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MINISTRY OF DEFENCE

"Doctrineprovides a military organisation with a common philosophy, a common language, a common purpose and unity of effort. "

. General George H Cecbar

JOINT DOCTRINE

FOR
AIR-LAND OPERATIONS

March 2010

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Foreword

The importance of the application of Air Power in support of land campaigns has been demonstrated time and again through history. The inherent speed and reach of Air Power, coupled with the advantages of an elevated platform, relatively immune to the effects of terrain, enable rapid engagement of ground targets far deeper in the battlefield. Joint application of Air Power alongwith artillery, allows simultaneity in engagement of targets located at different distances, thus preventing the enemy from concentrating its forces in space and time. At the same time, its ability of

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countering the threat from enemy Air Power as also providing surveillance, reconnaissance, air transportation, is of immense value in progressing the land campaign with the requisite tempo.

In a joint warfare scenario, the air space over the battlefield would have more than one user and hence the need for an efficient organisation for air space management to settle conflicting requirements and avoid fratricide. Network centricity, real-time communications, on-line real-time sharing of tactical picture and data enable all the users to operate in the same battle space, in a mutually supporting manner, with adequate safety. The need today is to establish organisations and procedures that would leverage the available technology towards a synergistic application of Air Power.

Apart from the application of Air Power in direct support of land operations, there is also considerable scope of indirect support, in form of surveillance, intelligence,reconnaissance and air transportation. Modern warfare is characterised by speed of battle and timely dissemination of the data/picture received from aerial platforms. Their expeditious analysis is of paramount importance, and can only be achieved through a dynamic inter-service organisation for planning, execution and monitoring. This Joint Doctrine for Air-Land Operations aims to achieve just that.

The Joint Doctrine for Air-Land Operations serves as the keystone doctrinal document for employment of military power in a joint operations scenario. It establishes the framework of concepts and principles to understand the approach to planning and conduct of land - air operations in a conventional war scenario. It is consistent with, and complementary to the Joint Doctrine-Indian Armed Forces.

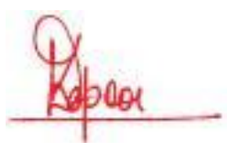
This document discusses the planning, execution and organisational precepts up to the operational level of air and land power

application specific to Joint Air-Land Operations. It describes organizations/ structures, command relationships and operational nuances that are relevant to Land - Air Operations. It also explains how maritime operations may be employed to influence the Land - Air Operations.

Updating is a continuous process and the concepts, beliefs and practices must evolve with time, to keep pace with advances in technology, changing global environment, nature of warfare, regional military capabilities and vital national interests. This Doctrine will be reviewed periodically in response to changes in the political and strategic environment, in light of experiences in combat or even as a result of emerging technologies.

JaiHind!

(Deepak Kapoor)



General
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Chapter-1

Environment and Threat

"To keep our nation safe, even in times of struggle;
and win our nation s wars, even against the most elusive foe. "
- General Norton A. Schwartz

General

1. India's strategic perspective is shaped by its geography, history, political vision and geo-political realities. India is both a continental and maritime nation with a territory of over three million sq km, a land frontier of 15,000 km and a coastline of 7516 km. In addition, it has island territories, quite removed from the main land. India shares borders with a number of neighbours, some of whom may have intentions detrimental to India's interests. The region has witnessed the growth of terrorism and fundamentalism, which is a serious concern for security.

Geo-Political Environment

2. The geo-political scenario is fast changing and the trend is likely to continue in the coming decades. Although USA remains the only super power today, the world is witnessing the emergence of various centres of power, with India as one of the leading global players. Each centre of power is attempting to achieve a 'balance of interest' as opposed to the erstwhile

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'balance of power'. As part of the South Asian Region, India presently has considerable interest in the areas stretching from West Asia through Central Asia and South Asia to South East Asia. Existing and emerging regional groupings can give rise to competitiveness with the attendant possibility of increasing instability due to inter and intra-regional conflicts. The region also includes nuclear weapon states and there is unprecedented proliferation of small arms and narcotic trafficking which, in turn, threatens the stability of the states and societies. Trans-border migration on economic grounds also raises serious security concerns.

India s areas of interest extendfrom West Asia to South East Asia

Economic Environment

3. With market forces playing an important role, economic strength is likely to become the currency of power. Economic linkages and inter-

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dependence amongst countries are likely to result in mutual security becoming an important issue. India is an emerging economic power with a strong market economy. Energy demands are rising and the nation needs to secure the sources and the lines of supply. Energy concerns are likely to be a source of conflict in the future. It is imperative that a stable security environment is provided by strong and effective armed forces.

4. Globalisation is linking economies of nation states and is driving their policies. Geo-economics is overshadowing 'Geopolitics'. Economics and national interests, rather then ideology, are shaping international interests and alliances / alignments. Since economic interests are driving national strategy, any conflict situation will invite concern and possible intervention by extra regional powers that perceive the conflict to be inimical to their interests.

Security Environment

5. The country has experienced four major conventional wars besides an undeclared war fought in Kargil in 1999. It remains engaged in an

India has fought four major wars, including the recent Kargil war

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externally abetted proxy war for the last several years in Jammu and Kashmir (J & K) and has been combating terrorism perpetuated by sponsored militant and terrorist groups. Insurgencies and Naxal ideologies are also being tackled in various parts of the country; a trend not likely to abate.

Nuclear Environment

6. The nuclearisation of the sub-continent is an important factor in any future conflict. The nuclear threshold is likely to be crossed if a state's vital national interests are threatened. India's nuclear doctrine proclaims no use against non-nuclear weapon states and no first use against a nuclear state. It is based on a credible minimum deterrence with a second strike capability.

Nature of Future Warfare and its Implications on Air-Land Operations

7. Wars fought for territory are slowly losing their relevance in an economically linked globalised world order. Although asymmetric war is emerging as a predominant form of warfare and the probability of conventional conflicts between states as a means to resolve disputes is fast receding, preparation for the conventional conflicts remains an imperative and cannot be relegated. In the Indian context, conventional war is still a distinct possibility because of border disputes with our neighbours. Therefore, occupation of territory, even if temporary, will remain a major objective in addition to other objectives. Preparation for conventional conflict, thus, remains an imperative for the armed forces. Future wars are likely to be characterised by: -

(a) An increasing trend towards limited wars occurring at short notice and fought at high tempo and intensity; limited in duration, space and means.

(b)

Achieving campaign objectives quickly would be essential before international pressure forces the combatants to come to the negotiating table. The focus would be more on causing strategic damage in the available time frames.

(c) Non-linear battle space involving synchronised and integrated application of space, air, surface and sub-surface elements. The battle spaces would include larger combat zones formed due to enhanced airpower capability, increased reach of integral fire power, surveillance assets and enlarged areas of influence of combat systems and weapons. This would entail added emphasis on all arms concept and greater integration and jointmanship among land, naval and air forces.

(d) Increased ranges of sensors, weapon systems and platforms would require a fused composite picture to enhance battlefield transparency and share awareness that would prevent fratricide and enhance efficiency in integrated battle space. Providing net centric inputs would increase situational awareness for effective combat decision making. To achieve net centricity, there would be a requirement for integration at the architectural level, which would necessitate knitting together interoperability in the Command, Control, Communication and Intelligence networks of the armed forces.

(e) Improved accuracy, lethality and standoff capability of weapons would result in greater destructive capability. There would be a need to exploit the ‘massing effect’ of Air and Land weapons by adopting a synergistic approach.

(f) There is likely to be ascendancy of Network Centric Warfare (NCW), Information Warfare (IW) and Psychological Warfare in the conduct of modern warfare.

(g) Conduct of operations under the glare of the media will have both positive and negative impact. National and international

public opinion and aversion to loss of lives in battle will have to be considered while planning operations. Information management vis-a-vis media should, therefore, become a part of planning operations. Precise targeting and accurate intelligence would become crucial prerequisites.

Mass destruction of target areas can be effectively ensured by pooling in Air and Land weapon systems jointly

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Chapter-2

Concept of Air- Land Operations

"We were once told that the aeroplane had 'abolishedfrontiers'. Actually, it is only since the aeroplane became the serious weapon thatfrontiers have become definitely impassable. "

- George Orwell

General

1. Employment of forces in the modem battlefield to achieve military objectives takes the coordinated effort of two or more Services. To achieve military objectives, the forces must be capable of producing three fundamental effects in varying degrees; neutralisation, destruction and capture. The combat power of each military force possesses certain intrinsic capabilities to produce these effects. Matching capabilities to missions is the essence of joint operations. By integrating and coordinating their actions, each force would make a unique contribution to the attainment of the primary objective. The aim of Air-Land Operations is to seek and strike deep to destroy / degrade the enemy forces at each stage of the battle. The ability of airpower to target cmcial vulnerabilities in depth provides a vital capability to control the force, space and time dimensions of warfare. This capability should be creatively exploited so that the ground forces can achieve quick and decisive results.

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2. During joint operations, the objective of air operations will be to degrade the enemy's air power and reduce its capability to interfere with the operations of own land forces, deny enemy land forces the ability to move unhindered, create an imbalance in his force disposition and destroy or severely damage his surface communications and logistic means.

Degradation of enemy's air efforts by own Air Force is one of the major objectives of air operations

Planning Considerations

3. Strategic Level. Any intended military action requires careful assessment of international support. Pro-active and aggressive diplomacy plays a pivotal role in preparing a suitable political environment prior to launching operations. Aspects such as economy, trade and commerce also come into play in such circumstances. Synergy between diplomacy and military action is essential for success. Military conflict is usually the

outcome of inability to ensure peaceful resolution of disputes. While coercive diplomacy may necessitate deployment of military forces as a prelude to offensive action, large-scale mobilisation of forces would normally follow a firm decision at the highest level to adopt the military option with minimum loss of time. Conflict termination requirements and a viable exit policy should be incorporated at the national and appropriate military level as part of the overall campaign plans. While each service pursues its own plan for procurement and deployment of Command, Contorl, Communications, Computer, Intelligence and Inter Operability (Cl) assets based on its own needs, care should be taken to see that the systems can communicate with each other where required. This should be ensured not only at tactical level, but also at the operational and strategic levels.

4. The threats to integrated information networks include threats related to hardware, software, media, physical (hard kill) and disabling of networks and information systems (soft kill). The source of threat could be from inside as well as outside. Creating electromagnetic interference, software intrusions and denial of services are some other forms of threat. There is a need to institute information security with highest levels of assurance.

5. Use of Space for Force Enhancement, it is imperative that synergy must be achieved in conventional and space applications for gainful employment. Capabilities afforded by space systems for force enhancement and planning are as follows:-

(a) Intelligence, Surveillance and Reconnaissance (ISR). Their primary contribution is to enable situational awareness by providing high resolution images of the area of interest, monitoring changes, strength and location of forces.

(b) Communication Satellites. They are typically geostationary satellites which enable the military commanders to exercise command and control over their forces and to receive realtime information about the progress of campaign.

(c) **Navigation Satellites.** Satellites like GPS and GLONASS have helped military forces to precisely manoeuvre, synchronise actions, locate and attack targets. They have profoundly improved the accuracy of weapon delivery.

(d) **Meteorological Satellites.** These satellites could be used to determine the most appropriate time for attack.

A high resolution image of an area of Indian Ocean taken by a meteorological satellite

(e) **Geodetic Satellites.** With the data available from these satellites, trajectories of ballistic missiles could be predicted accurately. These are essential for the guidance of cruise missiles.

6.

Operational Level.

(a) Operational level activity must directly contribute to achieving military strategic objectives. The operational level commander will dictate the nature of major operations, battles and engagements. Freedom of action to deploy reserves, assigning priorities and allocation of combat and logistic elements is of critical importance. This freedom of action has to be within the confines of political and military constraints.

(b) The resources made available to a commander to accomplish his operational objectives may be tangible (such as formations / units, combat and services support assets) or intangibles (such as delegated authority to achieve the given objectives). These give him freedom of action to exercise various options. Resources would be held at the level, which ensures their most effective employment. Operational commanders must work out the modalities to utilise all civil infrastructure and resources available in their respective theatre to enhance their combat potential.

(c) The operational level land forces commander would have certain additional responsibilities for civil affairs within their theatre of operations. Movement of refugees and minimising damage to civil infrastructure would have to be considered in addition to legal and moral obligation to minimise collateral damage. Once operations have ended, initially the military may be the only organ available to exercise authority in the area. Stability operations in future conflicts will be an important aspect that will warrant intimate civil military cooperation. Aspects pertaining to transition to civil control must therefore, be built into operational plans and put into effect at the very earliest.

7. Tactical Level. Commanders at the tactical level must ensure optimum employment of all the resources available to them and utilise them effectively to fight decisive battles. All objectives at tactical level should lie well within the 'culmination point' of the forces earmarked to

achieve such objectives. They should be in concert with, and be part of the commander's overall operational design. Success should be achieved with overwhelming asymmetry with optimal use of land, sea and air assets along with force multipliers with least cost to life and material.

Effect of Force Multipliers

8. Technological advances and acquisition of state of art equipment with capabilities commensurate with the modem trends have enhanced the capabilities of air and land power exponentially. Some of these force multipliers include Air Dominance Platforms, Airborne Warning and Control Systems (AWACS), Aerostats, Air to Air Refuellers (AAR), Long Range Air to Air Missiles (LRAAMs / BVRs), Multi Barrel Rocket Launchers, Long Range Artillery Weapons, UAVs, Battlefield Surveillance Radars, (both Long and Short Range) and enhanced night fighting capabilities.

Air to Air refuelling is a potent force multiplier which considerably increases range of air operations

9. The combined effect of all of these assets has not only ensured relative transparency of the battlefield, but has also enhanced the freedom for conduct of land operations.

Conceptual Changes

10. Offensive Intent. Once the hostilities commence, an offensive intent is essential to achieve success. Achieving 'Dynamic Air Dominance' is a step in this direction. This is a concept wherein modem Air Dominance Fighter aircraft, operating in conjunction with Aerostat / AWACS and FRA would be able to fully dominate airspace of finite dimensions for the period of interest. It is dynamic, as the airspace required to be dominated would keep changing with the progress of battle. This would provide a certain degree of freedom of action to the land forces commander to operate in a relatively secure AD environment.

11. Parallel Warfare. Advancement in technology has lent greater reach and precision to modem weapon systems. Larger number of targets can now be attacked in a short period of time. Distance is less of a constraint for targeting critical systems in depth. Targets of value at tactical, operational and strategic level can be engaged simultaneously instead of sequential targeting. Such simultaneous application of force across each level (strategic, operational and tactical) of war, uninhibited by geography describes the conduct of parallel warfare. This concept needs to be fully exploited for achieving campaign objectives.

Modem weapons can engage a larger number of targets in shorter periods

12. Effects Based Operations (EBO). An effects based approach is one where operations are planned and executed in order to achieve preferred effects that contribute directly in achieving desired outcomes. Hence, beyond the activity of destroying enemy forces lies the ultimate purpose of war, i.e. to induce the desired outcome. Effects based approach focuses upon those operations that relate to using military forces to control, rather than destroy, the enemy's ability to act. Focusing on causing functional paralysis conserves resources, that otherwise would be required to cause destruction. The surplus effort could now be used for neutralising additional systems. This creates a force multiplication effect. The first step therefore is to identify the effect that one wants to create and then determine what actions we should take to achieve this effect.

13. Relationship of EBO with Centres of Gravity (CsOG). The process of planning for effects would consider the effects desired at each level and identify vulnerabilities whose neutralisation would cause the desired effects at that or higher level of war. However, at the tactical level, the effects desired may require physical destruction of some target elements to cause functional paralysis of the entire target system. The concept of CsOG too focusing on causing disproportionate effects by tackling crucial vulnerabilities where successful attacks are likely to be decisive. Hence, CsOG and EBO concepts are closely interlinked. Identification of CsOG would significantly assist in evolving an EBO strategy.

Offensive Operations

14. The land and air elements will continue to focus on shaping of the battle space prior to the launch of offensive and during its conduct. The aim will be to create multiple options and deceive the adversary as to the major areas of interest. Though the basic concept of offensive operations in the Western and Eastern Fronts would remain largely unchanged, however, different terrain and operational peculiarities will entail variations during the conduct stage. Pivot Corps in the plains would provide the secure

launch pads and assist offensive formations at each stage of battle. Simultaneity in operations needs to be planned to unbalance the enemy. Contingency plans should be available to cater for the unforeseen situations. Air offensive may be launched in advance / simultaneously to gain requisite control of air in the projected areas of interest. Exploiting the mobility, the mechanised forces would project maximum combat power in the projection area speedily, and defeat adversary's time plan for move of his reserves. The field commanders would ensure that synergy is achieved between the offensive formations and that a tactical and logistics balance is maintained at each stage of the battle.

Mechanised columns can effectively bring down a preponderance of fire power on enemy positions

The security of the lines of communications and flanks must be ensured. During the offensive operations the synergy between land-air forces at each stage of battle would yield decisive results. In the mountains, dominating heights, vital passes, bridges over water bodies and ALGs/ airfields would constitute value objectives at the tactical and operational level. There could be modifications in air support during conduct of land forces operations in mountains, developed terrain or desert terrain but basic concepts will

remain unchanged. Heliborne and Airborne Forces are to be used wherever necessary to augment the offensive capability of conventional ground forces to gain mobility and surprise. Counter Surface Force Operations and Air Transport Operations will form an important and essential ingredient of operational planning.

Heliborne operations can prove to be a turning point during special operations in the mountains

15. Planning an Offensive.

(a) Enemy Information. Every possible means of acquiring intelligence and conducting surveillance would be employed to get accurate and timely information about the enemy. Of particular relevance will be enemy's strategic thought process, intention, grouping of formations, deployment and location of reserves.

(b) Joint Planning. Planning and coordination for operations

would be undertaken jointly by all three Services and each should complement the strengths and offset the vulnerabilities of the other, while formulating a joint plan. Though the extent of involvement of each Service would depend on the missions assigned to it and the prevailing circumstances, the inherent speed and reach of combat air power allows rapid engagement of enemy ground targets within and outside the tactical battlefield area in conjunction with ground operations. Air operations in support of land forces should be planned jointly to obtain synergistic effect in the specified theatre or areas of operations. All such air operations should contribute towards achievement of the overall military objective.

(c) Surprise and Deception. With the availability of modem day high-technology surveillance means, achieving complete surprise would be difficult. Accordingly, more than the element of surprise, it is deception at the strategic and operational levels, which should be given greater importance as this could more easily contribute to success.

(d) Simplicity of Plans. Even at the highest level, plans for offensive operations, should be simple. It will help in making the plan workable and thereby ensure better coordination and flexibility. This is especially relevant while planning joint operations.

(e) Nuclear Factor. Future operations would be conducted against a nuclear backdrop, therefore, political directions would factor in the nuclear aspect while stating military task. This might require adjustments / modifications in planning.

(f) Terrorism and Insurgency. Similar to the nuclear backdrop, a war in certain areas may have to be fought against the backdrop of terrorism. Hence, appropriate measures for rear area security should be inbuilt into operational plans.

16. Preparations for Offensive Operations.

(a) **Mobilisation.** Offensive forces must mobilise within the shortest possible time in keeping with the prevailing operational environment in order to take advantage of the benefits that such a step offers. This is especially relevant in a proactive scenario. This would entail the need for ensuring that the land forces as well as air power elements are in sync to be able to execute operations across the time horizon, ranging from 'min warning' mobilisation to 'full scale' mobilisation in the shortest possible time. In a conventional war scenario, there are generally two options for war initiation i.e. the air campaign preceding the ground forces by a short time or both are launched simultaneously; this, however, may not be the case in 'limited wars', where the urgency to achieve the objectives in the shortest timeframe is of prime importance.

(b) **Force Posturing.** 'Posturing' by offensive forces would be planned at the highest level to aid deception and pre-empt the enemy. In case of 'Zero Warning' mobilisation, air power could lead the offensive with the holding forces carrying out limited offensive till the arrival of dedicated offensive elements.

(c) **Reliable and Foolproof Communications.** Reliable and secure communications, with inbuilt redundancy, provides flexibility in employment of forces and assists the commander in influencing the outcome of battle.

(d) **Combined Arms Battle Concept.** The capabilities of all available forces should be understood and the cumulative strength of every Arm and Service must be exploited fully to achieve optimum results. Similarly, their weaknesses must also be known so that they can be mitigated through appropriate employment or deployment.

(e) **Directive Style of Command.** Offensive operations throw up unexpected scenarios and fleeting opportunities, which should be exploited to advantage. A directive style of command is most likely to produce decisive outcomes in offensive operations.

17. Conduct of Offensive Operations

(a) **Shaping the Battlefield.** Adequate time and resources, both air and land, must be used for 'shaping the battlefield'. Therefore, all operations at all levels must have common aims and objective / purpose. The dividends provided by airpower would be dependent upon airpower employment philosophy and ingenuity with which it is delivered. The focus should remain on conduct of joint operations at all levels to contribute towards achieving the overall national objective. Offensive IW, including psychological operations, should also be optimally utilised to demoralise and degrade the adversary.

(b) **Creation of Superiority at Points of Decision.** Absolute superiority across the board would be hard to achieve. Forces should, therefore, be deployed for the offensive in such a manner that they create force superiority at well-selected points of decision. Overwhelming combat superiority or advantageous asymmetry reduces the time required for achieving success.

(c) **Indirect Approach.** The essence of operational art lies in planning an 'indirect approach' to the objective. Concepts such as 'turning move', 'envelopment' and 'infiltration' provide dividends out of proportion to the force employed when seen in contrast to direct, frontal operations.

(d) **Tempo of Operations.** An offensive should generate such a mounting and execution tempo that it unbalances and paralyses the adversary. The design of operations should ensure that leading elements reach their objectives before the enemy reserves, therefore, be brought to effectively bear on them.

(e) **Employment of Forces.** Pivot or holding corps should also be prepared to undertake offensive operations. Accordingly, only the minimum essential forces should be committed to holding vital areas and the remainder should be grouped, positioned and tasked to conduct offensive operations to improve the defensive posture and create 'window of opportunity' for development of further operations. A few salient aspects are outlined below:-

(i) **Strike Corps.** Strike corps should be capable of being inserted into operational level battle, either as battle groups or as a whole, to capture or threaten strategic and operational objective(s) with a view to cause destruction of the enemy's reserves and capture sizeable portions of territory.

(ii) **Contingency Planning.** Formations should be prepared to switch from one theatre to another in the shortest possible time. Equipment commonality and pre-planned, tailor-made logistic support including utilisation of air element should be ensured to facilitate such switching.

(iii) **Employment of Heliborne, Airborne and Amphibious Assets.** Close integration of the air operations

Heliborne and Airborne operations can play a pivotal role in joint operations

with the ground forces should be ensured at all stages of the offensive. Available assets should be employed to augment the offensive capability of conventional ground forces. They could also be employed for security of island territories, offshore resources and maritime trade routes.

Defensive Operations

18 Defensive operations are necessary to ensure the security of own forces, providing base for strike forces and to create a favourable situation for offensive operations to be undertaken. Defensive operations must therefore be basically aggressive in design and offensive in conduct. The Air Force would provide the required air support to the land forces and its role would be important in blunting the adversary's offensive and restoration of the adverse situation, especially in crisis situations.

19. Planning for Defence.

(a) **Importance of Intelligence.** Acquisition of enemy intelligence is as important for defensive operations as it is for offensive operations.

(b) **Offensive Defence.** Defensive plans at every level must be offensive in nature. This implies that the enemy should be engaged effectively from the earliest available opportunity in a planned manner with every possible means. It also implies taking offensive action at every level as part of a coordinated plan to wrest the initiative from the enemy at every stage during war. A pre-emptive strike on his likely launch pads could completely upset the enemy's strategic design, cause imbalance in the disposition of his forces and wrest the initiative from him right from the beginning of operations.

(c) **Pragmatic Appreciation for Defence.** Defensive plans must be made after a very detailed and deliberate appreciation of the enemy's capabilities, intentions and interests, starting from the strategic and operational levels and culminating in the identification of threat at the tactical level. The emphasis at operational and tactical

levels should be on effective surveillance, gauging of enemy intentions and retaining strong reserves rather than holding every inch of ground.

20. Conduct of Defensive Operations.

(a) **Accurate Reading of Battle.** Accurate and continuous reading of the battle by commanders at every level is a vital ingredient for fighting a successful defensive battle. Availability of real time information at all levels is essential for this purpose. All available force multipliers should be jointly employed to achieve the best outcome.

(b) **Improvement of Defensive Posture.** Every formation should have well-coordinated plans for improvement of its defensive posture. Depending on terrain conditions, these could range from extension of the forward zone to capture of likely launch pads and dominating heights. Objectives for these offensive actions should be selected in a manner that ensures that these operations do not jeopardise and unbalance the subsequent defensive plans of the formation.

(c) **Heavy Attrition.** Once the enemy offensive has been discerned, all available firepower including air, armour, artillery and other weapon systems should be employed in a coordinated manner to cause heavy attrition and seriously degrade the enemy offensive.

(d) **Employment of Reserves.** The key to conduct of a successful defensive battle is timely and skilful employment of reserves to thwart the enemy offensive at the critical juncture in battle.

Chapter-3

Air Operations in Support of Land Campaigns

"Not to have an adequate air force in the present state of the world is to compromise the foundations of nationalfreedom and independence. "

- Winston Churchill

General

1. Air operations have the potential to make an immense contribution to the success of land campaign. The inherent speed and reach of air power enables rapid engagement of enemy ground targets across the length and breadth of the battlefield. The impact of airpower is such that it deprives the enemy the ability to control, influence or exploit battlefields, thereby helping own ground forces much more effectively than by carrying out individual, tactical destructive acts. Air operations in an air-land battle should be so designed that they either deny the enemy the ability to concentrate forces in time and space or facilitate high momentum of our own advance. To achieve the desired results in support of land campaign, air power conducts Counter Air Operations, Counter Surface Force Operations (CSFO), Surveillance (SVL) and Reconnaissance (Recce), Air Defence Operations, Airborne and Helibome operations.

Counter Air Operations

2. The aim of the Counter Air campaign is to achieve and maintain the requisite degree of control of the air. These operations are directed against

the enemy's air power. Achieving complete control of the air prevents the enemy from using his air assets in conjunction with his land and maritime forces while permitting use of own air power as per our will and design. Sufficient control of air must be achieved to ensure freedom of action for our surface forces. It needs to be remembered that no country has won a war in the face of enemy air superiority.

Well planned Counter Air operations can effectively neutralise enemy's air power

Surveillance and Reconnaissance

3. For any tactical battle to produce desired results, recce and surveillance is a pre-requisite for planning. A broad spectrum of sensors employed on fighter aircraft, Unmanned Aerial Vehicles (UAVs), and satellites are available to collect information pertaining to disposition, composition, location, activities and movements of the enemy forces. Timely response to such intelligence information is possible only if the evaluation and dissemination of tactical recce output is near real time. A good C4I2 network enables real time dissemination of tactical recce intelligence. Tactical recce by airborne platforms needs to be meshed with human intelligence. While airborne sensors continue to provide increasing

amount of info, the clever deception measures necessitate far larger role for Human Intelligence, contrary to expectations that Human Intelligence requirements have reduced.

Counter Surface Force Operations

4. Counter Surface Force Operations involve the use of air power, in conjunction with surface forces to deter, contain or defeat the enemy's army. The aim is to deprive the enemy of the military power it needs to control, occupy or exploit battle space. CSFO are necessary for own land forces to prosecute their operational plans successfully. Air power contributes to the land battle three ways; firstly, by attacking enemy ground forces that are actually engaged in combat with friendly forces known as Battlefield Air Strike (BAS); secondly, by attacking enemy forces, which are within battlefield and may be closing in to join the ground battle in the immediate future known as Battlefield Air Interdiction (BAI); thirdly, targeting strategic reserves, reinforcement and re-supply of the entire battle space up to several hundreds of kilometres behind the frontline, known as Air Interdiction (AI). Adequate air effort should be earmarked for CSFO after joint planning by Army and Air Force. Inter-se priority between AI, BAI would BAS would depend on the joint objectives.

5. Factors that need to be borne in mind during planning and conduct of Counter Surface Force Operations are: -

(a) A certain degree of control of the air is desirable for success of ground offensive. As this may not be feasible at all times and would depend on the prevailing situation, therefore, desired degree of control must not be a pre-requisite for launch of the ground offensive.

(b) Joint planning should seek to exploit the reach and speed of aircraft by striking deep at enemy forces before they reach Tactical Battle Area (TBA).

(c) Intelligence is essential for the success of Counter Surface Force Campaign. For this, tactical recce platforms of all the Services should be closely integrated to provide real time battlefield picture as well as to reduce sensor to shooter time.

(d) More than the physical damage and destruction, air attack has a profound impact on the ground troops by causing out of proportion shock.

6. **Air Interdiction.** The aim of these operations is to isolate the battlefield from strategic reserves and essential supplies. They are designed to destroy, neutralise or delay the enemy's strategic military potential before it is effectively brought to bear in the battlefield. The principle objective is to degrade the enemy's freedom of action, coherence and tempo of operation. This form of attack is usually executed against enemy forces not engaged in

Air interdiction against enemy targets in the Kargil sector

combat / supplies and the means by which such forces and supplies are

likely to be moved. Typical targets would include troop and vehicle concentrations, supply trains and convoys, amphibious forces, communication centres, bridges, railways and waterways. Joint planning between land and air forces holds the key to effective interdiction operations. Timing of air interdiction is of prime significance. Early execution may expose the battle plan / provide sufficient time to the enemy to re- organise and respond, while late execution would not achieve the desired effects. The effects of air interdiction are cumulative for them to be fully effective. Air Interdiction needs to be pursued for an extended period.

7. **Battlefield Air Interdiction.** Battlefield Air Interdiction is defined as air action against hostile land targets, which are in a position to directly affect own forces. BAI attacks are conducted against those enemy forces, which are in the battlefield but not in contact with own forces. The aim is to isolate the enemy forces in the battle zone from their reinforcements & supply and to restrict their freedom of manoeuvre. Since these are conducted away from the active battlefront, these do not require continuous coordination with surface forces and their organic fire support. It is, however, important to disseminate the results and effects of the BAI to the ground forces commander at operational level, through a joint mechanism. This will facilitate pragmatic planning for opposition anticipated from the enemy.

8. **Battlefield Air Strike.** Battlefield Air Strikes are air actions against enemy targets in close proximity to / engaged with own ground forces that require not only joint planning but also intimate coordination with the fire support and movement of own forces. Battlefield Air Strike is a shock weapon which should be employed quickly and decisively and should be concentrated in space and time. The ground commander would be pivotal in determining where BAS is to be employed. Identification of bomb line, target acquisition, chances of collateral damage and high probability of fratricide pose varying degrees of difficulty in execution of BAS missions. Some of these aspects can be overcome by employing

Precision Guided Munitions (PGMs), appropriate tactics and procedural control. BAS is most effective when time is at premium and decisive tactical results are desirable. Air effort should be earmarked for CSFO after joint planning by the Army and Air Force. BAS could either be:-

(a) Preplanned. These form an integral part of the ground plan and air effort is decided in advance at the appropriate joint planning level.

(b) **Immediate.** These missions are launched at a short notice to counter emergent situation or for exploiting fleeting opportunities which may present themselves during the battle.

9. Employment Considerations for BAS.

(a) The air defence and Electronic Warfare (EW) environment must be considered and provisions made for use for defence suppression, Electronic Counter-Measures (ECM) and defence against enemy air.

(b) The need for continuous and simultaneous operation of organic firepower in the battlefield will require their detailed integration with BAS missions by way of procedural and positive control. Net centric warfare concept should form the backbone of such operations.

(c) Normal radio communication may be denied / degraded in the battlefield area. This would necessitate procedures for control / clearance for BAS strikes with little or no radio communications. The communication jamming plans of the Services must be coordinated to ensure freedom from jamming to own communications.

(d) Providing adequate support to ground forces under the limitations imposed by night or adverse weather is becoming increasingly possible. For this, the hostile targets must be marked precisely for use of PGMs. Accurate intelligence and detailed imagery are pre-requisites for the success of such missions.

Air Defence

10. Air Defence (AD) involves the employment of a combination of passive and active measures to nullify or reduce the effectiveness of an enemy air attack. The IAF is charged with overall responsibility of Air Defence of Indian air space. The Army and Navy also execute many AD operations. Therefore, effective AD depends upon the integration of sensors, weapon systems, security of communications, real time transfer of data, accurate data analysis process and sound decision support systems of all the Services. The success of AD operations is heavily dependant on surveillance and early warning systems to provide adequate reaction time, response time of the weapon systems and the ability of the entire system to remain operational under attack.

Ground based air defence systems can be very effective against low flying aircraft

11. AD system is most effective when it is structured to allow: -

(a) Wide area surveillance coverage and control capability.

(b) Centralised Control to provide direction and co-ordination of various AD elements with

(i) An ability to inflict maximum attrition.

(ii) Sufficient system redundancy.

(iii) Reliable real time and secure communications.

12. Principles of AD. The four employment principles applicable when planning for active Air Defence are Mass, Mix, Mobility and Integration. The Control & Reporting (C & R) structure must be able to effectively handle a number of AD units, ie ‘Mass’, and also 'Mix' of airborne and ground-based weapon systems. C & R system should be responsive to the changing tactical situation, which implies 'Mobility' and 'Flexibility'. Finally, all the elements need to be integrated to provide a layered coverage and defence in depth.

13. Air Defence of TBA Over Land. Air operations entail a large number of own aircraft, helicopters and UAVs transiting the Tactical Battle Area (TBA) over land, whose safe transit must be ensured. This demands coordinated control of own AD weapons in the TBA over land. The Joint Air Defence Centre (JADC) would exercise control over the Air Defence weapon systems in the TBA over land while control of all airborne assets in and transiting through TBA over land would be with the Air Force.

14. To enable surveillance of maximum airspace, all relevant/available assets of Army and Air Force should be integrated to the extent feasible. Requirement of the Army to relocate AD assets as the war progresses must be given due consideration during this integration. Plethora of electronic devices namely, ground based radars and weapon systems, airborne radars and EW system, various communication systems operating in the TBA underpin the need for resolving the Electro Magnetic Interference (EMI) / Electro Magnetic Compatibility (EMC) issues.

15. Aerostat radars enable enhanced pick-up ranges of hostile aircraft. Early pick up of hostile tracks coupled with Integrated Air Command and Control System (IACCS) and its integration with Army automated C & R system at JADC level would greatly enhance the early warning available to our land forces in the TBA. The probability and number of successful hostile target engagements by AD weapons would consequently increase markedly. Aerostats, with their large surveillance ranges, will also greatly enhance the effectiveness of IAF's AD aircraft. Induction of AWACS on the other hand would enable IAF fighter aircraft engage hostile aircraft with Beyond Visual Range Missiles and also assist in neutralising an air threat by using Surface to Air Missiles (SAMs) well before an enemy aircraft poses a threat to our land forces. Operationalisation of Aerostats and AWACS, therefore, would markedly increase the survivability of our land forces against enemy air attacks.

AWACS are very effective aerial platforms for land-air operations

Air Transport Operations

16. Air transport operations involve the movement of personnel or cargo by air. This movement may be of combat forces, combat enhancing power or routine logistics. Air maintenance operations by both fixed wing aircraft and helicopters play a vital role in sustenance of combat troops in areas inaccessible by surface transport. These also help sustain airborne / heliborne forces till the link up / withdrawal is effected. The IAF undertakes Special Operations whenever required for inserting troops into enemy territory and to carry out clandestine and psychological operations. Available air assets need to be utilised judiciously for maximising their output.

Airborne Operations

17. Due to their inherent flexibility, airborne forces are capable of being employed on various missions whether these are strategic or operational. Airborne Operations are generally in furtherance of land forces plans and involve close cooperation with them. Though launched into depth areas of the enemy as part of the overall ground plan, a quick link up with the ground forces is essential for the success of an airborne operation.

18. For successful execution of these operations, control of air in time and space for the desired duration is essential. This would require coordinated planning vis-a-vis other air force campaigns / missions. Vulnerability of transport and heptrs to enemy air entails AD cover and other protection measures. The planning process must consider key elements related to intelligence, Dropping Zones (DZs), routing, deception, escorts, alternate DZs etc.

19. Characteristics. Airborne operations involve landing of troops from air in hostile territory for executing an assault in conjunction with other operations. Airborne operations achieve simultaneity of force application. They also provide an opportunity to gain a foothold across

obstacle systems in conditions where conventional land forces would require considerably longer time to be effective. Surprise and deception play a vital role in the success of airborne operations. Airborne operations could involve one or more of the following: -

(a) Airborne Assault. Forces are para-dropped into an objective area. These forces require specialized training for the task.

(b) Air Landed. Combat forces are landed by fixed wing /rotary wing aircraft near the objective area.

(c) Special Heliborne Operations (SHBO). Operations, wherein, helicopters are used for insertion and extraction of combat forces directly into action are called SHBO.

SHBO operations underway

20. Missions. The airborne missions may be classified as strategic, operational or tactical. The criterion for classification is the importance of objective and the effect that is sought to be achieved. The depth of insertion of own forces behind enemy lines is determined by the size of force,

feasibility and ability of providing reinforcements and linkup requirements or extrication, as applicable.

21. Planning Considerations. Airborne and heliborne operations require extensive coordination between the committed forces and the controlling headquarters. The following principles contribute to success: -

(a) Surprise is paramount for success. Extensive security and deception measures are necessary in all phases of the operation to prevent early detection and to minimize enemy reaction time.

(b) Landings should be in the area undefended by enemy or in areas where enemy defences have been effectively neutralized.

(c) Airborne assault may receive fire support from air strikes, missile strikes and long-range artillery.

(d) Attack helicopters may escort utility helicopters to prepare the Landing Zone (LZ) before landing of troops and to provide fire support once the assault force has landed.

22. Helibome Landing. Forces inserted by helicopters have the advantage of arriving on the LZ as organised units. The heptrs must minimise the time on ground to reduce their vulnerability. In the mountains, LZs should be closer to the objective and located on several sides of an objective to compensate for the reduced speed of movement.

Attack Helicopters

23. Attack helicopter (AH) is a potent platform in the context of air land battle and should be employed as a "manoeuvre arm' by the ground forces commander. It is a powerful option to engage armoured vehicles and its night capability needs to be optimally exploited. Being integral to the ground forces plan of battle, the AH is poised for quick reaction and its effort can be directed in line with the progress of ground campaign. However, its vulnerability to Quick Reaction Missiles (QRMs), especially, in the mountainous terrain needs to be factored in.

Chapter-4

Maritime Operations in Support of Land Campaign

"The ability for our Navy to be globally deployed, to be working with other countries with other navies, with other maritime services, has a significant contribution to maritime security globally "

- Lina Yerohs

1. Naval forces, like other armed forces, are powerful instruments of national policy. Unique characteristics such as three-dimensional capability, fast mobility, extended reach, versatility, sustained presence in the area of interest and freedom from being dependent on a host-nation, provide maritime forces the ability to influence events ashore in peace, crisis and conflict. The ability of the maritime forces to project power from the sea presents a spectrum of options that may be used. The reasons for selecting sea-borne combat forces as the instrument of choice for influencing operations on land, crisis management and deterrence could be: -

(a) Forward-deployed posture and rapid mobility making sea-borne combat forces readily available at crisis locations worldwide; thus providing significant deterrent value and reducing the likelihood of ambiguous or short warning.

(b) Naval forces possess a range of capabilities required for credible deterrence. Capabilities that can be demonstrated in actual crises include: maintaining presence, conducting surveillance,

threatening the use of force, conducting naval gunfire or air strikes, landing troops, evacuating civilians, establishing a blockade or quarantine and preventing intervention by other forces.

Naval Forces have a long and effective maritime reach

(c) Sea-borne combat forces can be sustained for extended periods at distant locations with logistics support relatively independent of foreign basing or over-flight rights. However, this requires a high degree of sea control along with requisite control of air.

(d) Sea-borne combat forces have unique escalation control characteristics that can contribute to effective crisis management. They can be intrusive or out of sight threatening or non-threatening, away from media glare or right in its middle, and easily dispatched but just as easily withdrawn. The flexibility available in employ-ment of naval forces provides escalation control in any crisis.

(e)

Sea-borne combat forces can maintain consistently high states of readiness because of their forward deployment, ensuring operational expertise and day-to-day preparedness.

(f) Deployment of sea-borne combat forces outside territorial waters does not require concurrence or consent of littoral states.

2. Maritime Power Projection. It denotes the Navy's ability to mount an offensive thrust against adversary forces at distances away from home base. These tenets of use of maritime power are relevant even in the modem era and were exploited in conflicts (Gulf wars 1991 and 2003 and Afghanistan 2001) to exert combat power and to sustain forces from the sea.

Influencing the Land Campaign

3. Indirect Means. The aim of indirect means is to cause such destmction upon the enemy capabilities and assets that his national will to continue the war is broken and the support for the conflict is eroded. Fleet vs Fleet Battle is one such aspect of maritime warfare, wherein maritime forces inflict attrition on the opposing force by the action of its fleet. Victory in the war at sea would produce its own beneficial effects in a manner that could favourably change the situation of the overall conflict. The aim of the maritime battle is to carry the conflict to the enemy's territory, to destroy his war waging potential and naval assets and to ensure a decisive victory. Maritime operations could also be conducted to cause attrition through commodity denial operations, which includes warfare against enemy's mercantile trade, blockade and attacks against key storage facilities ashore for critical commodities such as petroleum and natural gas, power generation facilities etc. The efficacy of commodity denial operations against a target nation hinges on three major facets, its vulnerabilities of specific commodities; dependence & the size of overseas trade and the duration of war. Commodity denial operations have limited use in a short duration war.

4. Direct Means. The direct means of influencing a land war by maritime forces aims to target the adversary's assets used specifically for war fighting or supporting the combat power. This direct means of influencing the land battle can further be bifurcated into two sub-sets. First one entails direct delivery of fire power on targets ashore by platforms at sea (ship, submarine and aircraft). The second is through insertion of a sizeable force ashore with requisite wherewithal which would then deliver the ordnance.

The insertion of land forces into target areas by specialised naval ships like LSTs / LCUs '

5. Air Strike on Shore Targets. Sea-based maritime aircraft can be used to strike strategic and tactical targets ashore as part of a joint campaign. These aircraft are particularly invaluable in the conduct of

distant operations, complicate the adversary's air defence scenario, threaten the littorals and supplement the overall air - land campaign. In addition, suitably equipped naval aircraft could be used for signature mapping of the adversary's radar networks and ESM to establish the key vulnerabilities for conduct of an effective air campaign.

6. **Land Attack Capability.** Possession of land attack capability, especially as an instrument of state policy has today become an important facet of warfare. The option to directly attack strategic and tactical targets on land from standoff ranges is another important function for which the maritime forces need to be structured and equipped. Such attacks on land assets could be launched from all the three dimensions of maritime battle-space providing surprise and thereby enhancing their effectiveness in support of land operations. The flexibility in the deployment of sea-based Tactical Land Attack Missiles (TLAMs) on a wide variety of targets provides increased options to the force commanders. Planning considerations for the management of the Air Space during the flight of naval attack missiles, clarity in target allocation in order to obviate 'overkill' in delivery of ordnance would therefore have to be addressed jointly. Issues related to inadvertent omission of important targets, sharing of real time data on target damage assessment and further targeting, communication interoperability and procedures would need joint planning.

7. Littoral Operations. The littoral - that swath of the land and sea of an approximate width of 300 nautical miles (200 nautical miles of EEZ and 100 miles ashore) where the large proportion of human, economic, political and industrial activity is carried out is also the area where the operational domains of sea, land and air merge. 'Maritime Manoeuvre from the Sea', involving joint sea-land-air operations which allow forced / benign entry using sea-based forces in the littoral regions are an important part of the maritime operations. In order to dominate the littoral of an adversary, his surface, air and underwater forces would have to be adequately suppressed. Conduct of anti-air, anti-submarine and anti-shipping operations by the use of airborne assets is therefore critical to progress joint operations in the littorals.

8. Joint Expeditionary Operations. Expeditionary operations represent any combination of joint or combined forces, operating outside the national-territorial confines to accomplish a military mission, with the singular objective to support operations on the land. The term expeditionary operations include amphibious operations, typically used in the context of assaults against enemy beachheads. It also includes the support to, and the conduct of operations against state / non-state actors as evident from the recent conflicts in Afghanistan and the Middle East. Expeditionary operations are the most visible but the most complex operations, which may be mounted to inject substantial numbers of fighting forces on hostile territory with the following aims: -

(a) Support of Land Operations in a Conflict. The aim could be to undertake a mission in the littoral, to open a second front or even to eventually link-up with the main force advancing over land. Even the mere existence of an expeditionary capability, or posturing by a force, is likely to compel the adversary to re-deploy an operationally significant capability away from the land borders, thereby assisting the Army in its land campaign.

(b) Out of Area Contingencies. Forced / benign entry using sea-based forces to inject the land forces in an area of interest.

(c) Humanitarian Assistance. In case of calamities, provide humanitarian assistance in a manner and quantum that befits India's stature and relative strength in the region.

9. Expeditionary operations invariably involve sea-air lift of troops and cannot be undertaken without first dominating the sea. This inducts the adversary into battle and damage inflicted degrades its combat power. Such action reduces the interference and resistance in the littoral environment.

10. Amphibious Operations. Amphibious Operations are launched from the sea by maritime forces for landing troops against a hostile or potentially hostile shore. Amphibious Operations integrate virtually all types of ships, aircraft, weapons, special operations forces and combat

forces in a concerted joint military effort. Amphibious operations are one of the most complex of all joint operations. Specialised knowledge with a high degree of coordination and cooperation in planning, training, and execution are essential for the success. During these operations, escorting of the maritime forces ensures safe and timely arrival of an amphibious force at an objective area and undertaking landing operations with minimum interference by the enemy. The Navy is structured to undertake four types of amphibious operations: -

(a) Amphibious Assault. An amphibious assault is the principal type of amphibious landing and may be defined as an attack launched from the sea on a hostile shore by naval and landing forces embarked in ships or craft.

Amphibious assault under way

(b) Amphibious Raid. Amphibious raids are landings from the sea on a hostile shore, involving swift incursion into enemy territory for a temporary occupancy of an objective followed by a

planned withdrawal. Raids may be conducted to inflict damage on a selected target, secure information, create a diversion, and capture / evacuate individuals or material.

(c) **Amphibious Demonstration.** This is conducted for the purpose of deceiving an enemy by a show of force at a time and place that would delude him into adopting a course of action unfavourable to him.

(d) **Amphibious Withdrawal.** This involves the withdrawal of forces from a hostile shore by sea in naval ships or craft in order to disengage forces.

11. Conduct of Joint Amphibious Ops will be governed by the Joint Doctrine for Amphibious Ops promulgated by HQ IDS.

12. Special Operations. The use of Special Forces either in prelude to war or in actual war is critical to victory. The Indian Navy retains

Special operations being launched off the Andaman Islands

an independent special operations capability. This can be utilised for sea borne insertions into the adversary's territory, especially in areas that are hostile, defended or remote. The aim of these Maritime Special Forces would be to conduct clandestine raids or intelligence gathering for progressing operations on land by joint forces or simply forcing the adversary to divert resources away from the main land battle between the two armies.

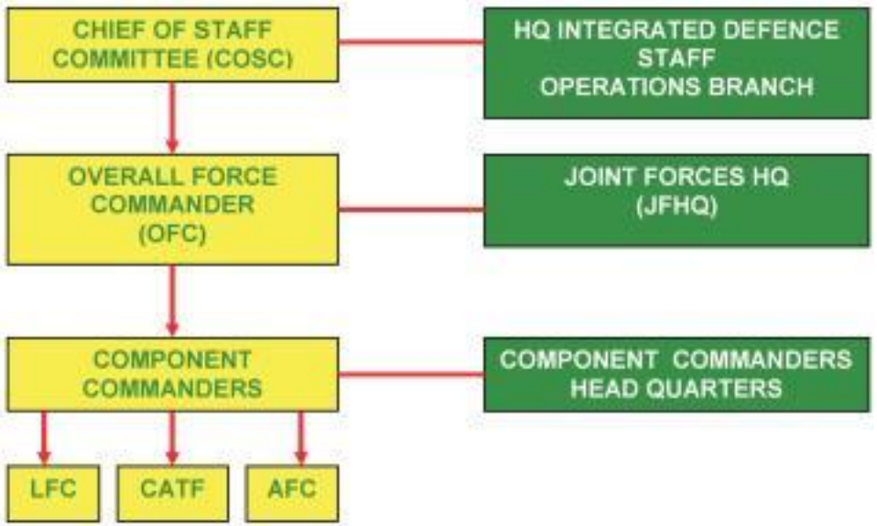
Command and Control Structure for Amphibious Operations.

13. **Chiefs of Staff Committee (COSC).** National objectives provide the framework for conduct of military operations. Within this framework, after the clearance from Cabinet Committee on Security (CCS) and receipt of Raksha Mantri's Operational Directive, the COSC will issue an Initiating Directive for undertaking amphibious operations. The staff functions would be performed by the Operations Branch at HQ IDS.

14. **Overall Force Commander (OFC).** After due consideration to the operational requirements and objective, the COSC could nominate one of the Commanders-in-Chief as the OFC. The OFC will be responsible to the COSC for the entire planning and conduct of the operations till the Amphibious Task Force (ATF) is dissolved. The staff functions would be performed by a Joint Forces Head Quarters (JFHQ) established by the OFC.

15. **Component Force Commanders.** The three Services will nominate their respective component force commander, i.e. Commander Amphibious Task Force (CATF) from the Navy, Landing Force Commander (LFC) from the Army and Air Force Commander (AFC) from the Air Force.

16. The broad line diagram showing the Command and Control for Amphibious Operations is given below.



Chapter-5

Organisation for Conduct of Air-land Operations

"Hitler built a fortress around Europe, but he forgot to put a roof on it. "
- Franklin D. Roosevelt

1. Role of Army and Air Force elements at various levels of the command and control chain are outlined in the succeeding paragraphs.

Army

2. Command Headquarters. The General Staff Operations / Aviation and Intelligence at Army Command HQ are responsible for planning and coordinating all aspects of Air Support Operations with Advance HQ of the Air Force, which is co-located with the Command HQ.

3. Corps Headquarters. The General Staff at Corps HQ are responsible for coordinating all aspects of Air Support Operations with the affiliated Tactical Air Centre (TAC) of the Air Force.

Air Force

4. Command Headquarters. The Air staff at Command HQ is responsible for coordinating all aspects of CSFO.

5. Advance Headquarters (Air Force). The Advance HQ and Army Command HQ will evolve a joint plan and coordinate all aspects pertaining to CSFO. AOC Advance HQ also functions as the advisor to the GOC-in-Cs Army Commands on all air aspects.

Organisation for Airborne Operations

6. Initial planning for Air Borne Operations would be at Services HQ who will issue the initiating directive. Air HQ will allocate the resources and nominate the Controlling Air Command. The Army HQ will allocate troops and equipment. The controlling Army and Air Commands will then set up a Joint Planning Cell for detailed planning at the designated mounting airbase. The planning cell will be responsible for planning, coordinating and controlling the operations. The cell will select mounting bases, aircraft and also plan in coordination with the appropriate authority. In all the contingencies Joint Operations Committee (JOCOM) at HQ IDS will provide an important link between COSC, Services HQ, Controlling Command and the Tactical Commander.

7. Command and Control. Once the air assets for transportation of the troops and equipment have been earmarked, the ground commander responsible for the operations would be given the operational control of the airborne force. The ’air assets' will continue to be under command of the air force commander but the functional control would rest with the commander responsible for ground offensive. Command and Control would be as under:-

(a) **Army.** During flight, the air transport force commander will be the overall commander. After landing, the ground force commander regains command of the land forces component.

(b) **Air Transport Force.** The overall control of the air transport force will be with Air Headquarters represented by the Air Command in the theatre, which in turn will nominate a task force commander.

Chapter-6

Planning for Air-land Operations

"A well conceived plan makes a man perfect; a detailed joint plan makes a team perfect"

Lina Yerohs

General

1. Planning for Joint Air-Land Operations commences with the understanding of the mission objective, purpose, intent and the desired end state. The process of joint planning commencing with the receipt of directive from CCS / RM and culminating in a joint plan at Command HQ for each theatre has been broadly outlined in the capstone document Joint Doctrine for Indian Armed Forces. This chapter would dwell upon the detailed planning after commanders have specified the design of battle and the desired end state in their respective theatres. Detailed planning is concerned with how to achieve the desired end state. It seeks to ensure that surface and aerospace combat elements operate in conjunction with each other to achieve decisive results. The planning would be guided by the fundamentals of joint operations as enunciated below:-

(a) Objectives. Joint operations are planned and directed towards clearly defined and attainable objectives towards which the combat potential of the components is directed to achieve desired results commensurate with the conceived and stipulated end state.

(b) Centralised Planning and Decentralised Execution. It is important to retain the freedom of action of own forces. Towards this end, joint planning must ensure total coordination at the operational level. It is at this level that the requisite spectrum of intelligence, communication & logistics inputs would precipitate the functionary support to operations. For the joint plan to be executed, there should be adequate decentralisation of command and decision-making to the lowest practical level. These levels must be predetermined for each Service.

(c) Unity of Effort. Planning for joint operations implies integrating the combat power of the services and their activities in time and space for a common purpose. Joint operations produce optimal, economical and just application of overall combat power at the selected decisive point to deliver the visualised objectives.

(d) Speed. Modem weapons, equipment and communications along with NCW, have and will continue to accelerate the pace of

Speed is the result of joint planning and effective communication

warfare. Robust and reliable networking will contribute towards reducing the sensor to shooter time that would enable exploitation of fleeting opportunities. In such an environment, the joint planning and execution process should facilitate rapid decision-making and action.

(e) Interoperability. Jointness in training, intelligence, planning, execution and logistics can lead to inter-operability and commonality of purpose in operations. Inter-operability of equipment particularly in the realm of communications needs special emphasis. Limitations of equipment, if any, should be understood and ramifications considered at the planning levels.

(f) Sharing of Inputs. Need based operational inputs in the desired format/ details especially intelligence, should be shared between the joint forces up to the tactical level. Institutionalised structure with security and information overload concerns appropriately addressed should be established for this purpose.

Information Collection and Dissemination Chain (Data Flow)

2. Information collection and dissemination consists of three sub architectures viz Sensor Grid, information Grid and Shooter Grid (Combat elements).

(a) Sensor Grid. It provides a high degree of awareness of friendly forces, enemy forces and the environment across the battle- space by employing a variety of sensors.

(b) Information Grid. It is the fundamental building block of Information Superiority. It provides the information, planning and analysis tool to make appropriate and timely decisions that are fed in through the command system. Some of the important char-acteristics of the information grid are as follows:-

(i) **Composition.** It is a physical grid that provides the infrastructure for computing and communications. The information collected from the sensors will be collected, processed, correlated and disseminated at processing and dissemination centres.

(ii) **Plug In and Plug Out.** Information Grid provides the necessary infrastructure for plug in and out of sensors and shooters.

(iii) **Information Protection.** Information security and assured information delivery are key elements of this grid.

(iv) **Obj ective.** The objective is to provide the C2 centres a high speed access to the information required to dominate the war.

(v) **Applications.** Services would work out the applications that are to ride the C4I2 network. HQ IDS would coordinate this in consultation with Services HQ.

(c) **Shooter Grid.** The Shooter Grid consists of the combat elements.

3. Identification of enemy's centres of gravity and formulation of an integrated degradation plan are important aspects of detailed planning which assist in determining the best method of accomplishing the assigned mission and directing actions necessary for it.

Enemy Centres of Gravity

4. The best results are obtained when powerful blows are struck against critical units or areas whose loss will degrade the coherence of enemy operations and, thus, accomplish the mission most rapidly and economically. Operational planning, therefore, must orient on decisive objectives and stress on capitalising on enemy vulnerabilities and concentration against his centres of gravity (Cs of G). Three elements play a crucial role in campaign planning. First, how quickly campaign objectives are achieved; second, the requirement of minimum collateral damage; third, least causalities while conducting combat operations. The

purpose of identifying enemy centres of gravity is to formulate an operational design that yields maximum pay offs with optimum effort. A centre of gravity determines the crucial balance in cohesion and effective functioning of critical capabilities and must be identified by a deliberate analytical process.

5. Identifying Enemy's Cs of G. The deliberate process of identifying enemy centres of gravity follows the following steps:-

(a) Identifying the desired end state and the objectives required to achieve this end state.

(b) Relate these objectives with those critical capabilities of the enemy that inhibit us from achieving the objectives.

(c) Determine the desired effort required to neutralise these critical capabilities. They could be made ineffective by isolation, impotent by insulating them from vital supplies, degraded by targeting some inherent weakness within them or made inconsequential by restricting their ability to manoeuvre or to reach their point of application.

The identification ofenemy i Centre of Gravity is a detailed and deliberate process

(d) Determine the crucial components upon which the effective functioning of that capability is hinged.

(e) Identify the crucial components which are vulnerable to attack and choose the one on which a successful attack is likely to be decisive.

6. **Operational Level Centres of Gravity.** The operational level is concerned with the employment of military forces in a particular theatre / area of operation to achieve strategic objectives. The critical capabilities of the enemy that would inhibit the achievement of operational level objective in an air land campaign would be his strike and strategic resources and air power. An examination of these critical capabilities is an important aspect of planning.

(a) **Strike and Strategic Resources**. Important elements that provide space and freedom to manoeuvre or enhance combat effectiveness or mobility are crucial components of this critical capability. These are as follows:-

(i) **Command and Control**. The Command and Control element acts as the nerve centre for effective functioning of combat forces. If neutralised, it could lead to chaos and confusion. Key communication nodes / links that relay orders and instructions and provide vital feedback would be theCsofG, if found to be vulnerable.

(ii) **Communication / Transportation Links**. Communication links such as key rail and road bridges / transportation networks form the backbone for providing mobility, freedom to manoeuvre and means to reach the point of application. Thus, a key bridge could be a C o G for these critical capabilities i.e. strategic resources.

(iii) **Logistic Supplies**. Fuel and ammunition supplies are essential for maintaining momentum of strike formations. They are the crucial components of this critical capability and become Cs of G, if vulnerable.

(b) **Enemy Air Power**. The effect desired is to prevent enemy air power from interfering with the achievement of own ground forces objectives. They would need to be neutralised either in the air or on ground to gain the desired degree of control of air and prevent it from attacking own Cs of G. The crucial component of

enemy air power is the fleet of strike aircraft. Considering capabilities of modem Air Superiority Fighters (ASF) in conjunction with Aerostat / AWACS cover, achievement of dynamic air dominance is a distinct possibility. The Centre of Gravity, therefore, would be either aircraft in air or airfields depending upon the availability of Aerostat / AWACS cover.

7. Tactical Level Centre of Gravity. The tactical level is where the opposing forces physically meet, objectives are unambiguous and actual battle takes place. Specific enemy formations may be considered critical when employed against our own forces. Tackling them would be quite similar to the methodology described to neutralise operational level capabilities. However, the effect would be more on isolating the battle zone and shaping the battlefield. At the tactical level, the principal critical capabilities are mobile armour elements and physical defences. The key to identifying the centre of gravity at the tactical level is to determine whether attacking it helps in contributing towards achieving the desired effect at the operational or strategic level.

Degradation Plan

8. Once the Centres of Gravity for various critical capabilities at the operational and tactical level have been identified, the next logical step is to formulate a degradation plan. An integrated degradation plan is prepared jointly for the theatre of operations. The purpose is to synergise all means of fire and force multipliers to achieve the desired degradation in consonance with the campaign objectives. The joint organisation at Corps and Command HQ level evolves a targeting philosophy in order to optimise resources and choose the best weapon for every target. The first step is to develop a surveillance and target acquisition plan, which facilitates target analysis. The next step is to match the capabilities of weapons with target characteristics, consider other factors impinging upon the availability of resources and assign the appropriate weapon.

10. **Surveillance and Target Acquisition Plan.** Anticipating key events on the battlefield always remains an imperative for the success of operations. To ensure that no time is lost in shaping the

battlefield, key elements of the enemy need to be kept under surveillance. A joint plan is prepared at the Corps and Command HQ level, which aims to direct appropriate sensors to specific target areas. The purpose is to collect, collate, interpret and disseminate operational and target intelligence, which feeds the targeting process. Sensors should be employed on a continuous basis even during peacetime (within political constraints) to provide for accurate targeting at the outbreak of hostilities. The purpose of this prehostility effort is to ensure that the strategic reserves can be targeted as soon as the hostility begins, or at an opportune moment as per the overall plan.

11. **Targeting Process.** Targeting is the art and science of producing the maximum effect with the available resources. Effective targeting gives physical shape to producing the desired effect in the most efficient manner. The process of targeting follows the following steps: -

(a) Identify the potential targets and its relationship with the effect desired.

(b) Prioritise the targets to achieve synchronisation of desired effects with the campaign objectives.

(c) Determine the level of neutralisation / degradation required.

(d) Choose the appropriate weapons to achieve the effect.

Effect of Weather and Terrain

12. Weather and terrain have a profound impact on Air-Land operations. Commanders must evaluate forecasted weather conditions for potential effects on plans, operations and on employment of air resources. Accuracy of the forecast weather is extremely important in the planning process for determining forces / weapon mix and for taking decisions in relating to target selection and routing of strike packages.

Contextual Implications of Weather and Terrain.

13. The deserts, plains and shallow mountains along our western border are suited both to air as well as land operations. However, approximately 6000 km of border, which India shares with its neighbours and is steeped with high mountains with large depths, is that much more difficult for offensive land operations.

14. Such terrain prevails along our eastern and northern borders. Consequently along our Northern and Eastern borders, the contributions of airpower, with its commensurate results, must be exploited. Of special significance is the dividend that can accrue with the employment of contemporary PGMs. In mountains, air will play a vital role in the execution of operations by the ground forces. The Air Force should, therefore, be well prepared and trained to operate in mountainous and hilly terrain in all possible and conceivable roles and conditions.

Chapter-7

Training

" Training is everything. Without proper training in our area of activity, we would be like lost lambs in this fiercely competitive world"

Lt. Gen. Jaswant Singh

1. Joint training in peace time is essential not only to practice joint procedures and techniques but also to put to test the structures and the communication systems. Joint exercises also bring out capabilities and limitations of each Service which the commanders and staff must be made aware of. Joint training in peacetime should, therefore, be based on the doctrines formulated so that lessons learnt are applied to overcome the drawbacks.

2. The aim of joint exercises is to ensure proper utilisation of the air effort by coordinated action on both sides. The conduct and operational procedures necessary to meet all likely contingencies should be worked out and practised as realistically as possible.

3. Joint training will include many aspects such as frequent liaison, procedural training, communication training, skeleton / sand model exercise, joint exercises and live firing demos. The following aspects of joint training will require particular attention: -

(a) AD when army is moving in ex area.

(b) Simulation of air attack when army is entraining and detraining.

(c) Use of secure communications.

(d) Use of laser designators / training of personnel.

(e) Air Space Management plans.

(f) Practice mobile Divisional Air Defence Centre (DADC) procedures.

(g) Entire chain of events & actions from demand to execution must be practiced periodically in an institutionalised fashion.

4. Liaison. Effective joint planning, co-operation and execution of tasks can only emanate if the staff from all the Services have thorough knowledge of joint warfare procedures, adequate knowledge regarding the capabilities and limitations of the weapon systems of each service and appreciation of each other's responsibilities. This can only be achieved through joint planning and execution of training exercises during peacetime. Therefore, proper liaison and development of rapport among the respective staff at all levels is extremely important.

5. Procedural Training. This is essentially to train officers, personnel and operators manning joint organisations to make them familiar in the use of the forms and procedures used in joint warfare. This must be done before these personnel are actually employed for these duties.

6. Communication Training. An efficient communication system is the most vital means for efficient command & control of joint operations. The communication system operators must be constantly trained to achieve and maintain a very high standard of efficiency. Practicing use of secure communication is essential.

7. Skeleton Exercises. There are some aspects of command and control, which cannot be properly exercised by procedural training alone and require live training. These aspects include setting up of HQ, joint agencies and relevant communication facilities and operating them under battle conditions for reasonable periods. Such exercises do not require large

training areas or many assets, but need a considerable amount of preparation. Once a satisfactory standard of operation has been achieved, consideration should be given to 'Surprise Alerts' on receipt of which joint HQ and organisations would have to be set up and operated within the stipulated time frames.

8. Joint Exercises. Joint exercises are the best way to practise all aspects of joint warfare. During such exercises, full use should be made of all support facilities. It is of the utmost importance that reliable and realistic communication be exercised encompassing all agencies. Exercise artificialities should be avoided and opportunity must be taken not only of testing the equipment and operators, but also to detect and analyse difficulties, errors and threats due to compromises.

Joint exercise being undertaken by army and naval personnel

9. Joint exercises must be conducted during different seasons of the year and in varied terrain conditions. This aspect needs to be factored in while formulating the annual joint training exercises calendar. Pursuance of this philosophy will pay dividends not only in actual conduct of operations from / in our homeland and out of area contingencies, but also in any future multinational operations.

10. Live Firing Exercises and Demos. This is one of the most effective ways of demonstrating the capabilities of each Service. Whenever large scale field firing exercises are conducted by any Service, officers from the other two Services should be invited to witness the fire power.

Simulated Joint Training

11. Joint Exercises. Joint exercises are being planned and conducted by the Services and HQ IDS. The training is theatre specific and involves bi / tri Service components at the Command HQ level. These exercises are being refined to include extensive modelling simulations, software and C4I2 network for the commanders at the tactical, operational and strategic levels.

12. Joint War Games. Fine-tuning and validation of joint war plans, doctrines and Standard Operating Procedures (SOPs) for conduct of joint operations are achieved through realistic war games. Realistic war games also provide a platform for enhancing compatibility and interoperability trials of equipment and software. Joint war games must be conducted on regular basis and detailed assessments must be carried out of the results achieved.

Chapter-8

Air Space Management

" The development of air power in its broadest sense, and including the development of all means ofcombating missiles that travel through the air, whether fired or dropped, is the first essential to our survival in war. "

- Viscount Hugh M. Trenchard

Airspace as a medium is indivisible and is truly seamless/ borderless. Platforms exploiting the medium of air with their characteristics of flexibility, speed and reach have the potential of posing a threat even in geographically distant and dispersed land areas. To enhance the defence against an air threat, there is a need to have a composite air space picture for effective employment of AD weapons. This also enables use of airspace by maximum number of airborne platforms/ systems with minimum restrictions thus optimising their employment.

1. Enhanced battle space transparency in the TBA necessitates integration of all the sensors and inputs of the Army, Navy and Air Force. Such integration is necessary for implementing the most effective and efficient Air Defence measures as also to optimise exploiting the offensive use of air assets/power of our forces. Facilitating and enabling in real time should be of primary concern in a joint operational philosophy. Effective surveillance & interoperable communication and integrated command & control structure are the key in any airspace management set up.

2. There must be a single controlling agency with necessary authority to co-ordinate & control military air activity. Appropriate common and effective surveillance, radar integration, command and control organisations, communications, information flow procedures and responsibilities, rules of engagement, weapon systems, alert status and delegation of authority are needed to ensure the credibility and deterrent value of our air defence and airspace management which includes the TBA. Inter-operability in sensors, platforms, weapons, processes and architecture is required among the three services.

An IAF sortie dominating Indian airspace

4. Purpose of Airspace Management. Some of the important purposes of Air Space Management are:-

(a)

To ensure safety of own aircraft, helicopters & UAVs from collision with friendly aircraft, Ground Based AD Weapon System (GBADWS), High Trajectory Weapon System (HTWS) and Medium Trajectory Weapon System (MTWS) through time and space.

(b) To ensure safety of friendly aircraft operating in / through the airspace, by exercising control over the weapon systems.

(c) To ensure optimum utilisation of airspace by each user, by resolving conflicts between interfering users based on the overall operational plans.

(d) To provide freedom to all Ground Based Weapon System.

5. Air space management would involve the following:-

(a) Control of all friendly airborne assets.

(b) Control of all GBADWS.

(c) Control of all HTWS/MTWS.

6. Airspace management entails surveillance of the entire airspace at low, medium and high levels by military and civil radars. The following fulfil this function: -

(a) **Control Mechanism for Enforcing Sanctity of Airspace.** Monitoring surveillance information and enforcing Air Defence Identification Zones (ADIZs) through technical, military and administrative measures.

(b) **Weapon Systems and Interceptors.** To deter, intercept and destroy unauthorized intruders in Indian airspace.

(c) **Air Traffic Control.** Control of air traffic in air routes, controlled areas, approach / departure and in the aerodrome zone.

7. Airspace management must essentially encompass the following functions: -

(a) Promulgation of ADIZs, laws of the air and identification procedures.

(b) Fcumulating procedures and structures for efficient, safe and optimum operation of all airborne platforms concurrently even in confined and restricted airspace.

8. Airspace Management Policy. The Air Space Management Policy will need to achieve the following:-

(a) Own aircraft including helicopters and UAVs (from Army, IN and IAF) should be able to exploit the medium without undue restrictions.

(b) All ground/ship borne AD weapons to have the freedom of operations without interfering with own aircraft missions.

(c) The air space should be effectively monitored to ensure denial of its use to the adversary.

(d) The air space management procedures should not compromise security and freedom of action of own assets by undue restrictive processes.

(e) Safely accommodate and expedite the flow of air traffic in the joint operations area.

(f) Enforce common practices and procedures to avoid mutual interference or fratricide.

(g) Enhance combat effectiveness of own forces.

9. Controlling Principles. For efficient control of airspace over TB A, following principles must be adhered to:-

(a) A designated single agency for air space control for a given area/sector under a nominated Air Space Control Authority.

(b) The controlling agency/organisation must have representatives and/or inputs of all users of airspace.

(c) Whenever positive control is not possible / practicable, restrictive measures of segmentation of airspace by volume / height band and or time may be imposed but it must be minimised, both in time and space.

(d)

The restrictions imposed must be temporary in nature and for a minimum duration.

(e) Operating procedures must be flexible to cater for both planned and contingent situations/operations necessitated due to fast and fluid tactical situation.

10. Olliding Principles. To optimally use our technology and execute our philosophy of conduct of various operations through the medium of air, we need to follow certain fundamental principles.

(a) **Unity of Control.** A single agency must exercise overall control over all the air defence elements using the integrated and automated system. The aim is to provide maximum freedom to all AD weapon systems in order to harness optimal operational output. This would provide unity of effort and minimal mutual interference. In a joint scenario, this control would rest with the Air Force. While considering air space control, it must be understood that it is a compromise between a wide varieties of conflicting demands of various users of the common air space. However, effort must be made to avoid undue restriction on any of the operators, be it on ground or in the air.

(b) **Centralised Control.** A single agency needs to exercise control over all operators within a given sector. This agency would be the nodal agency having the entire picture and wherewithal to disseminate the same and deal with situations with its embedded weapons systems.

(c) **Preference to Pre-planned Over Immediate Mission.** Pre-planned missions are easier to conduct and provide greater freedom to the operators with higher safety. However, since war has many uncertainties, immediate missions would also take place. In such situations, it must be understood that there could be sudden restrictions on certain operators to accommodate the immediate missions.

(d) Positive & Procedural Control. No matter how clear may be the radar picture painting all airborne objects; it would neither be practical nor desirable to keep a constant RT communication with all aircraft. Therefore, procedural control would also continue to form part of controlling procedures.

(e) Redundancy. Like all networks, the AD network will be prone to hard and soft kills. Degradation in the network AD operations must be factored in.

11. Enablers of Airspace Management. Enforcing sanctity of airspace and exercising control over all airborne platforms in and around our airspace including the TBA would need integration at operational and tactical levels of all airborne and AD assets. The following will facilitate this: -

(a) Total primary radar cover from low levels to high levels augmented by secondary surveillance inputs.

(b) An integrated real-time C4I2 system handling voice and data.

(c) Integrating the radars of each agency, thus optimising the radar resources.

(d) Adequate air defence aircraft and weapons and their operational integration to provide sector, area and point defence capability.

(e) Adequate redundancy and reliability of equipment.

(f) Real time information and decision making apparatus common to the three Services.

(g) Availability of Airborne Warning and Control System (AWACS) for surveillance.

(h) Declaratory rules of common engagement and weapon fire protocols.

(j) Commonality of practices and procedures where, feasible.

(k) Interoperability in sensors, platforms, weapons, processes and architecture is required between the three Services.

Air Defence at Sea

12. Air Defence within Air Defence Identification Zone (ADIZ) would be the responsibility of the IAF except Air Defence of IN / Maritime assets at sea, whether within ADIZ or outside, which would be a naval responsibility. IN, however, may request IAF for additional AD cover, within the range of shore based aircraft. All IN flying within ADIZ will be under intimation to

A surface to air missile being launched by an Indian Naval Ship

the relevant ADDC, for the purposes of identification. Modalities for the same would be worked out by IN and IAF in mutual consultation. Directives / Orders jointly issued for Air Space Management would address the following:-

(a) Procedures for shore based aircraft of both IN and IAF.

(b) Procedures for ship borne aircraft when landing at shore installations.

(c) Procedure for IAF aircraft tasked for AD at sea.

(d) Control of Ground / Ship borne AD Weapons when own.

(e) Procedure for avoidance of mutual interference.

(f) The issue of compatible IFF.

(g) Approach and recognition procedure at sea for shore based aircraft.

(h) Co-ordination and procedures for exchange of information between ADDC and MOC.

Air Defence Organisation

13. The functions of ADDC would be taken up in an automated manner. The integration of IAF AD network with Indian Army Air Defence network would be at JADC level and with Indian Navy Air Defence network at MOC level.

15. Even though the doctrinal principles of Airspace Management would be lasting, but with the advancement in technology, the Airspace Management becomes an ever changing phenomenon which would be based on the procedures dictated by the technology and will have to be revisited and revised periodically. Based on this Joint Doctrine, a Joint Services Study Group must formulate the modalities for implementing the common procedures for all the Services and in turn, individual Services must formulate their detailed SOPs.

Glossary of Abbreviations

A	
AAR	Air to Air Refuelling Air
ACT	Control Team Air Defence
AD	- Air Defence Control Centre.
ADCC	Air Defence Direction Centre.
ADDC	Air Defence Identification
ADIZ	Zone Air F or ce Commander
AFC	Attack Helicopters
AH	Air Interdiction
AI	- Andaman and Nicobar Command
ANC	- Amphibious Task Force
ATF	- Airborne Warning and Control System
AWAC	- Air Support Signal Unit.
S	
ASSU	
B	
BAI	- Battlefield Air Interdiction
BAS	- Battlefield Air
Bde	Strike Brigade.
C	
C&R	Control & Reporting
C4I2	- Command, Control, Communication, Computers, Intelligence and Interoperability
CATF	- Commander Amphibious Task Force
CATOs	- Command Air Tasking Orders
CCS	- Cabinet Committee on Security

COG	Centre of Gravity
COSC	- Chief of Staff Committee
CSFO	- Counter Surface Force Operations
D	
DACC	Div Airspace Control Centre.
DZ	Dropping Zone
E	
EBO	- Effects based Operations
ECM	- Electronic Counter-measures
EMC	- Electromagnetic Compatibility
EMI	- Electromagnetic Interference
EW	Electronic Warfare or Early Warning as appropriate.
F	
FR	Fighter Recce Forward Air Controller - Fligh
FAC	Refuelling Aircraft
FRA	
G	
GBADWS	- Ground Based AD Weapon System.
GLSec	- Ground Liaison Section.
GLO	Ground Liaison Officer.
H	
HTWS	- High Trajectory Weapon System

I	
IACCS	- Integrated Air Command and Control System
ISR	- Intelligence, Surveillance, Reconnaissance
IW	Information Warfare
J	
JAAOC	- Joint Army Air Operations
JADC	Centre. Joint Air Defence Centre
JFHQ	Joint Forces Hq Joint
JOC	Operations Centre
JOCOM	- Joint Operations Committee
L	
LFC	- Landing F or ce Commander
LRAAM	- Long Range Air to Air
LZ	Missile Landing Zone
M	
MOC	- Maritime Operations Centre
MSNRE	Mission Report
P	- Medium Trajectory Weapon System
MTWS	
N	
NCW	Net Centric Warfare
O	
OFC	- Overall Force Commander
P	
PGMs	Precision Guided Munitions

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Notes

Recce - Reconnaissance

S

SAM Surface to Air Missile

SHBO - Special Heli Borne Operations

SOP - Standard Operating Procedures

SVL Surveillance

T

TAC Tactical Air Centre

TBA Tactical Battle Area

TLAMs Tactical Land Attack Missiles

U

UAVs - Unmanned Aerial Vehicles

W

WTOT - Wing Time over Target

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