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Deficiency in Air Defence Radar Cover The CAG Report 2007-08

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Air Defence is a critical cog in the national security wheel because if the air defence is not effective or it fails to perform then the survival and effectiveness of offensive capabilities would be at stake. It is the most important and complex function of an Air Force. National air defence is the specific responsibility of Indian Air Force, though Indian Army and Navy also have their own air defence components but with limited scope and purpose for terminal defence of deployed forces. Air Defence comprises of active and passive components. Active components encompass Air Defence Ground Environment System (ADGES), weapons (combat aircraft, anti-aircraft missiles and guns) and communication system. ADGES is the most vital component of Air Defence. The ADGES comprises of radars, mobile observation flights, communication network, electronic warfare systems, integration and automation of systems etc. But the ground based radars including high powered radars (HPRs), medium powered radars (MPRs), and low-level transportable radars (LLTRs), are the most basic instruments of ADGES.

The recent report of Comptroller and Auditor General (CAG)¹ on the functioning of ADGES radars units in IAF focuses on functioning of ADGES. Therefore the scope of this brief is limited to radars in Air Defence. The thirty-five page report of CAG on functioning of ADGES radar units in IAF provides very specific details, figures and percentages of deficiencies in each area and how it affects the national security.

The threat dynamics of 21st century is variable and intricate as compared to what we have seen during the last two decades of 20th century. The dominance of suppression of enemy air defence

(SEAD) operations in use of aerospace power, the 9/11 event, use of Czech-built Zlin Z-143 light aircraft by LTTE against the Sri Lankan Air Force base, the raining rockets of Hezbollah in the Lebanon War of 2006 and in the on going conflict in Gaza strip and proliferation of ballistic missiles have brought the air defence into the focus. Notwithstanding the recent efforts of the Ministry of Defence (MOD) and the IAF to bolster the air defence by infusing high end technology in terms of modern radars, surface-to-air missiles and force multipliers, the report of CAG cannot be ignored for its starkness and the issue that it raises has a direct bearing on national security.

The CAG Report

The highlights of the audit report are as follows:

- IAF holds less than adequate number of surveillance radars needed for providing efficient and reliable detection capabilities for ensuring credible air defence.
- Timely acquisition of three additional high power static radars was not ensured to provide effective air surveillance over certain areas that may have become vulnerable to changed scenario.
- The outdated 1970-71 plan for air defence still forms the basis for determining the IAFs requirement of radars. Government is yet to approve IAFs revised plan of 1987-2007, despite significant changes in security scenario, technology and growing magnitude of potential aerial threats.
- Timely upgradation, replacement and modernisation of radars and associated equipment was not ensured, as a result of which, in 2008, IAF was compelled to operate with only 26 per cent of authorised holding of these radars

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- IAF is still dependent on obsolete analog technology in the communication media due to its failure to procure new reliable digital technology.
- Signal Units (SUs) which are responsible for operation and maintenance of radars, have large deficiency of officers in operational and technical cadre ranging between 27 to 38 per cent.
- A project of networking of low-level radars and operationalisation of an automatic control and reporting centre to enhance the operational effectiveness of radars did not succeed due to deficiencies in critical components and unavailability of some of the equipment.
- Performance of high power radars (HPRs) suffered from life expired generator sets and ageing air conditioning systems, whereas the medium power radars (MPRs) were affected by non-availability of critical sub-systems, ageing and inadequacy in height accuracy.
- Requirement of spares projected in Provisioning Reviews by repair depot was not met through centralized procurement resulting in serious shortages, ad-hoc procurement of spares at local levels and delays in meeting the emergent requirement.
- While at one training centre (Air Defence College), resources were over-stretched due to increase in number of courses and training weeks per year, at other training institute (Tetra School) the resources were under utilised.

ADGES System in IAF

Since radar is the primary tool of detection and early warning and triggers rest of the air defence reaction chain, hence the deficiency, unavailability or obsolescence of radars in air defence system would cripple the entire system. The comprehensive ADGES plan was first prepared in 1966 and approved by the Government in 1970. These plans were subsequently, revised in 1971, 1983 and 1987 owing to rapidly changing threat perceptions and increasing magnitude of aerial threat. The plan for period 1987-2000 was later extended to 2007, and a deployment plan up to 2020 was also prepared. However none of the plans prepared after 1971 received approval of the Government. Some of the elements of the ADGES plans have received piece-meal sanction from time to time. Acquisition and replacement have thus been few, unplanned, ad-hoc and delayed, creating a serious mismatch between availability and IAFs requirement of radar systems.²

There is no denying that there has been piece-meal induction of all three types of radars, leading to critical shortages of

all three types of radars till date. All these radars are from different countries of origin and use technology of different vintage, thus posing challenges to integration and networking of radars. Though the deployment pattern based on threat perception has ensured adequate radar coverage on the Western borders and part of Northeast and East, yet a very large part of Indian airspace is bereft of adequate radar cover particularly so in the central India, southern peninsula, coast lines in the west as well as east. This deficiency caused the incidents like Purulia arms drop and other incidents of air space violations. The issues that have been highlighted by CAG report also indicate that, the civil and military radars have been operating in isolation. A coordinated induction plan and integration of civil and military radars could have provided much better overall radar coverage and utilization of resources.

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As brought out by the CAG report, IAF has had a very steady and reliable performance from its HPRs and LLTRs, though there have been delays in up-gradation, integration and automation of radars however there has been 'no compromise' on the task of air defence. The paucity of radars and concentration of threat in a given area has led to over-utilisation of some radars as

compared to radars deployed in other areas. The LLTRs were utilised extensively for the purpose of training, exercises and surveillance. The over-utilisation of LLTRs could also be attributed to piece-meal induction with inadequate numbers. Unlike Pakistan, which inducted 66 mobile pulse doppler radars (MPDRs) of variable capabilities at one go and networked them through Siemens Integrated Low Level Air Defense Control System (SILLACS) systems to form a formidable low-level radar network and deployed them in a comparatively small area of perceived threat. India inducted the radars in installments and perpetually remained short of desired inventory. The MPRs have been the cause of concern right from the time of their induction. The MPRs that were inducted in beginning of 1980s have had serious maintenance problems, in terms of validation of technology, training of personnel, and availability of spare parts and reliability of performance. Consequently these radars performed below par right from the time of their induction and operated for a very short span of time before they were relegated to second tier of defence.

Though, the policy of IAF to indigenise the automation and integration of air defence radars is conceptually sound, yet numerous attempts to achieve automation in the form of Automatic Data Handling System (ADHS), Automated

Control and Reporting System (ACRC), Futuristic Automatic Data Handling System (FADHS) achieved limited success but provided enormous experience, exposure and training to IAF personnel in development and operationalisation of such systems. The lack of technological expertise and underdeveloped defence industry of India in Eighties and Nineties further accentuated the problem. The boom in communication and information technology as a consequence of economic growth, has provided a new impetus to Indian Defence Industry, which is now gearing up to support India's armed forces in developing such infrastructure.

Recent Developments

CAG report has overlooked many important developments that have taken place in the last decade and half, as far as radars are concerned. IAF has identified the deficiencies pointed out by CAG report and the process to provide gap free radar cover over the entire Indian air space and beyond has been put into place. IAF is in the process of improving its surveillance and weapon guidance capability by acquiring indigenous systems like Indian Doppler Radar (INDRA), Low-level Light Weight Radar System (LLWRS) Central Acquisition Radar (CAR) and induction of foreign systems like Aerostats and Green Pine radars from Israel. Information technology has enabled integration and networking of surveillance systems for more efficient command and control and battlefield management. The indigenous Integrated Air Command and Control System (IACCS), on the threshold of being operationalised in year 2009, would integrate the ADGES system with civil radars, airborne platforms like Airborne Early Warning and Control System (AWACS), combat aircraft, UAVs and Aerostat radars. The enhanced capacity of data handling system (DHS) to integrate different type of radars, simultaneously process and display digital track data on thousands of tracks with improved quality of Operator Work Stations (OWS) would have remarkable impact on situational awareness and quality of controlling.³ However the decisions to acquire Aerostat radars and AWACS are the most noteworthy developments of the last decade.

AWACS & Aerostat Radars

Three Phalcon AWACS are planned to be inducted in IAF by end of year 2009 and the contract for three more AWACS to be inducted by 2012 has already been negotiated. Two aerostat radars have already been operationalised and orders for four more aerostats have been placed and media reports indicate that IAF has projected the requirement of total 13 aerostat radars.⁴ Post Mumbai terror attacks Indian Navy has also hastened up the case for induction of two aerostat radars for coastal

surveillance and air defence⁵. Induction of these systems would provide major boost to air defence radar cover.

AWACS: A Strategic Platform - Role of Radar had the effect of forcing air operations down to tree top levels to stay below the radar horizon and thus evade detection. The next logical step was to mount the radar on an airborne platform thereby nullifying the benefits of a low-level approach. The strategic importance of AWACS emanates from its ability to extend multiple functions like command and control and battle space management from one airborne platform. AWACS would play a crucial role in enhancing the survivability and credibility of our nuclear delivery capability in a retaliatory strike. AWACS is also an instrument of power projection or the "AWACS Diplomacy" a term used by many to describe the use of AWACS for political coercion.⁶

At operational level enhanced early warning by gap-free radar cover at low and medium altitudes increases the reaction time. The low-level detection range of 400 kilometer is the singular characteristic of AWACS which addresses the major problems of air defence system. The enhanced radar pickup ranges would give impetus to area defence concept and the capability to carry own air defence in enemy's territory. This would be of significant importance against the adversary with the lack of strategic territorial depth.

Aerostats: Seamless Low-Level Radar Cover - Acquisition of Aerostat radars would augment the ground based radars. Aerostat radars have greater capabilities in terms of

detection ranges, V/UHF RT range, SIGINT etc. Mounted on a tethered balloon the radars could be hoisted to a height 10 to 15000 feet depending upon the payload. The radar overcomes the limitation of line of sight and provides gap free low and medium altitude coverage at ranges greater than 300 km. However, as compared to AWACS, aerostat radars have limitations in terms of range, operator work stations and communication facilities. Therefore the importance of aerostat radars should be seen as complementary to AWACS, which would form the backbone of Indian air defence in decades to come.

Requirement of AEW Systems in India

From the war in Bekka Valley in 1982 AEW systems have proved to be the decisive factor in winning the modern air warfare. India, now on the threshold of receiving first of its AWACS in the first quarter of 2009 and in the process of developing indigenous AEW&C system on Embraer's ERJ 145 has to address the issue of deciding the combination of the number of AWACS and AEW&C systems needed to meet the requirement of national air defence.

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The major factors that need to be taken into consideration in deciding the number of AWACS are:

Geographical Expanse- The first action should be to identifying the areas that need to be kept under regular radar surveillance, over land and over sea including island territories, littorals and EEZ. Calculation of the total length and breadth of the area to be covered by AWACS and drawing a ratio between the total area and coverage of a single AWACS would help deriving an optimal figure.

Politico-Military Contingencies- In addition to military contingencies, AWACS would be required to operate in politico-military contingencies like international (UN-Mandated) missions, assistance to friendly foreign country (Op Pawan and Op Cactus), force projection and assistance in disaster management, in situations similar to Gujarat earthquake and Tsunami in 2004.

Sectoral Approach to Threat Prioritisation

Prioritisation of threat on the basis of sectoral approach which covers the total geographical area (land frontier, sea/EEZ areas) within and outside Indian territorial region is a dynamic process that would remain a subject of periodical review. In the west, J & K and Punjab with peripheral Rajasthan would remain on high priority. The entire area would need overlapping radar cover from low to high altitude. The North Eastern region, especially Arunachal Pradesh, Assam and region adjacent to Tibet Autonomous Region (TAR) and Laddakh is Priority-II area. In long term i.e. 2020 and beyond, this area may become Priority-I. Growth in trade and commerce through the Sea Lines of Communication (SLOC) and growing energy crisis makes Indian Ocean a third front which needs continuous surveillance and enhanced radar coverage.

It would not be easy to quantify the number of AEW/AWACS required to provide coverage in an area without defined dimensions. A very conservative estimate would indicate that, India would require at least eight to ten serviceable and operationally available AWACS/AEW&C

systems to meet its security requirements. However, to fly eight aircraft would imply six or more on ground, taking the total requirement between 14 to 16 AEW systems.

Conclusion

The CAG report has highlighted very glaring deficiencies in the functioning of ADGES radar units, which include deficiencies in radars, lack of networking, poor serviceability, delayed upgradation, servicing, overhauls and outdated communication system. It was perhaps beyond the scope of the audit objectives to highlight the developments in last decade and projects underway to address the problems of ADGES functioning. The most important being the acquisition of aerostat radars and AWACS. The integration of civil-military radars, networking of ADGES system with airborne platforms and acquisition/upgrade of ground radars and installation of digital communication system is underway. AWACS would form the backbone of air operations in future warfare. The success of surface operations on ground and at sea would require extensive air defence cover from AWACS. In addition to strengthening the ADGES radar units, the long term air defence plans must cater to adequate number of AEW systems to meet the overall requirement of national security.

Notes:

¹ Report of Comptroller and Auditor General of India, *Performance Audit Air Force and Navy No. PA 5 of 2008*, presented in Lok Sabha on 24 Oct 2008. pp. 1-4

² Ibid

³ Group Captain Atul Kr Singh, *Transformation of Air Defence in Asia* (New Delhi, Knowledge World, 2008) pp. 20-21

⁴ Air Force to acquire EL/M-2083 Aerostat Radars from Israel, at www.india-defence.com/reports/3189, dated 13 May 2007.

⁵ Manu Pubby, "Balloon-mounted Radars from Israel", *Indian Express*, 19 January 2009, New Delhi.

⁶ Air Commodore Jasjit Singh, "AWACS: *The New Destabiliser*" (Lancer Press New Delhi. 1987) p. 33



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