



**CHALLENGES TO AIRPOWER IN THE  
FUTURE AND  
FORCE RESTRUCTURING OF THE IAF**

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**Declaration by the Guide**

This is to certify that the Lt Col Sarvesh Sharma a student of MBA in Aviation Management, SAP ID 500066080 of UPES has successfully completed this dissertation report on **"CHALLENGES TO AIRPOWER IN THE FUTURE AND FORCE RESTRUCTURING OF THE IAF"** under my supervision.

Further, I certify that the work is based on the investigation made, data collected and analysed by him and it has not been submitted in any other University or Institution for award of any degree. In my opinion it is fully adequate, in scope and utility, as a dissertation towards partial fulfilment for the award of degree of MBA.

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## EXECUTIVE SUMMARY

This dissertation researched challenging to air power in future and force structuring of the Indian Air Force. The security challenges to India will undoubtedly become more formidable in future and air power will play a key role in any future conflict. India will thus have no option but to build up her conventional air power capability. Future wars will be characterised by restricted political goals that will further reduce the margin of error. Our adversaries may then indulge in 'salami slicing' and force us to accept the changed status quo simply because we failed to respond to the challenge in time. What then can air power do? With its ability to proactively or reactively deliver a truly devastating punch by keep the enemy air forces down and shape the battlefield for a swift and decisive ground offensive, break the enemy's will to fight and achieve the desired "End State".

2. The threat perceptions meanwhile, have moved to the nuclear and the low intensity conflict ends of warfare. India has pumped resources into areas where the enemy was not and thereby missed a golden opportunity to become a global frontrunner in several fields<sup>1</sup>. Smaller aircraft, Unmanned Aerial Vehicles (UAV), low cost precision guided munitions like the ones used in Kargil conflict are all necessities for today's Indian Air Force and requires to be given more attention

3. Since independence, the Indian Government has taken several initiatives for better management of the defence forces. Notable among them is the Arun Singh Committee on Defence Expenditure (CDE) in the early 80s. This suggested radical restructuring at the highest level of national security planning, such as integration of service headquarters and Ministry of Defence and a systematic approach to defence allocations<sup>2</sup>. But all this has not been implemented so far. Jointmanship in various areas

like intelligence, integrated command structure, and logistics is the need of the hour and indeed an absolute must in the coming years.

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4. Manpower is another area, which has not been given the due attention that it deserves. This has not only led to noticeable reduction in morale, but has prevented the young men of this country from taking up the noble profession of arms. Here also, optimum utilisation of available resources and a reduction in certain areas could alter the situation dramatically. Lateral induction into the allied services in the civil sector, civilianisation of defence related support functions could all lead to huge savings translating into better living conditions and improving quality of life.

5. The trend in restructuring is a world-wide phenomenon. The Canadian forces model calls for reductions in personnel levels, which could be regarded as unavoidable in the current political climate in the western world: the strategy is to create "a smaller, but better equipped and more flexible armed forces"<sup>3</sup>. Australia has set the downsizing process in motion and actually implemented these features on ground. All North Atlantic Treaty Organisation countries and the United States of America have resorted to downsizing after the collapse of Russia. China too is restructuring its armed forces.

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**CHAPTER-I**  
**INRODUCTION**

***“If we lose the war in the air, we lose the war and we lose it very quickly”.***

**- ANON**

**Overview**

1. The security challenges to India will undoubtedly become more formidable in future and air power will play a key role in any future conflict. India will thus have no option but to build up her conventional air power capability. Future wars will be characterised by restricted political goals that will further reduce the margin of error. Our adversaries may then indulge in 'salami slicing' and force us to accept the changed status quo simply because we failed to respond to the challenge in time. What then can air power do? With it's ability to proactively or reactively deliver a truly devastating punch by keep the enemy air forces down and shape the battlefield for a swift and decisive ground offensive, break the enemy's will to fight and achieve the desired "End State" .

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<sup>4</sup> Saighal Vinod (Maj. Gen.), Restructuring the armed forces, USI Journal, VOL CXXVII, No 529, Jul-Sep97, p330

Committee on Defence Expenditure (CDE) in the early 80s. This suggested radical restructuring at the highest level of national security planning, such as integration of service headquarters and Ministry of Defence and a systematic approach to defence allocations<sup>5</sup>. But all this has not been implemented so far. Jointmanship in various areas like intelligence, integrated command structure, and logistics is the need of the hour and indeed an absolute must in the coming years.

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## **METHODOLOGY**

### **Statement of the Problem.**

6. Air Power will be the dominating force in any future war. This study is to examine whether the IAF is adequately structured to face these future challenges and if not what is the force structure required to meet these challenges.

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<sup>2</sup> Lt Gen. YN Sharma, Restructuring the armed forces, Defence Management, Vol.24, No2, Oct-Apr97-98, p7

<sup>6</sup> Marcel Masse, National Defence Minister, The future structure of the Canadian Forces, Military Technology, Vol. XV, No12, Dec91, p44



### **Justification for The Study.**

7. Presently, Indian air power is poised at a very critical juncture. Majority of its aircraft and equipment are technologies of the previous decades, and are reaching obsolescence. The Indian indigenous R & D effort has been striving to keep pace with the rapid strides being made in military aviation and the fields revolutionising warfare. 21<sup>st</sup> century has also witnessed the astronomical growth in avionics, computers and information technology. Leading analysts have rightly identified a 'Revolution in Military Technical Affairs' which needs to be exploited by any progressive nation.

8. With a fledgling force of six officers, sixteen men and four aircraft, the Royal Indian Air Force was born on 04 Apr 1933, at Drigh Road Karachi. Today, after 71 years, the Indian Air Force has grown from strength to strength and is the fourth largest air force in the world. On its payrolls are about 1,67,052 officers Airmen, civilians and Non Combatants (Enrolled). On its inventory are about 1200 planes; some state of the art, some old and obsolete. The Indian Air Force has in its inventory, equipment from Russia as well as the west, both of which adopt a different and sometimes totally opposite *raison d'être* of employment of these weapon systems. As a result, the Indian Air Force is today an assortment of numerous types and versions of aircraft with the consequential, stupendous problems of operationalisation, training, maintenance and logistics. It is time we took stock of our capabilities, weaknesses and strengths, opportunities and threats and decide on a new course. There is therefore, an urgent need for the Indian Air Force to take stock, prioritise the challenges, and responses. It has to devise a general strategy to deal with them within the available resources. Ways and means will have to be devised to strengthen the clout and operational effectiveness.

### **Scope.**

9. Air warfare is likely to involve dense electronic combat, increasingly smart Air to Ground weapons, increasingly effective surface to air defences, long range air-to-air weapons, mobile ground targets, concealed targets, widespread use of decoys and deception; all in a rapidly fluctuating operational environment. Concept of multi-

tiered defence/offence will be applied, involving more and more space applications. Air Power will continue to be decisively influenced by technology. Technology will continue to offer higher levels of performance and new capabilities. The gap between what is possible and what can be afforded will increase and, therefore, the fundamental restraint will remain financial. The interval between the introductions of completely new weapon systems will increase. Technical obsolescence will be a growing problem.

10. Success in the 21st century conventional war would be in possessing strategic capabilities, higher technological levels, missiles, satellites, modern inter-service-patched command, control, communications, computers, intelligence and interoperability systems. For greater combat effectiveness potential, state-of-the-art reconnaissance, intelligence, surveillance, target acquisition (RISTA) capabilities and domination offered by technology –intensive force multipliers are considered mandatory needs. We, therefore, need to understand the technology driven changes and evolve doctrinal precepts to meet the challenges of warfare in the next century. Although technology is making great advances, human beings remain the most effective systems of determining relevance and fusing information. Technology will aid us in many ways, especially in helping offset reductions in size, but technology will not solve all the problems associated with war. Conduct of war requires both science and art.

11. Good leadership, quality men, cohesive units and streamlined organisation, are absolutely necessary. Acquisition per-se will never meet the final requirements unless human factors are considered. In the entire gamut of Air Power, whether in the past or in the future “man in the loop” gives stability. To this end, training will be the key factor. Our investment today will ensure optimal utilisation of the high tech assets of 2020 and thereafter.

12. Therefore, the scope of this study is to analyse the strengths and weakness of the IAF as of today, it's capability to undertake **effect based operations** in any future conflict and be able to win. The study will also address the aspect of impact of modern technologies and their adoption in our AF to lend credibility to the force in being. The study will examine the existing force structure and the need to review the same catering for future requirements of war fighting.

**Chapterisation.**

13. The study would be divided into the following chapters -

- (a) Introduction.
- (b) Nature of future conflicts and threats to India.
- (c) The existing force structure of the IAF.
- (d) A vision for the future.
- (e) Recommendations.
- (f) Conclusion.

## CHAPTER – II

### NATURE OF FUTURE CONFLICTS AND THREATS TO INDIA

#### NATURE OF WAR

14. Various experts have conceptualised the nature of war in the future. Visions of space based interceptors, laser weapons, particle beam weapons, non-lethal technologies, unmanned bombers, space-based radars, information warfare, info denial, disinformation, psy-ops, economic warfare, LICO, bunker busters and such sophisticated doctrines, technologies and weapons are often mentioned. However, these are maximalist scenarios and we need to see as to whether and to what extent, such a state of affairs would apply in our immediate neighbourhood. Clearly, our environment would be more benign.

15. Pakistan would continue to be increasingly a rogue state, on the verge of bankruptcy, engaged in the ongoing proxy war with India. As regards China, while there is a considerable economic connection with the Western world at stake, their geostrategic relationship will continue to be uncomfortable. Already there are voices in the Western world seeking engagement of India as a counter to the growing military might of China. The Chinese too see themselves as the rulers of the middle kingdom and therefore, rulers of this part of the world. Consequently, if we do not display global ambitions of the kind that would upset the apple cart of major powers, we should find an increasingly responsive audience in the world in our struggle for elbowroom against Pakistan and China. However, this cannot be a great matter of solace for us because of the inherent conflict between the Western commercial and strategic interests in China's case. China is likely to be able to continue to exploit the economic leverage with the Western world for the foreseeable future, just as she has done so successfully in the past.

16. Nevertheless, technological levels of warfare wielded by our adversaries are not likely to be of world class. In the case of China, it may be a generation or two less, and in the case of Pakistan a generation less than what

China can wield. Technologically, India is not far behind these two countries in the equipment that is already deployed. Indeed there are large areas of our technological superiority already evident. There are indicators that the level of technology held by us is likely to get even better. One may mention the induction of UAVs, AWACS. Aero-stats, Project Diamond-ICCS, SAR, LCA, ALH and satellite technology. It is true that the Chinese are also making advances in these fields. However the technology denial regimes are likely to keep China's ambition under a modicum of check. Therefore, the technology gap should not be something too far beyond our reach to bridge. The rider is that the nation must continue to spend adequate amounts of money in this area. However, the level of technology in our region would continue to rise to the extent that war will become more "intelligent", requiring real-time operating systems and sensors for intelligence, surveillance, C4I2, mission tasking, Air Defence etc. These are the areas that we need to address more vigorously.

## **THREAT ANALYSIS**

17. Threat perceptions of a nation are based on two factors: -

- (a) Military Capabilities of a nation.
- (b) Intentions.

18. National security in the modern concept encompasses not just military but also economic, geopolitical and ethnic matters, even religious fundamentalism. While considering the future threats, therefore, all these aspects have to be taken into account and a course of action planned to ensure to the extent possible that such challenges do not transform into threats. Where this is not possible, the nation has to be prepared for a likely military confrontation. The aggregate of all such assessments provides the basis for a long-term national security perspective, its objectives and the possible methods of achieving them.

19. There is a tendency at the national level to downplay the threats to national security. While India may not be in a position to match the outlays of its potential adversaries, there is a threshold below which India cannot “ever” afford to go unless it wishes to jeopardise its security. Not playing heed to one’s security needs is a cardinal sin, which no nation can afford to commit. India does not have to wage war against any one. The only credible way to ensure that war does not take place is to make it clear to potential adversaries that the country has the wherewithal and the “will” to inflict irreparable retaliatory damage.

### **Threat From Pakistan.**

20. Pakistan has consistently been most unpredictable and continues to be so. It has also been most irresponsible as was displayed in Kargil where she embarked on a military disaster abinitio defying all tenets of warfare. Pakistan’s inadequate economy infirms her from matching India. She will continue to be dependent on her nuclear blackmail bogey to make the world to pay a princely ransom. Kashmir would continue to be centric to her interests and freedom fighters would resurrect like phoenixes to bleed India white even in areas outside Kashmir. Concurrently, Pakistan would depend upon China for modernization of her armed forces, which would also be to China’s advantage. In the event of a conventional war, Pakistan would capitalize on India’s slow process of mobilization of land forces and the international community’s intervention to halt the war in about three weeks. Beyond this time frame, Pakistan would collapse because of her economic bankruptcy and lack of strategic depth.

21. However the conventional threat from Pakistan across the accepted international borders has considerably reduced after both India & Pakistan have acquired the status of nuclear powers. There is a danger of the conventional conflict escalating in to nuclear exchange. Therefore, it is most unlikely that Pakistan will take the initiative and attack India conventionally because it would be a misadventure and an attempt to cease her very existence in the backdrop of nuclear exchange.

22. Pakistan has so far shown negative approach towards solving the long pending dispute by peaceful dialogue. The Kashmir issue is getting more complex by the day on account of the extensive support extended to the terrorist's activities by Pakistan. This is likely to continue for long. Therefore, in the immediate and middle future, a conventional war by Pakistan can be ruled out, however, an escalation in the proxy war or the low intensity conflict coupled with acts of terrorism in J & K and in other parts of the Country is more than certain. mercy of China's goodwill. The primary adversary of India is and has always been Pakistan. This force, though potent, has not procured any new combat aircraft since F-16s in 1984. Attempts to expand this fleet had been blocked by the Pressler Amendment and the situation is likely to remain status quo for quite some time. The Pak missile programme is however, progressing rapidly and is likely to play a significant role in future conflicts. 'Kashmir' continues to be the bone of contention between both countries. In spite of numerous attempts at diplomatic levels and even after Indian Prime Minister's Bus Journey to Lahore, the progress made in improving the relations is insignificant. Pakistan belied all the trust by its intrusion in to Kargil, where in India gave a befitting reply. In Pakistan, the military hierarchy under siege must "never" be allowed to harbour any illusions that it would be allowed to get away with adventurism.<sup>7</sup>

### **Threat From China.**

23. Chinese strategy emphasis on surprise as has been repeatedly displayed in conflicts she has been engaged in recent times. China's peace oriented overtures are backed up by the sound doctrine of Pre-Exemption and Surprise, embodying surprise, deception and shock effect. This has been the modus- operendi in all her military and political actions.

24. Militarily China has already advanced into RMA with technology and tactics governing aspects of command control, communication, computers, intelligence

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<sup>7</sup> Maj Gen Vinod Saighal (Retd), USI Journal Vol CXXVII, No 529, Jul-Sep 97, P-334.

information surveillance and reconnaissance (ISR), joint services and combined arms operations. Special emphasis for the Chinese has been an air and air defence operations, electronic and information warfare, and long-range precision strikes. India cannot afford to be complacent given the Chinese policy of deception and deflection. The overall modernization of China's Armed Forces is ominous not only along the Tibetan border but also along our sea interests including the Andamans.

25. While the Chinese military build up may continue unabated, however, it is appreciated that a military intervention by China in the immediate future is unlikely. The Chinese would more likely pursue a policy of coercive diplomacy and continue to negotiate to settle the border issue. China has repeatedly stated that the border dispute settlement should be based on mutual understanding and mutual accommodation.

26. In the light of foregoing, it may be assessed that the current status of Indo-China relations would not drastically change in the near future for better or for worse and a military conflict between the two Nations is quite unlikely. However, the preparations for a future battle must take in to account the military might of China in so far as it affects the Indian sub continent.

### **Threat From Other Neighbours.**

27. India's other neighbours do not yet hold out a conventional military threat, but anti-India sentiments are rife. Serious problems are being created and exacerbated by the prevalent situations in some states. The Myanmar drug connection and free trans-border movement of various militant groups has severely fractured East Indian States and enabled the establishment of a parallel government in Nagaland. Bangladesh refugees have created societal problems in areas as diverse as Assam, Delhi and Bombay. The reverberations of the Sri Lankan conflict are felt in Tamil Nadu, and other contiguous states. However, if India can stave off the major



adversaries in conventional military terms, it would also be able to handle these smaller military challenges.<sup>8</sup>

### **Objectives of War**

28. The objectives of war in the Indo-Pak context remain largely territorial. In the case of China, while there are large tracts of Indian territory under Chinese occupation, even the 1962 war was, in hindsight, less about territory and more about power projection. Given the nature of terrain along the Sino-Indian borders, the nature of war or conflict between these two adversaries is likely to be more about power projection or geo-political ascendancy, than about capture of chunks of territory. Pakistan's objectives of war are more difficult to define simply because Pakistan's ambitions far out reach her intrinsic capabilities. Even the Indian objectives in war against Pakistan are somewhat unclear. While there are Parliamentary resolutions in place which mandate the Govt to secure the return of Pak occupied territories, our record of the past in returning to Pakistan (after the 1965 and 1971 wars) territories claimed by us and the recent international opinion calling for respect for LOC would probably imply just a holding action. This automatically leaves the initiative on war with the adversary. This situation does not suit the Air Force very well. Thus the nature of war in the Indo-Pak context becomes a little fuzzy, in the absence of clearly defined objectives. Op Vijay was a war in many ways. Even so, the political restraint on the armed forces not to cross the LOC automatically circumscribed the nature of war itself to a holding action along the LOC. Thus, if the political directions remain the same, India would be unable to fight a war with Pakistan on its own terms and with the aim of attaining its defined and logical objectives. This needs to be considered and debated at the appropriate levels of decision making. It may seem that this is a political issue best left to the politicians. However, it does impinge directly upon the nature of warfare expected with Pakistan and about how and where to engage her. One might suggest there is a case here for the military to suggest to the nation alternative strategies and postures more appropriate to application of military power in pursuit of national objectives.

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<sup>8</sup> SP Tyagi and Sharat Dixit, An IAF for the future: some considerations Part I, Strategic Analysis Nov 97, p-1203.

### **The Nuclear Dimension**

29. The nuclear dimension needs to be reflected upon. Musharaff's belief that her declared nuclear parity had rendered India's conventional superiority irrelevant itself became irrelevant after Kargil. Indeed it took all of USA's Machiavellian manipulations to save Pakistan from military and economic rout by ensuring that India did not cross the LOC. The masterly manoeuvring, interestingly also left India feeling indebted to the USA for its intervention. Our belief is that it would take a considerable extent of fighting accompanied by serious loss of territory and face on the part of Pakistan before she can seriously contemplate employing nuclear weapons, provided that we have a credible and transparent capability to ensure that should Pakistan go nuclear in war, then Pakistan as is known, would cease to exist as a consequence of India's retaliation. The Chinese role in such a scenario is not likely to be extremely mature or helpful. She would probably encourage Pakistan to do something stupid so as to pick up pieces after the dust settles down.

### **Likely Duration of War**

30. The expected duration of war has often been an issue of discussion. The general consensus of opinion seems to be that the war shall be short and intense aimed at attaining the best bargaining position. However, not too long ago Iran and Iraq were engaged in their ten years of bloody war, fighting in and around Ethiopia, Rwanda-Burundi, Congo. former Yugoslavia etc has continued for several years. Perhaps it is only a fond belief that any future war between India and Pakistan, war between India and China would be a brief and bloody. This could as well be long and bloody and we need to realise that international opinion and resolutions are not to bound to put an immediate stop to fighting, even though sanctions would hurt everybody. Though it is probable that the war may not last for as long as sixty days simply because both sides would run out of steam, three, four or five week war is not beyond the realm of possibility. It is also fact that in the fourth week of war, the country with larger staying power would be able to pursue war more vigorously and may come out ahead.

31. In the emerging multi-polar world order, India stands firmly, strong and independent of any dependence or unwarranted alignment with existing super power or future super power. India's position can also be described non-pariel global strategic status. It is not a great power, yet it is not just another ordinary regional pretender. Population, size, economic and technical base, emerging global business engagement, cartographic position and military strength, impel India upfront in the international geo-political scenario. The ugly stability that prevails in the neighborhood, namely, the proxy war waged by Pakistan and the Line of Actual Control dispute raised by China is a reason good enough for India to be on a high alert round the year. In this competitive vignette, Pakistan and China continue to be a threat.

32. In such a threat scenario, the range of military operations could span a conflict spectrum from low intensity as is current, to high intensity or limited objective war in a particular theater such as Kashmir or Arunachal Pradesh. Therefore, security concerns for India cannot be mundane. The threat perception has become more complex with the introduction of nuclear weapons in the South Asian region. The strategic security scenario is greatly influenced by China, India & Pakistan all three nuclear powers in their own way. The analysis of the external threat would thus bring out the following pertinent

issues: -

(a) A conventional war by China or by Pakistan, in the immediate future is most unlikely.

(b) While the Eastern and North Eastern borders would continue to remain quiet/dormant, the situation along the Western and North Western border/LOC may further deteriorate with large scale infiltration, escalation in violence and spread of terrorism.

33. In order to counter the above mentioned challenges in future battle scenario, the emphasis would be to deliver a swift and lethal blow in the shortest possible time frame to achieve the desired result at a given location and time.

## CHAPTER - III

### EXISTING FORCE STRUCTURE

34. The Indian Air Force today is an assortment of numerous types and versions of aircraft with the consequential and stupendous problems of operationalisation, training, maintenance and logistics. India has been criticised, and perhaps rightly so, for its lack of strategic thinking and long term threat assessment, adhoc planning and “knee-jerk” arms acquisitions.<sup>9</sup> The present Chief of Air Staff has emphasised the need for joint policy, planning and training between the three services.<sup>10</sup> About IAF, his remarks included: -

(a) That it has an inventory of different types of aircraft with different country of origins and is struggling under the sheer task of maintaining them.

(b) Adding another breed of aircraft will increase operational, training, maintenance, spares and logistics problems. This adding another type of aircraft in a “penny-packet” to the existing multiple “penny-packets” will be operationally self-defeating. The aim should now be to standardise (if possible on an inter-service basis) and gradually reduce the variety of types.

35. Advocating urgent reviews of the Indian Air Force’s *raison de’etre*, changing roles in the coming decades, adoption to geo-political realities and above all, force restructuring. The overwhelming advances in aerospace technology are only matched by the overwhelming costs of its acquisition and operation and no air arm in the world can continue with the force levels, which peaked in the 80s. However, with judicious and rational planning, great advantage can be taken of the new generation

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<sup>9</sup> . *Alternate approaches & Strategies* – Rawat Publications, Jaipur 1996, pp103-46.

<sup>10</sup> Amit Gupta, *India – Defence Force, Determining India’s Force Structure*, Asian Survey, Vol XXXV, No5, May 1995, pp-441-443.

of multi-role aircraft, smart weapons and electronic wizardry. A leaner IAF can be that much more meaner.<sup>11</sup>

36. In the wake of the 1962 Sino-Indian Conflict, the Indian Armed Forces went in for a large-scale expansion. As a part of this process, the IAF was to be built up to a force comprising 45 combat Squadrons as well as proportional supporting elements.

37. At present, the Indian Air Force consists of total 78 Sqns. The composition of various ac fleets is as given below: -

(a)	Fighter ac	-	43 Sqns.
(b)	Transport ac	-	17 Sqns.
(c)	Helicopters	-	18 Sqns

38. The figure of 43 Sqns of combat ac is somewhat misleading. The actual availability of ac, aircrew, spares, tech personnel and such essentials is largely low; this is a well – known fact. The figure of establishment in terms of ac and personnel has been replaced but the 'To Be Maintained' (TBM) has been in the reduction mode throughout these years.

39. The current authorised force strength of IAF is 35 combat squadrons plus 10 transport squadrons although some inter change between the numbers for the two streams is "permissible". The Tata Committee recommended the enhancement from the pre-1962, 15 – Squadron force to a 35 Squadron force in 1969-70, which was to be a step-by-step expansion. The IAF itself agreed to stabilise this at 45 squadrons. In 1975-76, however, in reality, however, the IAF has been hard put to equip and sustain even the initial 45-squadron force.<sup>12</sup>

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<sup>11</sup> India- Air Force – 21<sup>st</sup> Century, New Doctrine for the 21<sup>st</sup> Century, Vayu Aerospace Review, No V, May 1995, pp21-26.

<sup>12</sup> India – Air Force-21<sup>st</sup> Century, New Doctrine for the 21<sup>st</sup> Century?, Vayu Aero Space Review, No V, May 1995, pp21-26.

40. Circumstances, both real and imaginary forced the IAF to accept ad-hoc additional acquisitions. The lack of long term (perspective) planning, the two Indo-Pak wars of 1965 and 1971 and the ever-present financial crunch prevented rational, planned expansion as well as any on-going roll-on modernisation and re-equipment plans.

41. The IAF has traditionally looked towards the former Soviet Union for aircraft, missile systems, spares and support, and renewed ties with Russia provide a strong indication that this is to continue. Even though the IAF has a fewer squadrons flying British Jaguars and French Mirage-2000s, the bulk of service's fighter force consists of Mig-21s, Mig-23s, Mig-25s, Mig-27s and Mig-29s. Apart from the Mig-29, all other Russian combat aircraft have been or are being manufactured under licence by HAL, which also has the rights for service, repair and overhaul of all these types. Likewise, the transport fleet consists of mix of Russian and British models, while the helicopter fleet is split between Russian types and licence built French ones.

42. The inevitable conclusion is that the IAF just cannot sustain its present force level in the next decade. What ever may be left, will also be obsolete or obsolescent and a hotchpotch of aircraft from Russia, France, Britain. There is there fore, an urgent need for the armed Services, and the Air Force in particular, to take a stock, prioritise on the challenges, our responses, devise with the available resources, and get down to the necessary restructuring and readjustments – ways and means will have to be found of strengthening the clout and operational effectiveness of the smaller forces, making them "lean but mean".

43. In the past years the AF has done much through the publication of its doctrine and in enunciating its roles and missions. All the classical roles and missions of the AF including Strategic Bombing, Counter Air, Air Defence, Combat Support Missions, transport and helicopter operations etc would continue to have their relevance. The extent of employment would relate to the higher aims and objectives and the Grand Strategy. However, as already mentioned, the AF is operating under a regime of certain set of perceived but unclear aims and objectives. There is also no

clear and enunciated long-term Grand Strategy towards which we are working. Consequently, we have to move on certain assumptions.

### **Primacy of Air Power**

44. We do not foresee that air power would become any less relevant than it already is. Indeed its primacy is likely to get accentuated. It is a manifestation of this that there is greater keenness amongst other two services to seek increasing assistance of air power in all their operations. This places great burden on the AF to live upto these expectations.

45. **Air Superiority.** Air superiority is the sine-qua-non of all military operations. We would, therefore, need to have the capability and intention to pursue the air superiority campaign most diligently and intelligently. The primacy of this campaign cannot be over emphasised. We, however, need to be careful not to convey the impression that while we pursue this, it would be at the total neglect of the other missions. The AF has adequate assets and effort available to be able to devote considerable force towards other campaigns such as CSFO, even from the early stages of the war while pursuing our campaign for control of air. It appears that the other two services need a little reassurance that we will provide adequate effort for CSFO and air defence of TBA. Possibly, in the past we have willy-nilly conveyed an impression that while pursuing air superiority, it shall be to the exclusion of all else, which is not the case.

46. **Counter-air.** With hardening of shelters and widespread proliferation of a large variety of air defence weapons, classical Counter Air Missions involving airfield bashing would carry an attendant penalty in the form of enhanced combat losses for only limited and fleeting gains (airfields can recover from damage within hours while aircraft and aircrew lost would not be replaced within the duration of the war). Such thoughts are possibly heretic to the ears of the die-hard ground attack pilots of the



classical mould. However, realistically, we need to tailor our doctrine in accordance with the technology in vogue. Hence alternative strategies need be thought of, accepted and pursued. In the future, attainment of air superiority would require more offensive application of our Air Defence aircraft in free escort and offensive escort missions, in using decoys and laying traps to obtain physical neutralisation of the enemy in the air, using the longer reach of our weapons. Induction of AWACS and Aerostats as well and the additional LLTRs would significantly enhance the efficacy of such missions. However, we must vigorously address the problem of airborne IFF. Data linking of combat aircraft and its situational information would enable superior tactics to be adopted. We need to pursue a programme to achieve this. Lastly, upgrades are overdue in the case of certain air superiority aircraft so as to improve their performance and viability in the relevant time frame. Such upgrades would have created the required force multiplication and we need to follow these to their logical conclusion. Past experience tells us that upgrades get unduly stretched out. Vendors sometimes make promises only to falter later. Vendor selection and project management needs to be superior. The aspects of the man behind the machine shall be touched upon later.

47. The strength of the AF has hitherto been its strike fleet. However, considering the expected force drawn down and keeping in mind the need for obtaining control of the air through greater use of offensive sweeps and free escorts i.e. through hard kill in the air, there would inevitably need to be a shift towards having greater numbers of air superiority aircraft. Enhancement of the numbers of air superiority–multi-role aircraft such as the Mirage-2000, Su-30 and the MiG-29, to a ratio of 60 : 40 of air superiority–multi role versus dedicated strike aircraft, gradually increasing to 70 : 30 or 80 : 20 would be prudent. Conventional attacks such as bombing and rocketry would continue to have their significance. However, increasing role would be played by terminal precision-guided weapons. The scales of precision weapons inventories as well as the designation equipment would need to go up. Training levels also would need to be enhanced. Certain special weapons for neutralising targets in the hills need to be pursued and acquired. These should include more LGBs and area weapons capable of being delivered accurately in dive attacks. There are certain cluster weapons which can be delivered in dive attacks with the cannister opening as

per delay proximity fuses. Similarly, there are fragmentation bombs capable of neutralising areas 100 m x 100 m, delivered in a dive or level attack which detonate above the ground with a proximity fuse. FAEs using proximity fuses should also be available. These types of weapons could make air attacks in the hills more viable. Stand off airfield attack weapons and other superior airfield denial weapons (GPS guided bombs) are other stores worth acquiring.

48. **Air Defence.** The single most glaring deficiency in the country's air defences, indeed of the AF as a whole is the lack of a viable real time command and control system. Project Diamond should overcome this deficiency. Air HQ and MOD are looking at this. However, the need to make haste is evident. Other air defence related equipment such as Aerostats and AWACS (which also have great utility for offensive operations), LLTRs, Pechora upgrades, and satellite communications, are on the anvil. These would enhance our capability to defend our air space and to exercise better control over the air. However. Some moves must be made towards development and eventual acquisition of non-conventional weapons (Direct Energy) for air defence, satellite based surveillance, ballistic missile warning systems and BM defence. Passive defence against non-conventional weapons and survival of the National Command Authority are cases of national relevance that would need Air Force's involvement and counsel. Weapon stocks must cater for the enhanced usage of air-to-air weapons expected in the process of securing destruction of enemy aircraft in the air. The numbers of AWACS and In-flight refuellers required would always outstrip the numbers available. However, the gap must be minimised.

### **Transport and Helicopter Operations**

49. Given the large size of the country, increasing significance of its island territories and enhanced belligerence in the Himalayan ranges, No reduction is anticipated in our tasks of air transport and heliborne operations. If anything, there is a need to enhance this capability. Ipso-facto, were we able to maintain 90 percent fleet serviceability (as most commercial operators regularly do) there would be no

real shortage of the aircraft and heptra assets. However, the fact is that we are not been able to maintain even 50 percent fleet serviceability. While the reasons are known, that alone is not the solution to the problem. The AF needs to find viable solutions to the problem of endemic fleet unserviceability. The An-32 fleet would possibly need replacement in a decade or so. If our past record in procuring DC3 and C119G replacements is any indication, we need to start exploratory studies and move our case now to find a suitable replacement for the An-32. A 20-ton aircraft as proposed by the HAL may not quite be the replacement that we need. The bulk of the AF consignments tend to be much smaller. The regular supply drops undertaken by IAF for the Army require an aircraft delivering the load over small DZs at slow speeds. A six to eight ton category STOL capable turboprop ac, needing little 1<sup>st</sup> and 2<sup>nd</sup> line support would be more appropriate.

50. Viability of airborne assault, para-drop operations deep inside the enemy territory would remain a big question mark. The Army would continue to demand this and the AF would continue to express its reluctance on this course. SHBO, on the other hand has found increasing use in the recent past in our CI ops in J&K. This is likely to continue.

### **RSTA.**

51. The inability of the Air Force to carry out meaningful reconnaissance and surveillance and inadequate conceptualising and pursuit of this ability, have resulted in different agencies making their separate bids for such equipment. They have also achieved considerable success. This is a classical case of air power assets being frittered away by distribution into pockets. The AF may consider making a comprehensive perspective plan for acquiring and centralising such capabilities as are really needed and relevant to obtaining real-time transparency of the battlefield and target areas. Some of this imagery needs to go down to 30 cm to 10 cm spatial

resolution. This, of course, includes satellites. For the moment, the AF may ride piggyback along side civilian satellite and communication satellites. However, we would have no option but to go in for dedicated imaging and communication satellites at some point in the future.

## **EW**

52. Our EW management, control and denial of the electronic spectrum leaves a lot to be desired. Undoubtedly, we have made some progress. However, the AF must endeavour to have 100% fit of RWR, ASPJ and CMDS at the very earliest. The Tempest programme is well behind schedule and far below performance and reliability required. We went into Op Safed Sagar with glaring inadequacies. We cannot afford to repeat the same. Alternative solutions may have to be found. Greater need and reliance upon hard kill of enemy radars and weapons would be a reality. SEAD would need to be intelligently fitted into our overall plans for gaining air superiority. Our inventories should have appropriate and ample stocks of weapons for creating the safe corridors and to defeat the enemy's game plan as also to attend to the Chinese threat.

## **Air-to-Air Refuelling.**

53. Air-to-Air refuelling would be essential for the inter-theatre moves, air defence of island territories and for operations against China. This needs to be pursued. Even with large numbers of in-flight refuellers, the French AF found itself short of this capability for their operations in Kosovo.

## **Info War**

54. Computer literacy is expanding rapidly in the IAF. All Commands are now connected on Wide Area Net Works. The IAF is poised at the threshold of using

informatics in a big way. Consequently, these would also become vulnerable to info war. Appropriate fire-walls and isolation would have to be ensured. At the same time we must persist with our IT/IW road map for info denial and for conduct of info war. We must recall that Pak has been active in this field already, wherein several of our web sites and computer systems have been invaded.

**CHAPTER - IV**  
**VISION FOR THE FUTURE**

***“Airpower is the most difficult of all forms of military force to measure or even express in precise terms.”***

***- Winston Churchill***

55. The country that has the technological edge has a distinct and disproportionate advantage over the one with inferior or obsolete technology. It is more so in the case of air power, where there is a continuous revolution in technology taking place. The pace of technological development is so fast that before one can perceive the impact of the new technology, a newer and more exciting one is already in the making. For example, when every country was contemplating going in for microwave landing system as standard equipment for the airfields, the emergence of GPS changed the whole scenario. The task of the planner in the circumstances becomes very difficult, not only in the field of acquisition, but also in visualising the challenges that one will have to face in future. There was thus a necessity to compile all the emerging technologies and study their likely impact.

56. Twenty first century is likely to be dominated by aerospace. Though militarisation of space is not likely to take place in the next half century or so, all the same, space will play an even greater role in the coming decades. Space technologies that will have a major role in air warfare. Due to the high state of readiness, rapid response, pre-positioning and simplified logistics etc, the AF is in a position to undertake full scale operations within a very short time frame. The Air Force has the ability and indeed has always engaged in the Deep Battle also. Air Power/Aerospace Power would dominate the battlefield in the future. Not only would it dominate the war but would also shape the strategic responses of nations during peace.

57. The battlefield of the future would have the following characteristics: -
- (a) Increased transparency.
  - (b) Greater accuracy of weapon delivery.
  - (c) Greater lethality of weapons.
  - (d) Greater dependence on innovation and resourcefulness to either ensure a kill or to save oneself.
  - (e) Rapid depletion of assets.
  - (f) High cost of even a limited war – not a matter for the faint hearted.
  - (g) Political objectives would be fuzzy and add to the fog and friction of war.
  - (h) Reserves would be limited.
  - (j) The sophisticated nature of equipment would preclude rapid creation of additional human resources of war within the duration of the war.
  - (k) The party commencing the war would have a distinct advantage.
  - (l) The area of conflict would be large and could shift rapidly.
  - (m) Vulnerability of static targets would increase.
  - (n) Even though militaries the world over recognise the merits in integrated fighting, the tendencies to keep things up one's sleeves are unlikely to go away. Consequently integration in fighting would continue to remain limited with some variations depending upon personalities involved and the level of predicament of a particular service.
  - (p) Space based surveillance and C<sup>4</sup>I<sup>2</sup> systems would play a crucial role. Indeed space-based kills may not be far away. Some rudimentary capabilities in this area may also emerge even within our own battlefield.
  - (q) Much has been said and written about Info war and psy-war. The relevance of these is indisputable.
  - (r) Technology denial regimes would strengthen.

(s) The cost of manpower is going up. Good quality material does not wish to join the Services, thus down sizing of forces would become unavoidable. We would need to be capable of doing more with the less.

(t) Under the garb of non-proliferation, pressures to de-nuclearise would persist.

(u) Capable combat aircraft would enjoy longer reach with greater probability of success. However, the skill and training/required would become progressively greater.

58. There is no denial of the fact that defence systems are prohibitively costly. Once a piece of equipment is inducted, it stays in service for a long time. This implies that there is an inescapable need for a long-term acquisition plan for various weapon systems. With revolution in technology taking place, there is no place for an industry or a combat force with second-rate technologies.

59. The dwindling budgets mean that the Air Force's options will be severely circumscribed. While the very best and the state-of-the-art technology are desired, the affordability is, and will always be, a major constraint. Can India catch up with the rest of the world as far as aerospace technologies are concerned? The question of affordability, threat perception, long term national and strategic objectives, and availability are some of the criteria that will have to be kept in mind when aspiring for acquisition of technology or equipment.

### **Technology Development**

60. The first question is of technology. There are a number of aircraft that have been manufactured under license. The knowledge and experience gained during four decades of manufacturing aircraft under license should have enabled us to take off. But this has not been the case, and reliance on foreign aircraft designers continues. DRDO is the only agency that carries out R&D of technologies. However, there are a few shortcomings that have crept in, which have retarded the development of technologies. DRDO is perhaps the only research organisation in the world that combines the functions of research, development and manufacture. In



the process, there is no accountability for delays, cost and time over runs, and performance shortfalls.

### **Aircraft Acquisition Strategy**

61. According to conservative estimates, the Indian Air Force (IAF) will need to acquire approximately 400 plus aircraft by 2010 to replace its aging MiG-21s, MiG-23s and some MiG-27s. It will thus be seen that very large outlay is required for all these, but no suitable and affordable choices are available. Because of political compulsions, even the sources for acquisition are fairly limited. A strategy is, therefore, required to meet the requirements of the Indian Air Force.

### **Force Multipliers**

62. Force multipliers are tools that help support combat operations. They do not in themselves involve the direct use of combat capabilities; they bring about major increases in the effectiveness of air, surface and sub-surface combat forces. This was evident during the Gulf War, when the American AWACS and Joint STAR enhanced the capabilities of the Coalition air and surface forces manifold. There is a general reluctance to sanction adequate funds for this vital aspect. To the list of force-multipliers must be added the infrastructure for optimal utilisation of the inducted systems. There has been a tendency in most armed forces, and India is no exception, to spend large amount on procuring sophisticated equipment but there is great reluctance to spend small amounts on the infrastructure and facilities for their operations. The financial sanctioning authorities do not understand the sophisticated systems, but they have their own way to block funds for things like air-conditioned buildings, trolleys, specialist vehicles, stable power supply, etc. In 1984-85, it was agreed that 10 per cent of the procurement budgets would be sanctioned for setting up of infrastructure. This was, however, never followed up. This aspect needs to be looked into and the trend reversed.

### **Air-to-Air Refueling**

63. Jaguars, Mirage-2000s, and SU-30s of the IAF have air-to-air refueling capability. This capability, is now being exploited by day as well as night. However, the number of tanker ac needs to be increased to meet future needs.

## **AEW&C Aircraft**

64. There has been a demand to acquire AEW&C aircraft for the IAF for over a decade and a half. These aircraft are now in the pipeline and need to be integrated into our AD system well and soon.

## **Aircraft Related Technologies**

### **Stealth Technologies**

65. It is doubtful if any country will give us stealth technology; we will have to find solutions to our problems. No effort should be spared to acquire these core technologies by every conceivable means – including overt and covert ones.

### **Situational Awareness**

66. This is one area where the awareness is already there. The MiG-21 upgrade programme is all about increasing situational awareness. Our biggest weakness is in the field of combat identification. A foolproof IFF for all our combat aircraft, ships and armoured vehicles is an inescapable requirement.

### **All Weather and Night Attack Capability**

67. Presently strike aircraft in the IAF has limited night attack capability. Similarly, the ability to navigate precisely and operate in bad weather is somewhat limited. To overcome these problems, efforts are already being made to acquire night vision devices and other equipment that will give the combat force the ability to attack at night. Most of our aircraft are not equipped with ILS and instead the reliance has been on GCAs. This imposes limitations on aircraft operations. It will be desirable to have aircraft with GPS/DGPS based system with inertial navigation system as a complementary system. The know-how and technology for these is available within the country and it should be possible to integrate these into our aircraft without many problems.

### **Weaponry**

68. In the procurement programmes, armament gets a rather low priority. The cost and availability are, of course, restricting factors. The next problem is of the integration of weapons with aircraft. Procurement has perforce to be restricted to

those weapons that are cleared for firing from the particular aircraft in service. Some integration has been done in recent years and this effort must continue and low cost solutions found.

### **Bombs**

69. PGMs will have an important role to play in the future conflicts. While one can indulge in the kind of prodigality as indulged in by the USA, nonetheless the capability to deliver PGMs needs to be augmented significantly. The Gulf War highlighted the necessity of having weapons with suitable penetration capability. India's requirements are no different. Bombs like BAP-100 and Durandel have limited capabilities. Technologies for the same need to be developed.

### **Air-to-Surface Missiles**

70. The commonest method of Suppression of Enemy Air Defence (SEAD) is to knock out enemy surveillance and fire control radars with anti-radiation missiles. The two other development programmes worth considering are the development of an air-launched cruise missile, and a long-range high-speed air-to-surface missile with capability to take on hardened targets. With the successful development of BRAHMOS missile and Lakshya – pilotless target aircraft – it should be possible to proceed further and embark on these missions.

### **Air-to-Air Missiles**

71. Air-to-air missiles are the main armaments for air combat. The number of air-to-air missiles required will work into thousands and not hundreds. Considering their short technical life; a long-term development and manufacture programme will make economic sense.

### **Theatre Missile Defence**

72. In the last few months, nuclearisation of the subcontinent has taken place. While one can deal with aircraft delivering these weapons, the real threat is going to be from surface-to-surface missiles. The answer, perhaps, lies in detecting the launch of all surface-to-surface missiles – with the help of anIRST system and thereafter destroying it with an airborne laser. A potent ABM system is a vital necessity and will have to be integrated into our AD system.

## **Countermeasures**

73. Without suitable countermeasures, the probability of survival in modern, lethal air defence environment is rather low. The information regarding types and the number of EW systems is naturally classified. But in EW game, constant research is required to upgrade the equipment and to have newer capabilities to meet emerging threats.

## **Information Warfare Technologies**

### **Computer Security**

74. The area that is, perhaps, the most neglected, but one that is likely to play a vital role in the next conflict, is information warfare. The question of securing this system should be given top priority. There is a requirement to set up some monitoring mechanism to detect any intrusion or even an unauthorised peek into the system.

### **Communications Network**

75. The satellite communication is versatile and today it is possible to have a rapid data transmission. The problem is the cost of the terminals and the lack of encryption facilities on INSAT series of satellites that are primarily meant for civil use. As and when a dedicated defence communications satellite is launched the same can serve as a stand-by to the main communications and be the primary means of communications in the battlefield, and in the other mobile scenarios like communication with ships at sea, and with aircraft and UCAVs.

### **Aerial Reconnaissance**

76. Reconnaissance is essential for gaining intelligence about the enemy. It is also main tool for precise targeting. The capability of finding moving and camouflaged targets will make the task of their destruction easier. If reconnaissance is to be useful, filtered intelligence must get to the warfighters as soon as possible. With the advances in computer technology, and by extending the applications to the field of photo interpretation, it should be possible to have non-film-based systems interpreted almost instantaneously.

77. The concept of utilisation of air power in future wars needs to be studied

keeping in mind the nature of war to which it is applied. In our context it may be presumed that drastic doctrinal changes will not take place in the utilisation of air power in the coming decade, primarily because of lack of budgetary support and political will, despite the proliferation of surface-to-surface, surface-to-air missiles and unmanned vehicles in the sky and space above it. Air power will continue to be largely the responsibility of the aeroplane and the helicopter. Any study of the interaction of air power and technology must therefore begin with a survey of role the Air power would be required to perform in our context.

78. The primary missions of the IAF as perceived are enumerated as follows:-

- (a) To defend Indian Air Space and the Indian Defence Forces against aerial threats, in area of operations within the reach of shore based aircraft.
- (b) To achieve air superiority above the area of combat and to further ground operations.
- (c) To attack strategic targets in the enemy territory.
- (d) To participate in combat in the Naval theatre within reach of shore based aircraft.
- (e) To carry out air transport operations.
- (f) To provide air intelligence as part of the general intelligence picture.
- (g) To carry out aerial photography missions for the defence forces needs.
- (h) To perform search and rescue missions over land.
- (j) To assist civil aviation authorities in command control and services as required.

79. The role of technology in enhancing the capabilities of air power is likely to prove all-pervasive in the near future. It would become increasingly difficult to compensate for technological superiority or quality through improved training, improved skills and quantity. Even limited access to high technology support systems may alter the balance irretrievably in future wars. Gulf War I and II has brought into focus many new thoughts on the capability and employment of Air Power. That was possible under a given set of circumstances. To get enamoured of that campaign and to presume its blind application in our context would be wrong. However, to ignore the prospects of unfolding technology and concepts would be a

greater mistake. Guided by our National aspirations, with our vision firmly into the future, the revolutionary advances of this decade can propel our air power to be an extremely viable force in the 21<sup>st</sup> century. The concepts that we must vigorously pursue are:-

- (a) Early Achievement and Sustenance of Air Superiority at the time and place of choosing.
- (b) Retention of Surprise and Initiative.
- (c) Synergy in Joint plans for Effect-based force allocation.
- (d) Parallel Warfare with focus on Systemic Damage rather than random target servicing.
- (e) Reduction of Attrition without compromising operational efficiency.
- (f) Offensive Air Defence with Economy of Effort (Both material and human).
- (g) Relentless operations to deny rest and recuperation to the enemy.

### **Economic Challenges**

80. Air power projection is directly proportional to the resource availability. Ideally, the resource should be indigenous for unhindered projection of air power. Despite the fact that defence is a critical factor in nation building, it will never be possible to accord it the supreme status and funding thus desired. Any developing nation has pressing social obligations and insulating it from the dynamics of such requirements can only be foolhardy.

81. **Trends in Plan Allocation.** The allocation for defence to GDP ratio has hung tenuously around 3% in the period 1965-90 while it stands at 2.4% - 2.7% thereafter. While such ratios do not directly translate into military capabilities, it does emerge that despite the security scenario becoming more demanding, the funding has shown

a downward trend. A comparison in plan allocations of other Asian countries are as shown in the Table (2):-.

Table (2)

Country	GDP Ratio
India	2.45%
Pakistan	5.13%
China	3.82%
Myanmar	12.67%
N Korea	24.76%
Japan	1.06%
Australia	2.44%
Israel	9.23%

82. **Affordability.** Maintenance of defence forces are not symbolic necessities. There is empirical evidence that, up to a point, defence expenditure supports development and after which it may be counter – productive. The affordability factor that stimulates growth can be placed at 3.5%. The intangible fallout of defence spending are deterrence leading to regional stability, internal stability due to awe inspiring presence of a guardian, respect by neighbouring countries and the community of nations. It thus develops an ability to project its views from a position of strength.

83. In order to enable any worthwhile planning of defence to be carried out, there must be a consistency in our commitment. The trend that exists today is that allocations are haphazard and do not adhere to five year plan projections. Five year plans for defence are to be co-terminus with the national plan periods, however, this has not been the case for the last five decades. Also, five year plans require the approval of the Cabinet Committee on Security (CCS). This too has not been the

case, in that, approvals have been either at the end of the plan period or have not been approved at all. Thus, for a nation with such a culture for planning, a plan for national security is finally the preview of the annual budget only.



## CHAPTER - V

### RECOMMENDATIONS

84. Force structure planning is the process of establishing military requirements based on an appraisal of the security needs of the nation and selecting military forces to meet these requirements within the fiscal limitations. All future wars will be fought in more than one dimension. The pre-eminent position of air power towards enabling a credible deterrence, force projection and in being the main instrument of conflict resolution will become even more pronounced in the coming decades. Air Power by controlling the third dimension has had and would increasingly have an over whelming influence on the conduct of surface warfare. In most cases, Air Power would be the preferred method of employing military power for political purposes in future.

85. **Review of the Force Structure of the IAF.** Today the IAF comprises some 43 combat squadrons of air defence, strike, close support and specialist aircraft. Then, there are about 10 squadrons of heavy and medium transport aircraft and a few light, utility aircraft. In addition, there are nearly 20 helicopter units. If the next 15 years are to be looked at in terms of what the Air Force will have vis-a-vis the current holdings, the picture will be very different because some of the fleets will have become obsolescent and would need replacement. At the moment, the only new additions are the Su-30 aircraft and a few Mirages in the pipeline, the LCA is as yet an unproved entity. There is apparently nothing yet to replace our transport fleet 10-15 years hence. And where helicopters are concerned, the Advanced Light Helicopter will augment but cannot replace the medium and light Mi-8/17 and the Cheetah/Chetak. In a further 15 years beyond the picture will be very different unless there are some new alignments, or collaborative/joint ventures because the country cannot "go it alone" in an increasingly expensive investment.

### IAF FORCE STRUCTURE FOR THE FUTURE

86. To be able to fight successfully, it would be necessary to retain the combat edge. There are major items necessary for the IAF to be able to dominate the skies,

deter the adversaries and to retain the edge throughout the war. Some are replacement of older systems, others are to be new inductions.

### **Airborne Platforms.**

87. Acquisition of airborne platforms would be entirely dependent on how we perceive the Air Power to be twenty years from now and what role do we envisage for the Air Force. As stated earlier classical roles in which Air Power would continue to be utilised are unlikely to change. However, the reaction time and tasks may be quite different.

88. **Fighter Ac.** The fighter fleet would largely remain unchanged till 2010. Indian Air Force needs to have the "numbers" as well as the quality fourth generation ac. If no future acquisitions are made, the IAF would lose approximately 10 squadrons by the year 2015 and more by 2020. This is based on two factors. Firstly due to phasing out of ac e.g. T-77, MiG-23 (BN), MiG-23 (MF) and MiG-25. Secondly losses that IAF would have to cater for at the prevailing accident rate. The IAF in 2015, therefore, would be 29 and ½ squadron Air Force comprising of SU-30, Mirage-2000, MiG-29, MiG-27, Jaguar and upgraded version of MiG-21BIS. At any cost we must not allow our present force levels to deplete and must maintain them around 40 Sqns in our inventory. We must maintain a basic ratio of one third between high, medium and low tech ac. Restructuring of our present day assets should be carried out and thrust for any future acquisitions should be on multi role ac. We must remember that 'today's high tech aircraft would become tomorrow's medium tech ac' and day after to low tech ac. Hence, adequate measures should be incorporated to maintain the technological edge.

One must also remember the need to deliver the nuclear arsenal from these platforms, should the need arise. The envisaged requirement of the fighter fleet is as follows:-

- (a) **Jaguar:** This versatile strike aircraft is of late 70s vintage. It has a good radius of action, weapon carriage capability and feasibility for up gradation and modification. This aircraft is therefore proposed to be retained as the backbone of the strike force with its existing strength of five squadrons. Hindustan Aeronautics Limited has the license for manufacturing this aircraft at Bangalore.

- (b) **Mirage-2000:** This is by far, the most reliable and state of the art multi-role combat aircraft that the Indian Air Force has acquired. It has proven its worth as a strike Air Defence and EW platform. Its design caters for smooth operation and up gradations. The high cost is more than justified by its performance and reliability. Two more squadrons of Mirage-2000 Dash 5/H should be procured.
- (c) **MiG-29:** Considering its vintage and the likely up gradations in the future, it should be retained on the Indian Air Force inventory. No fresh acquisitions are proposed; instead, a reduction of squadrons from the present three to two would meet the dual purpose of downsizing and better aircraft availability.
- (d) **Sukhoi -30:** The latest acquisition should be a definite asset to the strategic strike force, as well as the Air Defence forces. The present contract is for 40 aircraft. The proposed strength of this aircraft is six squadrons, considering the Indian Air Force requirements in a variety of roles.
- (e) **MiG-21 Bis (Upgraded):** The planned five squadrons of the aircraft would be sufficient to meet Indian Air Force needs. The aircraft would primarily remain an Air Defence asset, as there is no increment of range or payload as planned in the upgrade.
- (f) **AJT:** This aircraft contract has finally seen the light of the day. However, our programme of the IJTs need impetus and must be inducted into service on priority. The ageing MIG-21 type-77 fleet will not be able to sustain the rigours of training flying for too long.
- (g) **MiG-27.** Four squadrons of this aircraft would be retained in the inventory.

89. **Helicopters.** Armed/Attack Helicopters would constitute a potent platform, especially in the limited/ LICO environment. Though this would raise doubts in the minds of many against the backdrop of the Vietnam war, the utility of these platforms cannot be undermined. Indian Armed Forces would have to look for a replacement, particularly of Cheetah and Chetak class of helicopters. Besides, the

lifeline to Siachen would have to be kept alive and the northern and northeastern regions will continue to be dependent on our heli lift capability.

90. **Transport Aircraft.** The existing lift capability of the IAF falls just short of satisfactory level. The Indian Air Force needs a wide body ac in twenty-ton range and for the strategic lift capabilities. The existing capability is either six tons or forty tons. Short haul utilisation of IL-76 is not advisable, because of adverse relationship between number of landings vis- a- vis the sortie duration. For optimal utilisation, an ac in twenty-ton range with short landing capability on semi-prepared surfaces would be nearly ideal. While the issue raised may be contested but if we examine the remaining life span of IL-76, which is unlikely to be beyond 2015, it is prudent to acquire large number of small lift capability ac of twenty-ton capability. All this while we also must not lose sight of our strategic lift capability, as in future we are going to be, and we must aim to be a global player rather than concentrating only on regional issues.

### **Force Multipliers.**

91. Indian Air Force has already acquired air to air refuellers and is well on its way to acquire AWACS as well as modern ECM systems. This capability, however small in numbers would be essential in view of the likely enhanced neighbouring nations role for India in South East Asia.

92. **PGMs.** With the induction of increasing number of PGMs like Popeye, Matra LGBs, the low cost Griffin and Paveway kits as well as other Russian PGMs, along with the Patrick pods, CLDS and the day night Litening pods we now have precision engagement capability in day as well as at night. The effective employment of PGMs requires an understanding of precision as a total concept: precision in doctrine, tactics, command & control and logistic support. Further, the tactics should rest on four Pillars, namely, Intelligence, Acquisition, Neutralisation and Safety (from surface weapons). Here we need to pay greater thought, so that the limited numbers that we have give us "bigger bang for the buck" and provide us the crucial push in our operations. Once that degree of convergence is achieved, PGMs can add significantly to the credibility and effectiveness of air operations as targets can be struck more accurately and reliably with far fewer aircraft and with lesser risk of collateral damage than in the past. Precision engagement capability will help us in

handling LICO, were we to use them for attacks against the training camps/hideouts of insurgents/extremists.

93. **UAVs.** We are in the process of acquiring some more of these versatile platforms; we must use them in more proactive roles like the Israelis do. This would give us a tremendous edge over our adversary in terms of hard intelligence, recce capability and update on real time scenario. Offensive UAVs used against enemy radars will give us the much required punch to make a dent in our enemy's AD system, which would help our ingressing strike packages in carrying out the task unhindered and at will.

### **Surface to Surface Missiles.**

94. SSMs induction and their operational use would require us to reconsider our strike options. The exponential increase in our strike capability by induction of SSMs which would be independent of events e.g. bad weather, non availability of launch bases etc. We must, however, clearly understand that manned ac and SSMs are complimentary systems and are not repeat not a substitute. However, the IAF should concentrate only on the strategic strike capability with this platform. This fact may sound elementary when stated in a presentation like this but if not appreciated with professional and intellectual maturity, may result in doctrinal shift in our thinking. SSM technology in India has reached, if not a point of maturity, definitely to a point of high assurance and reliability.

95. Integrated deployment of SSMs with existing ac would possibly be one of the key factor that would decide the potency/effectiveness of any SSM system, range notwithstanding. In our context as well as in the context of our western neighbour, the numbers available would be merely a fraction of our total throw weight requirement with the conventional warheads; however, the real need would be to carry the nuclear warhead.

### **Capability to Absorb Nuclear Strike.**

96. In keeping with our policy of 'No First Use' of Nuclear Weapons, it becomes imperative for us that we develop the Second Strike capability. For this purpose we need to plan our infrastructure in such a way that any use of nuclear weapon by our adversary does not render us incapacitated. Hardened Blast Pens catering for NBC

warfare is one suggestion out of many. There is a need to plan and acquire equipment for NBC warfare and prepare and train ourselves so that we are capable of giving a befitting reply to our adversary, should the situation so warrant.

### **Technology Development**

97. Indigenous development of technology is an extremely desirable thing. However, it is not possible to start from scratch, design and build every component of system, small or large. There needs to prevail a sense of realism in assessment of feasibility, costs and time frames. In the past, these assessments have been seriously flawed, more often than not. Once a project is assigned to the DRDO, the services often lose control over the project. There is no accountability for cost and time overruns, or shortfalls in performance. The services are often literally 'run-out' of options because the partner at the other end made a bad call. Therefore, the DRDO must engage in development of core competencies and demonstrate technologies, so that services could use the higher confidence levels flowing out of this route to procure greater portions of their needs from the indigenous sources. Equally, there must be a mid course correction feasible. At a given point in time, in case of performance shortfalls or cost and time over-runs, it should be possible for a service to cancel or persist with a given project.

### **Manpower Planning**

98. Wars are won by the Man-Machine combination. We have talked about the machine, the system, but what about the man? We would need to get better people, if we need to do more with less. We need committed people, with a desire to excel, with a spirit of aggression, with a desire to vanquish the adversary. Mission consciousness needs to take precedence over career consciousness. Manpower is the primary resource without which other resources like money, material, etc., cannot be put to use. Even a fully automatic unit such as an unmanned satellite requires manpower to execute it and make further improvements. Manpower planning is the process by which an organisation ensures that it has the right number and right kind of people at the right time, capable of effectively completing the tasks that will help the organisation to achieve its overall objectives.

99. The IAF presently has over 1,31,320 regular personnel manning the Indian Skies.<sup>13</sup> Though the role of manpower in exploitation and optimum utilisation of equipment continues to be significant, the vastly greater 'kill potential' and effectiveness of modern weapons vis-à-vis man dictates that the optimum mix of man and machine be one which minimises the overall requirement of manpower in the force structure. Thus today, we witness states richer and more populous, fielding operational forces half or even a quarter of the size of forces.

100. Manpower today is not an input to the strategic calculus; rather it is an output. National objectives dictate national aims and to achieve these, alternate strategies are evolved. These alternate strategies in turn dictate alternate force structures, which have varying manpower requirements. Smaller manpower requirements mean lesser expenditure on manpower and consequently greater resources availability for equipment and technology. These in turn act as 'multipliers' to complement and enhance manpower effectiveness. The increased effectiveness can be translated into a more powerful force structure or an adequately powerful one at lesser cost. Further, it must be appreciated that strategy is not merely force structure. The ability of intentionality and resolve to project and enhance force structure capability depends upon the composition of the force structure and is much greater in the case of an equipment intensive force with an offensive strategic orientation. This potential can be utilised to compensate force structure reductions, making still greater reductions possible. The savings accruing from such reductions can again be ploughed back to further modernise the Air Force and increase its effectiveness and efficiency. The reiterative process can continue till optimisation is achieved and will result in progressive reductions in manpower with increase in effectiveness.<sup>14</sup>

101. The services never really got the necessary reprieve, leisure and national stability to look beyond their noses. It was either some hasty preparations for some

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<sup>13</sup>. MA Khan, The Indian Air Force: Structure, Equipment and Programmes, Strategic Analysis, Dec 1997.

<sup>14</sup>. KS Duggal, Economy in Defence Expenditure Reducing Manpower Costs, Trishul, Vol IV No2, p-35.

imminent threat or actual hostilities with their aftermath or the ever-present financial crunch and political instability, which claimed all their attention and efforts to cope with immediate situations.

102. In the Indian Air Force, the manpower planning and the right size of the force have been given a secondary status. A detailed study of manpower planning is a must for every commander so as to understand why right quality of manpower makes the force effective which is essential for winning a war. In today's environment, the study of manpower combined with the understanding of right mix of force should be considered as important as the study of strategy and tactics. The underplaying of these two aspects could in the long run mean difference between winning and losing a war.



**CHAPTER - VI****CONCLUSION**

103. The airplane, once introduced into the arena of conflict, destroyed the idea that distance provides protection and made forward defences epitomised by Maginot line, Siege-fried line, Bar-Lev-Line or the Saddam line irrelevant. The prophets of airpowers visualised its ability to defeat enemy single handedly by striking at enemy's heart and brain. The prophecy's fulfillment remained unfulfilled subject to technological limits, morality in war and resilience of human spirit. Yet, as the technology endows more and more capabilities to the instruments of air warfare. It enables air forces to increasingly project power and influence over land and sea barriers. Over the years, technology has improved the precision and lethality of weapons delivered through the medium of air. Table given below presents the comparative air power required to be employed to destroy a target of 60 x 100 sq. ft with 90% probability:-

**WEAPONS EFFECTIVENESS**

War	No. of Bombs	No. of Aircraft	CEP in Mts.
WW-2	9070	3024	1000m
Korea	1100	550	300m
Vietnam	176	44	125m
Gulf War 91	2	1	9m

Notwithstanding, the foregoing argument, a nation for its security will require all the three services i.e. the Air Force, the Navy and the Army. It will be imperative for all

the services to operate jointly, to build upon each other's mutual strengths while guarding each other's weaknesses for maximisation of nation's power.

104. It will be incumbent on planners and decision-makers to realise the changing dimensions of warfare and the contribution of various forces in fulfilling immediate and long-term national goals for a decision on force structures. Treasures will always be limited, everywhere. The choices in force structure will not be easy and to the satisfaction of everyone- yet prudent choices are must. Vision of the future, if clouded by the traditions of the past, may result in security disorientation - a disorientation that may prove to be fatal.

105. Today and tomorrow, the impact of air power will increasingly be more strategic than in the past. The thousand-fold increase in attack accuracy since WW II has revolutionised air power effectiveness. The breakthrough in night vision devices has turned darkness, into daylight taking away the most important protective shield from targets. Air to Air refueling extends the reach of this mighty instrument of warfare. Gathering of phenomenal amount of information through sensors in space and air medium, the ability to process this information at a breathtaking pace with state-of-art operates micro-processors and disseminating the knowledge to the attack executors has intensified the tempo of air operations. Causing strategic paralysis of the enemy is stated goal of modern air forces. We do not aspire for global domination by way of global reach- global power syndrome. Yet, in our area of interest and influence, we must have the rapid reach of air power. The world being a global village, we must aspire for global awareness. It is already possible, and within our capabilities. However, doctrinal direction is not so explicit.

106. **Air Superiority.** Adoption of new technology and enablers like air refuelers, AWACS, precision weaponry, integration of info systems will enable a numerically inferior force to achieve greater number of tasks. A suitably structured force will enable achievement and sustenance of air superiority over desired geographical area for the required time. This will enable other air operations by less sophisticated combat aircraft, training aircraft as well as transport and helicopter

operations. A benign environment will permit even transport and helicopters to be used in offensive role of ground attack. Our capability to shape the battlefield for ground forces will increase. The Army and the Navy will be able to undertake their operations without hindrance from enemy air. Our civil and commercial sector will not be harassed and interrupted by enemy's air attacks. Our defensive forces will be relieved from defensive tasks to be able to add to our offensive punch. Use of air transported ops, para ops; heliborne ops will speed up the ground battle. But, all these benefits will only accrue if we have control of air. Control of air demands continued battle. Above all, it demands a technologically capable force; well supported by modern enablers, operated by highly trained crew and commanders and directed by Air Marshals themselves through the concept and doctrine of air power. The decisive instruments of war demand maximum percentage of national military budget.

107. The requirements of the Air Force in terms of platforms, sensors, and technologies are very large. These need to be prioritised depending on the availability of funds and long term assessment of threats. Most of the vital technologies are not going to be made available. If available, there are likely to be unaffordable. A well thought out and debated long term strategy and plan needs to be drawn up if the fourth largest air force is to remain a technologically modern numerically viable force. Alternate routes are always available, and one should consider these alternatives. But the absence of long-term plans, and the tendency to leave things to the last moment will not get us anywhere. Future battlefields are almost in the realm of 'Sci-fi'. Any nation not keeping pace with the technological advancement would be left far behind. Notwithstanding the budgetary constraints; India must embark upon the quest for modern weaponry and keep her Armed forces modernized at all times. Indian scientific and industrial base has adequate foundation and strength to deliver. We must exploit this advantage.

108. We must remember the significance of the need to become and remain a great military power. This is possible only with sustained, accelerated economic growth through reforms. Economically strong India has the potential to be a great

military power. To be able progress on the path of economic growth, the borders need to be secure and peaceful. There is an urgent need to ensure peace at the Nation's Borders. The border problem needs to be resolved once and for good. Other than a strong, swift and lethal military action, there appears to be no other alternative to resolve the border conflict. India must assert itself and carryout such an action for well being of her citizens.

Looking into the future, we believe that IAF will play the most crucial part in any future war. Inherent flexibility of Air Power and its growing capabilities have already expanded possibilities of its employment in an entire range of scenarios with decisive effect. Earlier limitations on its employability during fair weather and by day only, is quickly becoming a feature of the past. Modern strike aircraft's ability to operate with equal ease, both by day and night in fair weather and foul can be exploited to maintain relentless pressure on the enemy round the clock. Ability to seek out and attack even relatively miniscule targets with surgical pressure opens up possibilities of using Air Power offensively without fear of causing collateral damage thus enhancing its flexibility even further. IAF already has these capabilities and they are bound to grow manyfold in the foreseeable future. These are some of the attributes which would hold the key to success in any future conflict.

109. India has a very long border against two implacable foes. A million strong army is strewn all along the entire length of this border. Where and when a pressure point might erupt cannot be forecast. Therefore we must have the means to concentrate our land forces, wherever and whenever necessary in the shortest possible time. In its sizeable transport fleet, IAF has both, tactical as well as strategic airlift capabilities. Coupled with the other national air transport resources, we are capable of bringing to bear the combat power of land forces quickly both within a theatre as well as outside. The edge that this capability provides undoubtedly will be maintained, if not enhanced.

110. Resources of Air Power, much like any other hardware generate only a potential. The real capability is derived from the human element. It is the quality of man behind a machine which finally makes the decisive difference between success

and failure and it is in this field that IAF must concentrate to produce its winning card. The concept of 'air warrior' propounded by our CAS is central in the context. Mental conditioning to employ the available tools to produce a win enjoins the good combatants to be more than just technically good at their jobs. Calling to perform under stress of combat demands great physical and even more importantly mental strength. In their absence, no matter how potent the tools, effect can not produce a win. This thought must remain central to our training and indeed conduit of the entire business of the Indian Air Force. Then and only then, we can exploit full potential of the resources of our Air Force and produce a victory that we can be proud of. Preparing now for the military challenges of the 21st century is central to our national security. The keys to preserving the military security are the integration of information technologies with air and space capabilities, and the connectivity for distributed, demand-driven systems. Investments in technologies which enhance vigilance, decision making capabilities and communication architectures will help ensure a future, full-service Air Force capable of providing a true edge for India.

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