iraqi supply lines, destroy Iraqi NBC capability, and reduce Iraqi combat effectiveness in the KTO by at least 50 percent. Attainment of the objectives would allow ground forces to initiate offensive operations against a confused and terrorized Iraqi force in the KTO. Targets included Iraqi ground forces, armour and artillery, bridges and C3 system in Southern Iraq.

d. **Phase IV – The Ground Offensive**. Phase IV was also known as CAS phase. It had no estimated concrete start day since it was dependent on the achievement of the goals of the first three phases. The objective of the phase was to win the air/ground campaign by providing intelligence, massive firepower and protective air cover for friendly ground forces.

Coalition Air Operation

29. **Strategic Air Operations**. Strategic air operations were the nerves and spines of Desert Storm. The main punch of strategic air operations were delivered within the first 24 hours of the air campaign. As the dead line imposed by UN was over without any sign of compliance from Iraq, coalition air campaign started against Iraq on 17 Jan 91 at around 0300 hours. All together, 668 aircraft attacked Iraq on that night. B-52 bombers carrying ALCMs, F-117A Stealth fighter bombers with LGBs and TLAMs from US Warships carried out surgical attacks against Iraqi leadership, C3I network, strategic air defence system and NBC warfare capabilities. Simultaneously, AH-64

attack helicopters, F-15E Eagle fighter, and GR-1 Tornado fighter-bombers neutralized Iraqi radars, SAMs and the C2 network to create safe passage for successive non-stealth aircraft to operate. Within minutes of attack, lights went out in Baghdad and did not come on until well after cease hours. Microwave towers, telephone relay exchanges, cables and land lines had been transformed into rubble. By second week, Saddam Hussein was reduced to sending orders from Baghdad to Kuwait by messenger, which took 48 hours. Hundreds of coalition aircraft marked by precision, successfully isolated Iraqi leaders from their troops and rendered the whole country into extreme sufferings by cutting off electricity, water and other daily necessities.

30. **OCAO**.

a. **SEAD**. Towards the beginning of the air campaign, one of the prime requirements of the coalition air forces was to suppress and destroy the Iraqi air defence system. Initially, coalition forces used a pair of F-117As to attack the SAM sites, where one aircraft acted as illuminator. As the air defence capability of Iraq gradually drained out, F-15E, EF-111A, A-7 Corsair II, F-4G Phantoms and TALDs were employed in packages to destroy the SAMs. Using the Israeli tactics of Bekka Valley War (1982), coalition forces employed TALDs to turn on the SAM radars and then use AGM-45 Shrike or AGM-88 HARM to destroy the SAM sites. Because of the number and mobility of enemy anti-aircraft systems, SEAD continued throughout the war.

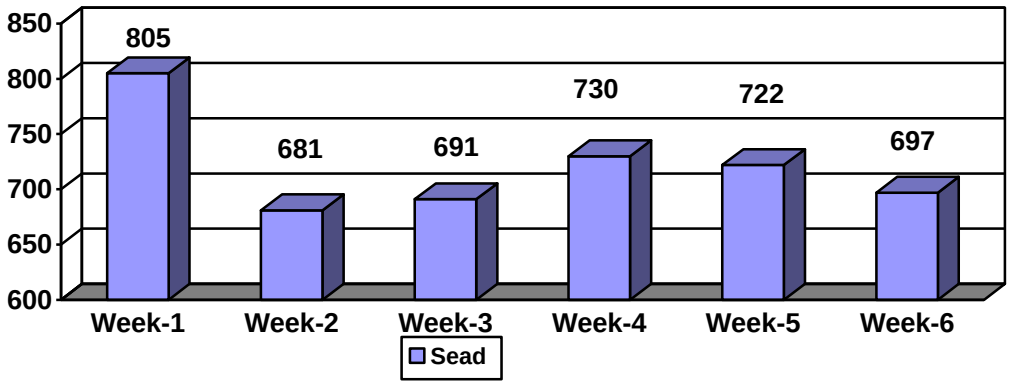

Figure-3: Breakdown of SEAD as per week.

b. **Air Field Attack**. Initially, RAF Tornados and French Jaguars carried out attack against Iraqi airfields. RAF Tornados attacked Iraqi airfields at LL using JP-233 runaway catering bombs. As the IQAF showed no inclination to engage the coalition in the air, Iraqi aircraft were destroyed on ground inside HAS using PGM. As a result, IQAF moved their air assets closed to the residential areas and to Iran. However, the aim of OCAO was achieved as long as IQAF did not contest coalition aircraft in the air. As such, the Coalition Commander declared air supremacy on 22 Jan 91. During the war, an

estimated 290 (40 per cent) of Iraq's 724 fixed-wing aircraft were destroyed in the air or on the ground by the coalition. Another 121 escaped to Iran, leaving 313 (43 per cent) intact and inside Iraq at the end of the war. Coalition aircraft also destroyed or severely damaged 375 HAS out of a total of 594.

c. **SCUD Hunt**. The objectives of the scud Hunt were to locate, attack, destroy or suppress mobile scud launchers and associated support equipment. Scud Hunt missions were of tactical priority as the use of scud missiles against Israel threatened the unity of coalition, had Israel retaliated. About 25 per cent of F-15Es, seven percent of A-10s, 25 per cent of LANTIRN-equipped F-16s and eight per cent of F-111Fs were dedicated to the Scud hunt. Moreover, F-117s, B-52s, Navy A-6Es, F/A-18s, KC-130 and RAF GR-1 Tornados were also used occasionally. Despite all out effort, Iraq continued to employ scud missiles until the last day of the war totaling 86 launches. Figure-4 denotes the weekly Iraqi Scud launch during the war.

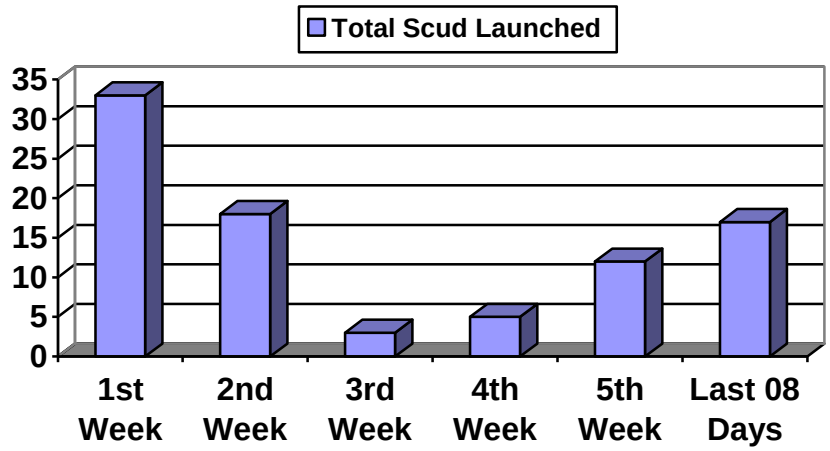

Figure-4: Weekly Scud Launch by Iraq

31. **Air Interdiction (AI)**. The objectives of AI missions were to shape the battlefield to help coalition ground forces achieve their objectives. AI missions started in the first days of the air campaign, when key C3 centres in Baghdad and elsewhere were taken out. Tornado, F-111, Jaguar, A-6 and A-10 aircraft were used for AI missions. AI missions were carried out 24 hours a day attacking rail links, bridges and supply depots. Out of 45 principle bridges, coalition forces effectively destroyed 44 bridges, often rendering a bridge inoperative by firing single missile. With the help of JSTARS, coalition forces also carried out a clean sweep of Iraqi transport network.

32. **CAS**. The final phase of the air war aimed to support the ground offensive to liberate Kuwait. As ground forces advanced into Kuwait and southern Iraq, unprecedented level of CAS was available to them. It can be even argued that the CAS provided was actually out of proportion to the threat posed by a demoralised and badly mauled Iraqi Army. Employing A-10 aircraft, coalition forces were quite successful in

destroying Iraqi tanks and artillery pieces in KTO. At the end of the war, although disputable, coalition forces claimed to have destroyed 1508 artillery pieces and 1210 APCs of Iraqi forces. B-52 bombers were also used in CAS role to carpet bomb the front line Iraqi troops.

33. **Combat Support Air Operation**.

a. **Air to Air Refuelling**. Desert Storm is also widely known as 'Tanker Dependent War'. Virtually every type of strike and direct combat support aircraft required air to air refueling. During Desert Storm, at least 339 US in-flight refueling tankers off-loaded more than 800 million pounds of fuel. For Air Force tankers alone, there were approximately 60,184 recorded refuelling events. On average, there were 1,399 refuelling events per day or approximately 58 in each hour.

b. **EW**. Platforms that conducted electronic combat missions or EW in a combat-support role included EF-111s, EC-135s, EC-130s, and EA-6B aircraft. These aircraft conducted missions involving jamming or destruction of radar sites. For jamming and destruction of radars, TALD and HARMs were used respectively. Electronic combat support missions enabled primary strike aircraft to conduct attacks on targets. A total of 160 coalition aircraft participated in EW during the entire air campaign.

c. **CSAR**. During 'Desert Storm' Air Force Special Operations Command, CETCOM was responsible for the management of CSAR assets. Aircraft supporting CSAR were located at five bases in KSA and at two bases in Turkey. MH-53 and MH-60 of USAF and UH-60 and CH-47 of US Army were the only helicopters capable of penetrating high threat environment for CSAR missions. Central Command's CSAR guidelines required reasonable confirmation of a downed crew's survival and location before a CSAR mission launch. The CSAR system was set-up so that once a crewman ejected and reached the ground, fighters would be diverted to the designated area. The JRCC then alerted AFSOCCENT to execute the mission. Due to dense enemy concentrations on the battlefield and Iraqi use of radio direction-finding equipment, downed pilots were frequently captured immediately after parachuting to the ground. As a result, only seven CSAR missions were launched, resulting in three saves.

d. **PSYOP**. Coalition forces employed a wide variety of air assets in tactical PSYOPs. MC-130, HC-130, EC-130 Volant Solo aircraft, B-52s, F-16s, Marine F/A-18s and Navy A-6s regularly participated in various PSYOP like radio transmission, loudspeaker broadcasts and leaflet dissemination. The aims of PSYOPs were to reduce the morale and combat efficiency of enemy troops and to convince enemy forces to take actions favourable to the coalition forces. B-52s employed in leaflet dissemination mission, dropped around 29 millions leaflets to persuade Iraqi soldiers to surrender. This was quite successful as thousands of soldiers of Royal Guards were influenced and surrendered even without any fight towards the end of the campaign.

Iraqi Operation

34. **Air Operation**. During the two weeks before the war, IQAF flew around 100 sorties daily, including about 60 combat aircraft sorties. It sustained a good effort for the first several days of the war, considering the state of its air defence, C2 and the damaged airfields. On the first day it flew 96 sorties, including 53 combat sorties. On second day, its sorties surged to 118, although combat sorties dropped sharply to 23. The number of combat sorties remained the same on the third day, but the total number dropped to 42. On the fourth day, combat sorties accounted for 58 out of 60 sorties flown. Thenceforth, the number of sorties fluctuated but remained low until sixth day, when it stopped. During the war, Iraq had lost 35 aircraft in air to air combat, while the coalition forces suffered no loss. The first half of these was lost early in the war and by 21 Jan 91, Iraq had lost 17 fighters (08 MiG-29s, 06 Mirages, 02 MiG-25s and one MiG-23) in aerial engagements. Other 18 were lost when Iraqi fighters fled to Iran. Besides, it is estimated that further 227 aircraft were also lost on ground.

35. **PSYOP**. The objectives of the Iraqi PSYOP campaign were to rationalize the invasion of Kuwait, gain the support of the Arab masses, discourage nations from participating in the U.N. embargo, and discourage or hinder military attacks on Iraq. Strategically, Saddam met with some early successes. He used Scud missiles to attack Israel and Saudi Arabia. As political and psychological weapons, Scuds were useful in diverting coalition attention and military effort away from the main battlefield. While the impact of the Scuds was militarily negligible, they did produce emotional and psychological effects. The disparity between the small number killed by Scuds and the enormous coalition effort devoted to anti-Scud operations highlights the importance of the psychological effects.

New War Fighting Concepts : General

36. The Gulf War began with more targets in one day's attack plan than the total number of targets hit by the entire 8th Air Force in all of 1942 and 1943. The first night of the Gulf War demonstrated that the conduct of war had changed. One hundred fifty two discrete targets made up the master attack plan for the opening 24 hour period of the Gulf War. However, it was not the numbers; rather how they were planned to achieve specific effects was important.

Parallel Warfare

37. In air campaigns before the Gulf War, area and point defenses had to be eliminated before war planners could gain access to what they really wanted to attack, e.g. enemy leadership. This concept was widely known as series warfare as depicted in Figure-5. In series warfare, sequential elimination of EW Radars, Ops Centres,

Airfields and SAMs were required (by non-stealthy aircraft) before reaching the leadership. In most of the previous wars like Arab-Israel war of 1967 & 1973, this concept was used in planning air campaign.

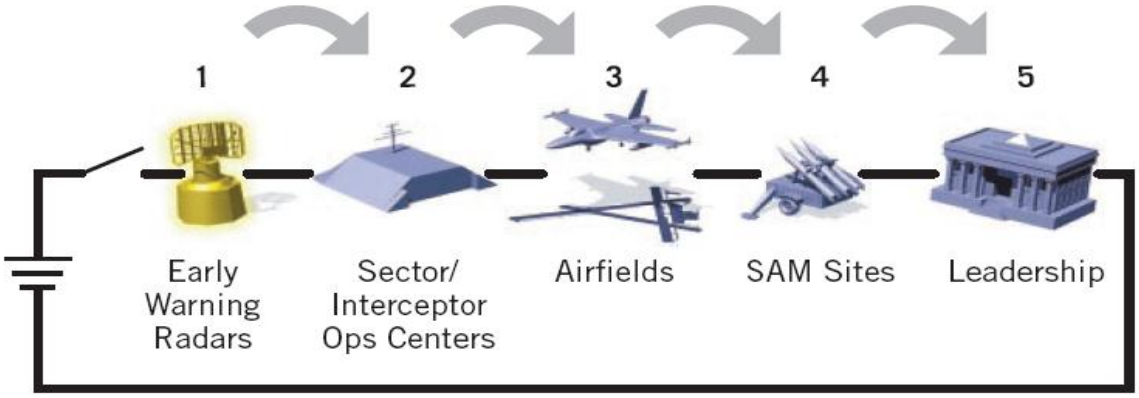

Figure-5: Series Warfare

38. Converse to the series warfare, Figure-6 depicts the same settings where all targets are attacked simultaneously or in parallel. However, in this case, access to the leader is only possible when all other defence elements are neutralized simultaneously. This approach is a parallel warfare because multiple targets are attacked simultaneously; however, it is weighed against air defence. Such approach requires a large force package, and repeated attacks are envisaged before reaching the key COG. However, true potential of parallel warfare is not exploited in this type of concept.

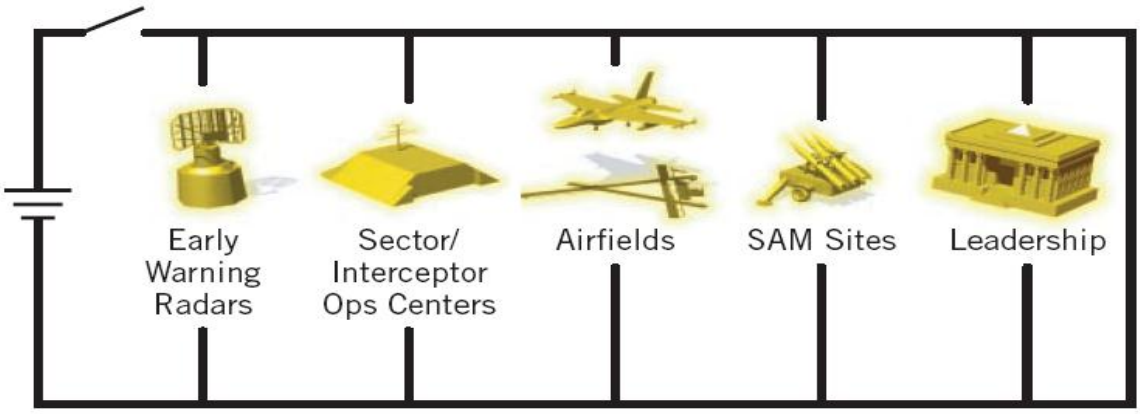

Figure-6: Parallel Warfare – Weighed against Air Defence

39. The capacity for a simultaneous attack against the entire array of high value targets is the concept of true parallel warfare, which was the hallmark of coalition's success in Gulf War. Such approach enables surprise at the tactical level, lowers casualties, injects paralyzing effects and gains total control over enemy in shortest possible time. Figure-7 depicts parallel warfare against all targets simultaneously. However, technology like stealth and abundance of resource is a requirement in conducting this type of warfare.

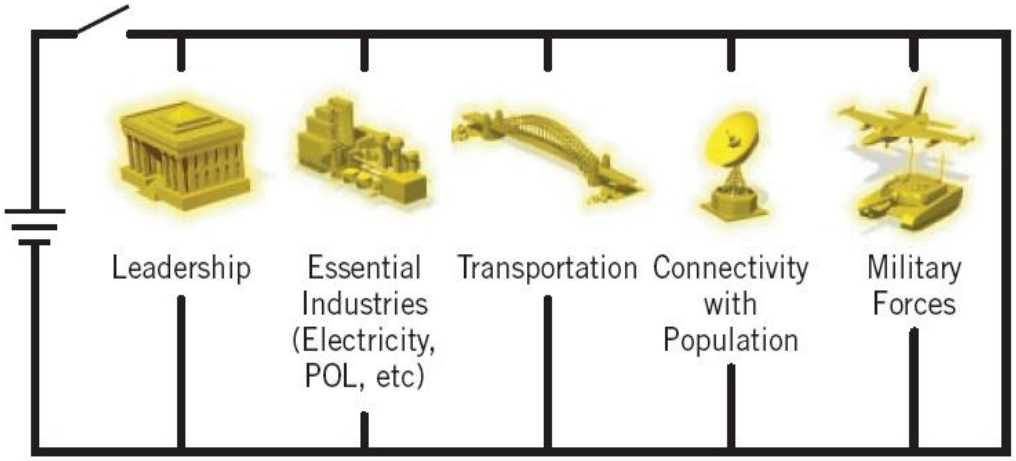

Figure-7: Parallel Warfare – Simultaneous Attacks against all vital Enemy Systems

Effect Base Operation (EBO).

40. Centuries of surface warfare created the common view that the intrinsic purpose of military force is the destruction of an enemy's military force. However, in Gulf War, specific air operations were planned to achieve certain desired effect, not the destruction. Applying this principle of EBO, the main purpose of the air campaign was to control rather than destroy an opponent's ability to act. For example, during the Gulf War, Iraq was able to launch individual aircraft sorties. However, as Iraq's air defence system was rendered ineffective by coalition operations, individual aircraft sorties flown were of negligible consequence. So, the aim of attaining the control of the air was achieved, even without the annihilation of the Iraqi Air Force. As a result, coalition air assets could be utilized effectively in some other operations to achieve a separate effect.

Coalition Tactics

41. **Medium and High Altitude Attacks**. During the first 05 days of the war, coalition aircraft losses to Iraqi surface to air weapons were 6.2 per day. Initially the attrition rate was high due to the coalition's tactics of flying at low altitude where AAA and portable IR SAMs were quite effective. Coalition air forces quickly changed their attack tactics from low level to high or medium level and the loss rate reduced to 1.5 for the remaining 38 days. Effective SEAD missions and a change in tactics effectively reduced the attrition rate to 1.7 aircraft per 1,000 sorties. If the aircraft attrition rate for the first 05 days had continued throughout the war, a total of about 267 coalition aircraft would have been lost. However, due to effective measures, coalition attrition was reduced to only 38.

42. **F-117 and Non-stealth Mix**. In addition to the F-117's low radar signature, Gulf War planners and tacticians used the presence of additional aircraft providing radar targets in the same general airspace to further reduce the possibility of detection.

This enhancement to low observability was partly technological, partly physiological, and partly psychological. Most current-generation radars, particularly airborne radars, have computer-generated displays that clean up the scope by removing clutter and false returns from the visual scope display through various analytical algorithms. The algorithms are highly effective in increasing display clarity, but they tend to eliminate precisely the kinds of weak and ambiguous returns a stealthy platform produces. Bypassing the computer-generated display and reverting to raw return would increase the chances of painting a low observable target such as the F-117 on the scope, but would also reintroduce clutter and increase the number of false returns.

43. **Kill Boxes**. Kill boxes were the areas where the RG and other Iraqi troops were dug in. It was a 30 mile square in the KTO in which autonomous strike operations were conducted. The squares were subdivided further into four 15 mile squares and became the operating areas for attacking aircraft. Sometimes the aircraft flight had a designated target within the kill box; at other times the aircraft flight was left to find the most appropriate target within the area. Approximately 78 million pounds of unguided bombs were delivered against ground targets located in kill boxes by F-16 and B-52.

Iraqi Tactics

44. During the Gulf War, Iraq effectively used the tactics of deception, camouflage and concealment to minimize the effect of hostile air attacks. One method they used to safeguard the Scuds was to park the missile system under a highway viaduct. They could pull the missile out, launch it, and then return the transporter-erector-launcher (TEL) to the safety of the viaduct in less than five minutes, less time than coalition aircraft needed to target the position. In some cases, ammunition and weapons stocks were moved from known storage areas to holes dug in the middle of empty fields for burial or covering with nets. In KTO, tanks were dispersed, but as the air strikes continued, more and more Iraqi tanks were camouflaged, buried with sandbags, or covered with camouflage nets.

45. As the war progressed, Iraq developed new tactics to safeguard its assets from hostile air attack. When coalition forces started destroying Iraqi aircraft inside HAS, Iraq dispersed its aircraft to unsuspected places such as along-side highway and in the residential areas. Moreover, Iraq also dispersed almost 121 fighters to Iran with an aim to preserve these aircraft for future use. Besides, Iraq also developed a new tactics of employing its AAA batteries. During enemy raids, Iraqi AAA batteries did not try to track and shoot down a plane. Instead all guns in a battery set up a wall of fire in their sector and let the plane run into it.

Technologies

46. Coalition's success in Gulf War was largely contributed by their overwhelming superiority in modern technologies. A few of the technologies those were used in Gulf War are as following:

a. **Stealth**. F-117 stealth or the "Black Jet," represented the single greatest technological advancement in Desert Storm. The tactical effectiveness of the F-117 rested on four pillars; the extremely low radar signature of the aircraft, the capabilities of the mission planning computer Elvira, effectiveness of the IR target acquisition and laser designator system, and finally, the skill and training level of the pilots. Representing 15.7 per cent of coalition's air asset, F-117s attacked 31 per cent of strategic targets during desert storm. As F-117s could attack with much less support than conventional bombers, they were credited with being "force multipliers", allowing a more efficient use of conventional attack and support assets.

b. **JSTARS**. The E-8 JSTARS were introduced for the first time in Gulf War. JSTARS is a reconnaissance and targeting platform for engaging ground targets. While still in testing phase, JSTARS flew their first operational mission during Desert Storm. Two E-8s employed for Desert Storm, flew alternately in every night and detected virtually anything that moved on ground. In few occasions, JSTARS also performed the function of C2 platform.

c. **PGM**. During Gulf War, 08 Per Cent of the munitions used were PGM. Out of the 17,000 PGMs expended in Gulf War, 9342 were LGBs, 5448 were ASMs, 2039 were ARMs and 333 were cruise missiles. Use of PGM was quite effective in reducing collateral damages, especially while attacking targets around the crowded area of Baghdad. Moreover, Iraq's hardened bunkers and aircraft shelters were only vulnerable to PGMs like F-117's GBU-27 LGBs. However, although only 08 percent of the munitions used against planned targets were PGMs, they represented approximately 84 percent of the total cost of munitions used in air campaign.

d. **Air to Air Refueling**. Although air to air refueling technology was used well before World War II, it played a very important role in Gulf War. During the Gulf crisis, some aircraft required as many as 17 refuelings to deploy from the United States to the Gulf region. During the war, Air Force tankers alone flew almost 17,000 sorties with 275 sorties per day. Nearly 60 percent of the wartime sorties by aircraft capable of being refueled in the air actually required tanker support. The distances between coalition air bases and targets meant that aircraft attacking deep into Iraq frequently had to refuel at least twice, once en route to the target and again on the return to home base. In some cases, refueling was conducted over Iraqi territory, an indication of the extent to which

the coalition controlled the air. Figure-8 depicts the contribution made by air to air refueling technology during Gulf War:

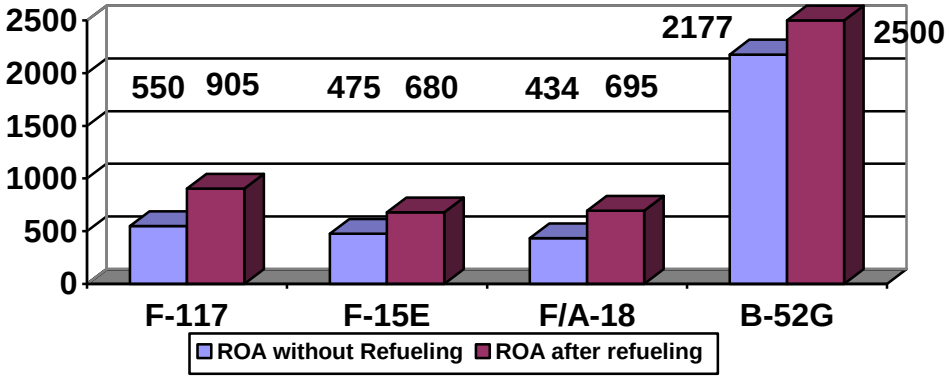

Figure-8: Contribution of Air Refueling

Coalition Air Power Analysis

47. **Strategic Objectives**. Strategic targets of Iraq were categorised in 12 different categories during the campaign planning. These 12 categories of targets are given at Annex L. From the very onset of the war, air power was applied against all 12 sets of targets. The outcome of application of air power against these targets is as following:

a. **Leadership and C3**. Post war analysis reveals that 57 percent of the C3 category and 52 percent of the GVC were destroyed. However, even with that amount of damage, it was very difficult to disrupt the C3. Moreover, the air campaign against the Iraqi leadership did not cause the regime to collapse and thereby, preclude the need for a ground offensive.

b. **Oil and Electricity**. Air Strikes destroyed 38 and 57 per cent of the oil and electric facility targets respectively. However, this destruction did not succeed in weakening popular support for the regime, as hoped by air war planners. Air strikes reduced Iraqi electricity generation to 1,000 megawatts, or about 15 percent of pre-war capability. Yet, leaders of Iraq did not sue for peace. With regard to oil, about 20 percent of the refined product storage capacity was destroyed, perhaps because fewer than 400 sorties struck these facilities. These attacks on oil had no significant military impact on Iraqi ground forces because Iraqi units had sufficient stocks to last for weeks, if not months.

48. **Control of the Air**. Coalition forces rapidly achieved and maintained air supremacy through effective application of air power. However, coalition aircraft were never safe from AAA or shoulder mounted IR SAMs while flying at either low or medium altitude at any time during the conflict. While the Iraqi air force never posed a serious threat to a qualitatively and quantitatively superior coalition force, more than enough of it survived to remain a regional threat. Similarly, coalition aircraft were not able to

defeat the AAA or portable IR SAM threats because of the very large number of these systems and the difficulty in finding such small, mobile, non-emitting systems. Moreover, although radar-guided SAMs accounted for almost no damage or losses after the first week of the air war, the number of launches remained quite substantial. About 151 SAMs were launched in the last 08 days of the air war claiming 02 coalition aircraft. Eleven coalition aircraft were shot down in the last 03 days of the war, almost all at low altitudes from AAA or IR SAMs. Out of a total 86 coalition aircraft lost or damaged during the war, 21 losses (25 percent) occurred in the last 7 days, long after air supremacy had been declared.

49. **SCUD Hunt**. Post war analysis reveals that coalition forces did not have the combination of real-time detection and prosecution required to hit portable launchers before they moved from their launch points. There is no confirming evidence that any mobile Scud launchers were destroyed. In 42 instances, F-15s on Scud-hunting missions were directed to an area from which a Scud had been launched but prosecuted only 08 to the point of delivering ordnance. However, the anti-Scud campaign could actually suppress the number of launches after the initial 10 days of the war. Data to support the deterrent effect of the Scud-hunting campaign are also weak because anti Scud missions did not have any direct bearing on the rate of firings.

Weaknesses of Coalition

50. **BDA**. During Gulf War, BDA was criticised to be too slow and inadequate. The lack of sufficient or timely intelligence to conduct BDA led to the additional costs and risks stemming from unnecessary re-striking. For example, BDA was performed on only 41 percent of the strategic targets and re-strikes were ordered to increase the probability of achieving the objectives. The problems of BDA were caused by a number of factors like absence of an organizational structure, procedural problems and non availability of adequate sensors. To improve the situation, CENTCOM developed a BDA methodology to incorporate all available sources. CENTCOM BDA coupled information from national systems, mission reports, deserter reports, and gun camera film with subjective analysis and sound military judgment to determine to what degree an objective had been achieved. However, despite these efforts, BDA continued to be a lengthy and problematic process through out the war.

51. **ATO Process**. The process of preparation and dissemination of ATO was a cumbersome task. For planners, generally it took 76 hours to prepare an ATO. However, the main problem with the ATO was its transmission. During the war, the computer network was so much bottlenecked that transmission and printing of an ATO took as much as 05 hours in many units. Transmission of ATO to navy was even more problematic because naval network was not compatible with the one in Air Force. The Navy ultimately found the best way to distribute the final ATO to the carriers was to use an S-3 aircraft. The number of amendments made to an ATO, average being 500, was also a problem for the operators. However, the US was aware of these problems and as such, by the time 2nd Gulf War commenced, all these problems were overcome. In

2nd Gulf War, ATO preparation and dissemination procedure was significantly simplified with the introduction of drag and drop based MAAP software toolkit.

Weaknesses of Iraq

52. **Defensive Doctrine**. During the war, Iraq barely used its Air Force to its full potential. If the Iraqis performed up to the standards of their equipment, they had the potential to give any opponent a tough fight. However, the impressive numbers and capabilities disguised serious deficiencies. The major deficiency of Iraq was rooted in its concept of defensive use of air power. Following the Soviet doctrine, Iraq mainly relied on utilising air power as a fire support to the surface forces and not as an offensive strategic force. Following the Soviet technique, Iraqi fighters were totally depended on ground controlled radars. Once the radar and other communication network were knocked out by the coalitions, capable fighters like MiG-29 were of no use. Although they developed a few of the 'state of the art' passive defence measures like HAS and bunkers, these were never enough against the world's strongest adversary. Despite having a good number of ground attack aircraft like Jaguar and Mirage F1, IQAF never capitalized the reach and firepower of the air power. Iraq hoped that the air war would be short and when ground war would start, they would defeat the coalition ground forces at ease. Iraq inherited such flawed strategy from their experiences of eight years war with Iran. Iran's strength in air power was similar to that of Iraq but this time they were fighting against the most powerful air power of the world. A change in strategy was essential which Iraqis did not. The concept of the control of the air' was probably totally unknown to the highest political and military leaders of Iraq. It is also evident from the remarks of Saddam Hussein before the war "*The United States* depends on the air force. The air force has never decided a war in the history of wars. The United States may be able to destroy cities, factories and to kill, but it will not be able to decide the war with the air force".

Analysis of Air Power

53. **Centralized Control and Decentralized Execution**. Air power assets of coalition forces were centrally controlled and planned by JFACC but its execution was left on the individual units. As a result, objective achieved after each individual sortie contributed towards achieving the strategic aim of the campaign. On the contrary, Iraq used her air power on piecemeal basis resulting in dissipation of effort and no contribution towards the attainment of the political aim.

54. **Priority**. Coalition Air Forces prioritised the targets in support of the objectives through out the campaign. For example, during the campaign, when mobile scuds became a potent threat, they gave reasonable priority to Anti-Scud missions and diverted F-15Es to perform these missions. On the contrary, Iraq even did not utilize her air power to its potential, let alone the application of 'priority'.

55. **Synergy**. Coalition forces employed its air power synergistically to achieve both tactical and strategic objectives. For example, while F-117s were attacking the key strategic targets in Baghdad, B-52s kept on bombing the Iraqi troops in KTO. As a result, coalition ground forces took only 100 hours to evict Iraqis from Kuwait. On the contrary, during their limited use of air power Iraqis failed to use their air power synergistically.

Lessons Learnt

56. The lessons derived from the war are as following:

a. Parallel warfare will form the basis of all modern air war in future, especially when strong air forces (e.g. USAF) are involved in war.

b. Application of air power in future wars will mainly concentrate on creating desired effects and not destruction.

c. Technology will play a vital role in application of air power in future wars.

d. 'Centralize Command and Decentralize Execution' will continue to be an essential C2 philosophy of air power to achieve unity of action and economy of effort.

e. Timely battlefield intelligence (BDA) capability is essential to ensure economic use of limited air assets.

f. Increased dependence on technology will necessitate excellence in electronic warfare.

g. True potential of air power lies in its offensive use.

h. Defensive employment of air power is not likely to be a winning option.

j. SAM and AAAs will continue to be a threat to aircraft.

k. Air power assets cannot avert destruction even when placed under the best of the PAD measures.

Conclusion

57. Gulf War-1991 was a milestone in the history of air power. For the first time in the history, air power was utilized to exploit its full potential and played a decisive role in the outcome of the war. Gulf War-1991 also witnessed the other extreme of the usage of air power. Despite having a capable Air Force, Iraq's strategy of 'saving the air assets for tomorrow's use' was a hallmark of failure.

58. The achievement of air power in Gulf War-1991 was manifold. For the first time, air power was handled maturely and the outcome was decisive. Air power with its inherent characteristics of height, speed and reach coupled with tremendous advancement in technology will continue to play a vital role in all future wars. Trends suggest that the employment and exploitation of air power are likely to be the determinant of success in future wars.