

AIR POWER

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This essay is designed to provide the war-fighter with a basic and somewhat informal overview of coercion, emphasising but not limited to, the coercive use of air power. Coercion is central to almost all military strategy, yet it is not often addressed in a systematic way in either military education or military doctrine due to a variety of reasons. In this article, Dr. **Karl Mueller** argues that it is nevertheless essential for the strategist – especially the air power strategist – to understand the essentials of military coercion, and in the process, dispels some of the "fog of theory" that often clouds this subject.



EDITOR'S NOTE

In one of the most important policy statements by a political leader in the defence establishment, Shri M.M. Pallam Raju, Minister of State for Defence, candidly spelt out the status and future strategy of aerospace power in the country while delivering the "P.C. Lal Memorial Lecture" to an auditorium full of air warriors and strategic community to commemorate the former air chief Air Chief Marshal P. C. Lal DFC, on March 19, 2007. In fact, we held up this issue of the journal waiting to see what would be said at the lecture. And we are happy to carry the text of the minister's speech. A professional himself, Shri Raju eloquently made out the case for the development of civil and military aerospace capabilities in the country to strengthen the foundations of the already robust economic growth so that it can move toward double digits.

The air force and the other two Services would require large investments for modernisation and force development to cope with the inevitable challenges associated with expanding trade and economic growth and deepening linkages with the outer world. But we need to emphasise the central issue that energising the aerospace industry in India must be a major priority for us if we are to provide the requisite technological and economic strength for a better tomorrow for our billion-plus people. The aerospace arena not only represents the highest ends of technological capability and, hence, vital for us to build our capabilities in this field, but it is also a high-cost and investment enterprise both in the civil field as well as for military purposes. For example, HAL alone is likely to be touching a turnover of over Rs. 50,000 crore (over \$11 billion) annually. The defence budget carries a tag of nearly Rs. 40,000 crore (nearly \$9 billion) for aerospace systems and spares this year. Rapid changes have been taking place in the last couple of years that require faster decision-making. The aerospace industry worldwide is holding its breath in anticipation of the openings, challenges and opportunities

that India clearly signifies. Aero India 2007 is sufficient proof – if indeed any was needed by now – of the global interest to be a partner in this century's greatest potential in aerospace opportunities.

It is in this milieu that there is a clear need for a catalyst to capture the mood that promises so much for the technological-economic growth of the country. And at this stage, that could best be provided, among other things, by the RFP for 126 multi-role combat aircraft that has been on the cards now for many years, but seems to have hit a glacier. It is time that this is firmly moved forward so that the process of procurement – complex, cumbersome and time consuming at the best of times – can commence its long journey. Combat aircraft are moving out of the air force inventory practically every day due to expiry of their design life. This has already reduced the combat force level, according to the minister of state for defence, by 18 per cent. And this may well hit a figure of around 25 per cent drop in the next couple of years in spite of the special sanction to acquire two squadrons of Su-30s (which would also take time to join the front line).

We have also watched China's military space programme acquire a new and worrisome dimension that does not seem to have hit the consciousness of the strategic community. One land-based missile destroying one satellite at 950-odd km (most of our satellites are below that altitude) also implies less than a dozen such missiles (and China has them in the hundreds) knocking off our total satellite assets. At the minimum, this could knock out the bulk of our communications facilities, however robust they might have been made otherwise. The implications for remote sensing and other uses, leave alone reconnaissance, nuclear strategy, etc. are obvious. But our mandarins continue to be confused about weaponisation and militarisation of space, and ground-based self-defence; and, hence, the tardiness about building space capabilities for our defence within the ambit of international treaty obligations and our aspirations to see space as a common heritage. The new threat to our space assets translating into action may, of course, be a worse case scenario and would remain hypothetical, but only as long as our relations with China are cooperative and friendly. But a country ignores military capability development that can impact on its security and prosperity at the risk of its future security.

FUTURE OF AEROSPACE IN INDIA: STATUS AND STRATEGY

M.M. PALLAM RAJU

AIR CHIEF MARSHAL LAL MEMORIAL LECTURE

New Delhi, Monday, March 19, 2007

I deem it a great privilege to have this opportunity to speak at the Air Marshal Lal memorial lecture which has had some very prominent speakers in the past years. I am not sure if I can measure up to those past dignitaries but I shall attempt to put in perspective my thoughts on the future of aerospace in India. Having also had some exposure to civil aviation in another responsibility, I shall attempt to put before the august gathering a layman's view of the economic situation and opportunity for the nation and also the potential within the country for the growth of the aerospace industry

Today's technological innovations are making the world a flatter place and are rapidly changing the way we live on this planet. Changes in the world order, the integration and interdependence of the world on economic and commercial matters are increasingly contributing to the world becoming a closer place, with air travel playing an increasingly significant role in bridging the far flung corners of the earth.

India's economic growth over the last four years and the brighter prospects that lie in the years ahead portend faster changes to come. The Indian economy has been growing at a pace of 8 per cent over the last four years, is poised to breach the 9 per cent mark this year and is expected to maintain a significant

Shri M.M. Pallam Raju is the Minister of State for Defence, Government of India, New Delhi.

growth rate for many years to come. Improvisation in the nation's infrastructure is expected to significantly contribute to the pace of the growth of the Indian economy. After achieving worldwide recognition for its strengths in the services sector, India is also working toward realising its full potential and towards establishing itself as a manufacturing economy. Most of the progressive states have become the catalysts for growth with the realisation that attracting investments into their respective states is the only sure strategy for growth and opportunity. All these changes in India and within the region are, therefore, going to have an impact on the commercial usage of air space within India, hence, have a direct bearing on the utilisation of air space for defence and strategic uses. The nation realises the importance of aviation – an important part of the national infrastructure, a vital need when dealing with internal security, disasters and emergencies, a vital engine for the growth of the economy and employment and an important strategic element of a regional power!

THE RAPID GROWTH OF THE CIVIL AVIATION SECTOR

Air traffic in India is growing at an average of 17 per cent per annum and passengers by 24 per cent. Air travel today has become affordable to many as a result of the entrepreneurial zeal of the new age promoters of private airlines who are working out their economics on the higher utilisation and lesser

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turnaround time of commercial aircraft and through prudent planning on containing operational costs. Coupled with the rising aspirations of India's young workforce, air travel within India and the region is

experiencing exponential growth. Aviation major Airbus says it sees a quickly rising demand for aircraft in India and expects it to be the fastest growing country for air travel for the next 10 years. Air freight traffic is also expected to gain as more domestic airlines enter the scene and as better infrastructure boosts profitability. The growth is expected to be led by the travel and freight sectors and it expects Indian firms over the next 20 years to place orders for 1,100 passengers and freighters valued at about \$ 105 billion. Boeing's European rival,

and part of EADS, estimates the Indian air travel sector to grow at an average 7.7 per cent per year over the next 20 years, compared to the projection for the global average of 4.7 per cent.

The rapid pace of economic growth within the country and the manner in which the economy has opened up to the world have invariably contributed to the demand for all kinds of services, including air services. The number of aircraft, pressed into service within India heralds a new wave of opportunity not only for the services but also those related to the maintenance and overhaul of aircraft. With an existing civil aviation fleet size of over 310 aircraft with scheduled carriers and another 182 with non-scheduled operators and with another 480 aircraft on order which are expected to be inducted over the next five years, civil aviation in India is expected to open up a lot of new opportunities in aerospace engineering services. The significant numbers of corporate aircraft that are going to be dotting the Indian skies will also add to the air traffic.

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India has 130 airports on the civil aviation side of which 90 are operational while 42 are non-operational. The country has a total of 400 airstrips, including those of the Indian Air Force (IAF). Of these, 123 are with the Airports Authority of India (AAI) and 75 airfields have regular scheduled flights operating. With airlines vying to increase the number of flights every day, the number of passengers carried in 2006 was a whopping 32.5 million domestic passengers and 17.2 million international passengers and freight of one million tonnes! Comparing these figures to the operations of previous years, it is obvious that as the infrastructure improves and with more planes coming into India, the juggernaut has just begun to roll. The constraints, however, are far too many and need to be addressed urgently to enable the smooth growth of the sector.

Let us compare the above mentioned figures with those of Singapore from where 4,000 flights to 180 cities weekly handle 33 million passengers and nearly

two million tonnes of cargo every year, all from just one airport! The Indian air space today has about 3,000 flights criss-crossing the skies every day. Comparing this to the UK, which is a much smaller country with 15,000 flights over its skies and with France having 10,000 flights over its skies makes us realise the urgent need to improve the infrastructure, to incorporate state-of-the-art technology and to reorient and train our technical manpower.

All this, therefore, demands better infrastructure to support the phenomenal growth of the industry and greater planning efforts for the optimum utilisation of aerospace. On February 17 this year, Shrimati Sonia Gandhi, the chairperson of the United Progressive Alliance (UPA) government, ushered in a new era for aviation in India when she laid the foundation stone in Delhi for a new modern integrated airport. This would have Asia's longest runway and the special feature is that this infrastructure would grow in a phased manner for another 15 years! Private enterprise is playing an important role in bringing the airports infrastructure up to world standards with the upgrading work in Mumbai and Delhi and the zealous efforts at creating new airports of international standards in the rapidly growing metropolises, which are symbols of the new age economy in India, namely, cities like Bangalore and Hyderabad.

THE IAF: REACH AND CAPABILITIES

Speaking about our defence assets, the IAF alone has in its inventory close to 1,400 aircraft and helicopters. It has manpower of over 117,000 with nearly 3,500 pilots and a similar number of aeronautical engineers. The army has a large fleet of light helicopters, the strength of which one day would overtake that of the air force. The navy, a three-dimensional Service, operates the large and heavy TU-142s and the lighter IL-38s, agile fighters and special helicopters. Over a hundred exclusive airfields are operated and managed by the military, most of them by the air force. The air force manages over a dozen base repair depots most of which are high-tech engineering facilities of industrial standards. Over 20,000 skilled technicians and engineers are employed in this industrial sector of military aviation. With world class institutions of excellence, the military is 100 per cent self-sufficient in training of its personnel – technicians, engineers, pilots,

air traffic and fighter controllers, administrators and a host of other specialists. Military aviation is supported by the Centre for Military Airworthiness and Certification (CEMILAC) which is akin to the civil airworthiness authority under the Director General of Civil Aviation (DGCA). The CEMILAC is highly competent and self-sufficient to examine and award airworthiness certification for Indian military aircraft and new designs like the light combat aircraft (LCA) and advanced light helicopter (ALH).

With dedicated efforts towards the induction of force multipliers and the focussed approach towards building network-centric warfare (NCW) capabilities, the IAF has, over the years, built up enormous and amazing capabilities, skills and talent.

With dedicated efforts towards the induction of force multipliers and focussed approach towards building network-centric warfare (NCW) capabilities, the IAF has, over the years, built up enormous and amazing capabilities, skills and talent. Today, air refuelling tankers refuel fighters in mid-air as a routine, in the day and at night. Our fighters have flown more than half way across the globe to Alaska, crossing many oceans, as well as to South Africa, France and back supported by in-flight refuellers. Aerial tanking has helped our Mirage-2000 set a record of flying over 4,000 km non-stop on the route to South Africa and the SU-30 MKI to stay in the air for well over nine hours at a stretch. Very soon, the air force would have complete surveillance radar up in the air in the form of the airborne warning and control system (AWACS), which would also have the capability to be refuelled in flight.

Our air force exercises routinely with friendly foreign air forces such as the air forces of the United States, France, Great Britain, Singapore and South Africa. Exercises with Japan and the USA and with China are to take place soon; military aviation diplomacy contributes immensely in strengthening bonds with friendly nations. The exercise results show our pilots, technicians and machines to be of world class. The current practice of bilateral and multilateral air exercises with nations around the globe is a strategy that enhances our exposure, exhibits our

capabilities and leads to a better understanding of coordinated efforts in a world that is getting interdependent and facing crises from the scourge of terrorism and the rising demands of global security and peace-keeping efforts. Our air force sports a world class formation aerobatics team and a helicopter display team that have thrilled audiences within the country and abroad.

Today, the IAF has a strength of 32 squadrons and there is an urgent need to modernise and to increase the force if we are to truly mature into a transcontinental force capable of playing a role in safeguarding the economic

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and strategic interests of the nation. Quoting from the recent speech of the president of India where he expressed the hope that the IAF would be a model air force by 2025 and a force for the rest of the world to emulate, "I visualise the IAF of 2025 to be based on our scientific and technological competence in the development of communication satellites, missile systems, unmanned

supersonic aerial vehicles and electronics and communication systems. The IAF will be endowed with the very best of technology in the world, alert and agile strategic planning capability, and, above all, the most professional and dedicated air warriors." To realise this dream of the supreme commander, the nation will have to invest in advanced technologies, manpower and training while shoring up the curriculum, the labs and the faculty in our existing institutions, along with strengthening the project management and manufacturing capabilities of our public sector undertakings (PSUs). The parallel utilisation of the private sector's capabilities for strengthening our defence sector also needs sustained nurturing and encouragement.

IMPACT OF RECENT DEVELOPMENTS AND AEROSPACE COMMAND

India's location at the base of continental Asia astride the Indian Ocean places it at a vantage point in relation to maritime trade in the Indian Ocean. India has a strong stake in the security and stability of these waters since a large percentage

of Asian oil and gas supplies is shipped through the Indian Ocean. The Indian Air Force has the means and capability to operate in areas away from Indian shores and has been successfully playing its role alongside the Indian Navy in ensuring the security of these waters. In fact, many defence operations rely on space-based sensors and the option of having an Aerospace Defence Command would certainly help the forces in better surveillance, reconnaissance and tracking. With its growing economic and technological capabilities, India is ready to contribute significantly to cooperative measures to tackle shared challenges. India has been playing an 'active role' in discussions on the cooperative use of outer space through deployment of space-based disaster management capabilities and could play a key role in collaborative structures that tackle threats to the well-being of the nation. The need of the hour is to share experiences, perceptions and knowledge for enhanced international peace and security. With the nature of warfare changing more in the last 15 years than in the previous 150 years, aerospace power has come to occupy a dominant position. In fact, the 21st century would belong to aerospace power. Therefore, a robust programme is urgently required to transform the IAF into a dominant space power.

With the nature of warfare changing more in the last 15 years than in the previous 150 years, aerospace power has come to occupy a dominant position.

The IAF has been advocating, and preparing for, the establishment of a tri-Service Aerospace Command to protect both the territorial and space assets of India. At the International Aerospace Power Seminar held at New Delhi from February 4-5, 2007, the chairman of the COSC, Air Chief Marshal S.P. Tyagi called India an aerospace power with "trans-oceanic reach," making the exploitation of its outer space vital. Although the idea for setting up an Aerospace Command was initially proposed by the IAF in the late 1990s, apparently the Chinese downing of a satellite, allegedly with a missile fired from the ground, could have proved to be a catalyst to further the argument for an aerospace command. The justification for an Aerospace Command may also be due to the massive growth of India's space programme in recent years, with its

ever-growing reliance on space-based communication satellites that sustain its information and communication technology assets.

Recent developments by our space programme and the missile programme demonstrate that India may possess the capabilities to weaponise outer space but the nation's external affairs policy desists us from following such a line. The external affairs minister has repeatedly stated in Parliament about India's stand against the weaponisation of space by any country. India has substantial assets

The security and safety of assets in outer space are of crucial importance for the global economic and social development.

in space that are poised to grow exponentially and with its ambitious programme expanding beyond launching satellites to putting an Indian on the moon in the coming decade, these assets need to be protected.

The security and safety of assets in outer space are of crucial importance for the global economic and social development. India is striving to redouble efforts to strengthen the international legal regime for the peaceful uses of outer space and guard it as the common heritage. Since its inception, the Indian space programme has focussed on developmental activities, with the ultimate target of having satellites launch capabilities for the purposes of mass education, weather forecasting, disaster management, communications and navigation. India's space programme has been commercially viable too. In 2006, "ANTRIX" the commercial arm of the Indian Space Research Organisation (ISRO), brought in more than US\$ 500 million. This is more than half the operating budget for all of ISRO. It is projected that within a decade, it would corner up to 10 per cent of the market. The proposed aerospace capabilities of "persistent surveillance and rapid response" would enable the tackling of diverse threats, ranging from non-state actors to natural disasters.

THE NATION'S AERONAUTICAL MANUFACTURING CAPABILITIES AND THE OFFSET POLICY – AN OPPORTUNITY?

Hindustan Aeronautics Limited (HAL) has been in the forefront of licensed manufacturing and production under transfer of technology (TOT) for the IAF

for a number of years. However, since the nation's commitment of the LCA programme in 1983, we have come a long way, although not exactly to the desired extent, in building the nation's indigenous aeronautics capabilities and competencies! The ADA, NAL and HAL have been the torchbearers in building and sustaining the nation's capabilities in aircraft and engine design and development, and manufacturing. A significant number of manpower hours have been invested in the aeronautical research and engine research. Beginning from scratch, the capabilities and the capacities developed so far are indeed a worthy achievement of a relatively resource constrained nation. These achievements need to be sustained and encouraged. However, the need of the hour is for better and more focussed efforts of project management to be able to deliver to the functional satisfaction of our forces. Strict discipline has to be maintained in adhering to deadlines, with better coordination with the users, namely, the armed forces.

Currently, the aerospace industry worldwide spends about \$60 billion globally on engineering, with India accounting for less than one per cent of this market as compared to 12 per cent offshoring of the overall engineering services. Most global aerospace industries are looking towards India as an outsourcing hub for the development of technology. According to a CII study, the outsourcing market in the aerospace market was around \$155 million and is expected to touch \$1 billion by 2008-10.

With the 2006 Defence Procurement Procedure (DPP-06) stipulating that Indian firms would have to perform 30 per cent of the value of contracts that exceed \$65

million (Rs. 300 crore), there is much hope that Indian defence firms can cash in on the modernisation needs of the armed forces and also improve their overall standards. The defence sector has been opened up to 100 per cent private sector participation, with foreign direct investment (FDI) capped at 26 per cent.

It is our government's resolve to introduce fairness and transparency in our dealings. With this end in view, the offset policy of our government seeks to

The offset policy of the Ministry of Defence coupled with the anticipated purchases by the IAF presents a huge opportunity for India.

provide avenues for the growth of medium and small-scale entrepreneurs.

The offset policy of the Ministry of Defence (MOD), coupled with the anticipated purchases by the IAF presents a huge opportunity for India. Major players like HAL, ISRO, NAL, DRDO labs and the software and design capabilities within India make it a very attractive destination for outsourcing and for doing the capacity building for sustaining the burgeoning industry in India. Design capabilities within India include design and development, simulation, prototyping, reengineering, and maintenance and testing services. Other areas suitable for outsourcing include navigation systems, air control management systems, high level aeronautical system design, control system design, cockpit equipment support software, interior design and ergonomics. According to a NASSCOM-BOOZ ALLEN HAMILTON analysis, by the year 2020, India's offshore market can go up to \$3 billion! Just as in the information technology (IT) sector, although the low cost of engineering design and services could lead us to a larger share of the global aerospace engineering services and the production of parts and assemblies, it is important that in the coming years the nation's strategy should be based on the abilities to emerge as a nation with a core strength of strong design and manufacturing capabilities.

According to a Goldman-Sachs report, over the next 50 years, Brazil, Russia, India and China – the BRIC economies – could become a much larger force in the world economy. In less than 40 years, the BRIC economies together could be larger than the G6 in US dollar terms. As today's advanced economies become a shrinking part of the world economy, the accompanying shifts in spending could provide significant opportunities for global companies. Being invested in, and involved in, the right markets, particularly the right emerging markets, may become an increasingly important strategic choice for these global companies.

The recent Indo-US nuclear deal and the agreement with Russia on access to navigation signals of the Russian Global Navigation Satellite System (GLONASS) for peaceful purposes, signal our government's steadfast commitment to actively engage world leaders in the field of aerospace power and space. It is evidence enough that India is willing to partner global leaders in the field in our efforts to optimise the advantages of aerospace power. Recent

declarations with nations for joint design on next generation aircraft and missiles are other worthy examples.

In the nation's quest towards creating the capability to design and produce in this competitive world, I would like to quote the Honourable Raksha Mantri who said, "We don't want relations to continue as buyer-seller any more. We want to establish a new relationship based on partnership. It should not be just purchase, technology transfer or licensed production, but a role in design and development; it should be co-production and participation in manufacture."

CIVIL-MILITARY COORDINATION

All these activities augur well for the economics opportunities and the aviation future of the nation but, of course, with the primary requirement that the aerospace management of the nation is placed in capable, responsible and accountable hands. The current scenario has the AAI and the DGCA and the Ministry of Civil Aviation (MCA) managing the various aspects of the steady growth of the civil aviation sector and its required infrastructure. The government's decision of privatise the modernisation and the expansion of some of the international airports certainly augments the efforts of the government towards accelerating the infrastructure growth of this sector. The additional needs of induction of advanced traffic management technology in airports, the reorientation and training of air traffic controllers (ATCs) to the increasing traffic scenarios and the shortage of appropriately qualified and skilled technicians, AMEs and pilots are other issues that need immediate action. Capacity building in terms of pilots and quality ATCs is of the essence and beefing up the technologies of all airports for all weather landings is an urgent necessity.

The IAF and its institutions and manpower are a resource goldmine for the nation.

The IAF and its institutions and manpower are a resource goldmine for the nation. CEMILAC has great depth of expertise as the military airworthiness authority due to its indulgence in the certification responsibilities of designs and upgrades for military aviation. Apart from pilots who are getting increasingly poached upon by the private airlines, a

few thousand trained specialists exit the military every year! Appropriate openings for this talent pool could definitely be identified. Similarly, over 1,000 air force technicians enter the job market every year but find it difficult to pass the civil AME licence exams. The dichotomy of the availability of skilled and experienced engineers versus the shortage of licensed engineers is an aspect that needs to be resolved between the DGCA and the military in order to overcome skilled manpower shortages.

The honourable prime minister has emphasised on various occasions, about enhancing the value-add to the skill-sets of the nation's young manpower. He has been speaking about strengthening our professional and vocational institutions and investing in the capabilities of our people to make them more productive. The air force has been a strong votary of the establishment of an Aeronautical Engineering College for the precise purpose of capacity building of the appropriately qualified and skilled workforce in aviation. This was because of the fact that the training for technicians and engineers for civil aviation has not been as organised as in the air force. The time has definitely come to imbibe these advanced skills in large numbers through the establishment of such an institute for aviation engineering through joint efforts. Encouragement to entrepreneurs

As the cost of aerospace engineering infrastructure is high and calls for high standards and tolerances demanding skills and experience, there is scope for HAL, Air Force Base Repair Depots and facilities of Air India and Indian Airlines to share and optimise facilities.

and the private sector in establishing flying schools, pilot training simulator facilities and training establishments can certainly accelerate the nation to reach its numbers. The need to infuse significant representation of military aviation expertise in the civil aviation sector, into advisory panels of higher engineering education, into research organisations and into manufacturing is again an opportunity that cannot be missed.

In a similar way, as the cost of aerospace engineering infrastructure is high and calls for high standards and tolerances

demanding skills and experience, there is scope for HAL, Air Force Base Repair Depots and facilities of Air India and Indian Airlines to share and optimise facilities. The time has come for the optimisation of resources of both the civil and military aviation in order to improve the efficiencies and capacity utilisation of facilities towards enabling the smooth progress of the sector. The timing of the opportunity has not been missed by private entrepreneurs who are exploring the idea of SEZs dedicated to MRO services in collaboration with multinationals.

However, there have also been areas of concern and conflicting interest with those of the IAF in terms of air space usage over certain airports due to increasing civil aviation traffic, the tendency to question the relevance of the extent of space occupied by the IAF in some major airports and also the urgency expressed for the transfer of defence land in some airports for the expansion of the airports due to increasing civil traffic. An audit by the IAF of its unutilised airfields and airstrips had encouraged the ministers and the officials of civil aviation and defence to sit together to evolve a mechanism for the optimum utilisation of the nation's assets towards enabling the growth of the civil sector. The mutual exchange of land between these ministries in Goa and Kochi is an example of cooperation when it comes to removing impediments in the country's growth story. Better coordination and frequent dialogue between the MOD and the MCA are important to resolve such issues as resolvable issues need not be obstacles to economic growth.

The emerging scenario, therefore, requires that the management of aerospace be done in a coordinated, responsible and responsive manner with the collective efforts of the civil aviation, the military and the government. We should definitely look at integrating and utilising our military assets and vice-versa for enabling the growth story of the country and creating the environment for more efficient aerospace management.

ASIA'S SECURITY ENVIRONMENT AND INDIA'S ROLE

Asia's security environment is unique given its geographical expanse and the political, economic and cultural diversity of the region. Our view has been that in Asia, a pluralistic security order based on a cooperative approach to security

is the answer. Only a pluralistic security order working through a network of cooperative structures can have the legitimacy as well as the wherewithal to deal with the security challenges of the 21st century.

There is a greater recognition today of India's stabilising role in the region born out of our restraint, our economic dynamism and potential, the history of

Human development in all its dimensions is, and will remain, our highest strategic priority.

our civilisation engagement and our role as a firewall against destabilising ideas and influences.

External security depends on national power. It requires a continuous enhancement

of the country's capacity to use its tangible and intangible resources in such a manner as to affect the behaviour of other nations. While power is often conceived in narrow terms as military power, in the world that is emerging, it must be much more broadly conceived to include political, economic, technological, social and intellectual dimensions. A vibrant economy and a leading role in international affairs may be as important as a strong military for the preservation and development of national power. Internationally, we must gravitate from a state-centred, egocentric and competitive security paradigm to a cooperative security paradigm that enhances the security of each nation by reducing potential threats to all nations. Human development in all its dimensions is, and will remain, our highest strategic priority.

AEROSPACE POWER AND INTEGRATED OPERATIONS

N.A.K. BROWNE

INTRODUCTION

At the outset, it is appropriate to gratefully acknowledge the profound influence that air power has had in our living times – and, indeed, in shaping the destiny of military conflicts. The term “living times” is being used to allude to the relative short time-span (103 years), during which air power has made such significant and rapid strides to become a predominant instrument of military power.

It is good to be reminded that aviation continues to produce frequent surprising events. After all, humankind required only 66 years to go from flying the first heavier-than-air-aircraft to landing on the moon! In fact, the major changes and developments – popularly termed as “transformation” – have taken place only during the last two decades and yet, like the prophets, we hope that the current and future generations joining the air force can look forward to the fulfillment of air power’s promise in the years ahead. But then, what were the real qualities of the earlier prophets who accurately forecast air power’s potential? They based their ideas on reasoning and intuition rather than any scientific formulations as to how air power might achieve decisive results. And in the end, they were proven right. At least the current generations are benefited with the advantage of hindsight and historical wisdom as these issues are debated.

It is also unique to note that the last two decades have witnessed a major adaptation of how air power has been applied successfully, ranging from Operation Desert Storm, in Bosnia, Kosovo, Iraq, Afghanistan, Kargil and very

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recently by the Israeli Air Force in Lebanon. What is revealing is that in these operations, air power played a crucial role and proved to be the lynchpin of military operations. Therefore, in this "Century of Air Power," its potential as also its restraining influence have been fully realised.

But first, a note of caution: in this interesting debate, no two nations face similar security challenges nor are the military and security forces structured along similar lines. Considering air power's unique characteristics of agility, speed, reach and lethality, it would be a fair assessment to state that most air forces exist to conduct military operations on behalf of their nation, and if necessary, to go to war. It is important to understand that this is the unique role which separates us from the other professions of arms since the consequences of a victory or defeat are indeed profound – both to the nation and to the Service. It

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is, therefore, necessary to appreciate the type of conflict we are engaged in, the factors which influence air power's unique application as also its limitations; the exploitation of unique technologies; the "effects-based strategy" and how operations are integrated. All these need to be fused into a composite 'decision' cycle for assuring the nation that we, indeed, possess a credible offence / defence capability. Within the broad framework of national objectives and resources, most militaries today are

structuring their forces, doctrines, training and command and control functions with the objective of implementing integrated operations and concepts.

The complex and multi-disciplinary nature of modern warfare has placed increasing demands on the concept of "Joint Ops." As a result, the term "Joint Ops" in the 21st century is being considered as far too restrictive in its construct. It is also surprising to note that "jointness" as a concept and "jointmanship" as its product are viewed differently by different people. A little research will indicate that both these words are not even mentioned in the *Oxford English*

Dictionary! Maybe this is the reason why we spend a lifetime trying to comprehend how we can fight and win wars together.

At the same time, there is no denying the fact that if conflict situations are of permanent nature and require a multi-disciplinary approach, then you cannot do it all by yourself. It is not only the military but diplomatic, informational, political and economic factors and a host of other agencies – all play a part in some form or the other. In the context of the Indian Air Force (IAF), we can visualise all air power activity which needs to be integrated with all other levers of power. These could be with the other Services, i.e. army, navy and other government departments and agencies, the Ministry of Defence (MOD) and other civilian and industrial organisations. This concept of “Integrated Ops” highlights the importance of effective integration and cooperation between the IAF and all the non-IAF organisations. These could be at the joint-level, multi-agency or even at the multi-national level. It is here that the term “interoperability” – which is bandied about quite carelessly these days – takes on a new dimension when we expect our trained ground / air crews and planning staff to convince the other partners in the integration of air power in joint military and civil-military operations. The integrated operations conducted by the IAF with other agencies in the wake of the tsunami disaster is one such example.

The central theme of this paper is to examine the role and influence of aerospace power in Integrated Ops, essentially in the Indian context. The cause and nature of conflict will be examined, followed by the technological imperatives needed for effects-based operations and the transformation strategies in the revolution in military affairs (RMA). While the US has assumed the leadership role in current developments, these have had a profound impact on the manner in which aerospace power contributes to Integrated Ops. An attempt will also be made to highlight the associated challenges which encompass joint planning, including doctrinal, organisational, informational and technological issues.

CAUSE AND NATURE OF CONFLICTS

In the 21st century, the cause and nature of conflicts are expected to assume a more divisive character. It is quite evident that the world today is highly

interconnected and that any conflict has the potential to influence events far and wide. At the strategic level, the two areas of friction which may lead to regional instability and growing confrontation comprise the depletion of vital natural resources, i.e. fresh water and carbon-based fossil fuels. While the economies of the developed world continue to depend heavily on the uninterrupted supply of oil, the growing energy demands of the developing countries led by China and India (3.8 per cent annually), has added new competitors. Overall, the world's projected energy consumption from fossil fuels will increase by 63 per cent till 2020. As per the US Department of Energy in a 2005 analysis, it is claimed that peak oil (the point at which global oil production will reach its zenith and then begin to plummet) could be reached as early as 2016. Therefore, in addition to exploring alternative strategies for securing energy, a premium will also be

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placed on additional vulnerabilities in the storage, processing and oil supply chain. It follows, therefore, that the engines of industrialised military complexes which rely so heavily on power, nuclear energy and oil sources, would constitute high value target systems.

For a moment, take a look at the nature of conflict, which itself has undergone a major change. The days of total wars, including extensive mobilisations, etc, appear to be a thing of the past. The nuclear factor has emerged as the key factor – at least in our part of the world – and increased economic interdependence, world opinion, media activism, etc, have overall resulted in the transmutation of armed conflicts. In order to prevent the cascading effect of instability spilling over into the other regions of the world, we are most likely to witness wars which are limited in scope, time and space but prosecuted at high technological and yet higher intensity levels. It is here that aerospace power has the distinct advantage of speed and firepower which can be brought to bear in order to achieve a favourable end-state.

In a limited war scenario, determining the objectives and this end-state also

poses a dilemma. In the short time span available, are we looking for an outright victory or a favourable outcome or are we content in preserving the status quo? Perceptions too matter. For example, a military stand-off in a limited war between

a bigger and a small sized military force is likely to create the perception of the smaller force having won. Take the recent case of the Israeli-Hezbollah conflict in Lebanon. We have been informed of the outstanding performance of the Israeli Air Force in this short conflict. However, the perception, at least in the Middle East, is that the Hezbollah did not lose the war. And in this context, not losing against the most powerful military in the region amounts to winning the war! Thus, it is important to define the type of dominance required in such types of limited conflicts.

At the other end of the scale, 9/11 demonstrated perhaps more vividly than any other single event, the extent to which the world has changed in recent years. Gone are the days when wars took months to launch and years to prosecute. Today, our enemies operate not at the speed of armies and navies moving across a battlespace, but at the speed of information moving across cyberspace, cellphones and satellites. While terrorism *per se* is not new – in fact, we in India, have been dealing with this insidious phenomenon for at least the last 20 years – the nature of the threat has changed dramatically and it has now assumed a global dimension. If we were to include the proliferation of weapons of mass destruction and the ability of states and non-state actors to covertly support these groups, then we collectively face a very serious threat indeed. And the real danger is in the perceived asymmetry which has been created by this new phenomenon. To this old problem has been added a new twist: the growing probability of attacks by “super-empowered individuals,” (e.g. terrorists armed with nuclear, radiological and biological weapons of mass destruction), who are not vulnerable to conventional modes of retaliation and effective deterrence. In asymmetric and state versus non-state conflicts, the focus is on surprise, manoeuvre and psychological attrition and demands a different collection of tools for success.

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While the future always appears uncertain, overall our more capable militaries must contribute to preserving security and stability in a fractured environment which is characterised by diverse and non-conventional challenges. It is for this reason that we have chosen to gradually move away and reorientate our defence strategy which basically addressed short-term dangers based on “threats” towards a capabilities-based planning to meet the long-term threats. In this process, the uncertainty factor is taken out of the equation and the forces are structured to meet both short and long-term contingencies. This issue will be subsequently examined in greater detail.

REVOLUTION IN MILITARY AFFAIRS AND TRANSFORMATION

Earlier, a mention was made of the profound changes which have taken place during the last 20 years in the development and application of air power. These changes came about as a direct result of the integration of new operational concepts and doctrine with technology, including a new strategy which advocated an “effects-based approach.” But before the validity of this new approach is examined, it would be relevant to note the background which necessitated this change. It may be recalled that historically, most independent air forces grew out of the need to support land and sea operations. Thus, a measure of an air force’s effectiveness – a la ‘jointness’ – was gauged from the number of sorties per day which could be apportioned to support ground operations instead of the direct effect that air power could deliver on the battlefield.

The principles of “mass and destructive power” which were truly reflective of the “attrition and annihilation” type of warfare being conducted by the ground forces also became the rallying point for air power theorists. How else does one explain the rationale for the 1,000 aircraft mass bombing raids over Germany in World War II? This type of linear or sequential warfare, where destruction of the enemy’s armed forces became the prime strategic objective, formed the basis of this strategy since it involved a gradual progression towards the enemy’s centre of gravity in a sequential nature. As a result, in the earlier air campaigns, air power was applied sequentially to first neutralise the enemy air defences i.e. radars, surface-to-air missiles (SAM) sites, airfields, etc before attacking targets of highest

value. At the same time, the battle for achieving “air superiority” or for creating a favourable air situation came to be viewed by the ground forces as a private campaign of the air force and its reluctance to support the ground forces in the joint battle.

In our assessment, this model is still very much a part of the operational plans of a number of armed forces which perhaps do not have access to high-end technology. There are three other possible reasons for this as well – the first is that the levels of technology before the 1990s did not provide precision in weapons delivery and, therefore,

the relevance of mass raids. Secondly, as the potency of enemy air defences increased, so did the number of resources to suppress these. And, lastly, there was the lack of an operational level concept for conducting effects-based warfare. Overall, therefore, technology has become the key **enabler** which has altered the dynamics of linearity, thereby providing us with a different or a non-linear approach; or as the United States Air Force (USAF) terms it, as “parallel war”.

Recent air operations bear testimony to the fact that once the focus shifted from force-on-force to an “effects-based strategy” then it was possible to achieve similar or better results with fewer resources. More importantly, the nature of parallel war exploited the three dimensions of time, space and levels of war to achieve the aim of rapid dominance. The constraints of geographical space no longer remain a limitation and the various levels of war i.e. strategic, operational and tactical are merged into one seamless entity since all the types and levels of targets can be struck simultaneously. During Desert Storm for example, over 50 targets were on the master attack plan within the first 90 minutes and 150 separate targets were designated for attack during the first 24 hours. As Jeffery Mektirick observed, **“By the year 2020, it is not out of the realm of possibility that as many as 500 strategically important targets would**

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be struck in the first minute of the campaign – representing a 5000-fold increase over Desert Storm capabilities.”

But none of this would have been made possible without developments in precision – in both navigation and weapon accuracy. The current precision munitions offer exceptional accuracy and their fusion with other sensors and satellite information has resulted in much higher assurance levels, thereby, drastically reducing over the target requirement (OTR).

It was the Israeli Air Force which first laid the foundation of this new “revolution” in military affairs or RMA during the Bekaa Valley campaign (which lasted only four days) in the early 1980s. This was followed by the US led Allies in the Gulf War in 1990 and in Op Enduring Freedom in the Afghanistan campaign. By basically using lesser resources and compressing what is often called the “kill chain” i.e. detect, decide, attack and access, this revolutionary change further enhanced the impact of air power during integrated operations. This radical change was best exemplified during Op Desert Storm in 1990, when over 80 per cent of the bombs dropped were on pre-determined targets. A comparison just 15 years later with Op Enduring Freedom reveals that over 80 per cent of the targetting information was provided to attack aircraft in the air – a perfect example of the speed of technology and networking information from sensors on the ground to the shooters in flight. Above all, this new concept maximised the application of air power on an effects-based approach, where no target – howsoever difficult to attack – could stay out of reach of the power dominating the battlespace. More importantly, this new strategy shifted the focus from the “means” to the ends or the “effects” which now received the highest priority.

Considering its overall promise, RMA in recent years has given way to “transformation” as the guiding rationale for most developments in the leading air forces. But then, what exactly does “transformation” mean? A quick reference to the *Oxford Dictionary* states that to transform is to make considerable change in the form, character or disposition. Please note: the emphasis is on the word “considerable,” which in our context is the major change that is being sought. Here one is reminded of Prime Minister Manmohan Singh’s recent statement in Parliament while debating the Indo-US nuclear deal when he said that, “...in

this 21st century we are assured of only one constant factor and that is change."

Well, in this air power debate, it is technology which constitutes the nucleus and which continues to produce the

dramatic changes. It is also relevant to note that while technology has been exploited in respect of improved airborne sensors, precision weapons, platforms (manned and unmanned), space-based assets and higher computation capability, the major change has also been ushered in by fielding centrally controlled network systems.

"...in this 21st century we are assured of only one constant factor and that is change."

NETWORK-CENTRIC OPERATIONS

Potential

The goal of network-centric operations (NCO) is to enable forces to accomplish their objectives more efficiently with greater situational awareness all round; with lesser forces and with fewer weapons. It is really the answer to relay accurate and timely intelligence for speedy decision-making by the commanders in the field. Put simply – you remain two steps ahead in the game.

Operational Challenges

Notwithstanding the reach of technology and the success achieved in what may be termed as a one-sided war in Afghanistan and Iraq, NCO has also revealed certain shortcomings. Perhaps the biggest challenge of network-centric warfare is that while senior commanders get flooded with information which may lead to micromanaging operations, the junior commanders either get very little information or receive it late or not at all. The other factors which compound the problem are glitches in technology gaps or inadequate training.

Technological Challenges

Two technological limitations also need to be noted. Firstly, bandwidth is the information lifeblood of any network and NCO rapidly eats up signal

bandwidth. As demands for information continue to grow, NCO will constantly require more and more bandwidth. This implies that there would be a premium on managing bandwidth more efficiently and for installing command and control systems that are better able to prioritise and sequence the flow of data. Secondly, sensors which are the starting point of any network, will always be susceptible to jamming. And as technological options increase, the network themselves may be attacked. Lastly, while NCO speeds up the entire kill cycle, its greatest weakness is its inability to distinguish between friend and foe. The answer, therefore, is to create networks which are tough, flexible and with adequate redundancy.

Technology as the key force multiplier is already providing solutions to some of these problems. Take the case of the high data transfer rates and advances in data compression algorithms; these offer tremendous improvements. The demands will also reduce when we fuse the various sensor data. In any case, optical wavelengths offer almost unlimited bandwidth and when we can use a laser or a fibre optic link, the bandwidth problem is virtually non-existent. In

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future, networks will present options that will enable us to shape the strategic environment well before the opening shot is fired, thereby implying that doctrinal changes will struggle to keep pace with the fast unfolding events.

ANALYSIS

An analysis of all that has been stated so far indicates that aerospace power has gradually evolved with the maturing of technologies to meet the requirements of speed, accuracy, lethality and ability to strike targets with precision over long ranges and across large geographical areas. By these attributes it has become the prime instrument for preemption, coercion and deterrence strategies. Besides enhancing the capabilities of land and naval forces, aerospace power also has an

independent capability to dominate hostile military power across a broad spectrum of threats and scenarios. Viewed in the larger context of national defence strategy, the integration of aerospace capability with the land and naval forces has resulted in maximising the effects of military power – so vital for the 21st century battlefield.

INTEGRATED OPS IN 21ST CENTURY

Type of Integration

As history has amply demonstrated, while land, sea and aerospace forces have their unique strengths, neither can guarantee the country's security alone. At the national level, there is a requirement to harness all elements of national power by integrating and coordinating the efforts of the Services, MOD and other security agencies with the work of others. The challenge of integrated operations is to build trust, synergy and momentum in realising national security objectives, but the devil is in the details, and efforts to complement and strengthen other elements of national power depend on leadership, inter-agency relationships and reliable avenues for communication. It is for this reason that wars in the last two decades have witnessed an increased emphasis on "Joint Ops."

The Indian Experience

The historical record in the Indian context has produced somewhat mixed results: the IAF effort to airlift the 1 SIKH Infantry battalion into the Kashmir Valley in October 1947 and its continued support in the Leh and Poonch sectors proved to be crucial in preserving the status quo of Jammu and Kashmir (J&K), as it exists today. We also believe that the course of the Sino-Indian War of 1962 would have taken a different turn if the combat potential of the air force had been applied in this short conflict. Following the 1965 Indo-Pak conflict, the credit needs to be given largely to the efforts of our former Chief of the Air Staff (CAS), Air Chief Marshal P.C. Lal, who laid the foundation of sound Joint Ops planning and execution. The result of the restructuring and establishment of mechanisms to facilitate inter-Service cooperation proved their mettle six years later during the Indo-Pak conflict in 1971, following which, Bangladesh was created.

Concept of Jointness

There is no doubt that despite all the asymmetries, future wars will require ground forces and “boots on the ground;” however, aerospace power will continue to have decisive importance for operational success. While our joint structures have stood the test of time, there is a need to recognise that in the uncertain future of tomorrow,

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the meaning of “jointness” is not the equal or mandatory use of each Service in every conflict situation. Quite often, it is misinterpreted as “allocations to each Service” rather than an integration of each Service’s capabilities. This leads to a situation similar to a game of hockey, where every player in the team gets to play in all the league matches! This is the wrong kind of jointness which leads to inefficiency and

wastage. The objective here is to recognise the unique capabilities of each arm and Service and to integrate the strengths of each Service for producing the desired synergy. So jointness is a means for ensuring success, and not an end by itself.

Challenges

From this it follows that lack of understanding and respect of the other partners’ capabilities, strengths and weaknesses leads to erosion of trust and confidence. Petty issues take centre-stage and are blown out of proportion while the basic lack of confidence feeds on the peripheral issues. The “what’s in it for me” syndrome, the desire to hog the limelight and turf battles are all time-tested but perennial problem areas. Our humble experience in this “jointness” game leads us to believe that as long as the commanders at the top agree – and even agree to disagree – and understand the overriding importance of the mission and have confidence in their ability to deliver – the others down the line simply follow suit. Therefore, lack of jointness, if any, in Service organisations can invariably be attributed to leadership issues all round. There are, however, ways and means to overcome some of these problems.

JOINT OPS

Need for Specialisation

In the Indian context, there is a requirement for other agencies and organisations to appreciate the unique and independent role of the specialist organisations. Here a reference is being made to the professional character and war-fighting ethos of the army, navy and air force which, in turn, gets reflected in the capabilities of the commands and field formations. Considering the nature of the threat and the operations envisaged, the three Services would have to bring to the table their unique specialisation and expertise for conducting effective joint operations. And on this subject, an interesting observation needs to be noted. Our experience indicates that of the three specialisations in land, sea and air warfare, the biggest tragedy is that the maximum awareness (or, to use a diplomatic word, "wisdom"), pertains to the land forces or land warfare and the least to air warfare. There is a historical reason for this imbalance, given air power's late entry in this warfare domain. As a result, in joint formulations, there is a tendency to template land warfare theories which are then superimposed over air power applications, leading to misplaced notions of jointmanship and misutilisation of combat assets. The bottom line is: **"You don't have to own an asset to exploit it."** While joint training and doctrine would assist in effective integration, the syndrome of "under command" and Service seniority, etc, would need to be replaced by a coordinating tasking mechanism with clearly defined command and control and functional responsibilities.

Joint Planning

The three Services have indeed made considerable progress in this area and the first step has been the renewed focus on "Planning for Joint Ops". It has even been suggested during earlier discussions that the term "Planning for Joint Operations" needs to be replaced by "Joint Planning for Operations". This is not a case of mere semantics only since the issues are complex

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and Joint Staff needs to be not only involved in the planning process but also accountable as well to see that their plans actually work on the ground. Given the complex nature of integrated operations where a large number of inputs are processed, it is recommended that a centralised mechanism be established for overseeing the planning and coordination aspects for the main, as also for the contingency plans. This factor becomes highly relevant in conventional, unconventional and limited conflict scenarios, especially when it is accompanied with a nuclear overhang situation. It is encouraging to note that the planning process has begun to take shape in the recently formed Integrated Defence Staff (IDS) HQ under the aegis of the Chairman Chiefs of Staff Committee (COSC) and as a first step, a host of contingency planning options have been examined and finalised.

Centralised Planning and Decentralised Execution

The emphasis in this entire process is not only on centralised planning but on decentralised execution as well. These aspects are two sides of the same coin. It needs to be emphasised that the focus has to remain on decentralised execution since it serves to "encourage disciplined initiative" and improves "situational responsiveness." Our entire system of training aims to develop air crew with the ability to take stock of the existing tactical situation and execute their mission. Centralised execution, on the contrary, amounts to micro management and is counter-productive. This is particularly relevant today when modern technology enables a commander to have access to large volumes of information and data. It is strongly recommended that commanders should remain focussed on high-level issues and avoid delving into mundane technical details.

Unity of Command

When we plan to integrate the potential of aerospace power with other components, the aspect of unity of command and indivisibility of air power needs to be preserved at all costs. This will ensure that our assets – and in turn – our capabilities are not parcelled out in small packets but retained as a composite whole with clearly defined chain of command and functional responsibilities. This

aspect assumes added significance in the light of the meagre resources, competing demands and increased expectations of each Service. It is equally important that all these endeavours are guided by a joint doctrine for war.

Joint Doctrine

The last six decades have seen the Indian armed forces being engaged in at least four major conflicts, with an ongoing undeclared war with Pakistani troops in the Siachen Glacier – the highest battlefield in the world. While each Service has its doctrine, the Joint Doctrine for war has been published only as recently as May 2006. We are in agreement that a joint doctrine should be embedded in the heart of warfare since it represents our centralised belief in joint operations. This document should now be the guiding beacon to show the way ahead, with necessary emphasis on joint application of military power in various scenarios in addition to data and communication integration, decision support systems, intelligence collection and dissemination and space-based assets for facilitating joint operations. More importantly, this doctrine should define how the joint plans are evolved around a common objective. In this context, there are two issues which need to be highlighted: joint targetting and joint training.

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Joint Targetting

Earlier the benefits of effects-based operations and exploitation of technologies to execute precision strikes were discussed. Having achieved a very high level of battlefield transparency with satellite imageries, recce and unmanned aerial vehicles (UAV) assets, it is possible now to undertake these missions with precision weapons. In other words, **“Air power is Targetting and Targetting is Intelligence.”** This constitutes the core competency for a joint targetting philosophy. In order to derive benefits from this force multiplier effect, there is a requirement to formulate a joint targetting philosophy which would involve detailed planning in order to prioritise the targets list, identify designation and

weapon options and thereafter leave the execution options to the Service which is best optimised for delivering precision strikes i.e. the air force.

Joint Training

It goes without saying that joint and collective training goes a long way towards enforcing our belief in each other's capabilities, and respecting the limitations. The joint training dilemma can be best explained as ... **"The problem is they don't know what they don't know; then don't know how to use it effectively when they do!"** It is only during peace-time that we can resolve issues related to a common communication protocol, fire support and coordination drills, defence suppression and intelligence sharing. It is also the period when the interoperable needs of each Service are identified and converted into employment tools.

INTEGRATED OPS

Joint Level

It may be recalled that earlier the term "Integrated Operations" was advocated in the context of involving the IAF and all other non-IAF organisations. This integration is visualised at the functional or the joint level with the other Services i.e. the army and the navy; and as a result of this initiative, two integrated commands: the Strategic Forces Command (SFC) and the Andaman and Nicobar Command (ANC) have been recently established. The next level is at the multi-agency level involving the Services and other quasi-military and non-military and joint security agencies. Developing aerospace capabilities to support internal security and disaster relief operations would come under this category.

Capabilities for Internal Security and Disaster Relief

We have recognised the need for integrating air power capabilities not only with the other Services, but also with the other organs of the state. Here a reference is being made to the peculiar internal security requirements of the country which *inter-alia* involve the Ministries of Defence, Home, Civil Aviation, etc. There have been a number of occasions where members or units of these agencies operate in conjunction with or under the armed forces, especially when involved in internal

security operations, in disaster relief and under the UN flag. While doing so, it is inevitable that command and control functions and tasking will need to be reassigned based on the agency or Service best capable of executing the task at hand. In the recent past, Joint Planning Staff have apportioned a higher level of roles and missions to the Air Staff, indicating a greater level of awareness and realisation of air power's potential.

Multi-National Integration

Finally, we are seeking an integration at the multi-national level where we identify common grounds of defence cooperation and mutuality of interests with other foreign partners. On this point, it needs to be emphasised that when we examine the changing world order and globalised economy from our strategic perspective in this age of balance of power system which includes the US, Europe, China, Japan, Russia and possibly India, the economic progress of India is not viewed as a threat but as a possible engine of growth in the world economy and polity. The need, therefore, for an inter-disciplinary integration at the multi-national level with shared common areas of security concern is inescapable. The IAF is presently in the midst of an extensive modernisation programme and in due course, we would be better placed to deal with the entire spectrum of threats. Our refueller force has not only been operationalised but is being further expanded, thereby, giving us more options and global reach. We are integrating with the other Services to deal with limited out of area contingencies and are closely examining the exploitation of space-based resources for enhancing technical intelligence.

INTELLIGENCE AND INTEGRATED OPS

The lessons of the Kargil conflict in 1999 have had a reenergising effect on our intelligence apparatus and these have undergone a major transformation. Apart from creating new structures at the national level, including the Defence Intelligence Agency at the Services level, there has been an increased emphasis on TECHINT (technical intelligence) and use of aerospace to enhance command, control, communications, computers, information, intelligence (C4I2) functions.

We are presently in the process of integrating and fusing some of the sensors and imaging data which will assist the three Services in speeding up the decision cycle. At the national level, an attempt is being made to achieve complete self-reliance in design and manufacture of space-borne sensors. India is amongst the few countries that has displayed its capability to launch satellites with high resolution imaging sensors. The successful launch of the Cartosat-1 and Cartosat-2 series of satellites provides us with this unique capability. A greater interaction is also being sought with the Department of Space and the Indian Space Research Organisation (ISRO) in a wide range of activities since the space domain is most useful for tri-Service application.

FORCE STRUCTURES AND DEVELOPMENT PLAN

Inevitably, the question of integration revolves around the type of structures or methodology to be adopted in the Indian context. Basically, three types of approach are suggested. The first is a bottoms up approach involving the Services at the lowest level, with joint training, joint intelligence and joint planning at the operational level. The second is the top down approach which advocates creating force structures and a Defence Capability Plan based on a common joint doctrine. We are perhaps following the third approach where both processes are being applied simultaneously.

Force Levels

There have been suggestions that the induction of force multipliers and modernisation of the armed forces when balanced against shrinking defence

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budgets and rising costs of defence should lead to reduction in combat force levels. While some cuts and downsizing may become inevitable in respect of units and formations which are bulky and unwieldy, historical experience indicates that force structures should be driven by strategic requirements and the need to acquire a

given set of capabilities. This aspect becomes crucial in a joint scenario, especially when some capabilities are dual-based, with one Service complementing the role of the other.

Capability-Based Approach

If India, and indeed, its armed forces are given the opportunity to exploit the technologies available – both from within the country and outside – then it is imperative that we adopt a capability-based approach. This is easier said than done as traditionally we are more comfortable dealing with numbers, force levels, force ratios, etc. While these will still be relevant, the focus will have to shift to acquiring critical technologies in increments to achieve a desired capability level. It is recommended that this approach be supported by the three pillars of capability-based planning, management and production. The first stage would identify the environment, the various contingencies, the existing joint doctrine and the capabilities that need to be created. The second stage would address the capability gaps that need to be narrowed from existing force levels and structures, including interoperability of platforms, communication protocols and resources management. The production stage would aim to close the loop by ensuring that indigenous research and development (R&D) and foreign production agencies actually result in the three Services acquiring the given set of capabilities. The Defence Capability Plan needs to be developed on the basis of through-life costing estimates which should cover not only the initial capital investment but also personnel, operating, support and upgrade costs. This entire process would then need to be integrated with the Five-Year Plan periods and resources allocated accordingly.

Technological Experimentation Process

Considerable progress has been made by the IDS HQ which has become a key agency along with the Services, for formulating the Defence Capability Plan and the Long-Term Integrated Procurement Plan for capital acquisitions. While to the outside world we may appear to be making haste slowly in the procurement process, what is needed is an integrated long-term development plan for each

Service, based on the technologies that need to be inducted. While doing so, we need to thoroughly examine existing programmes and projects and take bold decisions to involve an experimentation process. This technological experimentation offers the three Services an opportunity to identify innovative solutions for acquiring future capabilities. We will have to make valued judgements and take some calculated risks, if need be, since there is a big gap between current force capabilities and where we want to reach in the next 15-20 years. Our acquisition programmes need to have the in-built flexibility to include innovation into new programmes and to absorb technological developments rapidly. Past experience also indicates that in large and complex programmes, there are high risks of costs and time overruns leading to technological obsolescence. These can be easily avoided to include incremental technology insertion into these programmes with a promise that aerospace capabilities are delivered with the potential for future growth. This would require a close integration with indigenous R&D organisation, industry, Ministries of Defence and Finance as also transfer of technology and tie-ups with capable foreign players, strictly on a need-based approach. In all these endeavours, the user and the industry have to be closely involved with clear guidelines on responsibility and accountability – at the functional as also at the management level.

CONCLUSION

It is always a risky business to forecast future trends in the application of aerospace power to fulfill the need for integrated operations. But in spite of the uncertain international environment, there are a few fundamental views that stand out glaringly. The first is that military forces will continue to be employed against conventional and non-conventional threats, though the nature of conflicts is expected to remain limited in scope and content. Second, there is nothing new or novel in the idea of air power application to deal with asymmetric threats – after all, we have been doing so for the past 60 years at least; the prospect of precision strikes over long ranges by air and naval forces has altered the dynamics of deterrence at the conventional level. From this it

follows that air power will assume increased importance in the years ahead and constitute the instrument of choice for not only conventional deterrence but also for coercive diplomatic strategies. This aspect has not been lost sight of by some of the neighbouring countries in our region where greater momentum has been imparted towards modernising their air forces.

Air power will assume increased importance in the years ahead and constitute the instrument of choice for not only conventional deterrence but also for coercive diplomatic strategies.

Third, technological developments will provide new opportunities to both sides; the key issue is that the side which exploits this unique capability first to achieve a favourable asymmetry will succeed in dominating the battlespace. But technology by itself is not the panacea for all evils; it has to be matched by new processes, new structures – especially if the old ones have outlived their life; new thinking, and more importantly, thinking out of the box. The effects-based approach and transformation in RMA contribute to these new processes and will constitute the bedrock of a number of air forces' future developmental plans.

In the context of aerospace power application in the Indian subcontinent, this integration is visualised with the other levers of power at three different levels. The basic level is at the joint level with the other Services, moving up to the multi-agency level with other government ministries and civil organisations and, finally, integration at the multi-national level in mutual partnerships and cooperative endeavours dictated primarily by national interests and security objectives. While we are engaged in these various processes at different levels, the basic tenets of aerospace power like unity of command, centralised joint planning with decentralised execution and indivisibility of air power assets should not be lost sight of.

We also recognise that each of the armed forces has a specialised role while operating individually or in concert with the others. There would be reassignment of tasks and functional responsibilities based on the capabilities and the operational requirements. In this joint warfare scenario, we expect that aerospace power will

The major lesson learnt from all previous operations is that our capability is derived from our people, regardless of our reliance on technology. It's all about effective leadership.

provide the necessary synergy and momentum provided we have access to vital joint intelligence inputs and have developed the necessary understanding based on years of joint training and a common war-fighting doctrine. While each country will establish structures based on its needs and security challenges, it is suggested that a long-term capability-based approach be adopted. This will ensure that the integration of emerging

aerospace technologies with the desired capabilities is achieved optimally in the shortest time possible.

Finally, the major lesson learnt from all previous operations is that our capability is derived from our people, regardless of our reliance on technology. It's all about effective leadership. And as we gratefully acknowledge the leadership role and contribution of the early pioneers, who 75 years ago defined the future role of the IAF, it is hoped that we in some small measure would be able to fulfill that promise not only for this but also for our future generations.

STRATEGIC ROLES OF AIR POWER: THINK, PLAN, EQUIP AND TRAIN FOR IT

A.S. BAHAL

Conflict is endemic to human nature and as Plato had once said, "Only the dead have seen the end of war." Preparing for conflicts is, therefore, the best deterrence against potential threats. The likely threats to India's national security comprise widespread poverty, environmental degradation, hostile neighbours, terrorism, Maoist movements and the need to provide a secure environment to allow the Indian economy to flower. Added to this multiplicity of threats is the likely short duration of conflicts that necessitates the requirement to quickly attain campaign objectives whilst operating under perceived nuclear thresholds. Hence, it entails the conduct of war shifting from a tactical focus orientation to creating such strategic influence quickly that it forces the enemy to make the desired concessions in a short duration of time. Air power, with its unique ability to attack the enemy's crucial vulnerabilities in depth, creates possibilities to achieve quick strategic influence. Whilst the land forces must defeat the enemy's military before achieving the desired strategic effect, it is air power that is capable of achieving it swiftly and independently.

EVOLUTION OF STRATEGIC AIR POWER

In the late 19th century, Major Fullerton, a British Army officer, prophesied that "the impact of aeronautics had sowed as great a revolution in the art of war as the discovery of gun powder." In June-July 1917, the German Gotha bombers attacked London. Though the physical damage was less, its psychological impact

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was such that Britain soon established a strategic bombing unit in France known as "Independent Force" to conduct reprisal raids against the German heartland¹. In November 1918, Major Gorell evolved the first Strategic Development Plan in which he recommended dropping aerial bombs on commercial and industrial centres and lines of communications, thereby giving birth to the concept of employing air power independently to achieve the strategic effect.

Two classical theorists, Douhet and Billy Mitchel, were strong proponents of strategic bombing. Douhet in his book *Command of the Air*, highlighted that the

By 1930, the US Air Corps had developed a doctrine based on the belief that air power alone could achieve victory by breaking the enemy's will and capability to fight.

enemy's population centres and industrial complexes should be attacked to instill fear and panic, and air power's effect would then be so disruptive and destructive that it would make the enemy sue for peace. He even recommended the use of high incendiary, high explosive and chemical weapons. By 1930, the US Air Corps had developed a doctrine based on the belief that air power alone could achieve victory by breaking the enemy's will and capability to fight.

The Germans in World War II used the *Blitzkrieg* doctrine to create such wide scale spatial dynamism that they rapidly overran France and pushed British forces out of Dunkirk. It was only due to their inability to achieve control of the air in the Battle of Britain that their plans of invading England were shelved. After America entered the war in December 1941, their industrial capacity gave the Allies the potential to mount a Strategic Air Campaign. The Casablanca Directive issued in January 1943, tasked the Allied forces in England with the progressive destruction of the German military, industrial and economic systems and undermining the morale of the German people to the point where their capacity for armed resistance was fatally weakened². The employment of nuclear weapons in Japan seemed to prove Douhet's assertion of air power's decisive effect. It also brought in the

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1. Air Commodore (Retd) Jamal Hussain discusses the development of air power as a force, accessed from www.defencejournal.com/2001/November/evolution.htm.
 2. The Combined Bomber Offensive Progress Report, February 4 - November 1, 1943, US Air Force Historical Research Agency file No. 520.318 Frames 1196-1297, Appendix A.

concept of strategic deterrence when both sides possessed nuclear weapons and of strategic coercion when one side possessed it and the other did not.

The emphasis during the Cold War was on nuclear balance and strategic bombing was linked to this balance, thereby creating fears that it could be the critical mass that could trigger a nuclear exchange. This led to the development of nuclear bombers and high altitude interceptors. The major post-Cold War innovations were stealth, precision, extended reach, night sensors and computing power. Leadership now became a viable target³. A significant shift also took place with the use of night empowering technology that prevented major surface manoeuvres at night. Whilst the short duration of modern wars left little time for the strategic effect to take place, the need to quickly create strategic influence, however, increased, especially whilst operating under nuclear thresholds. In the 1991 Gulf War, technology brought about a paradigm shift in the employment of air power. The enemy was treated as a target system and air power was used strategically to carry out parallel attacks on the enemy's key centres of gravity (COGs)⁴. In the Kosovo operations, air power was the only military instrument used coercively to achieve Coalition objectives. Air power's ability to create strategic effect quickly without transcending territories on the ground made it a primary instrument of choice in modern warfare.

STRATEGIC DEVELOPMENT OF THE INDIAN AIR FORCE (IAF)

No. 1 Squadron of the IAF was formed at Drigh Road Karachi on April 1, 1933. It was designated as the "Army Cooperation Squadron." In World War II, the strength of the IAF was increased from one to nine squadrons. All squadrons were assigned the "Army Cooperation Role." At no stage did the British envisage a strategic role for the Indian Air Force. However, the IAF was instrumental in creating strategic effect by blocking the advance of the Japanese Army in Burma. In recognition of the crucial role played by the IAF, King George VI conferred it the prefix "Royal" in 1945. This prefix was dropped in 1950.⁵

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3. Thomas Keaney, "Air Power :What a Difference a Decade Makes," in Security Studies Programme Seminar.
 4. Talk given by Air Marshal Mehra, AOC-in-C South Western Air Command at College of Air Warfare on September 29, 2006, whilst highlighting evolution of air power and its doctrinal principles.
 5. Information has been obtained from Internet website [http:// www.answers.com/topic/Indianairforce](http://www.answers.com/topic/Indianairforce).

The IAF was put to test soon after independence when the Pathan tribesmen aided by the Pakistani forces invaded Kashmir. IAF Dakotas airlifted troops to Srinagar, Leh and Poonch and provided crucial support to the Indian Army in pushing the invaders out of these areas. This action saved not just Srinagar but two-thirds of Kashmir. In 1962, the IAF provided vital logistic support to the Indian soldiers fighting in some of the most inhospitable terrains. The decision not to use air power in combat operations was based on highly exaggerated fears of the perceived Chinese threat to the Indian cities (the People's Liberation Army Air Force (PLAAF) was virtually grounded due shortage of spares) and the feeling that the Chinese Air Force would interfere with the IAF transport operations on which the Indian Army was critically dependent. This was the only war where the IAF was not used and it was the only time our nation suffered humiliation post-independence. It was after the 1962 debacle that force levels and all round capabilities of the Indian Air Force were significantly enhanced.

On September 1, 1965, the Pakistani armour made rapid advances towards Akhnur. The Indian Army was caught unprepared and requested for urgent air support late in the day. Despite losing four Vampires, the IAF continued to attack the advancing armour and caused a strategic pause. One of the major roles of the IAF during this war was to keep the Pakistani Army's mobile artillery and tank divisions in check and the results of the IAF operations contributed to Pakistan suffering one of the largest tank losses in modern history.⁶

In the 1971 Indo-Pak War, the Pakistani armour and infantry moved towards Longewala. The Indian border outpost was manned by only one company. The IAF provided vital close support and 37 out of the 45 tanks were destroyed or damaged. This prevented a major loss of territory in the desert sector. A tactical action by the IAF resulted in creating a significant strategic effect. In East Pakistan too, within the first two weeks, the IAF carried out more than 4,000 sorties and provided vital air cover to the rapidly advancing Indian Army. The IAF also assisted the Indian Navy in sinking several Pakistani naval vessels in the Bay of Bengal. The attack on the governor's house at Dhaka targetted the

6. Ibid.

focal point of the enemy's COG, viz his leadership, and created such strategic effect that the entire Cabinet resigned even though around 93,000 Pakistani troops were available for the defence of Dhaka. Thereby, clearly indicating that tactical actions by air power have significant strategic influence. On May 26, 1999, air operations in Kargil commenced with a proviso to stay on own side of the LoC (Line of Control). Regardless of losing one MiG-21, one MiG-27 and one Mi-17 helicopter, the IAF, with the help of the global positioning system (GPS), precision weapons and innovative tactics proved to be a decisive force in evicting the invaders.

Air Chief Marshal S.P. Tyagi, in a media interview, has recently indicated that India's strategic boundaries have been redefined by its growing energy needs and participation in disaster management operations. The current scenario, therefore, necessitates a strategic reach to safeguard our national interests.⁷ Recently, India developed an airbase, located 80 km from Dushanbe, the capital of Tajikistan. The agreement between the two countries stipulates the presence of the IAF and the Indian Army to ward off threats to Tajikistan's security⁸. Given the IAF's existing air power assets, its recent acquisition of force multipliers and its increasingly dominant role in the region, it is no longer seen as a tactical support arm to the army but as a strategic partner.

STRATEGIC ROLES : RELATIONSHIP WITH FACTORS AFFECTING STRATEGIC APPROACH

Meaning of Strategic Roles

Most dictionaries define strategy as "a long-term plan or policy" or "art of moving troops, ships, aircraft, etc into a favourable position." The word strategy has been derived from the word "strategos" meaning "a general". On the other hand, the word strategic is defined as "of or promoting strategy" and "essential in war for use as a long-term military objective." From these definitions, it can be clearly discerned that in warfare, **any role of a military that targets the**

7. Information obtained from <http://www.defenseindustrydaily.com/2006/02indias-air-force-looks-to-enhance-its-reach-with-upgrades-force-multipliers-index.php>

8. Information obtained from <http://en.wikipedia.org/wolo/Farkhor-Air-Base>.

Those roles of an air power that directly create the desired strategic influence or directly impact the strategic dimension of war or whose effects create strategic outcomes.

opponent's strategy directly or attacks the means employed at the national level to put their strategy into action could be termed "strategic." In other words, those roles of air power that directly create the desired strategic influence or directly impact the strategic dimension of war or whose effects create strategic outcomes.

Strategic Level of War and Strategic Attack

The strategic level of war could be defined as "the level at which a nation identifies the national security policy and objectives and develops and utilises the national resources to accomplish these objectives." The strategic level deals with the overall conduct of war and involves those critical capabilities that form elements of national power. At this level, the desired effect would always be to impose the will of one nation over the other. The critical capabilities at the strategic level include moral strength, leadership, economic and technological strengths and the armed forces. Consequently, an objective sought that has an effect on the war as a whole determines if an attack is strategic⁹.

Strategic Dimensions of War and Their Link With Air Power

J.F.C. Fuller in "The Foundations of the Science of War" has identified three spheres of wars: physical, mental and moral. The physical is related to the fighting power or the means to fight, the mental to the thinking power and the moral to the staying power¹⁰ or ability to get people to fight. Concentrated attacks on the physical aspect would normally lead to concentrating mass or firepower on the enemy's fielded forces in an annihilation or attrition strategy. Focussing on the mental aspects would directly affect the strategy itself. On the other hand, the moral dimension is the one that provides the will to continue with the conflict

9. This definition given in the US manual was obtained from Mark J. Conversino's article, "The Changed Nature of Strategic Air Attack," *Parameters*, Winter 1997-98, pp. 28-41.

10. David S. Fadok, thesis presented to the Faculty of the School for Advanced Air Power Studies on "John Boyd and John Warden." *Air Power's Quest for Strategic Paralysis*, June 1994, available on www.fas.org/man/eprint/index.html.

and acts as a stimulant to enhance the war effort. It is at this level that coercion in any form could make the enemy succumb to our will. Ideally, one should target that part of the physical element that creates the maximum coercive effect at the moral dimension. Simultaneously, the mental element should be significantly degraded to break the enemy's ability to put his strategy into action. An optimum combination of attack on all these spheres could help win a war in the most cost-effective fashion.¹¹

The mental dimension itself constitutes two sub-elements, viz, intellectual and physical. Intellectual includes the leader's mind, the strategy devised and the ability of the opponent to put his strategy into practice, whilst, the physical part includes leaders themselves, command and control structures and communication nodes and links. It is at the intellectual level that fog, friction and deception measures could be employed. At the physical level of the mental dimension, targetting the enemy's leadership, command and control structures and communication nodes would break the cohesiveness and integrity of a fighting force. A combination of both these measures could lead to mental disorientation, thereby, causing a strong coercive effect at the moral level.

Air power has the unique capability to target all the three spheres of wars simultaneously, thereby, creating the desired strategic influence much faster than land or naval power can do. Air power is inherently strategic in nature and its tactical application would only fritter away its prime advantage of creating strategic effects.

Incidentally, the strategic mindset existed throughout air power's evolution in the early 20th century. Its classical theorists did not focus on individual target systems but aimed at collapsing the entire state that included the enemy's war-waging capability. They believed that winning all the tactical battles was of no consequence, if the

Air power has the unique capability to target all the three spheres of wars simultaneously, thereby, creating the desired strategic influence much faster than land or naval power can do.

11. Ibid.

desired strategic outcome was not achieved. The major limitation then was the inability of prevalent technology to provide the means to execute this strategy. However, with technological advancement, air power today provides such capabilities that link tactical actions to achieve strategic outcomes and this could prove crucial, especially in short duration wars.

Strategic Approach and its Relationship With Culture, History and Geography

Distinctive beliefs, values and assumptions constitute the strategic culture of a nation that exerts important influence on the formulation and execution of strategy¹². Its effect on air power doctrine could be to identify whether to focus on strategic bombing (Allies in World War II) or to apply it tactically (Goering's beliefs on employment of air power). The strategic mindset of the Americans in the latter half of the 20th century was mostly based on their culture, which till 9/11 did not really consider any substantial threat to their homeland and strategised employment of their forces far away from their shores. On the other hand, the IAF inherited its tactical culture from the British and this proved to be its bane in the 1965 Indo-Pak War, where it suffered large aircraft losses despite having significant numerical superiority. This tactical culture was also reflected in the type of aircraft and weapon systems that the IAF procured in the 1960s and 1970s.

History too plays a significant role in determining whether a nation follows a strategic or tactical approach. The daylight raids on London by Gotha bombers in June/July 1917 resulted in the creation of a separate strategic Service¹³. The century of national humiliation left a significant impact on the psyche of the Chinese leaders. It resulted in their following a strategy of isolation in the mid-20th century. Geography decides who our neighbours are and how they could exert strategic influence. A landlocked country such as Nepal would always be dependent on other nations to meet its strategic needs. In addition, geography plays an important role in the way warfare is conducted. India's geography is unique as it straddles some of the most important sea lanes in the world and yet the likely area of operations could cover all types of terrain, viz, mountains, hills, plains, forests, deserts, seas, etc.

12. Booth and Trood, eds, *Strategic Culture in the Asia-Pacific Region*, p.8; Jettcoat David, "Winning with Australian Air Power in Diverse Cultures," 2003, Aerospace Centre RAAF Base, Fairbairn, p13.

13. Jones, *The Beginnings of Strategic Air Power*, pp. 11-12, RAF formation and creation of a long range bomber force.

STRATEGIC ROLES OF AIR POWER

The most decisive victory is of no value if a nation is bled while gaining it. More potent and economical form of warfare is disarmament through paralysis rather than destruction through annihilation¹⁴.

- Liddel Hart

In the conduct of strategic art, it is always much easier and more cost-effective to trigger functional paralysis rather than implement an annihilation strategy based on destruction of the enemy's armed forces. The strategic roles in which air power could be employed are enumerated in the succeeding paragraphs.

Conflict Prevention

Prevention of war implies credible deterrence and if deterrence fails, then presence of sufficient offensive capability to give a befitting reply. The crucial strategic role of an air force is conflict prevention, primarily by possessing strategic deterrence capability. The threat implicit in deterrence must be credible

It is always much easier and more cost-effective to trigger functional paralysis rather than implement an annihilation strategy based on destruction of the enemy's armed forces.

to the opponent. Deterrence has a psychological element and, in addition to the availability of credible forces, can be strengthened by resolute policy, demonstrated military capability, the will to use force and a readiness to escalate should deterrence fail.¹⁵ The capabilities inherent in air power such as surveillance that detects hostile action in time, reach that attacks targets in depth, precision that provides discrimination, weapons that bring in lethality and rapid retribution that instills timeliness in response, provide it with enormous strategic deterrence capabilities. Further, when air power is employed even in a limited punitive role, it may not escalate the conflict in the same manner as the surface forces may do when employed for the same

14. Fadok, n.10.

15. Deterrence has been defined in this manner in AP 3000, "The Nature of Conflict."

purpose. The physical presence of infiltrators at Kargil, Dras and Batalik led to a full-fledged Indian response in May 1999.

Political Signalling

Air power's unique capability to provide persistent battlespace dominance with a judicious mix of inhabited and uninhabited platforms makes it an ideal military platform to send clear and unambiguous political signals to the enemy to prevent him from commencing or continuing with hostile activities. These signals could be delivered in the form of enhancing surveillance activities, increasing alert states and deploying offensive assets at operational locations.

Graduated Response

Gradualism is pre-planned increase in intensity of attacks over a period of time matching the response of the enemy. The aim is to bring the desired outcome at the lowest possible threshold of the enemy. The advantages of a graduated response include reducing unnecessary deaths, destruction, collateral damage and own casualties and not allowing the enemy to get into the last stage of do or die fighting spirit early on in the conflict spectrum. Air power is an ideal instrument to provide a graduated response as surface action inherently transcends territories. The IAF could be employed in a graduated manner if Pakistan sponsored terrorism doesn't reduce.

Strategic Coercion

It is a tool used to influence an opponent's decision-making calculus either to prevent a policy action from occurring (deterrence) or to force a policy change after execution (compellence)¹⁶. AP 3000 defines coercion as "the use of force, or threat of force to persuade an opponent to adopt a certain pattern of behaviour against his wishes." Coercive leverage comes from the enemy's expectation of more violence and anticipation of higher future damage. The characteristics of speed, flexibility, reach and lethality provide air power with wide ranging

16. John I. Pray Jr, "Coercive Air Strategy: Forcing a Bureaucratic Shift," accessed from www.fas.org/man/eprint/index.html

capabilities to undertake coercive tasks. This leverage could be brought about as was done by the British in the Northwest Frontier Province (NWFP) in the 1930s by causing severe shortages of essential commodities like food, water and energy resources. The initial operations of the Royal Air Force (RAF) were not successful against the Pathans and Afridi tribes. The RAF then bombed their water reservoirs and crops which subdued these violent tribes¹⁷.

Battlespace Dominance

The future battlefields are likely to be battlespaces that include land, sea, information and integrated air and space media. Air power with space-based assets could play a significant role in achieving battlespace dominance.

- (a) **Command of Air and Space.** Giulio Douhet in 1921 highlighted that “to conquer command of the air means victory; to be beaten in the air means defeat.” The only thing that prevented the invasion of Britain after the Germans rapidly occupied Poland and France was the inability of the Luftwaffe to achieve control of the air over British skies. In the 1965 Indo-Pak War, the IAF did not focus on air superiority, hence, lost more aircraft and the air war itself was a stalemate. Rapid developments in space surveillance, navigation, communication and anti-satellite (ASAT) technologies create an environment in which civil and military satellites would increasingly come under the risk of attack. In addition, due to proliferation of potent ballistic missiles, the area to defend has virtually expanded to space. Command of the air and space media would, therefore, prove to be crucial in achieving decisive advantage in future conflicts. There is a need for the IAF to acquire ballistic missile defence (BMD) systems and additional airborne
- The only thing that prevented the invasion of Britain after the Germans rapidly occupied Poland and France was the inability of the Luftwaffe to achieve control of the air over British skies.**

17. Air Cmde A.K. Tiwary, *Air Power and Counter Insurgency, A Review: J&K as a Model* (Lancer Books 2002), p. 57.

warning and control system (AWACS)/aerostats as well as set up an Aerospace Group to develop potent capabilities for achieving command of the air and space. In addition, the IAF, in liaison with the Defence Research and Development Organisation/Indian Space Research Organisation (DRDO/ISRO) would need to develop ASAT potential.

- (b) **Command of the Surface.** Command of the surface implies preventing the enemy from influencing strategic events on land or at sea. Even while conducting operations within the battlefield, the aim should be to isolate the battlefield from strategic reserves, deny the enemy options by limiting his ability to exploit space, degrade his sustenance capability and mortify his offensive potential; thus, rendering the surface forces impotent to cause meaningful strategic action. Air power employment in the Gulf War is a perfect example of command of the surface. The Pacific, War though primarily being a naval campaign, highlighted the decisive role played by air power in effecting control over the Pacific Ocean.
- (c) **Command Over the Information and Intelligence, Surveillance and Reconnaissance (ISR) Spectrum.** Command over information implies retaining the ability to collect, process and disseminate an uninterrupted flow of information, while denying the adversary the same capabilities. Persistent battlespace transparency would require integration of two enabling capabilities: network-centricity and utilisation of space-based assets. To achieve information dominance, there would be a need to target the enemy's command, control, communications, computers, intelligence (C4I) network as well as his ability to exploit space-based assets.

Strategic Bombing

This can be defined as those operations that seek the attainment of strategic military objectives directly and not through supporting surface forces¹⁸. During the Vietnam War, air power was initially used in tactical roles and it did not lead to tangible results. In March 1972, North Vietnam launched a major offensive and the US carried out air operations under Linebacker-I/II

18. Keaney, n.3.

that culminated in end December 1972. The attack on strategic targets near Hanoi created such a psychological impact that in just 12 days, the US air power achieved what it had failed to achieve in the previous eight years. Similar was their experience in the Kosovo operations in March-June 1999, where tactical operations paid limited dividends and it was only when air power attacked strategic targets that Slobodan Milosevic came to the negotiating table.

Psychological Operations (Psy Ops)

Sophocles had once said, "To one who is afraid everything rustles." Psy ops are designed to bring changes in the attitude and behaviour of the armed combatants and also of the civilian population. Offensive air action could also be employed as part of psy ops. In the Malayan Emergency from 1948 to 1960, the British conducted psy ops by employing leaflets as well as voice recorded broadcasts. More than 70 per cent of the surrendering MCP guerillas indicated that the "voice flights" had played some role in shaping their decision¹⁹.

Psychological operations directly target the moral dimension of war and intend to break the will to fight. In Book One of *On War*, Clausewitz lent strong support to Napoleon's popular maxim that "**in war, the moral is to the physical as three is to one**" and felt that the moral elements play a crucial role and constitute the spirit that permeates war as a whole²⁰. In the Gulf War 1991, the Iraqi Army was defeated as much by lack of supplies and physical attrition as by their soldiers fostering feelings of futility, hopelessness and inevitable defeat. Their defeat was both psychological and physical²¹. In the Kosovo operations too, Lt. Gen. Short intended to generate functional and psychological effects targeted directly at Slobodan Milosevic²². The IAF too needs to procure suitable equipment and formulate appropriate doctrines to conduct psy ops at all levels of war.

19. Maj Ronald F. Stuewe, "One Step Back, Two Steps Forward : An Analytical Framework for Air Power in Small Wars," *Air and Space Power Journal*, March 1, 2006.

20. Dr Joe Strange and Col Richard Iron, "What Clausewitz Really Meant by COG."

21. Col Phillips Mellinger, "Op Desert Storm: At its Most Basic, War is Psychological."

22. John A. Tirpak, "Shorts View of the Air Campaign," *Air Force* magazine, September 1999, <http://www.afa.org/magazine/watch/html>.

Asymmetric Warfare

Air power could be used for conducting surveillance and reconnaissance, logistic support, casualty evacuation, air mobility, communications, psy ops, electronic warfare, air policing and precision engagement. In addition, it could be used to augment the force to space ratio when needed in localised areas and yet maintain lesser overall armed forces' presence. Rapid response requirements of asymmetric warfare are best met by the employment of air power. In the Malayan Emergency, air power was used to locate 232 guerrilla camps and 313 cultivated sites. Air power was also used effectively by the British during the 1920s and 1930s to control land and people by bombing rebellious tribes and bandits to suppress insurgencies.²³

Strategic Airlift

An armed force's responsiveness is dependent to a large extent on its strategic airlift capability. The airlift provided by the IAF in October 1947 not just saved Srinagar but two-thirds of Kashmir. The operations conducted in 1984 under "Op Meghdoot" showcased the IAF's airlift potential to transport troops and equipment to the highest battlefield in the world²⁴. On November 3, 1988, the IAF airlifted a parachute battalion group from Agra to Hulule flying 2000 km non-stop to restore government rule at Male²⁵. The IAF has also performed numerous humanitarian missions at home and abroad,²⁶ including providing relief to Indonesia and Sri Lanka when the tsunami wreaked havoc in December 2004 and to the US in the aftermath of Hurricane Katrina. In addition, the IAF and India's civil air power resources were used to mount rescue operations to evacuate thousands of Indians from the Gulf countries in 1990-91. There is, however, an urgent need today to procure METAC aircraft and additional medium lift helicopters to augment strategic lift capabilities.

23. Thomas A. Keaney, "Lessons Unlearned, the History of Air Power in Unconventional Warfare", www.armedforcesjournal.com.

24. Information obtained from Internet website; www.answers.com/topic/indian-air-force.

25. Ibid.

26. Address by the Chief of Air Staff (CAS) at DSSC on April 15, 2005; Role of the IAF in the Changing Regional Security Environment.

Nuclear Deterrence

The IAF provides a viable second strike capability and, therefore, offers credible nuclear deterrence. Since IAF aircraft operate from secure airbases, the nuclear assets could be suitably stored there and appropriately protected.

Peace Operations

In peace operations, air power could be used effectively for ISR, search and rescue, casualty evacuation, crisis management, special operations, strategic mobility and logistic support. Air power's capabilities of reach, precision and lethality help it to be used both as a deterrent and as an actual counter to aggression. In 1961, the IAF used Canberra aircraft in Congo to stabilise the ground situation. Presently, two IAF contingents with MI-17 helicopters are based at Congo and Sudan. The IAF is also providing base support facilities.

Force Projection/Out of Area Contingencies (OOACs)

Depending on the quantum of force required and the time available, air power is the primary instrument of choice for force projection and OOAC situations. The tasks that could be envisaged include assistance provided to friendly countries (Maldives in 1988), humanitarian aid (tsunami aid to Indonesia/Sri-Lanka), protection of sea lines of communication (SLOCs), deterring offensive designs of the enemy, support for UN missions, rescue of Indians from crisis situations and protection of offshore platforms or island territories. These tasks require possessing an extended reach and a rapid response capability. There is a need to enhance our strategic airlift potential initially to brigade strength and thereafter to a division in the long term.

Cooperative Engagement

One of the key ingredients of future conflicts is preventive diplomacy. Facilitating this vital aspect would be cooperative engagement activities carried out by the armed forces during peace time. The IAF is regularly participating in international exercises with a number of air forces, including those of the USA, UK, France, Singapore, Russia and South Africa. Besides learning valuable lessons in

employing air power, it is also building vital cooperative long-term partnerships. There is a need to enhance cooperative engagement with our neighbours too.

FUTURE THREATS

In the future, threats to India's national security are likely to be diverse, varied and complex, requiring an integrated and rapid response. Yet, wars fought for territory may slowly lose their meaning in an economically linked globalised world order. Consequently, the menace posed by non-state actors,

The need to maintain considerable deterrent capability for a conventional conflict would, however, continue to increase as more potent capabilities are acquired by China and Pakistan.

terror organisations and Maoist movements is likely to increase further. In addition, the nuclear test carried out by North Korea and renewed rise of the Taliban and Lashkar-e-Tayyeba (LeT) in Afghanistan and Pakistan have brought a different dimension to the global security environment. The conduct of warfare could now range from asymmetric to high intensity conflicts fought under nuclear thresholds, with wide global ramifications. The need to maintain considerable deterrent capability for a conventional conflict would,

however, continue to increase as more potent capabilities are acquired by China and Pakistan. China especially has been modernising at a rapid rate for the last two decades. Hence, there is a need not only to develop strategic deterrence potential but full spectrum dominance capabilities to cater to the diverse nature of threats.

The IAF's capability and reach have enhanced significantly in the last decade; however, the quantitative combat strength of the IAF has declined. At the same time, in consonance with the emergence of an economically strong and technologically advanced India, our role in global affairs is increasing. It would require our armed forces to be utilised in out of area contingencies and UN peace-keeping operations. India's growing economic might would also require a secure environment to sustain its growth, be it against external aggression, the

scourge of terrorism, limited conflicts or nuclear threats. These complex challenges would require different force constructs that range from highly mobile and effective conventional forces to rapid reaction joint special forces. It is here that the IAF could provide the crucial cutting edge provided it has acquired certain crucial and lethal strategic capabilities.

EQUIPPING PHILOSOPHY TO UNDERTAKE STRATEGIC ROLES

There is nothing more difficult to carry out nor more doubtful of success, nor more dangerous to handle than to initiate a new order of things. For the reformer has enemies in all those who profit by the old order and only lukewarm defenders who would profit by the new order.

Niccolo Machiavelli²⁷

To undertake strategic roles effectively, there is a requirement to possess vital capabilities such as extended reach, precision, lethality, global airlift, space-based assets, stealth and joint force constructs that lead to strategic deterrence and full spectrum dominance. First of all, there is a need to change our traditional thinking based on a tactical mindset towards acquiring strategic potential. The IAF has a certain amount of strategic capability and some more is being acquired in the near future. However, there are vital deficiencies too. The combat strength of the IAF is likely to decline from 39.5 fighter squadrons to 29 by 2007. The RFPs for 126 MMRCA aircraft are being issued soon. Taking into account the procurement and induction cycle of 10-15 years, there is a need to show greater urgency in accelerating the procurement processes. In addition, there is a need to acquire stealth capability to enhance survivability, interoperable IFF to prevent fratricide, METAC transport aircraft and medium lift helicopters to augment airlift capability, high powered radars, AWACS/aerostats, advance surface-to-air missiles and BMD systems to improve aerospace defence and additional unmanned aerial vehicle (UAV) squadrons to cater for persistent surveillance potential. Further, there is a need to integrate space-based assets that enhance the IAF's combat effectiveness such

27. Maj Gregory P. Cook, "Waging Peace: The Non-Lethal Application of Aerospace Power," May 22, 1995.

as secure communications, navigation and sub-metre reconnaissance capability. To achieve their integration, there is a requirement for an Aerospace Command.

To counter-balance the declining numbers, the IAF has planned upgrades on its MiG-21 Bis, MiG-27, Mig-29 and Mir-2000 fleets. Additionally, the proposed delivery schedule compression of Su-30 MKI aircraft could check this depletion. In all, seven squadrons of Su-30 MKI aircraft are likely to be in operational service by the end of the 11th Plan and an additional two by the middle of the 12th Plan period (2012-17). A contract for 20 light combat aircraft (LCA) has also been signed. The Prithvi-II missile system's induction into the IAF has commenced and the three squadrons would be operational by 2008-09. Regarding BMD technology, we are awaiting the outcome of the indigenous missile system being developed by the DRDO²⁸. However, due to budget limitations, we may have to rely more on qualitative offsets, better training and innovative operational concepts.

The short and swift nature of wars requires a considerably higher degree of jointmanship, joint training and joint planning. Joint operations necessitate viewing the entire battlespace as a seamless environment. There would be a need to provide a fused composite picture not only to enhance battlefield transparency but also to spread shared awareness that prevents fratricide and enhances combat efficiency. This would require providing interoperable systems as well as making available a common backbone for secure communications among the three Services. Integration at the architectural level would require knitting interoperability in the command, control, communications and intelligence networks of the IAF, Indian Navy and Indian Army. Further, there is a need to electronically link the appropriate operational commands of the three Services with each other and to a joint operations room at Delhi to facilitate the execution of strategic art.

TRAINING IMPERATIVES

Today, the IAF is transforming itself to become an aerospace power with extended reach. There is a need to change our historical tactical mindset into

28. The information on future acquisition has been obtained from an interview given by the Chief of the Air Staff to the *Force* magazine, May 2006.

thinking strategic and thereafter to train for the same. The future aerospace leaders would need to develop a strategic outlook that develops unconventional responses to diverse threats ranging from challenges posed by terror organisations to OOACs and to high intensity conflicts fought under nuclear thresholds. Inculcating strategic thinking would require modifying our existing training syllabi appropriately in different training institutions and war colleges.

Integrated tri-Service exercises must be conducted once in two years. In addition, our personnel would need to learn to work in a multi-nation environment. This would require them to possess better awareness of global politics in general and of South Asia in particular. The IAF would also require to periodically train alongwith its sister Services and with our neighbours towards OOAC situations. The bilateral or multilateral exercises with other air forces must continue as they provide valuable exposure to our personnel. IAF leaders would need to be visionaries, analysts/theorists and strategic practitioners. Therefore, the focus during training should shift from the cognitive domain to the intellectual domain as the officer progresses in service. War-games, preferably computer aided, are an important method by which our strategic leadership could be trained to develop effective strategic thinking. The same must be conducted annually within different operational commands by making AOCs/station commanders execute strategic and operational art by employing them in senior/tri-Service appointments during the exercise.

The focus during training should shift from the cognitive domain to the intellectual domain as the officer progresses in service.

CONCLUSION

Over the last few years, the IAF has significantly enhanced its technological capability and reach. With the acquisition of force multipliers such as AWACS, aerostats, precision weapons, multi-role combat aircraft and air-to-air refuellers, the IAF would be able to undertake a number of strategic roles. These include conflict prevention, graduated response, battlespace dominance, strategic

bombing, psychological operations, strategic airlift, nuclear deterrence and force projection. To undertake these roles more effectively, there is a requirement to change our traditional tactical mindset towards thinking strategic. Further, there is a need to procure systems and equipment and formulate doctrines that prepare us for conducting integrated operations in diverse situations.

At the same time, the IAF's combat potential is declining in quantitative terms. There is a need to restructure the IAF, provide a balance between qualitative and quantitative capabilities and speed up our procurement processes. In addition, there is a requirement to acquire stealth capability, interoperable IFF, METAC transport aircraft, medium lift helicopters, AWACS/aerostats, high powered radars, advanced surface-to-air missiles and BMD systems. Further, there is a need to integrate space-based assets that enhance the IAF's combat effectiveness such as secure communications, navigation and sub-metre reconnaissance capability.

INTERPRETING CHINA'S NATIONAL DEFENCE POLICY

GURMEET KANWAL

The highest form of generalship is to baulk the enemy's plans; the next best is to prevent the junction of the enemy's forces; the next in order is to attack the enemy's army in the field; and, the worst policy of all is to besiege walled cities.

Sun Zi, *The Art of War*¹

Winston Churchill once famously described the Soviet Union as “a riddle wrapped in a mystery inside an enigma.” In the last few decades of the 20th century, that phrase could be used to describe China as well. However, since Deng Xiaoping’s four modernisations and market reforms began in 1978, China has been gradually opening itself up to the world – even though the transformation is laborious and tightly controlled. With its near double digit growth rate, China is poised to overtake the United States (US) and assume pole position as the world’s leading economy between 2030 to 2040. Whether this rise will be entirely peaceful, as China professes, or one that may be marked by turbulence and chaos, as some analysts fear, is a vexing issue. History is witness to the fact that major power shifts have never occurred without large scale upheavels. Managing the rise of China successfully is the most important fundamental challenge confronting the international community in the 21st century. Michael D. Swaine and Ashley J. Tellis have written: “This process is significant not only because it promises the internal transformation of one of the

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1. James Clavell, ed., *The Art of War by Sun Tzu* (London: Hodder and Stoughton, 1981), Chapter III, “Attack by Stratagem,” p. 23.

world's oldest civilisations, but also because *if concluded successfully* it could result in a dramatic power transition within the international system."²

The aim of this paper is to analyse China's national defence policy with a view to understanding its national security strategy and its impact on stability on the Indian subcontinent.

CHINA'S STRATEGIC CULTURE

The Chinese civilisation has been sustained over three millennia by a rich military tradition and a well-established strategic culture, which has been documented with the disciplined elegance of meticulous Chinese calligraphy by several ancient thinkers. Sun Zi's *The Art of War* is an unsurpassed classic in its genre. It "stresses the relationship between war and factors of politics, economics, diplomacy, astronomy and geography... (and) defeating one's enemy by strategic considerations, not by force."³ Liddell-Hart described it as the "concentrated essence of wisdom on the conduct of war."⁴ That war always has a political purpose has been long recognised by ancient Chinese strategists. In Sun Zi's approach to statecraft,⁵ the armed forces enjoyed a central place in civil society. He advocated the principle of "limitation in warfare" as against protracted or "total" war,⁶ attacking the enemy's weakness and bypassing his strength, striking him in a place where surprise would be achieved, practising deception (ambiguity, *guidao*) and using spies to gain strategic advantage in a campaign. He wrote: "... for just as flowing water avoids the heights and hastens to the lowlands, so an army avoids strengths and strikes weakness."

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2. Michael D. Swaine and Ashley J. Tellis, *Interpreting China's Grand Strategy: Past, Present and Future* (RAND: Santa Monica, CA, 2000), p. 1. (Emphasis in the original.)
 3. General Tao Hanzhang quoting Marshal Liu Bocheng in his commentary on *The Art of War*, cited by M. V. Rappai, "Sun Zi and the Chinese Revolution," in K. N. Ramachandran, M. V. Rappai, Swaran Singh and Srikanth Kondapalli, eds., *Sun Zi and China's Strategic Culture* (New Delhi: Institute for Defence Studies and Analyses, 1999), p. 41.
 4. Sir Basil Liddell-Hart's foreword in Samuel B. Griffith, *Sun Zi: The Art of War* (London: Oxford University Press, 1963), p. v.
 5. Summarised from Swaran Singh, "Sun Zi's Eternal Relevance: Exploring *The Art of War* as a Tool for Understanding China's Contemporary National Security Doctrine," n. 3, pp. 1-14.
 6. Sun Zi emphasised quick victories, not prolonged operations. "Thus, if a campaign is protracted, the resources of the state will not be equal to the strain... There is no instance of a country having benefited from prolonged warfare." Sun Zi, n. 1, Chapter II, "Waging War," pp. 19-20.

It has always been a tradition in Chinese statecraft to countervail major adversaries through alliances so as to avoid direct confrontation. Among other ancient Chinese scholars, Sun Zi's writings influenced Mao Zedong to devise modern guerrilla tactics based on China's ancient strategic culture. Fighting pitched battles over long durations was never a Chinese tradition. Chinese

generals employed hit-and-run tactics to catch their opponent unprepared and relied on accurate intelligence to plan their strikes. They preferred to follow an indirect approach. For logistics sustenance during a campaign, the Chinese planned to take the enemy's territories intact and depend on them for provisions.

China's historical approach to security, driven by its ruling elite's perception of cultural superiority, has been to attach equal importance to diplomacy and the use of force as instruments to further the interests of the state. However, no Chinese ruler ever hesitated to use force when it was considered necessary. In the modern era, the Chinese government has preferred the use of force to the soft power of diplomacy whenever it thought it could get away with using force. This is reflected in its proclivity to teach lessons to states that refuse to do its bidding. This approach is at variance with the Confucian ideology and is driven by China's subsequent exposure to the totalitarian and coercive facets of the practices followed by nomadic invaders. In the modern era, post-1911, China's political leadership has followed a personalised style of governance. As a result of this, internal jockeying for political power often influences the formulation of major national policies.

Chinese scholars take pains to emphasise that China has always been cautious in war and in its choice of strategic means. They quote Sun Zi, Wu Zi and Lao Zi, among others, to point out that China believed not in winning "one hundred victories in one hundred battles" but in subduing the enemy without fighting. They insist that in modern history, China was by and large compelled to take part in war and even then sought to restrict it to within certain limits. They term

It has always been a tradition in Chinese statecraft to countervail major adversaries through alliances so as to avoid direct confrontation.

border wars fought by China against several land neighbours as "self-defence counter-attacks" and maintain that the guiding principle was always of being on "just ground, to our advantage and with restraint... In terms of employment of fighting means China showed great sobriety, caution and restraint. This is a fundamental character of China's tradition of strategic culture."⁷ This appears to be the party line that is taught in China's military academies and, quite obviously, it is far from the truth. The border war with India in 1962 and that with Vietnam in 1979 were far from "counter-attacks in self-defence."

Almost throughout its long history, China was the preeminent political and military power in the East Asian region. Though some regimes were overthrown by invading hordes, the new rulers failed to govern China effectively and faded into history. This led to the emergence of a Sino-centric worldview. According to

Almost throughout its long history, China was the preeminent political and military power in the East Asian region.

Swaine and Tellis, "Such predominance created a belief in the geo-political centrality of China to the region."⁸ Apparently, China's self-image is still that of seeing itself as the "Middle Kingdom" and Chinese elites as well as ordinary citizens still have a very strong sense of China's preeminence

among its neighbours. However, China's experience of contact with the West has not been a happy one.⁹ China is still smarting from "defeat, subjugation and humiliation at the hands of the West and Japan"¹⁰ in its modern history. This has led to a "deep-seated 'victim mentality' among both the elite and the populace..."¹¹ Quite naturally, this has created a certain degree of paranoia about the intentions of the West, particularly the US and its East Asian allies, and intensified Chinese sensitivities to foreign threats.

7. Peng Guangqian and Yao Youzhi, eds., *The Science of Military Strategy* (Beijing: Military Science Publishing House, 2005), p. 77.

8. Swaine and Tellis, n.2, p. 3.

9. "From the Opium War in 1840 to the founding of the People's Republic of China in 1949, China had been bullied and humiliated by Western powers for more than a century. Historical facts have taught the Chinese people that only an adequate national defence can guarantee the country's sovereignty, security, unification and territorial integrity." Gen. Xiong Guangkai, "China's Defense Policy Equals Peace," *People's Daily*, March 10, 2003.

10. *Ibid.*, p. 3.

11. Swaine and Tellis, n. 2, p. 73.

Alastair Iain Johnston has written that China follows a *realpolitik*-based strategic culture that “in essence argues that the best way to deal with security threats is to eliminate them through the use of force. This preference is tempered by the explicit sensitivity to one’s relative capacity to do this. At the simplest, the operational strategic culture predisposes those socialised in it to act more creatively against the enemy as relative capabilities become more favourable.” The carefully constructed government policy is clearly to state that lofty principles (*Panchsheel* or non-intervention in the internal affairs of other countries, war only in self-defence and “no first use” nuclear doctrine) guide China’s international interactions, but to follow pragmatic hard-nosed security policies. It would be fair to conclude that in recent times, certainly since it has been ruled by a Communist oligarchy in the second half of the 20th century, China’s strategic culture has become more robust and less tolerant of perceptions that are different from its own.

VARYING INTERPRETATIONS OF GRAND STRATEGY

The term “grand strategy” is understood differently in different parts of the world. The Indian armed forces and most Indian analysts tend to go by the Western interpretation of what constitutes grand strategy.¹² Liddell-Hart wrote that the role of grand strategy or “higher strategy” is to “coordinate and direct all the resources of a nation, or a band of nations, towards the attainment of the political objective of the war.”¹³ The Indian Army Doctrine describes strategy as the “art and science of developing and using elements of national power, including political, economic, psychological, technological capabilities and military forces, as necessary, during peace and war to achieve national objectives. Military strategy is derived from the overall national or ‘grand strategy’.”¹⁴

12. In warfare, coordinated application of all the forces of a nation to achieve a goal. In contrast to tactics, strategy’s components include a long-range view, the preparation of resources, and planning for the use of those resources before, during, and after an action. The term has expanded far beyond its original military meaning. As society and warfare have steadily grown more complex, military and non-military factors have become more and more inseparable in the conduct of war and in programmes designed to secure peace. In the 20th century, the term grand strategy, meaning the art of employing all the resources of a nation or coalition of nations to achieve the objects of war (and peace), steadily became more popular in the literature of warfare and statecraft. (<http://www.answers.com/topic/strategy>)

13. Sir Basil Liddell-Hart, *Strategy* (New York: Frederick A. Praeger Inc., 1962), pp. 335-336.

14. *Indian Army Doctrine* (Shimla: HQ Army Training Command, 2004), Chapter 1, Section 1, Para 1.4.

According to the British Defence Doctrine:¹⁵ "Grand strategy is the application of national resources to achieve policy objectives (including alliance or coalition objectives). Its purpose is to direct and provide coherence to all aspects of national policy... Grand strategy defines policy objectives, forges alliances and stipulates limits on enabling activities. It also makes available the appropriate resources and, where necessary, gives direction to the national effort." Winston Churchill had described the art of grand strategy as the ability to see the outlines of the future and to be prepared to deal with it. The North Atlantic Treaty Organisation (NATO) sees grand strategy as the politico-strategic level of war.

In the US, the terms used are national strategy and military strategy. Military strategy is defined as "the art and science of employing the armed forces of a nation to secure the objectives of national policy by application of force, or threat of force."¹⁶ Gen. Maxwell Taylor, former chairman of the US Joint Chiefs of Staff held that strategy embraces three elements: aim, ways and means. He gave this formula for strategy: Strategy = Aim (goal pursued) + Ways (operational options) + Means (tools to achieve the goal).¹⁷ Marshal V. D. Sokolovski, former first deputy defence minister and concurrently chief of the Soviet General Staff, wrote that strategy "is a system of scientific knowledge dealing with the laws of war as an armed conflict in the name of definite class interests. Strategy – on the basis of military experience, military and political conditions, economic and moral potential of the country, new means of combat and the views and potential of the probable enemy – studies the conditions and the nature of future war, the methods for its preparation and conduct, the services of the armed forces and the foundations for their strategic utilisation, as well as the foundations for the material and technical support and leadership of the war and the armed forces."¹⁸

Mao Zedong called strategy "the study of the laws of a war situation as a whole." In *Problems of Strategy in China's Revolutionary War* (1936), Mao wrote:

15. *British Defence Doctrine* (London: Ministry of Defence, 1996), Joint Warfare Publication 0-01, p.1.8

16. *A Dictionary of United States Military Terms Prepared for Joint Usage of the Armed Services by the Joint Chiefs of Staff* (Washington D.C.: Department of Defence, 1963), p. 205.

17. Guangqian and Youzhi, eds., n.7, p. 11.

18. Marshal V. D. Sokolovski, *Soviet Military Thinking* (London: Macdonald and Jane's, 1975), p. 11.

Whenever there is a war, there is a war situation as a whole. The war situation as a whole may cover the entire world, may cover an entire country, or may cover an independent guerrilla war zone or an independent major operational front. Any war situation which requires comprehensive consideration of its various aspects and stages forms a war situation as a whole... The task of the science of strategy is to study those laws for directing a war that govern a war situation as a whole. The task of the science of campaigns and the science of tactics is to study those laws for directing a war that govern a partial situation.¹⁹

Explaining the implications of Mao Zedong's explanation of strategy, Peng Guangqian and Yao Youzhi have written:²⁰

Mao Zedong not only inserted a concept of 'campaign' layer (operational level) in between strategy and tactics, but also in a clear cut manner, stressed strategy as a whole and its regularity. He first underscored that there were intrinsically objective laws of strategy itself instead of the outcome of subjective will. Strategy took a 'situation as a whole' to make an overall planning instead of making a particular response to some local question (*sic*). Thereby he scientifically defined 'strategy' at a philosophical level; peeled all the outside additive elements from 'strategy'; and cracked open the nucleus of the most essential quality of 'strategy'. As a result, his definition was an embodiment of dialectic thinking of the tradition of strategic culture in the East. The *Military Terms of Chinese People's Liberation Army* issued in September 1997, insisted on Mao's scientific definition of strategy.

Based on Mao Zedong's definition, Peng Guangqian and Yao Youzhi summarised China's military strategy:²¹

Strategy (or military strategy) in China's new periods is taking the national comprehensive power as its foundation, the thought of active defence as its guidance, and winning local war under hi-tech conditions as its basic point to construct and exercise military strength and carrying out the overall and whole-course operation and guidance of war preparations and war for the purpose of protecting national sovereignty and security.

19. Cited by Guangqian and Youzhi, n.7, p. 9.

20. Guangqian and Youzhi, *Ibid.*, p. 10.

21. Guangqian and Youzhi, *Ibid.*, pp. 12-13.

This strategy is derived from China's military doctrine that emphasises coercive strategies during peace and surprise, deception, and shock effect in the opening phase of a campaign.

CHINA'S GRAND STRATEGY

Chinese military analysts define grand strategy as the "overall strategy of a nation or an alliance of nations in which they use overall national strength" to achieve national political goals, especially those related to national security and development.²² China's ruling elite believes that sovereignty, national unity and stability must be ensured for China's survival as a nation-state and future well-being. While the foremost strategic objective is overall national development, China lays emphasis on maintaining a favourable domestic and international "strategic configuration of power." Among its national interests, China counts "a stable international order, an equal footing in foreign affairs, expansion of export markets and (access to) overseas resources."²³ Quite naturally, Marxist ideology and Mao's thoughts and teachings, as well as the lessons of the Sino-Japanese War and China's civil war, influence the scope and reach of China's grand strategy.

Great Power Ambitions

China, without doubt a revisionist power, is moving steadily forward on its long march to acquire world power status and has formulated a meticulously

China's aim is clearly to become the dominant economic and military power in the Asia-Pacific region by 2010-15 and a major power internationally by about 2030-40.

crafted, though not formally stated, grand strategy to chart its course towards that goal. China's aim is clearly to become the dominant economic and military power in the Asia-Pacific region by 2010-15 and a major power internationally by about 2030-40. Its strategy of "four modernisations", formally adopted in 1978, is bearing fruit and is leading to fairly rapid, though

22. "Annual Report on the Military Power of the People's Republic of China" (United States Secretary of Defence: Report to Congress, 2002), July 28, 2003.

23. Ka Po Ng, *Interpreting China's Military Power: Doctrine Makes Readiness* (New York: Frank Cass, 2005), p. 26.

regionally skewed, development and modernisation, including modernisation of the armed forces. China's grand strategy is aimed at "firmly preserving China's core interests, strengthening its relations with neighbouring countries, consolidating friendships with the broad majority of developing countries and improving relations with developed countries."²⁴ In order to emphasise the benign nature of its grand strategy, China points out that its major themes are "peace and development," the non-use of force in settling international disputes, non-intervention in the internal affairs of other countries, the defensive nature of China's military strategy, its "no-first-use of nuclear weapons" declaration, its support for nuclear weapons-free zones, and claims that China would never deploy its military forces on foreign soil. However, Deng Xiaoping's 24-character strategy "keep cool-headed to observe, be composed to make reactions, stand firmly, hide our capabilities and bide our time, never try to take the lead, and be able to accomplish something" suggests a desire to downplay China's ambitions.

Development of Comprehensive National Power

China's grand strategy seeks to preserve national independence and increase national power through the balancing of two competing objectives: the development of comprehensive national power (CNP) and the exploitation of existing "strategic configuration of power" or "*shi*".²⁵ China's grand strategy affirms that national unity, sovereignty and stability guarantee, first, the survival of the state, and, second, the development of a national strategy with China at the centre of Asia. Incorporated in this strategy is Chinese patience or willingness to live with ambiguity before considering the employment of force such that advantage is obtained, moral high ground is occupied and supporters or non-supporters are identified. China's national security policy objectives, "dynamic stability" and economic growth, are directly linked to the

24. Yang Jiemian, "International Environment and Sino-US Interaction: Strategic Thinking and Policy Planning," *China International Studies*, Winter 2005, p. 61.

25. "Annual Report on the Military Power of the People's Republic of China" (United States Secretary of Defence: Report to Congress, 2002). The report explains "*shi*" as the "alignment of forces," the "propensity of things," or the "potential born of disposition," that only a skilled strategist can exploit to ensure victory over a superior force. Similarly, only a sophisticated assessment by an adversary can recognise the potential exploitation of "*shi*."

maintenance of unity through preservation of the regime, domestic order and territorial integrity. In a RAND study, Swaine and Tellis have written that China's grand strategy seeks to achieve the following three interrelated objectives:²⁶

- The preservation of domestic order and well-being in the face of different forms of social strife.
- Defence against persistent external threats to national sovereignty and territory.
- The attainment and maintenance of geo-political influence as a major and, perhaps, primary state.

Calming, Enriching and Befriending Neighbours

In order to balance its rise and the increase in its influence, China claims to follow the policy of "calming, enriching and befriending" (*anlin, fulin, mulin*) its neighbours. Its attempts at reassurance have so far been only partially successful as most of its neighbours in Asia are uncomfortable with its growing power and influence. While continuing to engage China and enhance their trade relationship with it, China's neighbours are simultaneously seeking to enter into strategic partnerships to hedge against China's perceived hegemony. The Association of Southeast Asian Nations (ASEAN) was originally formed as a display of solidarity against creeping Communist expansionism. This dual

A key element of China's grand strategy is to oppose and, if possible, prevent, the rise of other Asian powers so as to maintain its hegemony.

policy of accommodation plus insurance has so far paid good dividends.

Aspirations in Asia

A key element of China's grand strategy is to oppose and, if possible, prevent, the rise of other Asian powers so as to maintain its

hegemony. China does this through a complex web of economic and military inducements as well as by holding out subtle diplomatic and even military threats. Brahma Chellaney is of the view, "A major cause of strategic friction in Asia is that China brooks no peer competition from any other Asian power..."

26. Swaine and Tellis, n. 2, p. x.

China's long-standing strategy has been to neutralise or deter the rise of peer competition, including from Japan (which it sees as having the advantage of enjoying US military support) and India (whose 1998 nuclear weapons tests jolted Beijing out of its smug complacency and belief that it could keep India confined south of the Himalayas through Pakistan-aided, low-level deterrence).²⁷ The reorientation of China's land-based defence strategy to "one which holds maritime security as its key priority"²⁸ is a new concern in Asia as China has already begun to acquire capabilities that will allow it to dominate the sea lanes of communication in the Indian Ocean and the South China Sea.

Strategic Encirclement of India

Another principle component of China's grand strategy is to preserve and enhance its political supremacy and influence in Asia "without provoking the emergence of a countervailing coalition of states."²⁹ India's objective is to build a strong economic base that will be capable of supporting its aspirations as a regional power with the same primacy as China in Asia. Burdened by the baggage of history and plagued as it still is by the "Middle Kingdom" syndrome, China has always had immense difficulty in accommodating India's aspirations as the second Asian power. Despite improving trade relations with India, with the balance of trade now in China's favour, and relative tranquillity on the border, even though the territorial dispute is still far from being resolved, China is engaged in implementing a diabolical policy aimed at the strategic encirclement of India with a view to confining India to the backwaters of the Indian Ocean and stunting India's overall growth so that it is prevented from acquiring sufficient comprehensive national power to challenge China's hegemony in Asia.

- China seeks to contain India through a nuclear weapons and missiles nexus and an extremely strong strategic partnership based on extensive military

27. Brahma Chellaney, *Asian Juggernaut: The Rise of China, India and Japan* (New Delhi: HarperCollins Publishers India, 2006), p. 255.

28. Nimmi Kurian, *Emerging China and India's Policy Options* (New Delhi: Lancer Publishers, 2001), p. 191.

29. Alex Liebman, "China's Asia Policy: Strategy and Tactics," cited with the author's permission from a paper presented at the RAND-CEIP-CAPS (Taipei) conference "The PLA in the Asia-Pacific Region: Implications for the Evolving Regional Security Order," December 8-10, 2006, Taipei, Taiwan.

cooperation with its "all-weather" ally and friend, Pakistan, whose territorial integrity it has guaranteed. It has built the strategic Karakoram Highway linking Xingjian with Pakistan through the disputed territory of Jammu and Kashmir in the north. It has built a major sea port with the potential for establishing a naval base at Gwadar on the Makran coast.

- China is also engaged in serious attempts to make inroads into India's neighbourhood through Nepal, Bangladesh, Myanmar and Sri Lanka. China offers military aid, military training and subsidised arms to these countries, makes strategic infrastructure investments in them, such as the development of ports, and absorbs limited quantities of uneconomical imports from them.
- This is unlikely to change in the near future. In Dr. Varun Sahni's view, China's strategy in Southern Asia is "to create alternate incentive structures in India's neighbourhood to prevent the pacification and consolidation of the region."³⁰
- While this view is widely held by members of the Indian strategic community, many perceptive analysts in the West also share it. Quoting a variety of sources, Edward Timperlake and William C. Triplett II have carefully documented how China is engaged in surrounding India and "arming India's enemy."³¹

Internal Security Concerns

In terms of internal security, China has three separatist issues to contend with: Taiwan, Tibet and the Uighur Autonomous Region (Xingjian province). The three are distinctly different in terms of the threat they pose to national unity and the manner in which they have been dealt with by the Chinese authorities. The leadership has consistently been uncompromising on the matter of independence of Taiwan and views it as the most serious threat to China's territorial integrity. Diplomatically, the United States, perhaps grudgingly, supports the principle of "One China." However, the US connotation of "One

30. Personal interview on February 3, 2007.

31. Edward Timperlake and William C. Triplett II, *Red Dragon Rising: Communist China's Military Threat to America* (Washington D.C.: Regency Publishing, Inc., 1999), pp. 185-196.

China" leans towards the day-to-day reality of a Taiwan that functions as an independent nation despite its non-recognition by the UN and China's ongoing efforts for peaceful reunification. Taiwan's strategic importance to the US in Asia is no secret to the Chinese.

Strategy Towards Tibet and Xingjian

Unlike the dangerous brinkmanship between Beijing and Taipei, the separatist and terrorist issues in Tibet and Xingjian province have been suppressed by a combination of heavy-handed oppression, economic aid and development and gradual ethnic displacement of indigenous residents by migrant Han Chinese. Systematic assimilation policies that had been introduced earlier were terminated as a result of resentment and conflict between the Han and affected minority groups. A softer approach intended to win the hearts and minds of Tibetans and other minorities was crafted in the 1980s, but was never really pursued with conviction by the Han administrators in Tibet. China's "affirmative policy" is designed to give the minority nationalities enough power, education, or economic success to keep them from making independent demands and is not based on any philosophy of equality or any desire to celebrate differences.

Energy Security Strategy

The Chinese leadership is acutely conscious of the fact that further growth in China's comprehensive national power will depend on continued and robust economic growth and a stable security environment. China can continue to grow at about seven to eight per cent or better only on the back of massive increases in energy supplies. Securing adequate supplies of oil and gas is now a key concern for China and it will continue to seek energy security by diversifying its sources for oil imports, by acquiring equity stakes in new oil and gas fields and by enhancing the capacity of its oil reserves. China is also concerned about the security of the sea lanes through which its oil and gas supplies pass and is building up the PLA Navy for a proactive approach to safeguarding its oil trade. Simultaneously, China is pursuing a vigorous oil exploration strategy and is prepared to act aggressively to

stake its claim to disputed island territories, like the Spratlys and the Paracels, around which there are prospects of oil discoveries.

NATIONAL DEFENCE POLICY

Comprehensive National Power

In recent years, the Chinese have stressed the importance of "comprehensive national power" in determining the country's role in international affairs. Comprehensive national power is a comparative yardstick "by which China's

Comprehensive national power is a comparative yardstick "by which China's strategic planners evaluate and measure national standing in relation to other nations."

strategic planners evaluate and measure national standing in relation to other nations."³² Though this is a good tool, it is not clear whether and how the Chinese allocate weightages to the various elements of national strength, viz. economic strength, military power, soft power, physical size, natural resources, demographics, state of

internal security, socio-political cohesion, et al. Above all else, a strong political will to take hard decisions in the national interest and then to resolutely implement those decisions, should necessarily be an important ingredient of comprehensive national power.

Strategic Outreach

China's concept of national defence is no longer limited merely to the defence of territory but has been expanded to include the seaboard and outer space. In maritime security, the erstwhile strategy of "Coastal Defence" has been converted to a strategy of "Oceanic Offensive". The recent emphasis on bolstering naval and air forces stems from a desire to project power well away from China's shores. Consequently, China has redefined its "strategic frontiers."³³ The Chinese now think in terms of their strategic frontiers

32. *Annual Report on the Military Power of the People's Republic of China* (Washington D.C.: Department of Defence, 2002), p. 6.

33. "Strategic frontiers" is a fairly common term in the West, but one that has been adopted in China only over the last decade or so.

encompassing "defence of air, space and sea frontiers." China defines strategic frontier as the living space of a state and a nation that contracts with the ebb and flow of comprehensive national strength.³⁴

National Interests

China defines its national interests as:³⁵ "Safeguarding state sovereignty, unity, territorial integrity and security; upholding economic development as the central task and unremittingly enhancing the overall national strength; adhering to and improving the socialist system; maintaining and promoting social stability and harmony; and striving for an international environment of lasting peace and a favourable climate in China's periphery." The salient aspects of China's proclaimed national security strategy in the mid-1990s were as under:³⁶

- The primary objective of China's security strategy (for the future) will be to safeguard a security environment favourable to the country's economic construction.
- Peaceful reunification of the Motherland is one of the strategic objectives set by the Chinese government. (*Note: The merger of Taiwan with China is implicit in this*).
- To safeguard the country's territorial integrity has always been one of China's objectives for national security.
- China will continue to persist in the principle of no-first-use of force in settling boundary differences.
- China's modern security strategy pays great attention to establishing friendly and good-neighbourly relations with surrounding countries.
- China's geographical location dictates that the priority of its security strategy should be based on developing bilateral security cooperation with its neighbouring countries.
- While paying much attention to bilateral security cooperation, China will also be more and more active and energetic in its attitude toward multilateral cooperative security mechanisms.

34. Colonel Narendra Singh, "Chinese Armed Forces," *USI Journal* (New Delhi), October-December 1998, pp. 587-608.

35. *China's National Defence in 2002*, White Paper on national defence published by the Government of the People's Republic of China.

36. Yan Xuetong, "Orientation of China's Security Strategy," *Contemporary International Relations* (Beijing: China Institute of Contemporary International Relations, vol. 6, no. 2, 1996), pp. 2-5.

- As the post-Cold War weapons proliferation is evidently harmful to China's security, China claims to have been actively aiding international efforts to prevent arms proliferation.
- The guideline for China's defence construction in the next 15 years is to build a smaller but better army to reinforce the country's defence strength.
- China's earlier military strategy of "luring the enemy in deep" and the present strategy of "positive defence" adhere to the principle of self-defence.

National Defence Goals and Tasks

Over the last decade since China began to publish White Papers on national defence, the perceptions of its leadership have been evolving with the changing times and with changes in China's circumstances. The 1998 White Paper, the first in the series, described China's defence policy in these words:³⁷ "Guided by its aspiration for peace and development, China unwaveringly pursues a national defence policy that is defensive in nature, keeps national defence construction in a position subordinate to, and in the service of, the nation's economic construction, strengthens international and regional security cooperation and actively participates in the international arms control and disarmament process." The 2000 White Paper mentions the following "main aspects" of China's defence policy:³⁸

- Consolidating national defense, resisting aggression, curbing armed subversion, and defending state sovereignty, unity, territorial integrity and security...
- Building and consolidating national defense independently and through self-reliance... China does not seek alliance with any country or bloc of countries, nor does it participate in any military bloc.
- Implementing the military strategy of active defense. Strategically, China pursues a principle featuring defensive operations, self-defence and gaining mastery by striking only after the enemy has struck. Such defense combines efforts to deter war with preparations to win self-defence wars in time of peace, and strategic defense with operational and tactical offensive operations in time of war.

37. *China's National Defence in 1998*, White Paper on national defence published by the Government of the People's Republic of China.

38. *China's National Defence in 2000*, White Paper on national defence published by the Government of the People's Republic of China.

Similarly, the 2002 White Paper spelt out the following main “goals and tasks” for China’s armed forces:³⁹

- To consolidate national defense, prevent and resist aggression.
- To stop separation and realize complete unification of the Motherland.
- To stop armed subversion and safeguard social stability.
- To accelerate national defense development and achieve national defense and military modernization.
- To safeguard world peace and oppose aggression and expansion.

China’s National Defence in 2004, the 2004 White Paper issued by the Government of the People’s Republic of China, lists six “troubling” security trends: the failure to establish a fair and equitable world order; continuing competition for resources and geo-strategic position; increasing global economic disparities; the increasing importance of the military element of national power; new threats posed by traditional and non-traditional (transnational) security issues; and, that hegemonism and unilateralism have gained new ground. Flowing from these national security concerns, the 2004 Defence White Paper, explains China’s basic national security goals and tasks for the PLA as under:⁴⁰

- To stop separation and promote reunification, guard against and resist aggression and defend national sovereignty, territorial integrity and maritime rights and interests.
- To safeguard the interests of national development, promote economic and social development in an all-round, coordinated and sustainable way and steadily increase the overall national strength.
- To modernize China’s national defense in line with both the national conditions of China and the trend of military development in the world by adhering to the policy of coordinating military and economic development, and improve the operational capabilities of self-defense under the conditions of informationalization.
- To safeguard the political, economic and cultural rights and interests of the Chinese people,

39. *China’s National Defence in 2002*, White Paper on national defence published by the Government of the People’s Republic of China.

40. *China’s National Defence in 2004*, White Paper on national defence published by the Government of the People’s Republic of China.

crack down on criminal activities of all sorts and maintain public order and social stability.

- To pursue an independent foreign policy of peace and adhere to the new security concept featuring mutual trust, mutual benefit, equality and coordination with a view to securing a long-term and favorable international and surrounding environment.

China's National Defence in 2006, the 2006 White Paper issued by the Government of China, expresses satisfaction with the overall security environment and lists it as "sound". It describes China's defence policy in these words:⁴¹ "China will not

China will not engage in any arms race or pose a military threat to any other country.

engage in any arms race or pose a military threat to any other country. At the new stage in the new century, we will take the scientific development outlook as an important guiding principle for the building of national

defense and military affairs, vigorously advance the revolution in military affairs with Chinese features, and strive to realize an all-round, coordinated and sustainable development in our country's national defense and military capabilities." According to the 2006 Defence White Paper, "China's national defense policy for the new stage in the new century is defined as follows":⁴²

- *Upholding national security and unity and ensuring the interests of national development:* This includes guarding against and resisting aggression, defending against violation of China's territorial sea and air space, and borders; opposing and containing the separatist forces for "Taiwan independence" and their activities, taking precautions against and cracking down on terrorism, separatism and extremism in all forms...
- *Achieving the all-round, coordinated and sustainable development of China's national defense and armed forces:* China pursues a policy of coordinated development of national defense and economy... so as to ensure that the modernization of its national defense and armed forces advances in step with the national modernization drive. China works in a comprehensive way to ensure that its armed forces are revolutionary in nature, modernized and regularised. It strives to ensure coordination between the revolution in military affairs with Chinese features and preparations for military struggle, mechanization and informationization...

41. *China's National Defence in 2006*, White Paper on national defence published by the Government of the People's Republic of China on December 30, 2006.

42. *Ibid.*

- *Enhancing the performance of the armed forces with informationization as the major measuring criterion:* The PLA, taking mechanization as the foundation and informationization as the driving force, promotes the composite development of informationization and mechanization to achieve overall capability improvement in the fields of firepower, assault, mobility, protection and information... It is stepping up its efforts to build a joint operational command system, training system and support system for fighting informationized wars and enhance the building of systems integration of services and arms...
- *Implementing the military strategy of active defense:* The PLA will upgrade and develop the strategic concept of people's war, and work for close coordination between military struggle and political, economic, diplomatic, cultural and legal endeavors, uses strategies and tactics in a comprehensive way, and takes the initiative to prevent and defuse crises and deter conflicts and wars. The PLA will establish step by step a modern national defense mobilization system that is centralized and unified, well structured, rapid in reaction, and authoritative and efficient. Taking joint operations as the basic form, the PLA aims to bring the operational strengths of different services and arms into full play...
- *Pursuing a self-defensive nuclear strategy:* (China's) fundamental goal is to deter other countries from using or threatening to use nuclear weapons against China. China remains firmly committed to the policy of no first use of nuclear weapons at any time and under any circumstances... China upholds the principles of counterattack in self-defense and limited development of nuclear weapons, and aims at building a lean and effective nuclear force capable of meeting national security needs...
- *Fostering a security environment conducive to China's peaceful development:* China maintains military contacts with other countries on the basis of the Five Principles of Peaceful Coexistence, and develops cooperative military relations that are non-aligned, non-confrontational and not directed against any third party. China takes part in international security cooperation... It plays an active part in maintaining global and regional peace and stability...

ANALYSIS OF CHINA'S DEFENCE POLICY

China's White Papers on Defence

As part of its efforts to appear transparent about its intentions and to dispel its image of a reclusive regime shrouded in secrecy, the Chinese government has been issuing White Papers on national defence every two years since 1998.

While the initial efforts were rather tentative and mainly rhetorical, the 2004 and 2006 White Papers are more sophisticated and succeed in conveying a clear sense of direction. The 2002 White Paper was significantly more moderate in tone than the 2000 White Paper and this trend has been continued. China appears to have decided that its interests lie in projecting a positive, **(China's) fundamental goal is to deter other countries from using or threatening to use nuclear weapons against China.** cooperative image to the international community. Though the White Papers do not follow a rigid format, the issues covered are by and large the same. These include the security environment, the national defence policy, defence expenditure, leadership and the military service system, details of the structure of the PLA and the process of its modernisation through a "revolution in military affairs with Chinese characteristics," details of China's armed police forces, border and coastal defence, science, technology and industry for national defence, international security cooperation, and arms control, disarmament and non-proliferation.

"Defensive" National Defence Policy

In all its White Papers, China has continued to stress that its national defence policy is essentially defensive in nature and that it is subordinate to the higher goal of building a prosperous China. The language used to describe the formally-stated defence policy has been invariably carefully chosen so as not to alarm the international community and, in fact, to convince it of China's efforts to integrate peacefully with the rest of the world:⁴³

China pursues a national defense policy which is purely defensive in nature. China's national defense provides the guarantee for maintaining China's security and unity, and realizing the goal of building a moderately prosperous society in an all-round way. To build a powerful and fortified national defense is a strategic task of China's modernization drive.

China pursues a three-step development strategy in modernizing its national

43. Ibid.

defense and armed forces, in accordance with the state's overall plan to realise modernization. The first step is to lay a solid foundation by 2010, the second is to make major progress around 2020, and the third is to basically reach the strategic goal of building informationized armed forces and being capable of winning informationized wars by the mid-21st century.

Security Environment

The Chinese leadership is of the view that China enjoys basic stability in its security situation. China's White Papers on national defence have generally been relying on four salient factors to assess China's security environment: the primary military threat that China faces, the impact of emerging changes in the nature of warfare, the major challenges and opportunities emanating from the regional security situation and the global power balance. According to the 2004 White Paper:⁴⁴ "China's national security environment in this pluralistic, diversified and interdependent world has on the whole improved, but new challenges keep cropping up. The vicious rise of the 'Taiwan independence' forces, the technological gap resulting from the revolution in military affairs (RMA), the risks and challenges caused by the development of the trends toward economic globalization, and the prolonged existence of unipolarity vis-à-vis multipolarity – all these will have a major impact on China's security." This could be termed as an explicit statement of China's security concerns. The 2006 White Paper takes a less shrill approach, with the exception of misgivings about Taiwan's quest for independence:⁴⁵ "China's security still faces challenges that must not be neglected. The growing interconnections between domestic and international factors and interconnected traditional and non-traditional factors have made maintaining national security a more challenging task. The struggle to oppose and contain the separatist forces for 'Taiwan independence' and their activities remains a hard one... thus, still posing a grave threat to China's sovereignty and territorial integrity, as well as to peace and stability across the Taiwan Straits and in the Asia-Pacific region as a whole... A small number of

44. China's National Defence in 2004, n.40.

45. China's National Defence in 2006, n.41.

countries have stirred up a racket about a 'China threat,' and intensified their preventive strategy against China and strove to hold its progress in check. Complex and sensitive historical and current issues in China's surrounding areas still affect its security environment." China is apparently learning to come to terms with the prevailing security environment without getting too startled.

PLA's "Generation-Leap" Strategy

A common thread that can be clearly discerned to be running through all the White Papers is that the PLA is increasingly focussed on what Yu Ji, a Chinese scholar teaching at the University of New South Wales, calls a "generation-leap" strategy: mechanisation simultaneously with informationisation by plugging information technology (IT) assets into legacy weapons systems, followed by platform integration through networks and, finally, transformation into truly informationised armed forces through the introduction of specially designed weapons systems, platforms and information warfare units that are completely integrated into seamless networks.⁴⁶ This simultaneous effort, which the PLA calls "double construction", runs the risk of falling between two stools as China's information technology is still rudimentary and the PLA may be unable to find sufficient funds for hardware modernisation, especially for the mechanisation of the over two million-strong land forces.

Military Diplomacy

China has a well-structured military diplomacy programme. Though the stated goals of this programme vary somewhat from one White Paper to another, there is a fair amount of consistency. Kenneth Allen has identified the following general goals of China's military diplomacy programme:⁴⁷

- Shape the international security environment to support key national security objectives.
- Improve political and military relations with foreign countries.

46. You Ji, "Learning and Catching Up: China's Revolution in Military Affairs Initiative," in Emily O. Goldman and Thomas G. Mahnken, eds., *The Information Revolution in Military Affairs in Asia* (New York: Palgrave MacMillan, 2004), pp. 97-123.

47. Kenneth Allen, "PLA Diplomacy in Asia: Content and Consequences," cited with the author's permission from a paper presented at the RAND-CEIP-CAPS (Taipei) conference "The PLA in the Asia-Pacific Region: Implications for the Evolving Regional Security Order," December 8-10, 2006, Taipei, Taiwan.

- Provide military assistance to developing countries.
- Enhance China's military and defence industry modernization by acquiring technology and advancing key research and development programmes through foreign assistance.
- Help China's military leaders, younger officers and civilian cadre acquire modern military knowledge, especially from the developed world, in doctrine, operations, training, military medicine, administration and a host of non-combat related areas.

A significant recent development is China's proactive regional posture in the diplomatic, strategic, economic and cultural spheres in parallel with China's increasingly global posture. This is contrary to China's claim that it "plays an active part in maintaining global and regional peace and stability." While some of the countries on China's periphery have reciprocated with a desire for Beijing to assume regional leadership, others are still suspicious of its motives and have adopted a wait-and-watch attitude.

Military Modernisation

The PLA is still largely rooted in the People's War mindset and is at least 10 to 15 years away from achieving what may be termed RMA-ready capabilities at par with the Western armed forces of today. Its military modernisation drive gives greater priority to the PLA Navy, the PLA Air Force and the Second Artillery. It is aimed at acquiring a blue water capability for the PLA Navy (advanced surface warships and non-nuclear attack submarines) to enable it to operate away from its bases for long durations. It is aimed at achieving greater strategic reach for the PLA Air Force by way of modern fighter aircraft (SU-27s, SU-30s) and precision guided munitions (PGMs), airborne warning and control system (AWACS) for command and control and air-to-air refuellers. The PLA Army, that is being given the lowest share of the defence budget earmarked for modernisation, is working towards upgrading at least one infantry division in each Military Region to a rapid reaction division. It is also engaged in improving early warning capability through better reconnaissance, surveillance and target acquisition assets and better air defence, mobility and logistics support capabilities. The paramilitary forces are being increasingly downsized, though personnel are being laterally transferred to the

Immense effort is being put in to acquire information warfare capabilities. The PLA believes that "informationization" will enable the PLA to wage asymmetric warfare and that this is one field in which it can hope to play catch up.

People's Armed Police. Immense effort is being put in to acquire information warfare capabilities. The PLA believes that "informationization" will enable the PLA to wage asymmetric warfare and that this is one field in which it can hope to play catch up. A modern command, control, communications, computers, intelligence, surveillance, reconnaissance (C4ISR) system is being built virtually from scratch. At the same time, the PLA is upgrading its war-fighting doctrine and tactics, techniques and procedures and investing in the education of its officers.

Emphasis is also being laid on acquiring capabilities for exploiting outer space for military purposes as well dominating it through kinetic energy-based and directed energy weapons. The development of strategic land-attack cruise and ballistic missiles is also being accorded high priority. Capabilities for airborne and amphibious operations are also being steadily enhanced.

Power Projection

While China stresses the "purely defensive" nature of its defence policy, perceptive observers have noted the power projection capabilities that are inherent in China's growing strategic reach and the increasing role that military power is playing in enhancing China's comprehensive national power. Roy Kamphausen has argued that the PLA is "currently projecting military power throughout Asia by *responding to crises, contributing to deterrence and enhancing regional stability* using current capabilities. These efforts derive from, and contribute to, the building of comprehensive Chinese national power, which, in turn, serves to increase China's stature in Asia, advance China's foreign policy goals and even check US influence."⁴⁸

48. Roy Kamphausen, "PLA Power Projection: Current Realities and Emerging Trends," cited with the author's permission from a paper presented at the RAND-CEIP-CAPS (Taipei) conference "The PLA in the Asia-Pacific Region: Implications for the Evolving Regional Security Order", December 8-10, 2006, Taipei, Taiwan. (Emphasis in the original.)

"Since 1990, China has sent 5,915 military personnel to participate in 16 UN peace-keeping operations."⁴⁹ In recent years, China has participated in UN peace-keeping operations in Haiti, Lebanon, Liberia and Darfur. The PLA gains considerable experience from these efforts by "mobilising, organising and deploying" composite military task forces overseas. The PLA contributes to deterrence by vigorous aerial surveillance, including regularly crossing the centre-line over the Taiwan Straits, submarine patrols,⁵⁰ large-scale show of presence through the deployment of surface ships,⁵¹ amphibious training exercises and accelerated development and deployment of missile forces, particularly opposite Taiwan.⁵²

Nuclear Policy: Second Thoughts

While China continues to proclaim that it follows a "no-first use" nuclear doctrine, the improvements in the quality of its nuclear-tipped missiles and the progressive increase in their quantity are conferring new options and spurring new thoughts among China's national security analysts about the efficacy of its nuclear doctrine. Several of them have expressed the view that "under certain circumstances – such as an all-out attack against the country by conventional forces – China should use nuclear weapons."⁵³ A Chinese general had stated in July 2005 that if the Americans launched their missiles and PGMs on to targets on China's territory, "I think we will have to respond with nuclear weapons."⁵⁴ As more sophisticated intercontinental ballistic missiles (ICBMs) like the DF-31A and submarine-launched ballistic missiles (SLBMs) like the JL-2 enter service in larger numbers, China may be emboldened to review its no-first-use policy. It will certainly do so internally even if it continues to publicly proclaim that it will never be the first one to use nuclear weapons. Any Chinese move to

49. China's National Defence in 2006, n.41.

50. In November 2004, a Han-class submarine was reported to have illegally entered Japanese territorial waters. A Chinese Song-class submarine crossed within five nautical miles of the USS Kitty Hawk carrier battle group near Guam in October 2006 and reportedly surfaced deliberately to show its presence.

51. In September 2005, five PLA Navy warships deployed near the Chunxiao oilfield in the East China Sea where Japan and China have overlapping claims.

52. Kamphausen, n. 48.

53. Ann Scott Tyson, "Pentagon Finds China Fortifying its Long-Range Military Arsenal," *The Washington Post*, May 24, 2006.

54. Charles R. Smith, "China Wants War," Newsmax.com, July 18, 2005, <http://www.newsmax.com/archives/articles/2005/7/17/170416.shtml>

discard the no-first-use policy will be inherently destabilising. Hence, for defence policy and military planners among China's adversaries, it will be prudent to assume that China may backtrack from its no-first-use policy during a time of crisis.

US-INDIA EQUATION AND CHINA'S SECURITY

With its large military footprint, alliances and trade relationships in Asia, the US too is an important Asian neighbour and its security relationship with China impinges in a major way on the security framework in Asia. The US policy towards China is often described as "hedged engagement." Some elements in the Indian government and analysts in India's strategic community would like India to join the US in this hedging strategy. In fact, in the eyes of this group, the growing India-US strategic partnership has only one agenda and that is to join hands against China if that country's rise is not peaceful, as its leaders proclaim it will be. Though both governments have repeatedly denied any such intentions, clearly, both recognise that China's growing military muscle and strategic influence in Asia need to be balanced lest these reach hegemonistic proportions.

There is no consensus among Indian analysts on whether India should team up with the US to counter-balance China's growing power and influence. Nor is there such a consensus in the US. David Shambaugh approvingly quotes Joseph Nye: "If you try to make China an enemy, it will become one" and concurs with former Secretary of Defence William Perry and Assistant Secretary Ash Carter who warn against "attempting to create an encircling anti-China alliance."⁵⁵ It is in India's interest to follow an independent foreign policy that is reflective of its own vital interests rather than team up with the US to counter-balance China in Asia. However, in the eventuality that China flies in the face of conventional wisdom and implodes or disintegrates, the repercussions will be extremely dangerous for India and India needs to hedge against such an outcome. Meanwhile, China is vectoring in the possibility of the US-India balancing act into its security calculus.

55. David Shambaugh, Paper entitled "The Evolving Security Order in Asia: Implications for US-India Relations" presented at the conference "Power Re-alignments in Asia: China, India and the United States", co-sponsored by the Centre for the Advanced Study of India, University of Pennsylvania, and the Observer Research Foundation, New Delhi, December 14-17, 2006, New Delhi.

DEDUCTIONS AND CONCLUDING OBSERVATIONS

National Security Goals

From the formally-stated policy and arguments given above, China's national security goals may be assessed to be the following:

- To prevent separatist tendencies and promote reunification, guard against and resist aggression and defend national sovereignty, territorial integrity and maritime rights and interests.
- To promote economic and social development in a coordinated and sustainable manner and steadily increase comprehensive national strength.
- To pursue an independent foreign policy with a view to securing a favourable international and regional environment.
- To modernise China's armed forces in line with the trend in international military developments, particularly technological development.
- To improve operational capabilities for active defence under informationised conditions.
- To safeguard the political, economic and cultural rights and interests of the Chinese people and maintain public order and social stability.

National Security Strategy

For meeting its national security goals, China's national security strategy may be assessed to be the following:

- The primary objective is to create a security environment favourable to the country's economic development.
- Peaceful reunification of the Motherland is one of the strategic objectives set by the Chinese government.
- Safeguarding the country's territorial integrity is the foremost responsibility entrusted to the PLA.
- China will continue to claim that it will persist in the principle of non-use of force in settling boundary differences. However, it may be expected to follow a more robust policy with preemptive strategies, particularly in relation to Taiwan.
- Towards its regional neighbours, China will continue to follow a stick and

OFFENSIVE AIR POWER IN THE HIGH MOUNTAINS

R.G. BURLI

We share a long high mountainous border with China to our north/northeast and with Pakistan to our north/northwest. Historic alignments against India, along with the recent agreements between China and Pakistan on the modernisation of transport corridors, development of a new oil route and expansion of Gwadar port, etc should be a wake up call from the security perspective. Despite recent progress in economic cooperation, China has not softened its passionate territorial claims in India. To this day, it lays open claim to almost the entire area of the Indian state of Arunachal Pradesh. Water security through control of the mighty Himalayan watersheds may be as much the reason as pure territorial aspirations. Military preparedness in personnel, equipment and training is a necessity and China must feel compelled to perceive it. India must never doubt its intuition that China, despite being a potential long-term economic ally, would need to be deterred from ill-conceived military adventurism. That Pakistan needs to be deterred likewise is obvious.

As the succeeding text will endeavour to reveal, unlike India's perhaps wrongly conceived holding back during the 1962 War that resulted in a comprehensive and humiliating defeat, the key this time round should clearly be aerospace power.

This work examines the various facets of the application of offensive air power in the zone of joint physical engagement of a high intensity conflict situation with China, with a specific eye on operations in the Arunachal Pradesh region.

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LIKELY SCENARIO

Economic compulsions and nuclear threshold considerations could see international pressure mounting quickly on belligerents. In this scenario, operations would most likely be characterised by rapid movement with in-situ forces or those mobilised rapidly, coming into action in a quick timeframe with the intention of occupying territory as quickly as possible albeit under the restricting circumstances of terrain and environment.

The Indian land forces, despite being well prepared, are at somewhat of a disadvantage in terms of optimum positioning. They might want to thwart the Chinese endeavour by planning to stop the onslaught while keeping options open for a counter-attack at an appropriate space and time to capture Chinese territory towards using as balanced give and take after the hostilities. The Indian Air Force's (IAF's) air power could in such an instance, be expected to operate complementarily across a fairly wide area with alacrity.

A future Indo-Pak scenario could prove to be another series of insidious low intensity conflict operation (LICO) situations, perhaps akin to repeats of Kargil. A typical future Indo-Pak round could occur perhaps in the context of the Siachen Glacier. The ongoing Indo-Pak confidence-building measures (CBMs) might result in it having to be vacated by the Indian Army. Going by past experience, Pakistan would almost certainly renege on its commitment and occupy the Salto heights.

Whatever the case, if we could prepare, equip and train with modern capability to counter a high intensity war situation in the high mountains with China, the same means could be applied in a modified, perhaps scaled down sense, to defeating a LICO level military confrontation in the mountains with Pakistan in the Jammu and Kashmir (J&K) region.

It seems almost certain that an offensively oriented modern aerospace force would be a prerequisite.

To make this possible, it seems almost certain that an offensively oriented modern aerospace force would be a prerequisite. Conduct of parallel and synchronised operations would be essential. Offensive aerospace power applications would need

to be stitched seamlessly with tactical operations through detailed advance joint planning and training. All traditional air operations, including the gaining of the requisite control of the air through appropriate offensive and defensive counter-air operations (CAO) and inflicting the required level of systemic damage through a resolute interdiction campaign (were the opportunity to occur) would need

Offensive aerospace power applications would need to be stitched seamlessly with tactical operations through detailed advance joint planning and training.

planning and execution.

RECENT HISTORY

An examination of relevant history would reveal that other than to some extent in recent years, air power has had few precedents of truly effective application in the mountains. The Sino-Indian War of 1962 might have been a useful proving ground, but for the fact the IAF's offensive arm was kept grounded due to concerns of inordinate escalation of the conflict.

Soviets in Afghanistan

During the Eighties, the Soviets rediscovered why Afghanistan's harsh mountainous geography and harsher climate has made it difficult to conquer and occupy. As has been their wont, the Afghan fighters, pressed by the Soviets, retreated into the high mountains where Soviet tanks could not follow.

The Western powers and the Islamic states provided support to the Afghan resistance. The Soviets relied on special forces and air power to achieve a military solution. Selected conventional forces attacked resistance strongholds and air assaults attempted to envelop retreating insurgents. These units were light enough to be as mobile as the resistance itself. Yet they could call in tremendous firepower in the form of Soviet

Induction of American man-portable surface-to-air missiles like the Stinger resulted in large numbers of aircraft in general and helicopters in particular, being lost.

air power. These new tactics were initially effective and the Soviets might have been on the verge of defeating the resistance. But the induction of American man-portable surface-to-air missiles like the Stinger resulted in large numbers of aircraft in general and helicopters in particular, being lost. This made the Soviet tactic of surrounding the Afghan fighters through offensive air power ineffective and prohibitively expensive. The Soviets, unable to adapt to this new threat, ultimately lost the air war. This permitted the resistance to revive and the Soviets had to ultimately withdraw from Afghanistan.

Operation Allied Force, Kosovo

A part of Operation Allied Force, a post-revolution in military affairs (RMA) era air campaign, was conducted in the mountains bordering southern Kosovo against Serbian forces close to Albania and Macedonia. Precision guided munitions (PGM) including laser guided bombs (LGB) and joint direct attack munitions (JDAM) were employed during the campaign, sometimes against insignificant and highly mobile targets. Individual tanks had to be attacked in some instances. This was done fairly successfully with PGMs from great stand-off ranges. Weather hampered air operations on several occasions. During these times, being immune to weather, the newly introduced inertial navigation–global positioning system (IN-GPS) JDAM proved effective against pin-point attacks. The air commander, Gen. Short, operated under severe constraints in the theatre command chain, including a cumbersome and time consuming decision chain that was routed through the theatre commander (US Army Gen. Wesley Clarke) all the way back to the highest political echelons of mainland USA. Aerospace power, hence, turned out straightjacketed and incapable of being applied efficiently by commanders not well oriented to perceiving its nuances. A painful lesson was re-learned.

However, from an expert perspective, the campaign endorsed the effectiveness of network-centric warfare (NCW) as a force multiplier, use of PGMs like the JDAM and the unmanned aerial vehicles (UAV) in the reconnaissance surveillance and target attack (RSTA) role. These were developed upon further and greater effectiveness was achieved during Operation Enduring Freedom in Afghanistan a few years later.

Operation Anaconda

In a way, Operation Anaconda, a subset of Operation Enduring Freedom can perhaps be termed as a recent example of reasonably effective application of air power in the high mountains. Pursued by the Coalition forces, the Taliban and Al Qaida cadres retreated into the sanctuary of the labyrinthine caves of the Hindukush Mountains of south Afghanistan as they had done against the Soviets at an earlier time. Operation Anaconda was launched to force these cadres out of their mountainous hideouts. It started off with quick response ground forces trying to do the job single-handedly. But the ploy failed and only when casualties mounted a month after it began was offensive air power called in, almost as an after-thought. Special operations forces (SOF), along with expert tactical air controller (TAC) teams promptly went into action, calling in and directing massive air power in the mountains from large stand-off altitudes and distances. Both PGMs and free-fall bombs were used. JDAM and other ordnances, including thermobaric munitions, were employed. Satellites and UAVs like the Global Hawk and Predator were deployed for persistent intelligence surveillance reconnaissance (ISR). The Predator was also used for precision attack with the Hellfire missile and proved effective in reducing the sensor to shooter timeframe in engaging time sensitive targets.

What was demonstrated in the high mountains of Afghanistan was not classic air interdiction or battlefield air strike (BAS) but rather SOF-TAC team enabled precision air attacks against enemy ground forces with no friendly ground forces in direct contact. This novel use of air power enabled use of offensive air power directly at the operational rather than tactical level of war.

Novel use of air power enabled use of offensive air power directly at the operational rather than tactical level of war.

The Kargil Experience

Our own Kargil experience has been reflective of the several abominable errors of the past committed by us as well as other powers. The most glaring of these was a complete loss of initial synergy between air and land forces, brought about

by the late induction into the fray of air power and, hence, the denial of the optimum employment of its attributes of offensive action and shock effect by professionally trained minds, right from the outset. After all, we were fighting a clearly defined enemy within our own territory. There ought to have been no doubt in our collective psyche that we would stop at nothing with regard to what threatens our national sovereignty and territorial integrity. That this attitude dawned in due course of time as operations progressed does immense credit to the professionalism of the armed forces and the maturity of the nation. But had we really learnt from our own earlier experiences or those of others? Clearly not!

Operation Safed Sagar was in parts a post-RMA conflict in the high mountains that in a very general sense, no doubt, featured, on the one hand, the limited use of PGMs, but, on the other, was deficient of some intrinsic RMA attributes, especially those related to communications and networking towards enabling effective operational level command and control. What made up for this deficiency in some measure was that fortuitously it turned out to be a localised conflict with virtually no interference from enemy combat air power. Most importantly, it was an operation that displayed in full measure the power of innovation and adaptation that the IAF has been gifted with as an enduring trait by its founding fathers and the generations of personnel that have manned

The LGB attacks on Tiger Hill poignantly demonstrated not only the telling direct effects of PGMs, but also the indirect and more intangible dimensions of their effect on the human mind

its echelons. The use of airborne laser designation pods as reconnaissance tools for high-resolution imagery and the adaptation of the Mirage attack system for accurate delivery of dumb weaponry from high altitudes are, among others, two 'high visibility' cases in point.

The LGB attacks on Tiger Hill poignantly demonstrated not only the telling direct effects of PGMs, but also the indirect and more intangible dimensions of their effect

on the human mind in the harsh and tenuous environment of the high altitude mountains. The fall of Tiger Hill was succeeded by the almost spontaneous

collapse of the human will, as it were, on the part of the enemy to continue the fight. Hence, it became easier in its aftermath for the land forces to overrun post after mountain post in quick time and succession towards an earlier and favourable termination of the conflict.

Given its history, it ought to be clear that for air power to be effective in the mountains, it would need to be employed offensively, targetting would need to be precise in space and time, and centres of gravity (COGs) would need to be analysed minutely and be value-based. Enhancing the capabilities of available systems through innovation and relevant upgrades and ensuring interoperability of weapons and equipment should bear rich dividends.

To this extent, the environment of potential engagement would need to be examined and understood in the necessary detail.

EFFECT OF ENVIRONMENT ON MEN AND MATERIAL

The Himalayan ranges are high and rugged, with steep slopes. Valleys and passes are usually the only routes that would allow conventional ground movement of men and material at any viable speed and quantity. Avenues of movement in terms of roads or trails would be limited and require extensive effort to maintain and operate. Landslides and avalanches are particularly common in high cold mountains like the Himalayas. These would restrict movement and pace of operations. Once detected, the accurate power of air-launched weapons could significantly slow down enemy forces' movement.

Air transportation, a possible solution to the mobility issue, would be limited by drop-off of machine efficiency at altitude. Apart from reducing payload, it would increase considerably the effort and time to achieve movement of men and material. Winds could get turbulent, with considerable fluctuations in airflow strength and direction, particularly on the leeward side of mountains. Winds, combined with the terrain effects, could produce strain on air crew especially since they would have little margin for error. Helipads would need to be located in vantage areas on ridges or valleys. Once identified, these could be constantly targetted as part of the counter-air campaign. Air mobility by the enemy would, hence, be a very trying task.

We know from our own experiences in Siachen and Kargil that personnel operating in high mountains need to be in peak physical condition. Low temperatures and the rarified atmosphere of high mountainous altitudes are a devastating combination that could bring the fittest of even acclimatised men to

Despite the highest levels of equipment sophistication and capability, the man behind the machine or gun is the key to effectiveness in war.

a helpless state of inaction. Supply of water and ammunition and the evacuation of the wounded, especially if helicopters cannot land appropriately, could complicate operations. Despite the highest levels of equipment sophistication and capability, the man behind the machine or gun is the key to effectiveness in war. Should he be

demoralised or deterred, the war would be as good as won. Even under optimum conditions, shock effect induced by air delivered weapons could result in 'paralysis' of body and mind and cause rapid capitulation. As alluded to earlier, we know this from our own experience in the Kargil War.

Though the Indian Army has operated light tanks and armoured personnel carriers (APCs) in the Himalayas during both the first Indo-Pak War 1947-48 in Haji Pir and the China War 1962 in the Chushul, mountains are not favourable environments for armour operations, because tanks and machines lose efficiency at altitude. This, along with constraints of free movement in the mountains, renders them unable to optimise mobility and manoeuvre. Off-road vehicular movement would be difficult. Armour and vehicles, if caught in the open could be lucrative targets for air power. Mechanised infantry would suffer the same limitations as tanks. Use of airmobile forces would be difficult. Logistics nodes, and secure landing areas would be an important consideration. Concentration and regroupings are likely to occur in valleys. These could prove good interdiction targets for air power.

EFFECTS-BASED OPERATIONS (EBO)

Advances in wide-area, real-time airborne persistent surveillance and battle management systems make it feasible today for air attacks to create physical and

psychological effects that in combination can quickly prevent a fielded land force from being able to function well enough to overrun and occupy territory rapidly.

Further, the fragility of the human body and mind in the testing high mountainous environment would increase the operational level options through effects-based joint operations. Success could be achieved faster and more efficiently with less risk to our surface forces than is possible in operations that depend primarily on attrition and close battle to defeat enemy land forces.

Weapons

An essential part of EBO is an emphasis on weapons as the sharp end of the proverbial air power rapier. Weapons must be conceived to be on target with the greatest of accuracy and in just the right numbers to achieve the desired effect at the opportune time and place of choosing.

So what should we aim to achieve with weapons to ensure effective air-to-ground attack in the high mountains? For one, we should seek accurate attack on enemy men and material, especially mechanical means of transportation towards degrading enemy ground objectives while enhancing our own. Second, we should seek to deter enemy resolve in continuing operations by playing on the human mind by creating a perception of grave danger in movement and towards achievement of an intense psychological perception of defeat in the face of air attack.

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For both these effects to materialise, precision would need to be achieved. Hence, an emphasis on PGMs would need to be high.

Large terrain undulations of mountains could mean a magnification of small inaccuracies in conventional weapon aiming. Reduction of circular error of probability (CEP) achievable through PGMs would mean exponentially increasing the probability of a hit. Hence, weight of attack would reduce markedly. While accuracy of attack is an overt attribute of PGMs, defence against

PGM attacks is also increasingly becoming difficult on account of stand-off ranges. Also, given the inherent problems of effective air defence in mountains due to reasons of intractability and elements degrading surface-based human and machine performance, PGMs are capable of achieving a highly magnified projection of even a modest force level.

The intrinsic accuracy and effect of PGMs would permit the basic weapon to be kept small. Therefore, larger numbers could be fielded by a single platform. Also, a given platform could fly at a higher altitude to ensure better stand-off heights from crests and ridges. Such weapons could also perhaps be deployed on smaller platforms like UAVs, conferring them offensive status other than ISR related support functions. Smaller calibre weapons would also reduce collateral damage – an aspect that could be of considerable significance in bettering time-frames for decisions from higher echelons, relaxing ROEs and safeguarding own forces operating in close proximity of the enemy.

Lack of scope for manoeuvre by own surface forces might mean that they are unable to get out of the way fast enough to permit an air attack against a time sensitive target at short notice. Such movement might be unnecessary in the case of attack with PGMs. An intangible but nonetheless significant effect of precision attack would be the adverse psychological impact on the enemy of always being accurately targetted, with no place to hide. Therefore, resolute attacks with PGMs would in so many ways, tangibly or intangibly, prove successful.

The ability to wage a 24-hour battle would be crucial to the success of PGM attacks. The high mountains to the north are prone to rapid changes of weather. Unpredictable weather giving rise to fog and/or clouding in the high mountains could affect electro-optical designated and guided PGMs, including LGBs. In the circumstances, IN-GPS guided munitions could be effective. Like an LGB, the GPS guidance kit turns a standard calibre 'dumb' bomb into a smart weapon. It probably also comes with a lower price tag and is simpler in application.

Use of IN-GPS guided weapons should eliminate the need to disseminate target imagery to attacking air crew, and reduce workload. Apart from the potential for indigenous adaptation, IN-GPS tail kits like the Long Shot, offer not only a cost-effective solution, but enhanced ranges and uncomplicated precision

capability, with the weapons needing no special aircraft interfaces as they can easily be programmed from the cockpit with a hand-held UHF transmitter.

Other PGM capability such as ARMs and TV guided weaponry already available in our inventory or slated for retrofitment would be relevant as the situation and environment demands. However, before theory turns misleading, it must be realised that PGMs would always be limited in numbers owing to cost and deployment considerations. We would always perhaps have, if anything, a stock of dumb bombs instead and that would need to be worked into how effectively we end up utilising them.

In our specific context, where PGMs are not likely to be available in the requisite numbers, either on account of cost considerations or due to non-availability of the requisite technology, both flight path and non-flight path 'dumb' weapons would always have a major role to play in operations. Needless to say, their employment would need careful consideration and planning. The precision in their effective employment, of course, would mean a shift of focus onto the platform weapon aiming system instead of the weapon itself. Current capability as well as long-term retrofit plans for airborne platforms should allow for their effectiveness against area targets such as concentration areas and regroup points in mountain valleys and creation of landslides and avalanches at critical space and timeframes towards destruction and delay of the enemy.

Platforms and Profiles

Conceptually, the emphasis would need to be more on sophistication of weapons and targetting accuracy than on launching platforms. Aerial platforms would need to have navigation and weapon aiming systems to permit accurate aiming of unguided weapons. Some platforms would additionally have PGM capability. Autonomous capability would imply carriage of a targetting pod either by the same aircraft or another in the buddy mode. Should lasing through a ground based PLDS or a UAV be feasible, then the launch aircraft could be kept simpler and only provided the onboard equipment with the ability to intercept the GPS / LGB 'launch basket' accurately at a given height and speed. For more specialised weapons such as ARMs and TV guided munitions, much greater

degrees of sophistication in terms of aircraft on-board systems and weapon interfacing would be needed.

Inevitably, the IAF would always possess a range of combat aircraft to meet these requirements, either singly or collectively. Resources would need to be preplanned and managed judiciously by command staff. Rather than contemplate new and expensive airframes for the purpose, it might be better to plan on conferring retrofit capability in existing platforms. Indigenous endeavour would be highly desirable and could add to further cost-effectiveness.

The airborne threat would be addressed through an offensive/defensive counter-air campaign that could run parallel to the other integrated campaigns. For delivery of dumb weapons, dive attacks should be preferred to level release attacks. During dive attacks, however, the platform itself could be vulnerable in the final phase of attack, which should normally be as close to the target as possible, conducive to self-damage criteria of the weapons delivered and/or safe transition from dive conditions to climb after weapon release. Nonetheless, all

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aircraft, especially those expected to enter the danger zone of enemy AD in the battlespace, should be capable of minimising exposure time as also enhancing survivability with self-protection suites.

Some modern multi-role platforms would also be capable of swing-role employment during missions. For example, an air superiority fighter on an offensive air defence mission could contribute equally

effectively to time critical air-to-ground targetting to neutralise targets in the battlespace with dumb and/ or precision weapons.

Space and time peculiarities of mountain operations might call for the persistent attack capability of armed UAVs and UCAVs to meet the immediate tasking requirements of surface forces. Long endurance UAVs like the Heron, given a pertinent weapons capability of missiles or small calibre PGMs, could remain in the area to detect and neutralise high value targets of opportunity

more effectively and in a smaller timeframe. This could free up manned aircraft from immediate demand counter-surface force operation missions. Manned aircraft, in any case, have less potential for such long endurance flights on account of the human factor. This could go a long way in reducing the 'sensor to shooter' loop in time critical situations. Satellite communications could confer the flexibility to operate them at low to high altitudes, as the situation merits.

Enablers and Force Multipliers

Irrespective of sophistication levels, there would always be the need to balance the quality versus quantity factor. While quantity cannot be compromised, costs would inevitably mean a limitation in the overall numbers of systems available. No matter what, in pure numbers we would always be on the 'back foot' in comparison to an adversary like China. We would, hence, need to magnify or multiply our potential. The various sensor elements of satellites, AWACS, FRA and UAVs, would need to be stitched together seamlessly by good communications. Shooter platforms in terms of manned aircraft and UAVs among others would need to be integrated with command decision processing for time and space application of customised and effects-based firepower by air commanders.

Since the success of effects-based joint operations would depend upon efficient control at the operational level, the requirement of dynamic and fused information would be the principal enabler of future aerospace campaign success in the mountains. Communications would need to be secure. In the mountains, conventional communications, though useful, might incur line of sight limitations. Satellite communications could be exploited more effectively in the circumstances. India already has a significant Satcoms capability, which is making rapid inroads in the military realm. This would need to be integrated more extensively with NCW towards effective air power applications in the high mountains.

Irrespective of sophistication levels, there would always be the need to balance the quality versus quantity factor.

Real-time imagery and good connectivity would result in the 'kill chain' becoming shorter, along with a substantial increase in target-attack accuracy. Persistent ISR and precision attack should provide the ability to deny the enemy a sanctuary by day and night. Greater use of 'peer down' positioning of sensor capability available in satellites and UAVs would be necessary.

The problem of mountain shadows would inevitably impinge upon the optimal performance of stand-off look down airborne radar of the AWACS and similar systems. Enemy air power could exploit this limitation to conceal approach through low-level ingress into the battlespace. Though not the easiest of tasks to operate close to high mountain surfaces on account of piloting problems, weather and loss of efficiency, this loophole would need to be compensated through suitable joint deployment of lightweight sensors and SAM systems. This aspect would also favour application of own air power from medium to high altitudes other than in very specific instances demanding low level operations as, for example, of attack helicopter and dive attacks with dumb weapons by fighter bombers.

Air-to-air refuelling (AAR) would be an indispensable enabler in keeping attack and AD aircraft airborne for longer durations, enhancing their range and most importantly, optimising their weapons carriage potential towards EBO. In

Air-to-air refuelling (AAR) would be an indispensable enabler in keeping attack and AD aircraft airborne for longer durations.

the future, UAVs, including the armed variety equipped for AAR could accrue significant force multiplication. The Heron, for example (which is already a weapons integrated platform), could be made available on almost continuous tasking and call through AAR. This, together with their inherent slow speeds and stealth, could

make them highly adaptable and effective for applications in the high mountains.

Active as well as passive electronic warfare (EW) would as always be indispensable. Aircraft would need to be equipped with automatic active and passive counter-measure systems, irrespective of their role and function.

LIKELY GENERALITIES OF THE AEROSPACE PLAN

Time and space constraints would place a premium on the conduct of parallel operations. Aerospace power would need planning for employment without hesitation right from the outset of hostilities. Its effects must be planned for accurate and customised employment in space and time. An integrated army-air force strategy would need to keep in mind the political realities alluded to earlier and air operations would need to be suitably tailored to meet the imperatives of speed and initiative.

ISR would be the most important opening element of the aerospace plan. Vertical dwell as against oblique sensing would be essential. Imaging satellites could provide effective high-resolution hyper spectral and synthetic aperture radar (SAR) surveillance of the expected battlespace and enemy forces. While manned aircraft could prove useful in certain conditions, UAVs, on account of their ability to operate for prolonged durations of time, in close proximity to the areas of operational and tactical interest could be indispensable as reconnaissance platforms. This would also be significant for targetting of PGMs. If done as a national endeavour by integrating the resources of all civil and paramilitary agencies, ISR could provide a clear picture of enemy centres of gravity. This could be matched against more specific human and machine degradation factors to provide a real perspective for value-based targetting in the mountains.

ISR would be the most important opening element of the aerospace plan.

In short duration, fast paced operations, air dominance in the required battlespace would be a prerequisite. Since AWACS operations could be restricted due to mountain shadows at low levels, offensive counter-air would need to hinge on the high level multi-layered AWACS supported action by air superiority fighters. AWACS would need to be employed and protected aggressively in accurate space and time regimes to achieve force multiplication. AAR would also need to contribute to supporting this endeavour.

For the purpose of targetting, identification of own COGs along with those of the enemy would need high precedence. Especially to ensure that own air power is able to function unimpeded in the face of enemy action. Therefore, among own

COGs, airfields (including helipads and FAARPs) in the rear areas would be one of the more important ones, not only for the air force but for the army as well. These would need to be protected through a resolute offensive and defensive counter-air campaign and a well-designed joint ground defence plan, while denying the enemy the same.

Against China, in support of our endeavour of the enemy ground forces movement denial plan, it would be crucial to identify centres of gravity perhaps biased more towards the operational and tactical level rather than the strategic level, as our prime objective in this regard ought to be focussed on deterring or thwarting rapid advance by its surface forces. In order to slow down and disrupt the pace of enemy operations, air interdiction would automatically assume high significance. Rear concentration areas, logistics nodes and choke points would perhaps be high on priority as early interdiction targetting and for repeat attacks.

The more or less fixed and predictable avenues of approach of enemy ground forces would mean that fixed interdiction targets could be pre-assigned for appropriate attack during the joint planning stage itself and actually negotiated according to time sensitive stipulations at the onset of hostilities. From the parallel operations viewpoint, this could be desirable as it would form a part of the air force's overall pre-planned counter-surface force campaign, running concurrently with all the other main air campaigns. Mobile targets in terms of enemy air mobile and manoeuvre forces, along with others in that class, could be left for tackling on emergent basis. Good situational awareness of the battlespace would perhaps mean that no air attack resources other than the barest minimum are kept tied down against immediate demand by surface forces.

Prioritisation of independent air interdiction as well as synergised battlefield air operations effort would need emphasis. In the mountains, given the expectation of relatively slow speed and unpredictable pattern of movement of the ground battle, the theoretical definitions of these terms could become somewhat obscured as battle lines are unlikely to be linear. Loose or ill-defined battle lines should demand the requirement for effecting close control of attack aircraft from the ground, not only in the contact zone but elsewhere as well. The traditional joint forward air controller mechanism might fail the demands of this

specific requirement. The situation would call for a more independent, flexible and mobile joint control team, capable of directing air strikes not only against battlespace targets, but across a wider spectrum on the lines of the SOF-TAC teams of Operation Enduring Freedom. As explained later, this would need to be a joint air force-army venture.

Prioritisation of independent air interdiction as well as synergised battlefield air operations effort would need emphasis.

Combat in the main battle area could turn out to be a series of isolated actions fought from strong points on ridge lines and in valleys. Battlespace air operations could be particularly effective in mountains, since enemy mobility, a crucial factor in the scenario, would be restricted by terrain. Other than fixed emplacements, vehicles and personnel would be particularly vulnerable to effective air attack when moving along narrow mountain roads. Precision-guided munitions could destroy bridges and tunnels. Under well-examined conditions, dumb weaponry in the form of free-fall bombs and large calibre rockets like the S-24 could be effective in causing landslides and avalanches to close routes or even collapse on both stationary and advancing enemy forces. Long-delay fused bombs could also be effectively employed to impede the enemy's ability to make critical route repairs to ensure mobility. Precision-guided munitions, as well as fuel air explosives could be used to destroy or neutralise well-protected point targets such as tunnel entrances, bunkers and enemy forces.

Armed and attack helicopters could be employed for missions in areas where AD systems are ascertained as absent. Nonetheless, they would need to invariably be equipped with active and passive self-protection suites. Performance limitations might mean that their effective utilisation could be confined to relatively lower mountain altitudes. They could also be employed to outflank retreating enemy, to set up positions overlooking likely withdrawal routes.

SOME SALIENT JOINT ASPECTS

Jointness would be crucial in the high mountains. The joint operational plan once evolved in advance would need to be bolstered by acceptance of responsibility

and accountability by each Service. In a short crisp confrontation in the mountains, in order to halt the enemy, firepower from the ground and air would need to be projected as a pre-planned, synergistic and efficient application of force in the required space and time.

To this end, offensive air power elements would need to be made quickly self-deployable to new locations within or adjacent to the required theatre and come into action effectively at the space and time of joint choosing. This should drive, in some scenarios, the preclusion of own surface forces to engage powerful enemy surface units in unnecessary close combat. Reducing or eliminating close combat requirements would complement the more lightly equipped mountain forces to redeploy quickly and retain capability of manoeuvre rather than get bogged down in a situation of potential attrition warfare that we could ill-afford in the mountains, particularly in view of our relative adverse ratio in terms of physical numbers of personnel and equipment.

The ground terminal attack controller (TAC), a modern day forward air controller (FAC), if you like, could become a key element in this process. The TAC, supported by land special forces, would be meant to precisely and efficiently maximise air power's effect on the enemy. Unlike the FAC-ACT team that is dependent on resources at the wing/division level, this new age team would need to be structured as a self-supporting unit with appropriate mobility and communications, that apart from aircraft control, should enable tasking and direction from the operational level. Mobility in the mountains may call for special measures such as provision of helicopter or animal transport. Whatever the case, TACs should help make air power decisive on the non-linear mountain battlefield. Of course, this new skill would need joint commitment in training and resources to produce a supportable number of TACs. The ability to provide live, realistic joint training in survival, communications and control of attack aircraft to maintain not only the TAC's proficiency but also to conduct initial TAC training and qualification would need to be an important joint organisational initiative.

There must be a clear understanding that space and time application of joint force can only be optimum when undertaken by each Service individually through

the pursuit of its specific core competencies at war-fighting. Hence, each Service cannot possibly ensure that every possibility in an operation is covered. We have little option other than to give latitude in terms of individual Service core competencies and build trust and synergy and lay the ground for synergised effects-based operations.

CONCLUDING THOUGHTS

The successful implementation of effects-based joint operations in the mountains

would require increased emphasis on the qualifications of commanders and staff at the operational level. The Services must treat qualifications for this level with the same thoroughness that is ascribed to tactical level qualifications. As is the case with tactical level units, all personnel, regardless of rank, would do well to demonstrate appropriate knowledge and judgment regarding operational level joint operations before being assigned command and control responsibilities.

Aerospace power would be crucial to the outcome of any future war in the mountains. The currently available and future developments in aerospace surveillance and battle management capabilities provided by indigenous satellites as well as our present and future combat aircraft and UAVs would need to be threaded through broadband joint communications into an effective command and control, intelligence, surveillance, and reconnaissance (C2ISR) arrangement to make effects-based joint operations in the mountains a reality. Such battle management capability should make it feasible to exploit the accruing wide area

situational 'awareness' to achieve the effect of 'paralysis' of enemy forces by targetting responsive, precise and lethal air attacks against enemy surface war effort that is in physical operation at an opportune space and time.

There must be a clear understanding that space and time application of joint force can only be optimum when undertaken by each Service individually through the pursuit of its specific core competencies at war-fighting.

Aerospace power would be crucial to the outcome of any future war in the mountains.

AWACS: THE PIVOT OF AEROSPACE POWER

ATUL KUMAR SINGH

On December 7, 2006, the United States Defence Security Cooperation Agency (DSCA) notified the US Congress for the foreign military sale to Pakistan of three excess P-3 aircraft with the E-2C Hawkeye 2000 airborne early warning (AEW) suite.¹ The Pakistan Navy has already been operating the P-3C Orion which is a long range, high endurance maritime surveillance, reconnaissance, anti-surface warfare aircraft; it has also contracted with the USA for the supply of eight P-3C aircraft, the first of which was received at the PNS aviation base PNS *Mehran* on January 18, 2007². The new deal with Pakistan is to refurbish and modify the three P-3C aircraft with the E-2C Hawkeye 2000 AEW suite. Pakistan has tried to acquire airborne early warning and control (AEW&C) aircraft since 1979 when it first made an attempt to negotiate for the Boeing 707 based E-3C airborne warning and control system (AWACS) from the USA, on the pretext that it wanted to bolster its defences against Soviet and Afghan government air attacks across its western borders.³ Twenty years later, in 2006, the *primary purpose has been altered as development of an effective air defence network of its naval forces and to provide AEW, surveillance, enhanced command and control and communication capability. The secondary requirement is to assist US forces in Operation Enduring Freedom and provide control capability over land against*

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1. "Pakistan-E2C Hawkeye 2000 Airborne Early Warning Suite for P-3s," News Release from Defence Security Cooperation Agency, downloaded from www.dsca.mil on January 9, 2007.
2. Associated Press of Pakistan; "Release of P-3C Orion Planes to Pakistan Sign of Cooperation with US," downloaded on January 19, 2007, from www.app.com.pk
3. Air Commodore Jasjit Singh, *AWACS: The New Destabiliser* (New Delhi: Lancer Press, 1987), p. 33.

transnational terrorist and narcotics smugglers. In the mid-1980s, the E-2C Hawkeye trials on the Afghan border failed because of the limitations of terrain masking and performance limitations in mountainous areas. Even a US Navy website has posted, "Hawkeye's degraded performance over land is one of the weaknesses."⁴ However, the Hawkeye-2000 variant is considered to have enhanced performance over land and is reported to be capable of detecting ground targets in a low track density environment. Therefore, even if the main purpose of the Hawkeye is to augment the Pakistan Navy's anti-shipping, anti-submarine warfare capability, it is important for the Indian Air Force (IAF) to note that, in addition to its maritime capability, the E-2C Hawkeye 2000 AEW suite can be effectively used over land.

Pakistan has also finalised a deal worth \$1.15 billion with Sweden for a provisional contract to supply the S100 Argus turboprop airborne early warning system. Pakistan is planning to acquire six to seven such AEW systems with a combination of PS-890 Erieye radar and SAAB 2000 aircraft.⁵ "Pakistan has made down payment for the Swedish system and expects the delivery to begin by 2009 at the latest," a military official has said.⁶ This signifies that Pakistan is in a hurry to bolster its air defence and air offensive capabilities over land as well as over sea.

In another important but expected development, Pakistan signed a memorandum of understanding with China on November 24, 2006, during the visit of Chinese President Hu Jintao, for a long-term collaboration in defence production, including development of an airborne early warning surveillance system. Considering the timeframe for the development of a new project and the gestation period, in all probability, Pakistan will invest and collaborate in the development of the ongoing Chinese AEW programmes KJ-2000 on the IL-76 airframe and KJ-200 on a modified airframe of the Y-8; this project is also known as Balanced Beam.

The diversified and long-term plan of acquiring AEW&C indicates that

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4. US Marine Corps Reference Planner Part II,0 "Equipment Limitation," downloaded from <http://www.fas.org> on January 21, 2007.
 5. "Sweden Finalises SAAB 2000 AEW&C Contract with Pakistan," posted on June 26, 2006, and downloaded on December 27, 2006 from www.defenceindustrydaily.com
 6. Reuters <http://today.reuters.com/news/articleinvesting> and <http://www.tribuneindia.com> downloaded on November 27, 2006.

Pakistan wants to cover itself against the possibility of economic or military sanctions and acquire four to six AEW systems in the short-term (the next three to four years). For its long-term requirement, Pakistan will develop AEW&C systems with China. In the long term (2015-2020), Pakistan will have at least 6 Erieye systems, 3 Hawkeye systems and at least one or two systems developed in collaboration with China. However, in the short-term (by 2015), Pakistan may acquire a total of 10 to 12 AEW systems, and even with modest serviceability of 40 per cent, it will have 4 to 5 aircraft flying at any given time. This may sound alarmist; however, the fact that Pakistan is making a fast track approach in a diversified manner cannot be ignored. If we consider a five-year period for the present deals to materialise, by 2012, the Pakistan Air Force (PAF) could keep a constant watch on Indian airbases during peace as well as in war time. Similarly, the operational activities of the Indian Navy would also remain under the constant vigil of Hawkeye 2000 AEW, P-3C Orion and Atlantique maritime reconnaissance aircraft.

Development of such a capability by Pakistan and China would have serious implications during peace as well as operations. The subject had been dealt with comprehensively by Air Commodore Jasjit Singh, as early as 1987 in his book *AWACS: The New Destabiliser*, and most of the issues addressed by the air commodore in 1987 are still valid and unanswered, except that now, India is also in the process of modernising its air force and developing capabilities to meet the growing challenges to its national security. The Indian Air Force is also acquiring Phalcon AWACS on board the IL-76 platform and the Defence Research and Development Organisation (DRDO) is in the process of developing an indigenous AEW system. The first Indian AWACS is likely to be inducted by December 2007. At this juncture, there are issues we need to address, such as the strategic implications of AWACS for India, the operational role and effectiveness of AWACS, how many AWACS do we require for our own security, what is the comparative performance of Phalcon, Erieye, Hawkeye, etc. and then consider the implications of Pakistani AWACS/AEW for India, and try to answer a bigger question, "Do we really need to be concerned" and if "yes", what do we need to do?

ROLE AND EMPLOYMENT OF AWACS

"Origins of AEW&C systems can be traced to a research programme of the US Navy (USN) initiated as 'Project Cadillac' in June 1942. Project Cadillac resulted in tests, beginning in August 1944, of a modified Grumman TBM-3 Avenger torpedo bomber, fitted with AN-APS20 radar in a large ventral radome and accommodation in aft fuselage for the radar operator."⁷ The post-World War II saw the development of AEW platforms in the shape, initially, of a modified torpedo-bomber and maritime patrol aircraft. An increased threat from the Soviet anti-ship cruise missile, the AS-1 Kennel, and the increasing need felt for a role optimised system led to the design of the first aircraft specifically for the AEW mission: the W2F-1, primarily for the US Navy. After development and upgrades, the aircraft entered the US Navy in 1964, under the designation of E-2A Hawkeye.⁸ However, it was in 1977 that the US Air Force (USAF), acquired the E-3A Sentry AWACS, using a modified Boeing (707-320B), that was meant to provide early warning against strategic threat and support strategic defence against Soviet bombers.

Since then, the role, employment and capabilities of AWACS have transformed to adapt to the changing nature of warfare. In the 1980s, AWACS assumed a broader role as a command and control centre for a larger number of fighter aircraft operating within the radar coverage of AWACS. By assisting the

The role, employment and capabilities of AWACS have transformed to adapt to the changing nature of warfare.

interceptor aircraft in controlling defensive intercepts, AWACS assumed the role of an augmentation platform for ground-based radar units. In the 1990s, during the Gulf War, AWACS provided control and battle management support to offensive counter-

air forces in a theatre-wide offensive.⁹ The subsequent technological upgrades like advanced computer technology, secure communication, maritime surveillance capability, improvement in radar, radio and display systems have further enhanced the role of AWACS as a command and control platform. As a

7. Shashank Sinha, "Dawn of AEW&C Operations in Indian Military," an IDC Analysis, New Delhi, June 29, 2006, downloaded from www.india defence.com/AEW story.

8. Air Commodore Jasjit Singh, *Air Power in Modern Warfare* (New Delhi: Lancer International, 1985), pp. 112-113.

9. Major Thomas W. Nine, "The Future of USAF Airborne Warning & Control; A Conceptual Approach," downloaded from www.fas.org/man/dod-101/sys on January 3, 2007.

tool of power projection, the US has used AWACS for coercive politics. Air Commodore Jasjit Singh wrote in 1987, "...the US has made increasing use of AWACS for political purposes, leading, in fact, to some people coining the term 'AWACS diplomacy' to describe the phenomenon."¹⁰ The USAF has employed AWACS in different roles and for different purposes, extending from purely defensive operations to coercive diplomacy and implementation of international sanctions. Some examples are quoted below:¹¹

- Deployment of AWACS to maintain North American air sovereignty in Alaska and as part of NORAD
- Deployment of the E-3A Sentry in Saudi Arabia in March 1979 in the context of the conflict in Yemen
- Deployment of AWACS in Saudi Arabia, Turkey and Bosnia for enforcing international sanctions.
- Deployment in Egypt in October 1981 (in the immediate aftermath of the assassination of President Anwar Sadat) and again in February 1983 (to forestall through coercive politics the allegedly impending Libyan backed coup attempt in Sudan).
- Deployment of the E-3C Sentry in Operation Desert Storm (1991) for weapon control, battlefield management, surveillance and electronic support measures (ESM) and in similar roles in Operation Iraqi Freedom, 2003.

STRATEGIC IMPORTANCE FOR INDIA

Air Battle Management

The flexibility and versatility of AWACS is evident in the expansion of its role and exploitation of its capabilities by the USAF. The strategic importance of AWACS emanates from its ability to extend multiple functions like early warning, surveillance, ESM, command and control and signal intelligence (SIGINT) and battle management from one airborne platform. It affords the capability to single-handedly conduct air operations over geographically dispersed locations and diversified terrain. India's land frontier measures more

10. Jasjit Singh, n.3 pp. 25-26.

11. Jasjit Singh, *Ibid.*, p.26 and Thomas, n.9, p.8.

than 14,103 km and it has a 7,600-km-long coastline.¹² Defending such a vast area of diversified terrain by ground-based radars is neither practical nor cost-effective. AWACS would overcome the limitations of ground-based radars and function with relatively improved efficiency from the plains of Punjab, Rajasthan, the coastal areas and over the Indian Ocean. This capability affords significant strategic advantage for conduct of air operations over the entire area of national interest.

Prioritisation of Operations

At the same time, it is also to be understood that, to cover such a vast expanse of land, coastline and island territories, a large number of AWACS would be required. India is acquiring three AWACS; as to the question of whether three AWACS would be adequate to meet India's defence needs, the answer is "no", but the issue will be dealt with later. AWACS cannot be apportioned in a particular role; in a given theatre, it can support a variety of operations over a single mission. The demand-to-availability ratio for AWACS will always remain critical, especially in the Indian context, considering the vast geographical expanse and distances between different theatres of operations. Considering the numbers, *AWACS will remain a strategic asset directly under the control of Air Headquarters (Air HQ) and the operational demands of Command HQ would have to be prioritised considering the overall military objectives and time critical operations.* Therefore, it is important for field commanders and operators to understand that the availability of AWACS should not be taken for granted for every operation, in every given theatre.

Air Dominance Operations

Primarily, AWACS would be used to achieve air dominance over the adversary's air space and in joint battle with the army and navy to attain time critical military objectives. Initiative, surprise, concentration of firepower, shock effect and attaining operational advantage over adversaries would remain the guiding

12. Lt. Gen. J. F. R. Jacob (Retd), "The Defence Scene and the Budget: An Appraisal," *The Indian Defence Review*, 1995.

principles for the utilisation of AWACS. Therefore, it will be important to identify the specific areas of AWACS utilisation in the IAF's operational plans and in joint planning by the three Services. The command and control and air battle management function would be carried out by AWACS over land or over sea in coordination with ground-based/shipborne air defence systems and other force multipliers.

AWACS in Nuclear Strategy

Strategically, a very critical role for AWACS could be envisaged in unconventional warfare. In a seminar on Nuclear Strategy (January 8-12, 2007) at the Centre for Air Power Studies (CAPS), India's most eminent proponent of air power, Air Commodore Jasjit Singh, while speaking on, "Survivability Challenges" in the nuclear environment had mentioned, "AWACS is a platform which increases the survivability and credibility of nuclear attack." Considering India's "no first use" policy, Indian nuclear strategists have to reconcile to absorbing the first strike and launch a punitive/retaliatory strike within a reasonable timeframe. In this case, the first imperative would be to safeguard our weapons and delivery systems. Aerial delivery of nuclear weapons is the most viable option to create a desired impact at a given time and place. Although it is understood that after absorbing the first strike, the balance of air dominance may shift in favour of the adversary and our strike capabilities will face tough resistance, that's where the integration and networking of force multipliers is to be exploited and such contingencies must be considered in our counter-strike strategies. AWACS, integrated with other force multiplying platforms, could play a strategically vital role in guiding and positioning our delivery vehicles over the selected target area.

AWACS for Continental Air Force

In its Platinum Jubilee year (2006 - 2007), the Indian Air Force, is being shaped to expand from a subcontinental to a continental air force, which would be capable of safeguarding national interests and economic assets over the larger area of national interest in the Indian Ocean, Central Asian region and Southeast Asian

region. In this process of evolution, the importance of an air expeditionary force needs no emphasis. For an expeditionary air force, AWACS would perform the role of an airborne command and control centre, for handling contingencies beyond own territory/territorial waters, similar to the evacuation of the peace-keeping force from Sri Lanka, or the landing at Male airfield (Maldives in 1988) amidst the uncertainty about the status of the airfield, or the protection of aircraft and ships evacuating the Indian population from Jordan in 1990 and Lebanon (Cyprus) in 2006. AWACS, therefore, could be effective as an instrument of power projection or "AWACS diplomacy."

OPERATIONAL ROLES FOR AWACS

AWACS is a strategic asset with significant operational capabilities and tactical employment. The flexibility of the role and employment of AWACS has blurred the line between the strategic role and operational utilisation of AWACS. "Historically, military planners have found situational awareness of potential hostile targets and of friendly forces to be a key component in obtaining and sustaining military superiority over adversaries. Radar had the effect of forcing air operations down to lower levels, to stay below the radar horizon and, thus, evade detection... an airborne platform, thereby, nullifying the benefits of a low-level approach has been perhaps, the single, greatest force multiplier in air operations."¹³ Airborne surveillance radar that can maintain situational awareness about potential targets and friendly aircraft over hundreds of square miles of air space in any direction became a reality with the introduction of AWACS. AWACS not only addresses the line of sight constraints of ground-based radars, it extends the airborne command and control station with long range communication facility in support of national air power. AWACS, flying at 30,000 ft, approximately to 100-150 km inside own territory would give 250 km of EW and control capability in enemy territory, for six to eight hours which could be extended with aerial refuelling. The impact of AWACS on air operations is explained in the subsequent paragraphs.

13. Squadron Leader Ajai Singh, "The Air War with AWACS Symmetry," *The Indian Defence Review*, 1995, downloaded www.bharat-rakshak.com/LANCER/index.html on November 25, 2006.

Radar Cover and Tactical Control of Offensive Missions. The extent of radar cover would facilitate conduct of air dominance operations in enemy territory. Fighter sweeps and free escorts could be employed more effectively under positive radar cover deeper into the enemy territory from low altitudes to medium and high levels. Radar cover of existing ground-based radars is restricted by line of sight, although at medium (10,000 ft) and high altitude,

ground-based radars can give cover from 250-400 km. But the ability of ground radar to pick-up low-level targets flying at 100 metres (300 ft) is restricted to 45-50 km, therefore, large numbers of radars are required to cover a smaller area, and still the early warning is inadequate. On the other hand, a single airborne platform like AWACS or aerostat provides a seamless low and medium level cover up to 400 km or more.

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Command and Control Centre: In peace-time as well as in war-time AWACS remains an instrument of power projection and application. As an airborne command and control centre, AWACS, along with multi-role air superiority fighters (MRASF) could be utilised for coercive diplomacy or to actually open a new front of war and take the adversary by surprise. For example, a high intensity air battle may be in progress in a given theatre, and to dilute the adversary's resources and attention, integrated force of AWACS, air-to-air refuelling (AAR), and MRASF is brought to bear on the adversary by carrying out a heavyweight air attack in a different sector, thereby, taking the enemy by surprise and seizing the initiative.

Medium Level Ingress: The sole purpose of low-level flight profiles, where fighter aircraft flew at 50 to 100 metres (150 to 300 ft) above ground level

(AGL) was to avoid and delay the detection by air defence (AD) sensors and give minimal reaction time to AD weapon systems. The gap free low level radar cover of 250 km or more in the adversary's territory would afford instant detection, greater reaction time, and swift offensive action by fighter sweep or free escorts would make the low level ingress tactics redundant. For the most part of Pakistan, the lack of geographical depth would place all its main airfields like Sargodha, Chaklala, Kamra, Rafiqy and satellite airfields i.e. Murid, Mianwali, Multan, Chander within the detection ranges of AWACS.

Own strike missions could afford to fly at medium levels under positive radar cover, thus, avoiding the three-tier low level radar cover of MPDRs which are restricted to 4.5 km (15,000 ft) in elevation coverage. This would also render en-route short range air defence systems (SHORADS) deployed in the tactical battle area (TBA) ineffective because most of these weapon systems have a slant range of 2.5 to 3 km (8,000 to 10,000 ft). Medium level ingress would afford prompt threat warning, larger radius of action, more freedom to manoeuvre and better endurance for strike aircraft.

Defence in Depth: Enhanced early warning and gap free radar cover would facilitate the area defence concept. Area defence affords optimal exploitation of speed, mobility, flexibility and firepower of fighter aircraft and greater freedom of action for terminal weapons deployed at vulnerable areas /vulnerable points (VA/VPs). This trend is fairly visible in the recent changes in deployment patterns, command and control structures and operational exercises of the IAF. AWACS would facilitate early interception, maintain continuity in application of

Enhanced early warning and gap free radar cover would facilitate the area defence concept.

firepower and afford opportunity for multiple interceptions and, thus, impose greater attrition and provide the classical defence in depth. As an offshoot of greater early warning

aircraft on ORP, terminal defence weapons can now maintain a more realistic state of readiness and avoid a prolonged state of readiness I/II.

Air Space Management Over TBA: The problem of air space management emanates from the delayed/no detection and identification of tracks, very little reaction time and unreliable chain of communication. AWACS with onboard long range HF/V/UHF RT and large detection ranges would assist in resolving the problem of air space management. Detection ranges beyond horizon, early radio contact, medium level approach and timely communication give options of exercising positive control over AD weapons in TBA, maximise their freedom of action and reduce the chances of fratricide. Higher and larger vertical slabs would be available for helicopter operations of the IAF and army, transport support operations, special heliborne operations (SHBO) and combat search and rescue (SAR). However, this is not to say that AWACS is the panacea for this vexing problem. The permanent solutions for the integrated radar network, composite air picture and fibre optics communication links would streamline the battlefield air space management. Even then, air space management will continue to pose challenges experienced by the technologically superior Coalition forces in the Iraq War 2003, where a US A-10 attacked and killed nine US Marines on March 23 and a US F-16 CJ fired on a Patriot missile battery on March 24.¹⁴

The electronic intelligence and communication intelligence (ELINT and COMINT) system on board AWACS receives, analyses, locates radar and communication signals. AWACS SIGINT capabilities would supplement the existing intelligence infrastructure. AWACS can transfer SIGINT data either directly or through the ground exploitation system (GES) to a ground-based command and control centre for real-time analysis and decision-making. The enemy's electronic order of battle (ORBAT) can be

14. Anthony H. Cordesman, *The Iraq War: Strategy, Tactics and Military Lessons* (Dehradun: Natraj Publishers India, 2006), pp. 239-240.

updated for planning of air operations and the real-time radar picture can be correlated with electronic-ORBAT.

Monitoring and Analysis of Adversary's Air Activity: Information on the adversary's capabilities, and analysis of such information, is an ongoing process during both peace and operations. Monitoring of enemy air activity (known as general hostile area (GHA) analysis in the parlance of the Indian C & R organisation) during flying training and known periods of air exercises would give good insight into the enemy's tactics and capabilities. This capability was limited by line of sight of ground-based radars. Airborne platforms can monitor air activity 350 km or more during peace-time (because they can fly closer to the international border) and 250 km or more during war-time (for safety reasons, these platforms would operate at least 100-150 km inside own territory). The air activity when correlated with radar and radio activity monitored by SIGINT systems would form definite patterns of tactics and manoeuvres practised by the adversary.

AWACS IN HIMALAYAS

Effectiveness of radar, airborne or ground-based, in mountainous terrain is restricted by terrain masking. All radars, including AWACS, work on the line of sight principle and are prone to radar shadows owing to terrain masking. Positioning the radars on higher peaks and along prominent valleys to get longer detection ranges and early warning has achieved some success but it continues to suffer from factors like frequency of operation, beam pattern of radar, behavioural pattern of electro-magnetic (EM) waves in extreme weather conditions, low temperatures, high humidity and extremely dense clutter picture. The technologies like digital clutter processing, phased array technique, pulse compression, doppler principle and use of appropriate frequency bands have enabled more efficient high technology radars but they continue to suffer from the limited radar horizon which is just 15 per cent more than the visual horizon. The AEW platforms have further enhanced the line of sight and provide

greater ranges beyond the horizon. However, the problem of radar shadows and constraints of terrain masking in mountains persists.

Although AWACS overcomes the constraints of line of sight and provides higher probability of detection at farther ranges, the performance of AWACS would also be restricted and it will not be able to detect aircraft taking advantage of terrain masking in mountainous terrain. From its operating altitude of 30,000 ft, AWACS would be able to detect low level fighter aircraft at 400 km or more, thus, providing valuable early warning to area and terminal defence weapons. For example, a closer look at the terrain in Jammu and Kashmir (J&K) would illustrate that an AWACS flying 100-150 km inside own territory east of Kishtwar on an axis between 321440E, 770424N to 333612N, 760745E (50 km south of Nunkun) would give adequate early warning of Pakistani aircraft approaching Indian borders from the southwest (Lahore) and west (Islamabad). From a distance of 400 km, AWACS would have continuous radar cover till they approach the foothills of mountains 50-75 km east of Islamabad or west of the Line of Control (LoC). At this time, the distance of the aircraft from AWACS would be approximately 250-275 km. Hereafter, these aircraft would remain in the shadow of the Pir Panjal range till they emerge out of the valley 100-125 km from the AWACS anchor axis. Therefore, AWACS would give an early warning of 8-10 minutes before the aircraft could enter the radar shadow area and this early warning could be taken advantage of in a situation of air dominance, while it may be of no use if we are on the defensive.

AWACS will not perform optimally in the rest of the Himalayas because of the high mountain ridges in the areas of Gilgit, Skardu, Karakoram range, Leh and in the Aksai Chin area. In this area, AWACS would be ineffective for the purpose of detection and early warning unless hostile aircraft are flying above the ridge line. A similar situation would be faced above the Tibet plateau, which appears to be a flat surface; however, terrain, undulations range between 2,000-3,000 ft. Aircraft flying above the ridge line may be detected, but at low altitudes there would be large areas of radar shadows.

AWACS could be used more advantageously in conjunction with smaller ground-based radars like low level lightweight radar (LLLWR), ST-68 and

other GCI units integrated on a network to provide a composite air picture. While it is true that in mountainous terrain aircraft would invariably take advantage of terrain masking and follow the valleys to avoid radar detection and give as little early warning as possible, it is also true that such an approach is predictable, and smaller sensors like mobile observation posts and radars could be deployed to cover the approaches to these valleys. The other disadvantage of the approach through a valley is that the entry and exit points of the valley are known; they could be monitored by unmanned aerial vehicles (UAVs), smaller radars, and weapon systems could be placed to engage the threat immediately after exit.

ADEQUACY OF AWACS

In April 2004, India signed a deal of \$1.1 billion for the supply of the three Phalcon AEW system installed on the IL-76 MD Candid aircraft.¹⁵ At this rate, each AWACS is likely to cost \$366 million which is an expensive proposition for a developing country like India. Perhaps that is why the initial acquisition has been restricted to three systems. The cost of AWACS has always been a restrictive factor, thus, a number of cost-effective options are now being examined the world over, These include:¹⁶

- Saab 340, Metro III and other aircraft fitted with the Erieye radar.
- Boeing-Bell V-22 Osprey AWACS aircraft may become very popular with VSTOL carriers operators.
- Westland Sea King AEW 2 helicopters with the Searchwater radar.
- E 801 Oko (Eye) on KAMOV Ka-31 of the Indian Navy.

While the options are many, India needs to acquire a cost-effective system that would sustain its long-term air defence requirements, maintenance and upgrade for futuristic requirements. Considering India's threat perception and geographical expanse, a large number of AWACS would be required to meet the contingency on two fronts.

15. "India and Pakistan AEW Options," an article on www.spyflight.co.uk/indiapakaew downloaded on December 26, 2006.

16. G. Jacobs, "AWACS for Air Supremacy: A Survey," *Indian Defence Review*, 1995, downloaded from www.bharat-rakshak.com/IAF/News on December 26, 2006.

For example, if we were to cover the 2,000-km-long border with AWACS flying 150 km inside own territory, concurrently three AWACS would give a lateral coverage of 1,900 km. In this case, the maximum overlap within own territory would be 200 km and 100 km in the hostile territory. Flying a racecourse pattern on a leg of 100-120 km, three aircraft would be required to cover the entire border. In addition, for the time being at least, one aircraft would have to be earmarked for naval AD requirements at any given time over the Indian Ocean; this would raise the figure to four aircraft for the western front. However, in the long-term, the Indian Navy will need to work out its own requirement for AEW systems in addition to its existing KA-31 AEW helicopters. *To maintain a single watch of eight hours on the western front by four serviceable aircraft, we may require as many as 10 AWACS.* The figure would increase to 20 aircraft if we were to plan another four AWACS for a contingency on two fronts or cater to 24-hour surveillance watch on the western front.

We are told that *five aircraft are required for maintaining a single orbit surveillance/control for round-the-clock operations.* The broad breakdown was that an aircraft on station departed from the allotted orbit only after the next aircraft had arrived on station. Therefore, at any given time, two fully serviceable aircraft are a must. Of the remaining three, one is on scheduled maintenance, another on modification and the third on minor rectification. Taking this analogy into consideration, 20 aircraft would be required to maintain 24-hour surveillance by four aircraft on station. Air-to-air refuelling capability and the IAF long-term plan to acquire six aerostat radars may ease the requirement of large numbers of AWACS; also depending upon the nature and geographical extent of the conflict, we may not always have to maintain a 24-hour watch. Still, once the hostilities break out, the optimum number of serviceable aircraft flying at any given time will go below four – that would mean a minimum figure of 12 aircraft for one watch, one front contingency. The numbers that we require to deal with the contingency are important, but more important are the numbers that we require to deal with the contingency and exploit the system for strategic advantages.

Outright acquisition of such large numbers of AWACS is not an option for a developing country like India. Therefore, the initial induction of three AWACS

is a stopgap arrangement, along with acquisition and deployment of aerostats. Two aerostats have already been acquired, and reports suggest that four more are in the pipeline. With six operational aerostats, the requirement of round-the-clock surveillance by AWACS would diminish. Indigenous development of AWACS technology is the best option to meet our air defence requirements in totality. DRDO efforts to develop an airborne surveillance platform (ASP) need to be supported by the IAF and Ministry of Defence (MoD). Cost-effective platforms like the DRDO's super vision maritime patrol radar (SV-2000 MPAR) for the advanced light helicopter (ALH) and Russian E-801M Oko (Eye) AEW system which is being used on the Indian Navy's Ka-31 AEW helicopter,¹⁷ need to be assessed and used wherever possible to strengthen the available resources till we have the indigenous capability to produce, operationalise and maintain AWACS without external support.

A COMPARATIVE STUDY

From Bekaa Valley in 1982 to the Iraq War in 2003, all air battles have been fought under the conditions of AWACS asymmetry. The results of these air wars are to be assessed in the light that the opposition did not have access to AWACS even when it had an air force. In a condition of AWACS symmetry, it would be in order to carry out a comparison between the platforms and sensors to understand the strengths and weaknesses of various systems. A detailed comparative study based upon reliable intelligence and sources of information could be the foundation of our strategy on the outbreak of hostilities, even though it may be considered too early to do this because the information on the specification of sensors is very sketchy, be it the Phalcon, Erieye or Hawkeye 2000. However, the detailed specifications of platforms are available; hence, what could be compared are the known parameters of the platforms and sensors which have been operating in similar or marginally different configurations with other countries. The tabulated form of a comparison of platform and sensor parameters is placed at **Appendix A** to this paper.

17. Martin Streetly, "Electronic Eyes on Wings and Rotors," *Jane's International Defence Review*, vol.38, November 2005.

A brief description of the AWACS that are likely to take to the sky in Southern Asia is listed below:

- | | |
|---|-------------|
| • Phalcon AWACS on A-50 (Mainstay) | India |
| • Erieye AEW&C on EMB-145 | India |
| • Kamov-31 Helix B | Indian Navy |
| • Erieye AEW&C on SAAB 2000 | Pakistan |
| • Hawkeye 2000 on P 3C | Pakistan |
| • KJ-2000 with ESA radar on A-50 (Mainstay) | China |
| • KJ-200 Balanced Bean system on Y-8F 600 | China |

Chinese AWACS

A study of the AEW development process discloses very little about the performance of sensors that are likely to be used by the Chinese KJ -2000 (AWACS). Four such systems are being developed on the IL-76MD, which would have a triangular electronically steered phased array (ESA) antenna enclosed in a static radome; the ESA radar is being indigenously developed by the Nanjing Research Institute of Electronic Technology unit. It is also reported that the Chinese system is based on a combination of the IL-76 and Argus AEW mission suite (BAE system avionics). *Jane's* has reported that China seems to have acquired an unspecified number of Argus systems to be fitted on the IL-76. Although a Chinese delegation is reported to have visited the UK for discussions on the procurement of the Argus system, the information needs to be treated with caution.¹⁸ Some Internet sources claim that Chinese AWACS would have capabilities similar to the Russian A-50. *Jane's* has also reported that the Chinese Argus-based AEW&C capability was being developed alongside possible acquisition of up to three Russian A-50Eh AEW& C aircraft.¹⁹ In addition to the KJ-2000, the second AEW&C platform is being developed on a modified airframe of the Y-8 aircraft, which is designated as the Y8-F-600. The platform has been extensively modified with improved avionics and engines for better performance. This platform would be fitted with an electronically steered phased

18. "Airborne Early Warning, IL-76MD AEW Variants," in Martin Streetly, ed., *Jane's Electronic Mission Aircraft*, Issue 14, December 2004, pp. 45-46.

19. *Ibid.*, p.46

array radar, similar to the Swedish Ericsson PS-890 Erieye.²⁰ This system is widely known as "Balanced Beam" project mainly because of the shape and mounting of antenna in the form of a triangular beam mounted on top of the fuselage along with the fuselage reference line (FRL). The information available in the public domain is inclined to compare the system with the Erieye, even though it is not clear if it is based on similar technology. The Erieye system has the capability to detect targets in 360° and expected to have detection ranges in excess of 350 km.²¹

Pakistan's Acquisitions

Pakistan's multi-pronged approach to acquire AEW&C systems has been addressed in the beginning of the paper. The first system that is likely to be delivered and operational in Pakistan is the SAAB 2000 turboprop, along with the Erieye early warning (AEW&C) system. The SAAB 2000 Erieye combines a modern turboprop aircraft with an advanced technology sensor. The turboprop SAAB 2000, with a cruise speed of over 665 km/h (360kt), is one of the fastest turboprop aircraft. The combination of near jet speeds, higher rate of climb and descent, and 180° turn in less than 30 seconds enhances its survivability. The Ericsson PS-890 is an S-band pulse doppler, active phased array surveillance radar which incorporates 200 solid state modules. The range of the S-band (3.1 to 3.3 GHz) side looking radar is 300 km. The 900 kg dorsal antenna is housed in a 9-metre-long box radome mounted atop fuselage. From its standard operational altitude of 6,000 metres (20,000 ft), the radar has a maximum range of 450 km.²² Though many other sources claim that the system has coverage of 360°, the information in the public domain gives an impression that the look angle on each side is optimised for 120° coverage on both sides and there is a limitation of a partial blind zone or reduced pickup zone of 45° to 60° in the frontal and rear quarters.²³

The Erieye airborne warning and control system also includes a command

20. "Y-8 'Balanced Beam' (KJ-200)," *Airborne Early Warning Aircraft*, downloaded from www.sinodefence.com/airforce/specialaircraft on January 1, 2007.

21. Ibid.

22. n.5.

23. Ibid.

and control system with five operator work stations; the system also includes an electronic warfare (EW) suite, electronic support measures, identification friend or foe (IFF), communication and data link and a self-protection system. It is claimed that the operational efficiency of the system is so high that a small force of three aircraft is sufficient to sustain two airborne platforms round-the-clock for a limited period or one airborne patrol with one aircraft on continuous ground alert for more than 30 days.²⁴ The Erieye system is also operating on Embraer 145 or P-99 aircraft with the Brazilian Air Force and Hellenic Air Force of Greece.

Pakistan has also finalised a deal with the US Department of Defence (DoD) for the sale of three excess P-3 aircraft with the Hawkeye 2000 AEW suite and associated equipment at a total cost of \$855 million.²⁵ Variants of the Hawkeye are being flown by the Israeli, Egyptian, Japanese, Singapore and Taiwan Air Forces and the French Navy. Pakistan will acquire the Hawkeye 2000 AEW&C suite on refurbished and modified P-3 aircraft with range and endurance. The latest variant of the E-2C (Hawkeye 2000) with its new mission computer, improved radar displays and cooperative engagement capability (CEC)²⁶ is a system of hardware and software that allows the sharing of radar data on air targets among ships. Radar data from individual ships of a battle group is transmitted to other ships in the group via a line-of-sight, data distribution system (DDS).²⁷ The CEC capability will mean better coordination between the Hawkeye and other platforms (ships, fighter aircraft, etc.), achieving unprecedented performance.

The Hawkeye has already been operating from the P3-C in the US Navy and Australian Air Force. The AN/APS-145 radar is the key element of the Hawkeye. The APS-145 offers enhanced performance over land and sea when searching in over the horizon mode and at the land, sea and OTH interface. It is reported that the APS-145 is able to track aircraft over land, regardless of terrain and target

24. *Ibid.*

25. n.1.

26. "United States Navy Fact File, E-2 Hawkeye Early Warning and Control Aircraft," downloaded from <http://www.navy.mil/navydata/fact.asp> on January 22, 2007.

27. FY 1998 Annual Report by Director, Operational Test & Evaluation on Cooperative Engagement Capability downloaded from www.fas.org February 8, 2007.

density. The environmental management system (EMS) automatically modifies its signal processing and tracking algorithms to suit the changing search environment. The radar is capable of detecting ground vehicles in less density environment and over the sea it detects moving and stationary surface and aerial targets. An enhanced high speed processor is incorporated into the mission computer, which maintains in excess of 20,000 tracks for scan-to-scan correlation.²⁸ The radar is capable of detecting targets within a three-million-cubic-mile surveillance envelope while simultaneously monitoring maritime traffic. The Hawkeye 2000 is expected to automatically track more than 600 targets, and control more than 40 airborne intercepts.²⁹ Enhanced main display units provide operators with improved visual representation. The Hawkeye has only three operators, "a radar operator, an air control operator and a combat information center operator. The three system operators work independently in all operational roles."³⁰ Therefore, the capability to control 40 intercepts simultaneously needs to be addressed with caution and needs further studies about the type and extent of intercepts controlled by a total of three operators. The ASW variant of the P-3 Orion can accommodate a maximum of 21 crew, including flight crew. Therefore, it would be safe to assume that the AEW version would accommodate a larger number of display systems and controlling crew. A pictorial cut-out of the P-3C with the Hawkeye's UHF radar is placed at **Appendix B**, showing the additional space for intercept tactical controllers.

Acquisition and Development by India

In addition to acquiring the Phalcon AW&CS on board the IL-76 airframe, India is working on developing another indigenous AEW system as of 2005. According to former Defence Minister Pranab Mukherjee, completion of development activities and commencement of user trials should occur in 2012. As of 2005, the aerial platform had not been chosen although the Brazilian Embraer was considered a contender.³¹

28. n.18.

29. Specification of E-2C Hawkeye 2000 downloaded, from www.fas.org on January 22, 2007.

30. Fact Sheet E-2C Hawkeye downloaded from http://www.northropgrumman.com/e2c_hawkeye.html

31. "Airborne Surveillance Platform" <http://www.globalsecurity.org/military/world/india/asp.htm>

The Phalcon AEW&C aircraft is based on four sensors: phased array radar, phased array IFF, ESM/ELINT and CSM/COMINT. The AEW&C phased array radar replaces the conventional rotating radome radar. It is mounted on a stationary dome providing 360° degree coverage. The electronically steered beam supports tracking high manoeuvring targets. The radar operates in three modes: normal surveillance mode, long range mode, and surface mode. In the long range mode, the detection ranges are greater than 400 km. The radar is capable of detecting the airborne targets between 50 metres to 15 km. It can track 100 targets simultaneously and track 500 targets in TWS mode. Four simultaneous interceptions are possible from one operator workstation (OWS) and a maximum of 16 intercepts could be controlled simultaneously. The IFF system employs solid-state phased array technology to perform interrogation, decoding, target detection and tracking and IFF data is automatically correlated with the primary phased array radar. The ESM/ELINT system receives, analyses and locates radar signals, covering 360°. It combines high sensitivity with high probability of intercept, and achieves excellent accuracy in bearing measurement. The PHALCON's CSM/COMINT receives in UHF, VHF and HF bands, rapidly searching for airborne, shipborne or ground communications signals of interest.

At this juncture, not much is known about the progress of indigenous efforts by the DRDO. The Scientific Advisor to the Defence Minister Dr M. Natarajan, informed during the third Subroto Mukherjee Seminar on December 31, 2006, that the AEW&C will be based upon phased array radar technology with 240° sector coverage and detection ranges greater than 200 km. The platform would also integrate C band SATCOM link, radio relay (RR) and V/UHF links. The system is likely to be developed over a period of the next 4-5 years.

The Indian Navy has been using the E-108M Oko (Eye) AEW and surface surveillance radar on board the Kamov (Ka-31) helicopters. The radar is folded and stowed beneath the aircraft fuselage. The surveillance radar operates in the S-band (2-4 GHz) and scans mechanically in azimuth and electronically in elevation.³² It is optimised for detection of low flying aerial targets in the heavy land or sea clutter environment. It has 360° coverage with six RPM. Radar can

32. "KAMOV Ka-31 Helix -B AEW Helicopter" downloaded from www.bharat-rakshak.com on January 22, 2007

simultaneously track 40 airborne or surface threats and detect fighter aircraft from a range of 110- 115 km, depending upon the radar cross-section.³³ The radar information is transmitted via an encoded radio data-link channel to a shipborne or shore-based command post. The data link range is 150 km.

IMPLICATIONS FOR INDIA

The two striking implications of China and Pakistan acquiring AEW&C systems are: firstly, the acquisition of force multipliers of the magnitude of AEW would erode whatever little numerical and qualitative superiority the IAF has over the PAF; secondly, it demonstrates Pakistan's growing insecurity in this region and over the Indian Ocean. Pakistan is developing offensive and defensive capabilities of its comparatively smaller air force through force multipliers. The acquisition of AWACS should not be seen in isolation – the entire gamut of weaponry in the form of F-16, UAVs, air-to-air missiles (AMRAAM), guided bomb units, laser guided bombs, JDAMS, anti-shipping missiles and other combat aircraft from China should be considered in totality to assess the implications for India. "Thus, even a small strike force of F-16 supported and controlled by AWACS and other electronic warfare systems would pose a significant potential to neutralise the adversary's AD radars, surface-to-air missiles (SAM) and anti-aircraft artillery."³⁴

Pakistan is well aware of the IAF's modernisation plan and its emphasis on space-based capabilities, information technology, networking of forces and development of information, surveillance and reconnaissance (ISR) capabilities. While India's threat perception and defence requirements may be more strategic and continental in nature, Pakistan, in its attempt to attain parity with India, projects every move of the Indian armed forces as anti-Pakistan; hence, the military modernisation plan is seen in a limited context. To negate the capabilities of the IAF and Indian Navy through their modernisation plan, Pakistan seeks advanced high end technology and long range surveillance systems for greater early warning and attack capability.

The Pakistan Air Force would receive a quantum jump in the fields of

33. n.18.

34. Jasjit Singh, n.3, p. 63.

reconnaissance and surveillance during peace-time and during operations. The six Erieye systems with the Pakistan Air Force are likely to be flown along India's western borders and coastline. The ELINT and COMINT equipment on board these aircraft will monitor all radar and radio transmissions on the Indian side up to a range of 400 km or more. The IAF's electronic ORBAT and deployment of forces would become totally transparent to the PAF. This problem becomes more significant, because during peace-time, Pakistani aircraft could fly 40-50 km from the international border, thus, observing and monitoring the IAF's operational and training activities up to a depth of 300 km from the international border. This would help Pakistan draw a complete picture of the strengths and weaknesses of Indian air defence and strike capabilities.³⁵

The Pakistan Air Force would receive a quantum jump in the fields of reconnaissance and surveillance during peace-time and during operations.

The IAF would be forced to withdraw its operations to the rear bases, restrict its radar and radio transmissions, and still, a large part of the IAF's flying activity, operational exercises, tactics and radio transmissions would be monitored by Pakistan. In this case, the Indian Air Force would eventually be forced to move its fighter aircraft to rear bases in the central and eastern states, which in any case the IAF should consider as a long-term measure of survivability. Availability of AAR and air battle management by AWACS calls for dispersed deployment in depth. Therefore, the launch bases should be kept in depth to provide better air defence and survivability. This would entail long-term planning, capital expenditure on development of airfields and shifting of infrastructure which has been built and developed over 30 to 40 years. A long-term plan for shifting in a phased manner will need to be seriously actioned.

Pakistan's acquisition plan for AWACS is to obtain the systems from different sources and diversified sensors to meet different requirements of surveillance and intelligence operations over land and sea. It is also clearly visible that Pakistan does not want its long-term plans to suffer from sanctions or denials in

35. Jasjit Singh, *Ibid.*, p. 66.

the future, considering the fluctuations in geo-strategic / geo-economic interests. For India, therefore, it implies that it must live with the reality of Pakistani AEW&C and plan its strategy to fight the next battle of air dominance over Pakistani territory in conditions of AWACS symmetry.

It is expected that by 2015, the aircraft carrier *Vikramaditya* (*ex-Gorshkov*) and Indian air defence ships are likely to be operational. The aircraft carrier with MiG-29, naval light combat aircraft (LCA) and naval helicopters along with IAF maritime Jaguars, SU-30 MKI, aerial refuellers and AWACS would form a formidable force. To counter this force with long range early warning and to acquire the capability to neutralise the aircraft carrier, Pakistan is acquiring, a large number of P-3C Orions, Hawkeye, Augusta submarines and anti-shiping missile like the Harpoon and Exocet.

Another important implication of China-Pakistan strategic cooperation in development of AWACS is the familiarity of the Chinese aviation engineers with the capabilities and limitations of the IL-76 as a platform and information on the Phalcon AEW system. Israel may have backed out from the deal to supply the Phalcon AEW system, but in the process of evaluation and negotiation of the deal, People's Liberation Army Air Force (PLAAF) personnel must have studied the Phalcon system in detail. This intimate knowledge of the system could be utilised to develop a counter-strategy for Indian AWACS and exploit the weaknesses of the Phalcon. The Indian Air Force and specially AWACS operators will do well to know the weaknesses of their system and consider that Pakistan is aware of them. On the other hand, Pakistan may assist China by supplying critical inputs on sensor technology from the Swedish Erieye or Hawkeye 2000 sensors.

AWACS busting has always drawn significant attention. Some believe AWACS busting by fighter aircraft is a viable proposition without considering the detection ranges of AWACS at low altitudes, early warning available, fighter air defences and ability of AWACS to retreat in the presence of threat. Also, one has to keep in mind that systems like the E-3C, Phalcon and A-50 have ESM platforms which can detect radar and radio transmissions from ranges larger than that of radar; such radar and radio transmissions could be analysed to identify an emanating threat.

A radar warning of 250 km is adequate to scramble or divert airborne fighters to engage the threat. As the threat closes in, AWACS would continue to retreat while guiding own fighters or it may hand over the interception to the aerostat or ground-based system in the case of a medium level approach. The advent of the surface-to-air Chinese FT-2000 anti-radiation missile has further bolstered the case for engagement of AWACS. Though the possibility of AWACS engagement by these systems cannot be totally ignored, the probability is low due to:

- None of these systems has been tested for its efficacy.
- The FT-2000 has a range of 100-120 km –that would mean that the AWACS should be flying within that range for it to successfully engage it.
- It is a passive radar homing missile – what would be the impact of switching off the radar or activation of electronic counter-measures (ECM)?

Lastly, the Pakistani AWACS would mean detailed joint planning with the army and navy to work out all possible contingencies theatrewise, starting from J&K going down to the Indian Ocean and island territories. Availability and utilisation of assets among the three Services, planning and prioritisation of theatrewise operations and contingency plans must be worked out. The Indian Air Force would have to plan its battle of air dominance fully aware of the risks involved in preemption and initiative. The aggressive and unconventional approach would be crucial to achieve the surprise factor. That brings us to air operations in AWACS symmetry.

AIR OPERATIONS IN AWACS SYMMETRY

The potential of AWACS and its capabilities provide the decisive edge in air warfare. AWACS asymmetry allows the transformation of a small force into a winning force.³⁶ But the bigger question is: what would be the effect on its efficacy if the opposing air force also has the same capability? The air operations under the umbrella of AWACS symmetry may not have similar success rates as were seen in the air battles of the Middle East.

In the situation of AWACS symmetry, a detailed study of the capabilities and limitations of the systems would help analyse what should be our

36. Ajai Singh, n.13.

The potential of AWACS and its capabilities provide the decisive edge in the air warfare.

operational strategy. Both the Erieye and Hawkeye systems have certain limitations as compared to the Phalcon AWACS. The Erieye system has a limited radar cover in the frontal and rear cone of the aircraft.

Reliable radar detection is in the cone of 150°-160° on both sides of the aircraft. The detection range against a fighter class of aircraft is limited to 330 km as compare to 400 plus of the Phalcon. Though it is claimed that the Hawkeye-2000 affords enhanced performance over land, its control capability, endurance, limited number of operator work stations (OWS) impose considerable limitations. It, therefore, remains best suited for maritime surveillance. The SAAB 200 is also constrained by a restricted number of OWS and operators on board.

Also, other aspects of performance like blind zones, communication ranges, radar accuracy, resolutions and data handling systems also affect the control capability; therefore, it becomes extremely important to know the precise performance limitations and exploit them at the earliest to achieve the element of surprise.

In the case of AWACS symmetry, the performance of the radar platform would remain the same – only the methods of its utilisation in time and space, initiative, **“There will have to be a shift in the thinking from air space denial to air space control as means of achieving one’s aim. The battle for dominance on both sides will be fought in the air....”**

innovative tactics and aggressive approach would help gain advantage in the beginning of the air battle. Therefore, the approach of the politico-military leadership would have to be aggressive and preemptive. “There will have to be a shift in the thinking from air space denial to air space control as means of achieving one’s aim. The battle for dominance on both sides will be fought in

the air...., the side which has superior tactics and training would emerge victorious and be in a position to control operations in other dimensions as well.”³⁷ In the air

37. Ajai Singh, Ibid.

battle, the one who detects, aims and shoots first, would seize the initiative. Tactical control of fighter sweeps and free escorts in the enemy's air space would become more critical. An aggressive approach would help achieve air dominance, for example, positioning own multi-role air superiority fighter (MRASF) equipped with BVR air-to-air missiles in enemy territory and engaging hostile aircraft as soon as they get airborne. Some of these aspects were practised and tested in the IAF exercise Gagan Shakti in October 2006.

India needs to consider fast track progress for development and deployment of space-based capabilities to create a sort of asymmetry and maximise the advantage of all assets. Meanwhile, sensor integration and fusion of data is already being progressed, for example, integration of AWACS with the integrated air command and control system (IACCS) through its ground exploitation system (GES). IACCS integrates with ground-based/aerostat radars, UAVs, communication links (HF, V/UHF, and SATCOM) and the entire gamut could provide a fused data link to fighters on the operational data link (ODL). We need to create a seamless synergistic net-centric environment to integrate command and control centres, weapon platforms, ISR data targetting information and data links and precision weapons to create an asymmetry to counter the AWACS symmetry.

CONCLUSION

In the overall context, one has to consider that the machine performs as well as the man behind it. Intent, knowledge, capability and training would ultimately help one side gain an edge over the other. In modern air warfare, AWACS emerges as a most potent force multiplier which could easily tilt the balance in favour of an AWACS operator. Strategically and operationally, AWACS provides a decisive edge to air operations, and air defence operations, in particular. It provides the quantum jump in detection and control capability. The most outstanding feature of this platform is the reach and flexibility that it provides. As an air surveillance, command and control platform, it could be operated anywhere in the area of interest. Training, tactics and operational exercises are the best way to master the employment of AWACS in different

scenarios. Training should include not only the capabilities of AWACS and the methods of its exploitation, but also address the issues pertaining to mental attitudes, innovative approaches and in-depth study of the enemy's capabilities and limitations in a situation of AWACS symmetry. The battle for air space control and air dominance would have to be swift, concentrated and the most critical aspect of our wars in the future. As has been proved in the past, an initiative and aggressive approach in the air battle will provide the decisive edge and prove to be a governing factor in the result of war.

Acquisition of AEW by Pakistan is definitely a security concern, but at present, it seems that the best way to deal with it is to plan and prepare. There is no need to for the Indian Air Force to be overly concerned. It is yet to be seen as to how long it would take for these deals to materialise. The recent news of the US Congress introducing a Bill to restrict military aid to Pakistan, subject to the US president certifying that Pakistan is doing enough to control the Taliban, could mean delays/cancellation or nothing at all. In the overall context, the IAF is better off as far as aircraft, weapon systems, training and professionalism are concerned. But the crux of the matter would be proving it once again, if the situation comes to that.

APPENDIX A

Comparative Performance of AEW & C Systems

Phalcon	IL-76 Erieye	SAAB Erieye	Emb-145 Hawkeye	P-3C on IL-76	KJ-2000 Hawkeye	E-2C
Flight Crew	Five	Two	Two	Five	Five	Two
Msn Crew	10 /11	5 to 6	5 to 8	11 or more	>10	Three
Max Range,	6,100 km	1,300 km	2,460 km	3,746 km	-----"	2,775 km
Service, Ceiling	34,000 ft	25,400 ft	37,000 ft	28,700 ft	34,000 ft	37,000 ft 11,275 metres
Flight Endurance	7 hrs	5 - 7 hrs	08 hrs	12 hrs	7 hrs	6 h 15 min
Patrol Speed	600 km/h	296 km/h	450 km/h	610 km	600 km/h	480 km/h
Max Speed	800 km/h	600 km/h	833 km/h	760 km/h	800 km/h	602 km/h
Sensors	L Band ESA Radar	S Band Phased array PD radar	S Band Phased array PD radar	AN/ APS145 UHF PD radar	ESA radar	AN/ APS145 UHF PD radar
Antenna	Fixed Trian- gular in radome	Fixed, dual sided, electronic scanning	Fixed, dual sided, electronic scanning	Rotating, in Circular radome	Fixed Triang- ular in radome	Rotating, in Circular radome
Detection Range	450 km	350 km	350 km	> 500 km	Not kn- own	> 500 km
Tgt Tracking	100 targets	40 targets	40 targets	>600 targets	Not kn- own	>600 targets
OWS*	Eleven	Five	Five	Three	Not known	Three
Inter- ceptions	16	10-12	10-12	40	Not known	40

The platform data has been collected from various articles, journals and Internet sites:

Martin Streetly, ed., *Jane's Electronic Mission Aircraft*, Issue 14, December 2004, pp. 45-46 .

"Fact Sheet E-2C Hawkeye," downloaded from http://www.northropgrumman.com/e2c_hawkeye.html

"Airborne Surveillance Platform," <http://www.globalsecurity.org/military/world/india/asp.htm>

"Sweden Finalises SAAB 2000 AEW&C Contract with Pakistan," downloaded on December 27, 2006, from www.defenceindustrydaily.com

"Y-8 'Balanced Beam' (KJ-200) Airborne Early Warning Aircraft," downloaded from www.sinodefence.com/airforce/specialaircraft on January 1, 2007.

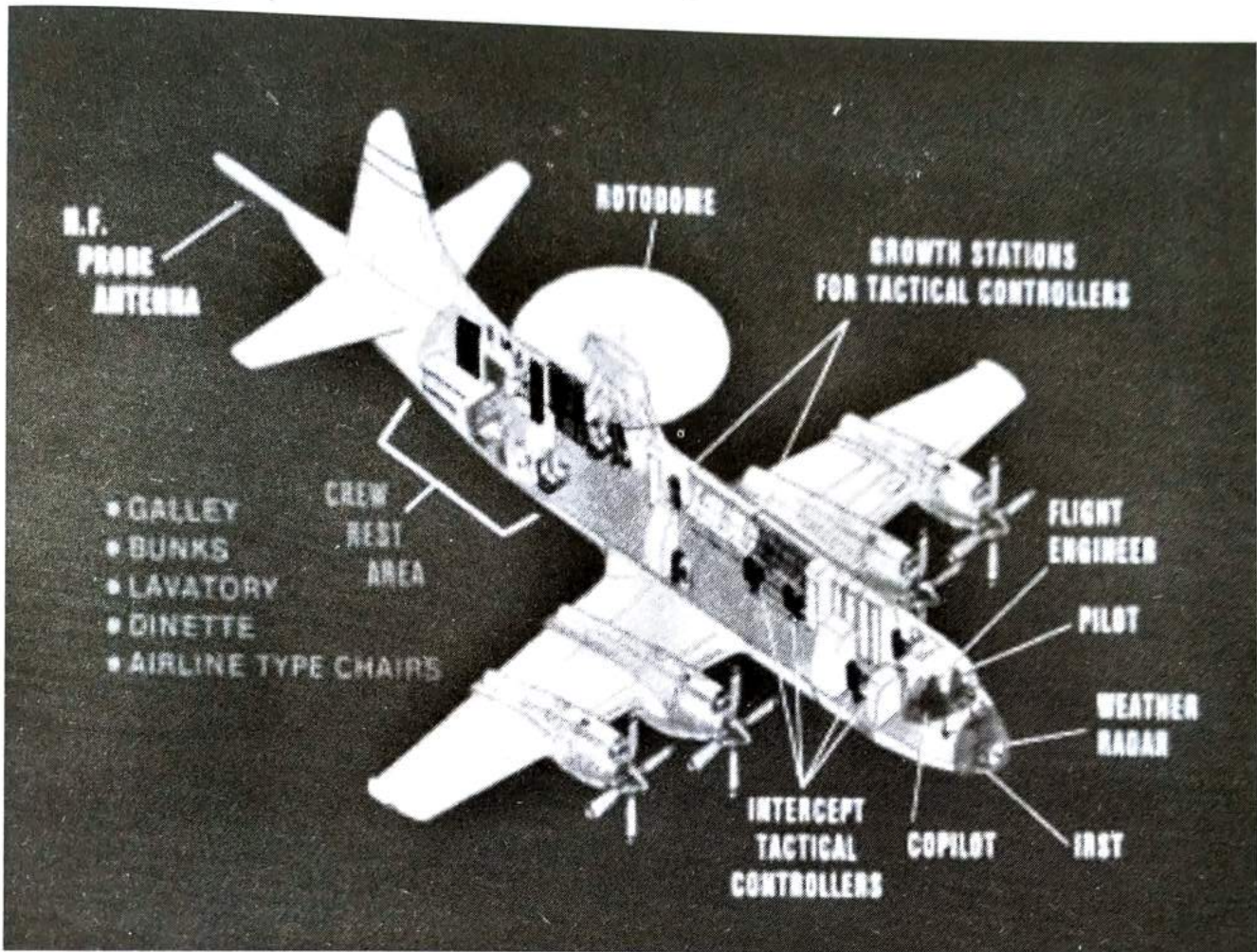
"United States Navy Fact File, E-2 Hawkeye Early Warning and Control Aircraft," Downloaded from <http://www.navy.mil/navydata/fact.asp> on January 22, 2007.

Specification of E-2C Hawkeye 2000 downloaded, from www.fas.org on January 22, 2007.

Martin Streetly, "Electronic Eyes on Wings and Rotors," *Jane's International Defence Review*, vol.38, November 2005.

* Operator Work Stations

P-3c With Hawkeye UHF Radar



The Hawkeye's UHF radar has been integrated with both the Lockheed P-3 and C-130 airframes, providing a mid-range system with substantially better range and endurance performance than the E-2C. These derivative systems exploit the additional airframe volume available and use larger and newer computer and display technology, in comparison with the cramped E-2C airframe. Downloaded from www.ausairpower.net/aew-aesa.html on 23 Jan 2007

PAKISTAN'S DEFENCE SPENDING: SOME TRENDS

SHALINI CHAWLA

Pakistan's defence spending has always been a matter of concern for the economists and academic experts in Pakistan and the financial institutions abroad. Pakistan maintained defence spending at above 6 per cent of the gross domestic product (GDP) till the late 1990s. In the last six years, the official defence spending figures have been kept low owing to the massive international pressures in the past and the strong debate in Pakistan blaming defence spending for the country's economic woes in the 1990s. On the other hand, other factors have been in evidence to enhance Pakistan's military capability in spite of ostensibly lower defence expenditure than in the earlier period.

Defence requirements and allocations received precedence in the national expenditure of Pakistan from the beginning and by every successive regime, regardless of it being civilian or military. At the very inception of Pakistan, the first Prime Minister, Liaquat Ali Khan (August 1947-October 1951) said, "The defence of the state is our foremost consideration. It dominates all other governmental activities."¹ In a similar strong statement, Prime Minister Muhammad Ali Bogra (April 1953-August 1955) said that he would rather starve Pakistan than allow weakening of its defence.² By the 1990s, Pakistan had a deplorable state of the social sector which stood in complete contrast to the grandeur of the military elites in Pakistan. This wide gap between the haves and

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1. *News Chronicle*, October 9, 1948, as cited by Hasan Askari Rizvi, *Military, State and Society in Pakistan* (London: Macmillan Press, 2000), p. 62.
2. *Dawn*, August 17, 1953, as cited by Rizvi, *Ibid.*, p. 62.

have-nots in Pakistan has actually resulted in a massive social divide, leading to civil unrest in the society and dismissing hopes for a democratic rule in Pakistan. Neglect of the social sector in Pakistan over the decades has led to weak human resource development with low education (and, hence, the growth of *madrassas*) and employment rates. This, in turn, has encouraged the motivation for *jihād* in the Pakistani youth.

The terrorist attacks in the United States on September 11, 2001, and Pakistan's consequent status as a US ally in the war against terrorism once again provided the military regime with an opportunity to fulfil its aspirations for military modernisation and build-up. Although, the official defence spending figures were maintained at an average rate of 3.4 per cent of the GDP in the last six years, the actual spending in building military capability and maintaining it stands much higher in Pakistan.

TRENDS IN PAKISTAN'S DEFENCE EXPENDITURE

Pakistan's defence budget, unlike that of India or even of China, has no transparency and no details about the breakdown of defence expenditure are

Pakistan's defence budget, unlike that of India or even of China, has no transparency and no details about the breakdown of defence expenditure are available even informally.

available even informally. Only an overall defence budget figure is provided by the government. Estimated military spending is significantly higher as external military assistance in various forms is not included in the official figures of the defence expenditure. Also, several military related expenditures are covered under the civil and public administration. Table 1 indicates Pakistan's defence spending for the past five decades.

In the mid-1950s and early 1960s, the US military aid helped to keep defence spending low with a high military capability. America's fear of Soviet expansion into the Middle East persuaded it to keep Pakistan on their side and Pakistan entered into regional anti-Communist alliances, the Southeast Asia Treaty Organisation (SEATO) in 1955 and the

Baghdad Pact (renamed the Central Treaty Organisation (CENTO) after Iraq left the pact in 1956). In the mid-1950s, when Pakistan first received American assurance and eventually the military assistance, it considered it to be "a glorious chapter in its history." Prime Minister Bogra said that the "United States military aid will enable Pakistan to achieve adequate defensive strength without the

Table 1: Pakistan: Defence Expenditure Statistics

	Defex (bn. Rs.)	GDP (current prices, bn. Rs.)	Federal Govt. Exp (bn. Rs.)	Population (mn)	Defence Forces (‘000)	Defex /GDP (%)	Defex/ Federal Govt. Exp (%)
1961-62	1.109	19.139	1.986	97.5	250	5.79	55.84
1962-63	0.954	20.489	1.795	101.1	250	4.66	53.15
1963-64	1.157	22.945	2.337	104.7	253	5.04	49.51
1964-65	1.262	26.202	2.734	108.5	253	4.82	46.16
1965-66	2.855	28.969	4.498	112.5	278	9.86	63.47
1966-67	2.794	32.622	3.765	116.7	278	8.56	74.21
1967-68	2.182	35.542	4.077	121.0	351	6.14	53.52
1968-69	2.427	37.985	4.371	124.0	357	6.39	55.53
1969-70	2.749	43.347	5.099	127.0	390	6.34	53.91
1970-71	3.202	46.006	5.751	131.0	390	6.96	55.68
1971-72	3.726	49.784	6.926	135.0	404	7.48	53.80
1972-73	4.440	61.414	8.406	63.34	350	7.23	52.82
1973-74	4.949	81.690	11.954	65.89	466	6.06	41.40
1974-75	6.914	103.557	14.384	69.98	500	6.68	48.07
1975-76	6.103	119.736	17.709	72.12	502	5.10	34.46
1976-77	8.121	135.982	20.609	74.33	604	5.97	39.41
1977-78	9.675	159.840	25.454	76.60	588	6.05	38.01
1978-79	10.302	177.844	29.861	78.94	518	5.79	34.50
1979-80	12.655	210.253	37.948	81.36	544	6.02	33.35
1980-81	15.300	278.196	46.348	83.84	549	5.50	33.01

PAKISTAN'S DEFENCE SPENDING: SOME TRENDS

1981-82	18.631	324.159	51.116	86.44	560	5.75	36.45
1982-83	23.224	364.387	59.076	89.12	588	6.37	39.31
1983-84	26.798	419.802	75.902	91.88	588	6.38	35.31
1984-85	31.794	472.157	90.074	94.73	479	6.73	35.30
1985-86	34.763	514.532	100.043	97.67	483	6.76	34.75
1986-87	41.325	572.479	111.856	100.70	483	7.22	36.94
1987-88	47.015	675.389	136.151	103.82	481	6.96	34.53
1988-89	51.053	769.745	156.417	107.04	481	6.63	32.64
1989-90	57.926	855.943	173.273	110.36	520	6.77	33.43
1990-91	64.623	1,020.600	183.660	113.78	550	6.33	34.63
1991-92	75.751	1,211.385	199.000	117.31	565	6.25	38.67
1992-93	87.461	1,341.629	235.000	120.83	580	6.52	37.91
1993-94	91.776	1,573.097	258.000	124.48	580	5.83	34.31
1994-95	104.512	1,882.071	295.017	128.01	540	5.55	35.43
1995-96	115.250	2,165.598	334.737	131.63	577	5.32	34.43
1996-97	127.441	2,404.633	398.209	135.28	587	5.30	32.00
1997-98	136.164	2,759.525	461.907	139.02	587	4.85	29.48
1998-99	143.471	2,960.000	606.300	140.00	587	4.32	23.66
1999-2K	150.440	3,562.020	680.410	140.00	587	4.22	22.11
2000-01	133.500	3,876.025	691.700	140.40	587	3.44	19.30
2001-02	151.600	4,095.212	648.600	141.20	587	3.70	23.37
2002-03	159.700	4,481.412	706.300	145.00	600	3.56	22.61
2003-04	180.536	5,250.527	753.300	148.70	616	3.44	23.97
2004-05	216.258	6,203.889	902.800	148.70	616	3.48	23.55
2005-06	*223.501		1,098.500	148.70	616	-	20.35
2006-07	*250.000	-	-	150.00	616	-	-

* Budget Estimates

Source: Jasjit Singh, "Trends in Defence Spending," in Jasjit Singh, *Asian Defence Review 2006* (New Delhi: Knowledge World, 2006), pp.87-88.

country having to assume an otherwise increasing burden on its economy."³ Ayub Khan too regarded the US assistance as a tremendous boost to Pakistan's security. The bulk of the equipment Pakistan acquired in this period came in the form of US aid (not sale). Despite this, defence expenditure figures indicate spending at the rate of around 4.8 per cent till 1964 and Pakistan was spending approximately 50 per cent of its federal governmental expenditure on defence till the mid-1960s.

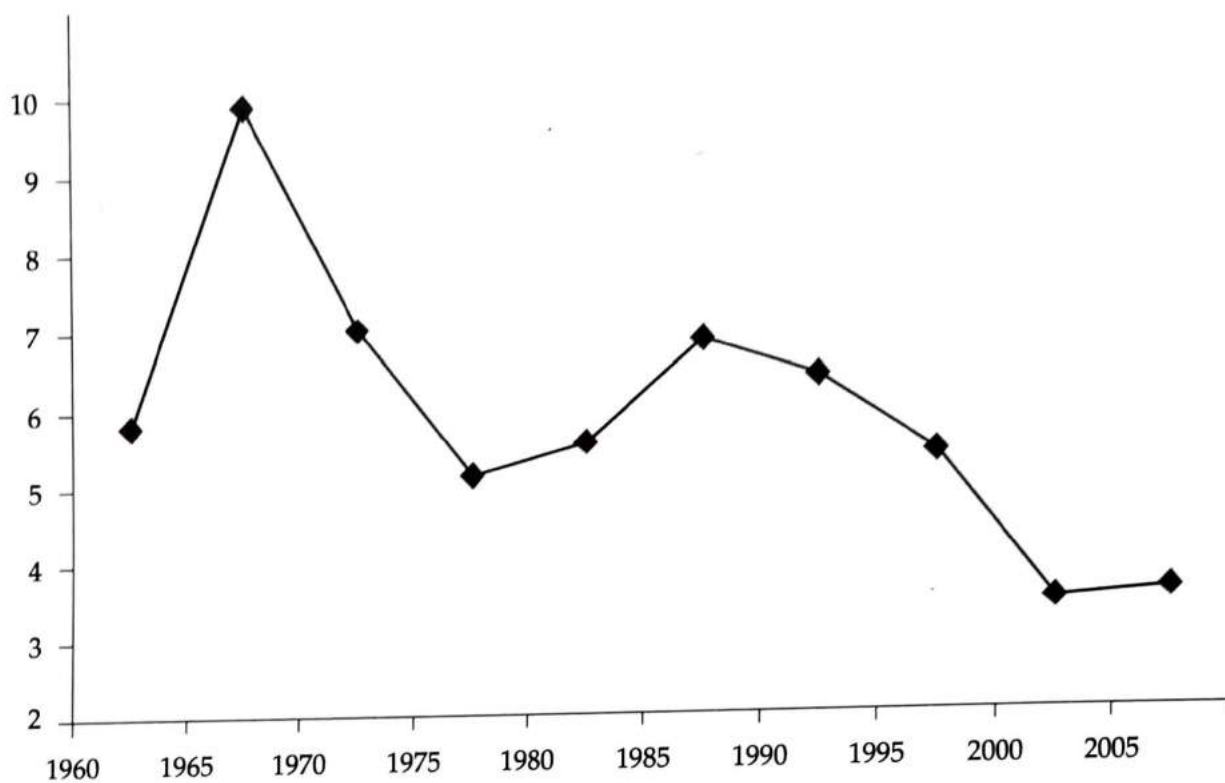
Military spending witnessed a steep rise after the 1965 Indo-Pak War. Defence allocation doubled in the fiscal year 1965-66 to Rs. 2,855 million from the previous year, when the figure was Rs. 1,262 million. In terms of the percentage of the total expenditure, this rise was 53.67 per cent from 46.07 per cent. The salaries and facilities provided for the military were also increased in this period, placing the military above the civilian counterparts financially and providing them a luxurious life-style. There was opposition by some political parties in the National Assembly regarding the lavish life-styles which the military enjoyed, but the opposition was undermined. Ayub Khan's regime viewed the military as a tool for socio-economic development and modernisation of the Pakistani society.⁴ The number of military personnel was increased from 253,000 in the 1964-65 to 357,000 in 1968-69. The defence budget during 1967-71 was an average 6.5 per cent of the GDP. American sanctions, consequent to Pakistan's launching the war against India in 1965, stopped the arms pipeline. On the other hand, Chinese weapons started to flow in after the 1965 War and reports also talked about money flowing in from the Arab world to support the defence infrastructure of Pakistan.

Military expenditure again increased in 1971-72. This was primarily due to the 1971 War when the military was deployed in East Pakistan and Pakistan's defeat led to a realisation of the need for further enhancing of defence capabilities. Pakistan focussed on diversifying its sources of weapon procurements in the 1970s as its access to US arms suffered a major blow with the US arms embargo. This was the time when Pakistan moved even closer to China which became an important source for weapons owing to the following factors:

3. Dennis Kux, *The United States and Pakistan 1947-2000: Disenchanted Allies* (Karachi: Oxford University Press, 2002), p. 63.

4. Rizvi, n.2, pp. 105-106.

Fig. 1: Defence Expenditure Trend



1. Bilateral relations improved after the Sino-India War of 1962. Pakistan and China signed three pacts in 1963 which covered trade, civil aviation and borders wherein Pakistan illegally ceded large tracts of land in Shaksgam Valley in Jammu and Kashmir (J&K) to China.
2. China demonstrated open support to Pakistan in the 1965 War launched by Pakistan and also supplied war material, including T-59 tanks and MiG-19 fighter aircraft.

Chinese military assistance was not only in the form of arms supply but also for the development of indigenous facilities in defence production.

3. Chinese weapons turned out to be cheaper than the weapons from the West.
4. Credit from China was available on easy repayment terms.
5. Pakistan started to view China as a more reliable partner compared to the US.⁵

Pakistan was the first non-Communist country to have received such lavish assistance

5. Pervez Iqbal Cheema, *The Armed Forces of Pakistan* (Oxford: Oxford University Press, 2002), p.164.

from China. Chinese military assistance was not only in the form of arms supply but also for the development of indigenous facilities in defence production. Bhutto's regime further revised the pay, allowances and other facilities for the commissioned ranks as well as for the non-commissioned ranks of all the three Services.⁶ Pakistan's military strength increased remarkably in the 1970s, and by 1976-77, it stood at 604,000 as compared to 351,000 in 1967-68, recording 70 per cent increase in just 10 years.

Pakistan's military strength increased remarkably in the 1970s... recording 70 per cent increase in just 10 years.

During Gen. Zia ul-Haq's regime, the defence budget continued to remain at a higher level. According to him, "We have to match sword with sword, tank with tank, and destroyer with destroyer. The situation demands that national defence be bolstered and Pakistan cannot afford any cut or freeze in defence expenditure, since you cannot freeze the threat to Pakistan's security."⁷ Gen. Zia's militarisation plans were boosted by a major strategic development: the Soviet invasion of Afghanistan. Pakistan became a US ally and was declared the frontline state in the war against Communism. Gen. Zia emphasised the threat perception in Pakistan from the east as well as from the west and focussed on major weapon acquisitions. He also received a large supply of arms, ostensibly for the Afghan Mujahideen, but more than 60 per cent was retained by the army. By 1982, the United States was providing Pakistan with \$600 million a year in military and economic aid. Apart from Pakistan, only Israel, Egypt and Turkey received more assistance.⁸ Apart from seeking Pakistan's support in resisting the Soviet military presence in Afghanistan, Washington was also of the view that securing Pakistan would motivate the Pakistani leadership to slow down their nuclear programme. The military and economic support from the United States helped the economy to recover from Bhutto's flawed policies in the 1970s. The

6. Rizvi, n.1, pp. 146-147.

7. Mushahid Hussain, "Pressures Put on Pakistani Spending," *Jane's Defence Weekly*, vol. 10, no.2, July 16, 1988, p. 70.

8. Kux, n.3, p. 266.

GDP growth averaged 6.5 per cent in the 1980s and matched the growth rate of the 1960s. Defence expenditure in the 1980s, hovering at 6.5 per cent of the GDP, remained at a high level of 25 per cent of the total government expenditure. The US military assistance also provided some major equipment to Pakistan on lease.⁹ Pakistan was able to acquire high technology arms at a relatively lower price paid by its people. Despite the military and economic assistance from the US, the defence expenditure in the 1980s remained high in order to sustain a high level of militarisation.

The 1990s witnessed increasing macro-economic imbalances and Pakistan experienced deceleration in both economic growth and investments. GDP growth, which stood at 6.5 per cent in the 1980s, declined to an average of 4.6 per cent in the

The 1990s witnessed increasing macro-economic imbalances and Pakistan experienced deceleration in both economic growth and investments.

1990s. In the second half of the 1990s, GDP growth rate witnessed a steep decline when it dropped down to 1.9 per cent in 1996-97. Eventually, in the following years, continuing the slow pace, GDP growth rate stood at 2.5 per cent in 2000-01. Public debt went up within a decade from Rs. 802.1 billion in 1990 to Rs 3,198 billion by the year 2000. As a percentage of GDP, it increased from 93.7 per cent to above 100 per cent during the same period. The defence

expenditure, however, remained at approximately 5 per cent of the GDP in the 1990s. High defence spending in the 1990s was due to the suspended US arms supplies (under the US laws) and, secondly, Pakistan's strategy to continue the proxy war in India.

In the late 1990s, Pakistan faced tremendous pressure from the International Monetary Fund (IMF) to control any further increase in the defence budget and cut the fiscal deficit. It was under these international pressures that the annual budget of the fiscal year 2000-01 separated pensions of the retired military men from the defence budget. These allocations were reflected under the head of general administration. Thus, the defence budget in the fiscal year 2000-01 appeared to

9. For example, the 6 destroyers in the 1980s with the Pakistan Navy were acquired on lease from America.

have gone down from Rs 150.4 billion in the previous year to Rs 133.5 billion. It can be concluded that pensions had approximately 11 per cent share in the defence budget and it continues to be so although not reflected in the official figures.

Macroeconomic indicators depicted a downfall and the economy was in the doldrums by the end of the 1990s. Pakistan, in a radical move, projected a freeze in the defence budget for the year 2001-02. But the actual spending went up from Rs 133.5 billion in the previous year to Rs 151.6 billion in 2001-02 (in a total government expenditure of Rs 752 billion). At this point, the debt servicing and the defence outlays totalling Rs 4,690 crore, exceeded its revenue receipts of Rs 4,530 crore, indicating that the remaining government expenditure needed to be financed through continued borrowings. The external debt stood at \$ 38 billion, amounting to about 70 per cent of the GDP. A freeze in the defence budget was proposed by the Debt Reduction and Management Committee (of the IMF). The Government of Pakistan agreed that, "Following the over-run relative to the target for defence expenditure control, mechanisms have been put in place to ensure that the defence budget remains within the agreed limits."¹⁰

It was at this stage that the terrorist attacks in the the USA on 9/11 altered the dynamics of government financing in Pakistan as a consequence of its becoming a "frontline state" (against terrorism) for the third time in less than 50 years. Defence expenditure in the last five years has been hovering at a rate of around 3.5 per cent of the GDP – a remarkably lower figure than the earlier figures. But this does not automatically imply a lower military capability. The lower percentage of defence spending as compared to previous decades can be attributed to the following factors:

1. International pressures in the previous decade laid strict conditions on defence budget.
2. Since the 1990s nearly, 70-80 per cent of Pakistan's weapons and equipment have been acquired from China at lower cost and friendship prices. This has helped to contain the defence expenditure at a lower level, averaging 5 per cent of the GDP during the 1990s.

10. This came in the aftermath of an IMF Standby Arrangement for an amount of US\$ 465 million. As cited in Nadeem Malik, "A Freeze on Defence," *Newsline*, March 2001, p.67.

3. The defence budget as a percentage of the GDP has come down due to significant growth in the GDP figures in the last five years. Pakistan's GDP currently (in the last five years) stands at approximately 7 per cent on an average, as compared to 2.5 in the late 1990s.
4. Post 9/11, Pakistan has been receiving major US military assistance as a chief ally in the war against terrorism and as major Non-NATO Ally of the US. The inflow of US military assistance has been in the form of supply of modern defence equipment, training of the Pakistan military and also modernisation of Pakistani facilities and bases being used by the US since September 11, 2001. Thus, even though the official figures state the defence expenditure at 3.8 per cent, the actual resources being spent on defence are much more.

Currently, the military comprises 616,000 personnel and this large number itself demands a major part of the national resources for its maintenance. Even when the military is not directly in power, it has played a significant role in the national decision-making process. However, all the three forces, the army, the navy and the air force, do not enjoy equal privileges in terms of dominating the national policies related to defence. It is the Pakistan Army, which is the most influential in defence decision-making. It also receives the largest chunk of the defence budget which is around 60 per cent of the total budget. The air force holds a share of approximately 16-20 per cent and the navy, around 10-15 per cent, and the remaining 5 per cent goes to the inter-Services organisations.

ESTIMATED DEFENCE EXPENDITURE

The defence budget data provided by the Government of Pakistan is just the total figure without indicating any details regarding the distribution of funds under various heads. It is a normal practice to get the defence budget passed by Parliament as a one line item on the agenda. According to reliable Pakistani sources, the defence expenditure figures do not include the costs of acquisitions of major weapon systems.¹¹ The major weapon acquisition in Pakistan has largely taken place with military and economic assistance provided by the United States,

11. Air Marshal A. Rashid Shaikh, PAF (Retd), "Security and Development: Hobson's Choice," *Defence Journal*, vol. XXI, May-June 1996, p.13, as cited in Jasjit Singh, "Trends in Defence Expenditure," *Asian Strategic Review 1998-99* (New Delhi: Knowledge World, 1999), p.75.

the Arab world and other nations. For example, the initial payment of the \$1.4 billion of the first 40 F-16 aircraft in 1980-81 was reportedly funded by the Saudi money.¹² Pakistan separated the military pensions which amount to approximately 11 per cent of the budget in the year 2000 from the defence budget and placed them under the civil administration expenditure, to project a decline in the defence budget. The money

spent on providing various perks and facilities to serving as well as retired defence personnel is also absorbed under various other heads.

The estimated military spending, including the entire military power, is much higher than projected in the official defence budget of Pakistan. For example, Pakistan has been receiving US military assistance (besides the arms supplies) since 2001 under four heads as outlined in Table 2.

The major weapon acquisition in Pakistan has largely taken place with military and economic assistance provided by the United States, the Arab world and other nations.

Table 2: US Military Assistance to Pakistan (in millions of dollars)

Programme or Account	FY 2001 Actual	FY 2002 Actual	FY 2003 Actual	FY 2004 Actual	FY 2005 Actual	FY 2006 Estimate	FY 2007 Request
FMF	-	75.0	224.5	74.6	298.8	297.0	300.0
IMET	-	0.9	1.0	1.4	1.9	2.0	2.1
INCLE	3.5	90.5 ^a	31.0	31.5	32.1	56.3	25.5
NADR	-	10.1	-	4.9	8.0	7.8	10.3
Subtotal	3.5	176.5	256.5	112.4	340.8	363.1	337.9

Notes: FMF- Foreign Military Financing

IMET- International Military Education and Training

INCLE- International Narcotics Control and Law Enforcement

NADR- Non-Proliferation, Anti-Terrorism, Demining and Related^b

a - Included \$ 73 million for border security projects that continued in FY2003.

b - The great majority of NADR funds allocated for Pakistan are for anti-terrorism assistance.

Source: K. Alan Kronstadt, "Pakistan-US Relations," CRS Report for Congress, Washington DC, Updated October 26, 2006.

12. Jasjit Singh, *Ibid.*, p.75. Jordan had provided at least one squadron of F-104 Starfighter for Pakistan to fight the war against India.

EXCESS DEFENCE ARTICLES (EDA) SALES

Pakistan has also started to acquire weapons and equipment from the United States which are declared as surplus by the Pentagon. These are normally made available to US allies. Hence, Pakistan was declared one within the framework of old agreements (of the 1950s) and the more recent declaration making Pakistan a major Non-NATO Ally. Weapons sold to Pakistan under this dispensation are well below even their depreciated value. The current market value would obviously be much higher. A summary of EDA sales to Pakistan is placed at Table 3.

As may be seen, the US assistance to Pakistan has grown rapidly post 9/11.

Table 3: Excess Defence Articles to Pakistan by the United States

Fiscal Year	Original US Acquisition value of the defence articles (US dollars)	Pakistan Acquisition value (US dollars)	Remarks
2003	1,629,968	1,629,968	
2004	88,902,447.5	86,400,000	Pakistan in this period paid only for the P-3 aircraft; the rest of the equipment which included F-16 external fuel tanks and motor lifeboats was delivered free of cost.
2005	38,322,594.1	32,446,966	Pakistan paid for the 2 F-16s acquired in this period at one-fourth of the market price for the aircraft.
2006	41,500,000	0	The P-3(H) aircraft was delivered free of cost to Pakistan
Total	170,355,009.6	120,476,934	Pakistan paid 30 per cent less than what was originally paid by the US

Sources: Based on data from the Defence Security and Cooperation Agency, Department of Defence, United States of America.

The FMF for Pakistan which stood at \$ 75.0 million, went up to \$ 297 million in the fiscal year 2006 and is estimated at \$ 300 million in the fiscal year 2007. The figure for IMET funding for Pakistan which was \$ 0.9 million in the fiscal year 2002, has doubled and amounted to \$ 2.0 million in the year 2006 and is estimated to cross \$ 2 million in the fiscal year 2007.

Taking into account the figures for the last six years from FY 2002 - FY 2007, the total US assistance under the FMF, IMET, NADR, INCLE amounts to an average figure of \$ 266.5 million annually. The total EDA for the FY 2002-06 five-year period amounts to \$120.5 million. Pakistan's officially stated defence budget for the same period stands at \$ 12,785 million. Thus, the US assistance and the excess defence articles alone amount to 11.49 per cent of Pakistan's defence budget.

OTHER ARMS SALES

The United States has provided/ assured to provide/sell significant numbers of major weapon systems in the last five years (2002-05) years. Based on the Congressional notifications in the last five years, which may be subject to some minor modifications, Pakistan has received/will be receiving the following arms from the US (weapons from China and France are in addition).

2002 - C130 E cargo aircraft and associated equipment and services - estimated value : \$75 million.

2003 - AN/TPS-77 air surveillance radars and associated equipment and services - deal estimated at \$100 million.

2003 - Air traffic control radars and associated equipment and services - deal estimated at \$110 million.

2003 - Bell 407 Helicopters and associated equipment and services - deal estimated at \$97 million.

Pakistan has also started to acquire weapons and equipment from the United States which are declared as surplus by Pentagon.

Total US assistance under the FMF, IMET, NADR, INCLE amounts to an average figure of \$ 266.5 million annually.

2004 – HF/VHF radio systems and associated equipment and services – \$ 478 million

2004 – Bell helicopter began delivering 26 412EP medium twin engine helicopters and associated equipment – deal estimated at \$230 million

2004 – Six PHALANX close-in weapon systems (CIWS), upgrade of six PHALANX CIWS Block 0 to Block 1B as well as associated equipment and services – deal estimated at \$155 million.

2004 – 2,000 TOW-2A missiles, 14TOW-2A Fly to buy missiles as well as associated equipment and services – deal estimated at \$ 82 million

2004 – 8 P-3C aircraft with T-56 engines as well as associated equipment and services – deal estimated at \$ 970 million

2005 – 40 AGM-84L (air launched) and 20 RGM-84L (surface launched) Grade B Canister Harpoon Block II missiles as well as associated equipment and services – deal estimated at \$ 180 million

2005 – 300 AIM-9M-1/2 Sidewinder air-to-air missiles- \$ 46 million

2005 – 115 M 109A5 155 mm self-propelled howitzers as well associated equipment and services – deal estimated at \$ 56 million.

2006 – Harris High Frequency /Very High Frequency Radio systems – deal estimated at – \$160 million.

2006 – Harpoon Block II anti-ship missiles as well as associated equipment and services – deal estimated at \$370 million.

2006 – Refurbishment and modification of three excess P-3 aircraft with the E-2C Hawkeye 2000 airborne early warning (AEW) suite, as well as associated equipment and services. Estimated deal \$ 855 million

2006 – \$ 5 billion sale to Pakistan involving – F 16 C/D block 50/52 aircraft, weapons for the F-16 C/D Block 50/52 aircraft and F-16 A/B Mid-Life Update Modification kits.

Total US equipment supplied to Pakistan in the period 2002-06 was worth approximately \$ 8,964 million (Rs 55,577 crore.)

Pakistan's total official stated defence budget during the same period was approximately \$ 12,785 million (Rs 78,000 crore). In other words, Pakistan's officially stated average defence expenditure for the last five years amounts to Rs

205.99 billion per annum. In terms of percentage of GDP, this is 3.5 per cent. However, adding the weapons from the US in this period, Pakistan acquired military capability at an average value of Rs 269.69 billion per annum. This would be notionally equivalent to 4.6 per cent of the GDP as compared to the officially stated 3.5 per cent.

In other words, the approximate value of only the US equipment supplied in the last five years is about 70 per cent of Pakistan's defence budget in the same period. Even if we presume that 50 per cent of the notifications materialise into actual contracts, still it stands at 35 per cent of the defence budget for the period of the last five years. Obviously, the major weapons have been funded from extra-budgetary sources. The number will go up if the equipment from China and France is also added to this figure.

This aspect of Pakistan's defence spending has been ignored by experts and scholars so far. However, given the extent of extra-budgetary extra-national support to Pakistan's defence budget, we need to further explore this crucial area and arrive at objective conclusions.

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IMPLICATIONS OF THE MILITARY SPENDING

Socio-Economic Implications

For the purpose of analysing the socio-economic implications of defence spending, we have taken only the official data of money spent on defence from Pakistan's government budget.

The consistent high budgetary spending on defence over the decades led Pakistan into serious economic troubles. Although, it was the economic mismanagement by various regimes in Pakistan and persistent large fiscal deficit that led to the economic imbalance in the 1990s, it is acknowledged that the major share allotted to the defence budget contributed directly and indirectly to

the increasing debt burden in the country. According to one study, "Defence expenditure in Pakistan has a negative impact on GDP when it increases to over 6.5 per cent of the GDP for a decade and more. During the 1978-88 decade, this threshold had already been crossed with defence expenditures averaging 6.8 per cent."¹³ The study which covered a period of over quarter of a century since 1960, concluded, "An examination of a budgetary trade-off in Pakistan found that economic services as a whole were adversely affected by military expenditures."¹⁴

In the 1950s and 1960s, Pakistan was spending approximately 50-55 per cent of the total expenditure on defence. The impact of these high numbers on defence accompanied by Bhutto's nationalisation plan and weak macro-economic management led to high revenue deficits in the 1970s. Gen. Zia's period projected growth in the GDP figures but in the early 1980s itself the growing gap between revenue and expenditure due to the defence burden and debt servicing started pressurising the economy.

The increasing non-development budget entailed huge cuts in the development budget of Pakistan. Initially, the declining development budget was financed through borrowing. As a result, debt repayment and debt servicing also added to the non-development budget which was eventually financed through debt. In the 1990s, Pakistan reached a stage where new loans were being acquired to repay the old ones. Thus, high defence spending added to the miseries of the Pakistani people. As a percentage of GDP, the public debt increased from 93.7 per cent in the mid-1990s to over 100 per cent in mid-2000.¹⁵ The increasing debt obviously resulted in an increase in the debt servicing and its liability recorded a rising trend in the 1990s – increasing from \$1,316 million in 1990-91 to \$2,353 million in the 1997-98, an average increase of 8.5 per cent per annum.¹⁶ By 1999-2000, debt servicing stood at 11.8 per cent of the GDP. Added together, debt servicing and defence expenditure exceeded the total national revenue of Pakistan by the late 1990s. The Pakistan

13. Robert Looney and David Winterford, *Economic Causes and Consequences of Defence Expenditures in the Middle East and South Asia*, (Boulder: West View Press, 1995) p. 216.

14. Looney and Winterford, *Ibid.*, p.109.

15. Government of Pakistan, *Pakistan Economic Survey 2000-2001*.

16. *Ibid.*

Economic Survey 2000-2001, stated, "The persistence of large fiscal deficit and the associated build-up of public debt has been the major source of macro-economic imbalances in Pakistan during the 1990s. Failures in enhancing revenues consistent with growing expenditure requirements by broadening the tax base and strengthening the tax administration, on the one hand, and inability to maintain a balance between the productive and non-productive expenditures, on the other, for a long period of time, have exacerbated fiscal imbalances in Pakistan. In addition, poor governance has not only contributed to inadequate control of government expenditure but also failed to ensure that expenditures were allocated efficiently and equitably."

The consistent cuts in the development expenditure resulted in a deplorable state of the social sector. By the mid-1980s, when the economy started its major downslide, the proportion of people below the poverty line started to increase from 17.32 per cent in 1987-88 to 33.50 per cent in 1999-2000.¹⁷ The 1990s were marked by a constant rise in the poverty head counts, accompanied by a declining growth rate. Given the existing feudal structures of society, increasing poverty has also led to increasing distortion of income distribution and a widening gap between the rich and the poor. Former Finance Minister Mahbub-ul-Haq was reported to have stated that by the late 1960s, only 22 families controlled the financial fortunes of Pakistan. Increasing disparities in the social sector, in turn, have contributed in no small measures to ethno-sectarian conflict since the early 1980s, besides reinforcing feudalism by increasing the dependence of the poor on the affluent.

The consistent cuts in the development expenditure resulted in a deplorable state of the social sector.

The economic decline in the 1990s also witnessed a deteriorating employment situation in Pakistan. In the 1990s, unemployment was at a high rate of 5.9 per cent per annum as compared to 1.35 per cent in the 1980s. This, in turn has added to social ills, ethno-sectarian conflicts, *jihad* and societal violence. Due to lack of investment and employment opportunities, there is a mismatch in Pakistan in

17. *Human Development Report in South Asia 2001* (Karachi: Oxford University Press, 2002), p.82.

the supply and demand for skills. The high rate of unemployment and poverty linked to the inefficient education system in Pakistan has led more and more Pakistanis into *madrassas*.¹⁸

Table 4 gives us a picture of spending priorities in Pakistan. Military spending (only the official figures), when compared to the spending on health and education, two most important social sectors, is much higher. Even after 9/11, with foreign

Year	Education (% of GNP)	Health (% of GNP)	Defence (% of GDP)
1999-2K	2.1	0.7	4.2
2000-01	1.6	0.7	3.4
2001-02	1.9	0.7	3.7
2002-03	1.7	0.7	3.6
2003-04	2.1	0.6	3.4
2004-05	2.1	0.6	3.4
2005-06	-	0.5 (P)	-

funding flowing into the economy, the social sector remains the same. In fact, UNICEF in a report in 2005 blamed Pakistan's heavy military spending, directly, for the diversion of resources from public and specifically child health.¹⁹

Military Implications

The high priority to defence accelerated the modernisation of the defence equipment in Pakistan. Although the major weapon systems have mostly been bought outside the defence budget, high defence spending has sustained the weaponry and kept up the supply of the spare parts. The military implications may be summarised as follows:

- Pakistan's actual military spending is significantly higher than what the official budget indicates.

18. Shalini Chawla, "Jobs or Jihad, that's the Question," *The Indian Express*, July 19, 2002.

19. "Pakistan: Military Spending at the Expense of Children's Health", UNICEF, at <http://acr.hrschool.org/mainfile.php/0211/410/>

- Pakistan is in the process of massive military modernisation.
- The number of military personnel was increased significantly and the high defence spending supported the increased numbers and vice-versa.
- Defence spending has been centred on modernising and expanding the Pakistan Air Force (PAF) and the maritime strike capabilities.
- Surveillance capability is being significantly enhanced.
- Substantive modernisation of air defence.

Pakistan's actual military spending is significantly higher than what the official budget indicates.

The trend in defence spending and building military capabilities indicates two important elements. One, Pakistan has been able to maintain a high level of military capability due to external assistance, both from the US and China though in different forms and in different ways. The US arms supplies have been erratic and fluctuate over time. Chinese supplies and, hence, China's influence has been more steady and seen as reliable in Pakistan. Second, a large quantum of military expenditure is embedded in extra-budgetary sources of military acquisitions and possibly manpower-related expenditures. Taking the current phase of US arms-support to Pakistan through diverse ways, it can be concluded that Pakistan's military capability represents a level of expenditure closer to 4.6 per cent of the GDP rather than the official figure of 3.5 per cent as recorded in recent years – that is, a level around 35-70 per cent higher than the official figures.

Pakistan military capability represents a level of expenditure closer to 4.6 per cent of the GDP rather than the official figure of 3.5 per cent as recorded in recent years.

THE ESSENCE OF COERCIVE AIR POWER: A PRIMER FOR MILITARY STRATEGISTS

KARL MUELLER

INTRODUCTION

This essay is designed to provide the war-fighter with a basic and somewhat informal overview of coercion, emphasising, but not limited to, the coercive use of air power.¹ The subject is central to almost all military strategy, yet it is not often addressed in a systematic way in either military education or military doctrine. This lack of comprehensive attention is due to a variety of factors, ranging from the philosophical misperception that because it is a matter of politics, coercion falls outside the principal sphere of military concern, to the practical obstacles to study that are posed by a field developed by independent theorists who often do not share even a common vocabulary. This article will argue that it is nevertheless essential for the strategist – especially the air power strategist – to understand the essentials of military coercion, and will try along

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This article has undergone security and policy content review and has been approved for public release IAW AFI 35-101.

1. For lengthier and more detailed discussions of many of these subjects by the same author, see Karl Mueller, "Strategies of Coercion: Denial, Punishment, and the Future of Air Power," *Security Studies*, vol. 7, no. 3, Spring 1998, pp. 182-228, and "Strategic Air Power and Nuclear Strategy: New Theory for a Not-Quite-So-New Apocalypse," in Phillip S. Meilinger, ed., *Paths of Heaven: The Evolution of Airpower Theory* (Maxwell AFB, Ala.: Air University Press, 1997), pp. 279-320. On coercive air power in particular, see also Robert A. Pape, *Bombing to Win: Air Power and Coercion in War* (Ithaca: Cornell University Press, 1996), and Daniel Byman, Matthew Waxman, and Eric Larson, *Air Power as a Coercive Instrument*, MR-1061-AF (Santa Monica: RAND: 1999).

Coercion, in its broadest sense, is causing someone to choose one course of action over another by making the choice that the coercer prefers appear more attractive than the alternative.

the way to dispel some of the “fog of theory” that often clouds this subject.

COERCION AND WARFARE

Coercion, in its broadest sense, is causing someone to choose one course of action over another by making the choice that the coercer prefers appear more attractive than the alternative. In the international arena, coercion is usually intended to change the behaviour of states, and this essay will focus on states as the targets of coercion, although most of what follows also applies to other sorts of coercion. Similarly, this discussion will centre around the use of coercion for major security issues, such as deterring war, compelling surrender in war-time or the sacrifice of national territory, and the like, although much coercion involves far less serious stakes.

This definition of coercion obviously covers a lot of theoretical ground. First, it includes both *deterrence* and *compellence*, that is, efforts to make the adversary not do something it otherwise might do (such as attacking the coercer) and efforts to make the adversary take an action it otherwise would not (such as ceding territory to the coercer). There are important differences between deterrence and compellence – mainly, other things being equal, compellence tends to be more difficult than deterrence because of factors such as policy inertia – but the two forms of coercion resemble each other far more than they differ. Moreover, much coercion falls into the gray area between deterrence and compellence, such as coercion intended to make an adversary halt an invasion; this can be interpreted either as compelling the enemy to stop, or as deterring the enemy from advancing further. In such cases, drawing a clear line between deterrence and compellence becomes a matter of pure semantics, so it is usually better to think of deterrence and compellence as opposite ends of a continuum rather than separate and distinct categories.²

2. On deterrence and compellence, see Thomas C. Schelling, *Arms and Influence* (New Haven: Yale University Press, 1966), pp. 69-91. On defining coercion, see among others Thomas W. Milburn, “What Constitutes Effective Deterrence?” *Journal of Conflict Resolution*, vol. 3, no. 2, 1959, pp. 138-145, and Lawrence Freedman, ed., *Strategic Coercion: Concepts and Cases* (New York: Oxford University Press, 1998).

Second, this definition does not say anything about the means being used to coerce the adversary. Coercion can involve the threat or actual use of military force,³ economic sanctions, or a whole range of other political pressures. Usually, it involves more than one at the same time. Of course, there are differences between coercion using threats of war and coercion through threats of diplomatic criticism, for example, but most of the same basic principles apply to coercion regardless of the tools being employed. Similarly, coercion need not involve gradual escalation in the application of force; this is obvious for deterrence, but even in compellence, there is no requirement that coercive force be applied in a restrained or limited manner.

Finally, this definition does not exclude coercion through promises and rewards instead of threats and punishment, which may seem strange. It is certainly possible to treat "positive sanctions" as something separate from coercion – after all, in everyday life, "coercion" refers to something negative, such as your boss' threat to fire you if you don't work overtime, but not an offer to pay you extra as an incentive to do so. However, drawing this line is not actually as easy as it sounds. Coercion depends not just on making what you want the adversary not to do appear unappealing, but on making it look less appealing than what you want them to do instead. Thus, policies that make complying with coercive demands attractive have the same effect as those that make resisting unattractive, and the coercive strategist must pay attention to both sides of the balance. In addition, many of the same factors that determine whether a coercive threat will be effective also apply to promises, though there are some interesting differences between the two.⁴ This essay will return to the

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3. It is probably obvious to the modern reader that deterrence does not have to involve nuclear weapons. As recently as 20 years ago, however, deterrence theory was so strongly associated with nuclear deterrence that many people considered "conventional deterrence" to be something of a novelty.

4. See David Baldwin, "The Power of Positive Sanctions," *World Politics*, vol. 24, no. 1, October 1971, pp. 19-38.

subject of coercion through rewards later, although it will focus mainly on coercion through threats of harm since this is how coercive air power is most often used.

PUNISHMENT, DENIAL, AND DESTRUCTION

Coercive force – either threatened or applied – is intended to change the behaviour of the adversary. Thus, it differs from force that is employed for the simple purpose of destroying a target.⁵ At the tactical level of war, “pure force”

Coercive force – either threatened or applied – is intended to change the behaviour of the adversary.

predominates, for the goal of attacks is usually the physical destruction or incapacitation of an enemy unit or vehicle. In contrast, at the strategic level, destruction is rarely the ultimate goal of armed force. There are exceptions to this generalisation – for example,

the 1981 Israeli attack against the Osirak nuclear reactor, which was intended to destroy the target and, thus, temporarily cripple Iraq’s nuclear weapons programme, and was (presumably) not expected to discourage Baghdad from continuing to pursue nuclear weapons development or to intimidate Iraq into a less anti-Israeli foreign policy – but these are relatively uncommon. When a state seeks to make an enemy surrender, it is engaged in coercion, for the goal is to cause the enemy to *choose* to capitulate. Wars in which no surrender will be accepted do occur, but they tend to be very expensive to fight. Of course, coercion usually seeks concessions much more limited than national surrender.

It is useful to think of purely destructive force and purely punitive coercion as opposite ends of a spectrum. At the *destruction* pole are efforts to produce entirely physical effects, such as the annihilation or incapacitation of an adversary state. This may, of course, change the enemy’s behaviour, by removing the capability to take some action that the attacker does not like, but it does not cause the target state to choose not to do something, so it is indifferent to the enemy’s will. Destruction is conceptually simple, but can be difficult to carry out if the goal is an ambitious one, like entirely eliminating an adversary’s ability to fight.

5. For the seminal discussion of coercion and “brute force,” see Schelling, n. 2, ch. 1.

At the other end of the spectrum lies coercive *punishment*, the use of force to change the adversary's policy choice without affecting its abilities. Examples of such policies using air power range from huge assured destruction threats designed for deterring nuclear attacks to minor punitive raids such as the 1986 US strike against Libya or Israel's frequent retaliatory strikes against terrorist targets in Lebanon. Executing such an attack has no significant effect on the adversary's ability to take or persist in the undesired action, but instead the attack (or just the threat of it) seeks to make the enemy choose to comply with the coercer's demands because this appears to be a better choice than not complying. Although in practice many forms of punishment do have some collateral effect upon the enemy's capabilities, punitive coercion essentially seeks directly to affect the enemy's will to resist rather than its ability to do so.

It is useful to think of purely destructive force and purely punitive coercion as opposite ends of a spectrum.

Between these extremes lies another approach to coercion, typically called *denial*. Denial involves changing the enemy's behaviour by making the undesired course of action appear pointless, either through actually reducing the enemy's ability to carry it out successfully, or by persuading the enemy that it lacks the ability to succeed. Instead of raising the costs of defiance to the point that compliance appears preferable even to successful resistance, denial makes defiance appear unlikely to succeed, in the hope that the enemy will consider compliance to be better than defiance that will ultimately fail anyway. In short, denial seeks to change the enemy's will to resist by reducing its perceived capability for resistance, reducing the adversary's perceived options to a choice between surrendering now and surrendering later.

Denial has much in common with destruction: both seek to make the enemy's objectives unachievable in some sense, and usually focus on attacking military forces or the resources and infrastructure that support them. However, denial is coercive, for it is directed against the adversary's beliefs about the future, and it calls upon the adversary to make a policy choice. Destruction is a matter of objective reality. The attacks one mounts in a denial

strategy are likely to resemble those contained in a pure destruction campaign, since the best way to convince someone that defeat is inevitable is usually to make it inevitable; however, a strategy to make an adversary surrender is likely to have significant differences from an effort simply to destroy the enemy outright.⁶

COERCION AND VICTORY

Destruction is simpler than coercion. Of course, making purely destructive military strategy is difficult enough, since warfare is a complicated business that can take a lifetime to master, even for an unusually clever general. But making good coercive strategy requires understanding not only military art and science, but also additional layers of politics (and often economics and psychology), since it is necessary to predict both what the enemy will be able to do, and what the enemy will choose to do given its capabilities, at the grand strategic as well as the military level.

Yet most warfare is to a greater or lesser degree coercive. States usually seek the capitulation of their enemies rather than their complete incapacitation, although denial strategies sometimes make it possible to pursue both goals at the same time, by allowing the coercer to fall back on a strategy of destruction if coercion fails (as the Allies did against Germany in World War II). The reasons are obvious: bringing the contest to an end while the enemy still has the means to resist offers the prospect of conflicts that are less expensive for the coercer and probably for the enemy as well, and successful coercion may avert warfare altogether through deterrence or compellence that relies on threats rather than

6. This distinction between coercion and destruction parallels the relationship between the often conflated concepts of deterrence and defence. Deterrence involves changing the enemy's expectations about what war will be like so they will choose not to attack, while defence involves making war better (or less bad) for yourself if deterrence fails. Since deterrence exists in the mind of the enemy while defence involves real capabilities, secret weapons can defend but cannot deter, and dummy weapons and other bluffs can deter but contribute nothing to defence if deterrence fails. See Glenn H. Snyder, *Deterrence and Defense* (Princeton: Princeton University Press, 1961), ch. 1. The concept of non-defensive deterrents reaches its pinnacle in Stanley Kubrick's 1964 film *Dr. Strangelove* (for which Thomas Schelling was an early script consultant). In the movie, the Soviets have constructed a doomsday machine (a device conceived in the real world by deterrence theorist Herman Kahn), which will automatically destroy the world if the USSR is attacked, thus, providing complete deterrence but no defence. Unfortunately, Moscow delays revealing the secret invention, which means it cannot deter the nuclear attack that is then launched by a deranged US Air Force officer.

the actual use of force. Often states pursue coercion in situations where they would never consider seeking victories through pure force because the costs of doing so would be prohibitively high.⁷ This is particularly true when the stakes are less than vital interests for the coercer.⁸

Thus, coercion is successful when the adversary complies with the coercer's demands, and would not have done so in the absence of the coercive effort. Coercion has failed if the adversary does not comply with the coercer's demands; in the case of deterrence, failure is easy to recognise, while unsuccessful compellence can end with the coercer backing down, or with the coercer pressing ahead and achieving its goals through brute force. If the coercer's demands are met, but not because of the coercer's threats, coercion is neither successful nor unsuccessful, but merely irrelevant to the outcome; this often happens in deterrence, when a state seeks to deter an attack that the adversary had little inclination to launch in the first place. As a result, even long after the fact it can be difficult to determine with certainty whether a particular coercion effort succeeded or not if the adversary acted in accordance with the coercer's wishes.

Simple assessments of the success or failure of coercion can be complicated further when the adversary complies with some of the coercer's demands but not all of them. Such cases are common, and can lead to endless debates over whether the result should be counted in the win or the loss column of the coercion scorecard. It is better by far to recognise that coercive success is rarely an all-or-nothing affair, and since coercion results

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7. This is also why we rely predominantly on coercion to shape human behaviour in domestic law enforcement, motor vehicle traffic control, and child rearing, to name just a few non-military spheres of endeavour.
8. Because almost all warfare is coercive to some degree, it is nonsensical to argue that military power should not be used for coercion. In fact, most of those who decry coercion as a misuse of the military are actually complaining about particular sorts of military coercion strategies, such as gradual escalation or the use of coercive force in pursuit of minor national interests. It is certainly possible to argue that coercive force should never be used in situations where the coercer is not willing to prosecute the conflict to the point of achieving a victory through pure destruction if coercion fails, but this does profoundly restrict the use and the utility of military power. For elaboration on this point, see Karl Mueller, "Politics, Death, and Morality in US Foreign Policy." *Aerospace Power Journal*, Summer 2000.

will frequently be ambiguous, the analyst should consider what was and was not achieved through coercion rather than worrying too much about how to label the outcome.⁹

REQUIREMENTS FOR COERCION

Because coercion is a matter of the adversary's perceptions, it depends entirely on a set of subjective factors, some of which are more obvious than others at first glance. The most commonly listed items on coercion checklists are the credibility, capability, and communication that lie behind coercive threats, but there is more to coercion than these "three Cs".

Credibility is the most often discussed feature of coercive threats. A threat will only carry coercive weight to the degree that the adversary believes the coercer will actually carry it out if compliance is not forthcoming.¹⁰ Whether the adversary's perception is correct is irrelevant, all that matters is how much the threat is believed. This does not mean that coercive threats must be entirely believable, however. Even a small chance that a coercer will follow through on a threat to inflict great harm (such as launching a nuclear attack) may be sufficient to carry considerable coercive weight. In general terms, the more frightening a threatened action is, the less credible it needs to be. This works out nicely, because more severe threats are typically – but not always – more expensive to carry out, and, thus, are less likely to be entirely credible than milder ones, since the coercer has greater incentives to renege on costly threats than inexpensive ones.¹¹ Because credibility is so central to coercion, and can often be quite difficult to establish, a large proportion of coercion theory is devoted to discussing ways in which the credibility of threats can be enhanced.¹²

Capability is also a vital but often neglected part of coercion. If the adversary does not believe that the coercer has the ability to carry out a coercive threat, it is

9. See Mueller n. 1, and David A. Baldwin, "The Sanctions Debate and the Logic of Choice," *International Security*, vol. 24, no. 3, Winter 1999/2000, pp. 80-107.

10. Note that a threat that is severely lacking in credibility (or severity) may still have value for purposes other than coercion, for example, it may provide domestic political benefits for the government that makes it.

11. Credibility works the same way for promises of rewards as for threats of harm, just one of the ways in which positive sanctions resemble negative ones.

12. The foremost work on the subject is still Schelling's *Arms and Influence*, n. 2.

worthless as a coercive instrument, even if the coercer's will to try is not in doubt. Although it goes hand-in-hand with credibility, capability usually draws far less attention in coercion theory, largely because American nuclear strategists (whose concerns dominated coercion theory for most of the Cold War) have long been able to count on a great surplus of coercive capability. However, capability can become quite problematic for less powerful states, and even for the United States in areas such as economic sanctions, or conventional military coercion against states that are not military pygmies.

Communication plays a secondary but important role in coercion. Coercive demands and threats must be communicated in order to be effective, which is often a simple matter, but one that can become challenging if the messages involved are complex and the coercer wishes to send them through actions rather than words. It is equally critical to communicate what will happen if the adversary does accede to the coercer's demands, since threats of harm need to be recognised as being conditional on the target state's behaviour if they are to encourage compliance.

It is often suggested – usually by coercion sceptics – that coercion requires the adversary to behave rationally, but this is not entirely correct. Coercion theory does assume a minimal degree of rationality in the target state's behaviour, since it must choose to follow the course of action it prefers rather than those that it does not prefer. However, it is more accurate to say that coercion theory simply requires that the adversary not behave completely irrationally, for even if a less-than-perfectly-rational state tends to make poor decisions as a result of its handicap, a big enough coercive threat ought to be able to overcome the interference. Of course, a state's behaviour can fall short of the rational ideal for many reasons – including mentally defective leaders, organisations and interest groups pursuing parochial instead of national interests, inefficient government bureaucracies, imperfect information, motivated and cognitive biases – which may make coercion either easier or more difficult, depending on the details of the case. However, truly irrational state behaviour, which should not be confused with states rationally pursuing objectives that seem senseless or unfathomable to others, is very unusual in the international system.

Whether the adversary will comply with the coercer's demands or instead resist them to the death ultimately depends more than anything else on what is being demanded.

A final factor that profoundly shapes the success and failure of coercion often receives less attention than it deserves: the interests at stake in the confrontation. Whether the adversary will comply with the coercer's demands or instead resist them to the death ultimately depends more than anything else on what is being demanded. It seems obvious that almost nothing will persuade most states to sacrifice their sovereignty or national survival,

while even very limited pressure may be enough to coerce an adversary to give up something trivial. Yet observers persist in treating the failure of feeble pressure to produce huge coercive concessions as significant – the “failure” of the US grain embargo against the USSR in response to the 1979 Soviet invasion of Afghanistan is one of the more striking cases of this sort. The same pattern sometimes appears in discussions of coercive air power.

The fact that stakes are central to coercion does not mean, however, that the side in a dispute that cares more about the dispute will necessarily prevail. Coercion is indeed usually competitive, with the target state seeking in turn to coerce the coercer to abandon its efforts.¹³ Thus, if the two sides have similar resources to apply to the contest, a disparity in interests may determine which side gives up first. However, it is typical for one state to be more powerful than the other, in which case superior strength may overcome superior commitment. In the end, it is the state with the greater will to win relative to the coercive pressure being applied against it that should prevail. The next section attempts to represent these dynamics in a more systematic way.

THE COERCION CALCULUS

Coercion is a matter of changing the adversary's expectations to make compliance with the coercer's demands appear more attractive than resisting

13. On this point, see Byman, et. al. n. 1, and Daniel Byman and Matthew Waxman, “Defeating U.S. Coercion,” *Survival*, vol. 41, no. 2, Summer 1999, pp. 107-120.

them (for deterrence, this means making not attacking look like a better option than attacking). In more concrete terms, this can be disaggregated into a set of distinct but interconnected variables: the expected benefits and costs of compliance, the benefits and costs anticipated from successful and from unsuccessful resistance, and the expected probability that resistance will succeed.¹⁴ Ideally, the coercer would like to maximise the expected costs of resistance and benefits of compliance, and to minimise the benefits of resistance, the likelihood that resistance will be successful, and the costs of compliance.

Punishment strategies seek to increase the costs of resistance, and can be directed against anything the enemy values, including civilian population, military forces, economic wealth, national infrastructure, or international influence. Punitive coercion is intended to cause fear of future pain, as in Giulio Douhet's prescription for city bombing; inflicting actual pain may be a means to this end, but only destruction strategies cause pain for its own sake. Because pure punishment strategies do nothing to help the coercer if coercion fails, the credibility of punishment threats is likely to be questioned if they are costly to carry out.

Denial strategies seek to reduce the likelihood that resistance will be successful, most often attacking the adversary's ability to fight by damaging military forces or the industry and other systems that sustain them.

Where punishment strategies rely upon anticipated pain for coercion, denial strategies seek to cause hopelessness. Since reducing the enemy's chances of

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14. This can be represented symbolically, for those who are not afraid of algebra, in the following inequality (with successful coercion expected when the left side is greater than the right):

$$B_C - C_C > P_S(B_{SR} - C_{SR}) + (1 - P_S)(B_{UR} - C_{UR})$$

where B is benefits, C is costs, C indicates compliance, SR and UR indicate successful and unsuccessful resistance, and P_S is the probability that resistance will succeed. For the specific case of deterring aggression, substitute S_Q (status quo) for C, V (victory) for S and S_R, and D (defeat) for UR. For a longer and more tediously detailed discussion of the coercion calculus, see Karl Mueller, *Strategy, Asymmetric Deterrence, and Accommodation* (Ph.D. diss., Dept. of Politics, Princeton University, 1991).

successful resistance usually increases the coercer's prospects for achieving a pure force victory if coercion fails, denial threats tend to be relatively credible, though the more expensive they are to carry out, the less true this will be.

On rare occasions, reducing the expected benefits of successful resistance can be an important element of coercion, for example, in the case of deterrent scorched earth threats to destroy assets that a prospective invader might hope to acquire through aggression.

Finally, a variety of positive sanctions can be used to reduce the costs and increase the benefits of complying with the coercer's demands. Both reassurance and bribery involve dangers of encouraging blackmail in the future, but they can be an effective and efficient way of achieving coercive objectives in many cases.

In practice, a single threat or application of force will frequently have both punishment and denial (and often destruction as well) effects. This is certainly true of coercive air power, which almost always inflicts pain while pursuing

denial (for example, in bombing enemy war industry or troops in the field), and usually damages military capabilities when inflicting punishment (such as bombing civilian infrastructure). However, the terms of the coercion calculus can also interact in more complicated ways than simple "two-for-one" effects. For example, developing the ability to defeat an attacker can also encourage aggression if it frightens one's neighbours.¹⁵

The logic of coercion indicates that success is most likely when the expected net costs of resistance are high, when the costs of compliance appear low, and when there is little or no prospect that resisting the coercer's demands will lead to a result that would be better than complying with them.

COERCIVE STRATEGY

Given this menu of strategic options, what sorts of coercive strategies are best? The logic of coercion indicates that success is most likely when the expected net costs of

15. On such "security dilemmas," see, among others, Robert Jervis, "Cooperation Under the Security Dilemma," *World Politics*, vol. 30, no. 2, January 1978, pp. 167-214.

resistance are high, when the costs of compliance appear low, and when there is little or no prospect that resisting the coercer's demands will lead to a result that would be better than complying with them. The higher the stakes, the more important denial will become, because the harder it will be to make the costs of successful resistance outweigh its expected benefits.¹⁶ This does not, however, tell the strategist very much about how to go about making good coercive strategy.

Perhaps the most useful piece of guidance to be found in the coercive air power literature is Robert Pape's admonition for strategists to focus not on the targets to be attacked, but on the coercive mechanism that they expect will lead to the strategy achieving its political objective.¹⁷ In short, a coercive target set is only as important as the chain of events that attacking it will trigger, so what to attack should be decided only after the strategist knows why to attack it.

Coercive mechanisms usually include many things, either explicitly or implicitly, including expectations about the second- and third-order effects that will follow from air attacks, theories about how the enemy makes policy decisions, models of how the enemy's armed forces, economy, and society work, and beliefs about the individual and collective psychology of enemy leaders and citizens. From Giulio Douhet to John Warden and beyond, the evolutionary history of air power theory is littered with strategies built on fatally flawed, or just severely underdeveloped, coercive mechanisms.¹⁸

Looking across this varied intellectual history, some recurrent patterns of error appear. Many air power theorists have made the mistake of assuming that enemy societies are fragile mechanisms that can be easily and catastrophically disrupted by bombing, when in fact their economies and morale both tend to be fairly resilient.¹⁹ This is especially true of very modern states, whose robust economies and educated populations give them great – and frequently underestimated –

16. Robert Pape argues that punitive conventional bombing never works, but his argument is based on the coercive stakes being extremely high. See Pape, n. 1, and the analysis in Mueller, n. 1.

17. See Pape, *Ibid.*, chap. 3, and Thomas P. Ehrhard, "Making the Connection: An Air Strategy Analysis Framework" (Maxwell AFB: Air University Press, 1995).

18. Mueller n. 1, pp. 186-87. For an historical survey of major air power theories, see Phillip S. Meilinger, ed., *Paths of Heaven: The Evolution of Airpower Theory* (Maxwell AFB, Ala.: Air University Press, 1997).

19. See Stephen T. Hosmer, *Psychological Effects of U.S. Air Operations in Four Wars 1941-1991*, MR-576-AF (Santa Monica: RAND: 1996).

capacity for adaptation.²⁰ Similarly, airmen are often seduced by the quest for small but critical “panacea target” sets, the destruction of which they optimistically believe will unhinge the adversary’s will or ability to resist – yet some, such as Arthur Harris, have erred in the other direction, failing to recognise that some targets really are more important than others. In reality, opportunities do exist to achieve both physical and coercive effects against some adversaries that are quite out of proportion to the limited effort required for the attacks, but identifying these usually requires very serious and sophisticated analysis of the specific adversary’s economy, society, and military, rather than a simple list of standard target sets.²¹ Many coercive mechanisms fail to disaggregate the enemy, treating as unitary an adversary that in reality needs to be understood as a group of competing governmental or domestic interests, each of which may respond differently to a particular coercive policy.²² Finally, some strategies are built on false analogies between people and states, assuming, for example, that the cumulative psychological effects of bombing upon entire societies or governments are merely a larger version of bombing’s tactical-level shock effects upon individuals.

MAKING COERCION WORK

Given potential pitfalls such as these, how can the coercive air strategist maximise the chances of succeeding? There is no simple prescription for coercive success, but historical experience does provide some guidance, much of it in the form of reasons why coercion often fails.

Many coercion failures can be attributed to a straightforward mismatch between coercive pressures and political demands. The importance of the stakes in coercion cannot be overstated, and a strategy that applies relatively small amounts of pressure in an effort to cause the adversary to sacrifice vital interests

20. See Mancur Olson Jr., *The Economics of the Wartime Shortage* (Durham: Duke University Press, 1963).

21. See Mancur Olson Jr., “The Economics of Target Selection for the Combined Bomber Offensive,” *Royal United Service Institution Journal*, vol. 107, November 1962, pp. 308-314, and Alfred C. Mierzejewski, *The Collapse of the German War Economy, 1944-1945* (Chapel Hill, NC: University of North Carolina Press, 1988).

22. On the importance of disaggregating different actors and interests within the adversary state, see Jonathan Kirshner, “The Microfoundations of Economic Sanctions,” *Security Studies*, vol. 6, no. 3, Spring 1997, pp. 32-64; Wallace J. Thies, *When Governments Collide: Coercion and Diplomacy in the Vietnam Conflict 1964-1968* (Berkeley: University of California Press, 1980) provides such an analysis of North Vietnam in explaining the failure of Operation Rolling Thunder.

is almost certainly doomed to failure from the outset, as the United States eventually discovered in Vietnam.²³ Other failures can be attributed to the sorts of inadequate or faulty coercive mechanisms described above, leading to underestimating the enemy's physical or psychological resilience; this had much to do with the failures of coercive air power (and blockade) against Britain and Germany in World War II, and against the Afghan resistance in the 1980s. Finally, failures can result from operational defects in the application of force – failing to inflict the damage called for by the strategy, or abandoning a sound strategy before it has time to work. All of these are problems that an astute strategist can do much to avoid.

Many coercion failures can be attributed to a straightforward mismatch between coercive pressures and political demands.

However, coercive air power also faces limitations that no amount of cleverness can entirely overcome. Bureaucratic inertia and emotional resistance will almost always cause coercion to be slower than purely rational models would predict. Conflicts and major crises tend to make the perceived importance of the issues in dispute rise over time, as lives are lost, nationalist rhetoric escalates, and leaders' reputations are staked on victory. Conceding to the coercer's demands will sometimes appear to represent a death sentence to enemy leaders, either figuratively or literally, which may be sufficient to make them resist no matter how costly and pointless doing so becomes. On the technological front, precision-guided weapons are only useful if there are suitable (and identifiable) targets for them to attack. All of these factors, and others, mean that air power is not an omnipotent coercive instrument, though its capabilities have increased dramatically during the past generation.

As an imperfect rule of thumb, it is fair to say that coercion has a good chance of succeeding if the coercer can bring about four related conditions, and do so prior to succumbing to the enemy's counter-coercion. First, the enemy should believe that victory is impossible, because even a slim hope of eventual success

23. It is worth noting that many hopeless coercion efforts of this sort are never intended to succeed, but rather are carried out for other reasons, such as domestic or international political consumption.

may be sufficient motivation to hold out against great coercive pressure. Second, particularly if the stakes are high, the enemy should be further convinced that continued resistance offers no hope of leading to any result better than complying with the current demands would be; even when victory appears out of reach, the enemy is likely to grasp at straws such as the prospect of forcing a negotiated compromise settlement. Third, surrender now should appear to be a better deal than surrender later, either because resistance is costly, or because the terms being demanded are likely to become more severe as time passes; otherwise, even futile resistance will not be unattractive. Finally, complying with the coercer's demands must be at least minimally acceptable to the enemy in absolute terms, for if surrender looks too awful to contemplate, then any alternative is likely to appear preferable, no matter how unpleasant, hopeless, or desperate. Coercion may actually succeed without achieving all of these conditions, particularly if the coercer's demands are not great, but failure to fulfill any of them may be sufficient to make a coercive strategy fail.

It is important to recognise that in some cases, not even the best possible coercive strategy will produce success, even for a coercer as powerful as the United States. Sometimes, a coercer will lack the resources or the ability to carry

It is important to recognise that in some cases, not even the best possible coercive strategy will produce success, even for a coercer as powerful as the United States.

out a sufficiently powerful coercive strategy to achieve its ends, while there are occasional cases in which coercing the enemy is beyond the means of any state, or even the entire international community. On the other hand, there are always strategic options that are ill-conceived enough to fail. For the air power strategist, it is necessary not only to be able to craft optimal strategies for coercion, but also to be able to identify cases in which no strategy

promises success at a reasonable price, and other instruments of power – or a policy other than coercion – are required. Developing the expertise in coercion required to do these things is an intellectually challenging task of the highest order, but without mastery of coercion, there is no full mastery of war.