

## PREFACE

This Report for the year ended March 2009 has been prepared for submission to the President under Article 151 of the Constitution. The report contains results of performance audit on the following two subjects pertaining to Air Force, Navy and Defence Research and Development Organisation.

### **Air Force**

#### **I. Operation and Maintenance of Mi series Helicopters**

### **Navy**

#### **II. Functioning of the Aviation Arm of the Indian Navy**

This Audit Report includes matters arising out of the performance audits of (a) Operation and Maintenance of Mi series Helicopters in the Indian Air Force and (b) Functioning of the Aviation Arm of the Indian Navy.

### I. Operation and Maintenance of Mi series Helicopters in IAF

Helicopters are a key component of defence capability as they make a unique contribution to a wide range of operations. India is a vast country with long borders and possesses some of the world's most inhospitable terrain, be it high mountains in the north, dense jungles in the north-east, deserts of Rajasthan or the Rann of Kutch. Many of these areas are not accessible by road or any other means. It has been the helicopter fleet of the IAF that has provided communication, logistics to these remote areas and played its part in combat role too.

Almost 60 *per cent* of this fleet comprises of Mi series helicopters. A performance audit of Mi series helicopter fleet's operation and maintenance was conducted. The review revealed that, operationally, there are gaps in the existing force levels since the Indian Air Force (IAF) is operating with only 74 *per cent* of the helicopters against its current operational requirements. Besides, a large proportion of the helicopter fleet will reach the end of their operational life in the near future. Further, despite availability of funds and a specific acquisition programme, IAF was unable to induct even a single helicopter between 2002 and 2007. Although IAF's own needs were not being met, 25 helicopters were sent abroad for participation in UN missions and seven helicopters were modified for VIP role without approval of the Government. Efficiency of fleet operations, as indicated by achievement of flying tasks, was an area which requires improvement.

On the repair and maintenance side, audit noted that there were delays in creating repair and maintenance facilities for newly acquired helicopters. At the facilities created, i.e. the designated Base Repair Depot, a large number of allotted overhauls tasks could not be completed due to shortage of spares on account of delayed and inadequate provisioning. Consequently, 210 engines had to be sent abroad for overhaul at a cost of Rs 68.49 crore. Quality of work done by the depot was a matter of concern as several engines overhauled by it had to be prematurely withdrawn. The sub-optimal performance by the maintenance agency, ageing fleet, non-availability of spares also resulted in reduced serviceability and lowered flying efforts at unit level. In fact, the serviceability levels fluctuated between 45 to 75 *per cent* while shortfalls in achievement of flying tasks ranged from 47 to 67 *per cent* for the period 2003 to 2009 in respect of medium lift helicopters. The BRD also utilised 42 *per cent* excess man hours in overhaul of aero engines in comparison to prescribed standard man hours.

All in all, the Mi fleet is performing its tasks in a commendable manner despite the ageing of fleet and numerous challenges in maintaining serviceability. In light of the deficiencies noted, certain recommendations have been made by audit in the report to complement Ministry of Defence and IAF's efforts in ensuring that its helicopter fleet retains its operational edge.

## II. Functioning of the Aviation Arm of the Indian Navy

The Aviation Arm of the Indian Navy was established in May 1953 with the commissioning of INS Garuda, a Naval Air Station at Kochi. History of naval aviation, spanning over half a century, has been an illustrious one and today, the Indian Navy is one of the few navies in the world which can boast of an aircraft carrier alongwith a multi-faceted fleet in terms of platforms and technologies. The Naval Aviation Arm contributes to combat capability through carrier-borne strikes against maritime targets in areas beyond the reach of conventional land-based Air Force aircraft, air defence of the fleet, reconnaissance and anti-submarine warfare.

The Aviation Arm holds the key to achieving the "blue water" aspirations of the Indian Navy. As such, a Performance Audit was conducted into the functioning of the Aviation Arm for the period 2003-08, later updated to December 2009. The review indicated weaknesses in the planning, asset management, operation, repair and maintenance activities. There have been significant delays/shortcomings in the preparation and finalisation of the long term acquisition plans. Ad hoc planning resulted in the spill-over of a number of schemes originally envisaged in the X Plan (2002-07) to the XI Plan. The fleet being operated by the Indian Navy, at present, is critically short in terms of numbers and even after potential inductions during the period 2007-12, the Aviation Arm is likely to achieve only 26, 33 and 63 *per cent* of the force levels required in respect of long range reconnaissance, combat and anti-submarine warfare aircraft respectively. Indian Navy's air combat capabilities have been drastically reduced owing to availability of only one carrier, which is almost half a century old and is to be decommissioned in 2012. The Wing is also characterised by ageing and obsolescent assets. Attack capabilities of the already depleted aircraft fleet on-board the carrier have been restricted in the absence of a fully functional radar and limited firing of practice missiles.

Modernisation and upgradation activities have not been as successful as envisaged. Induction of sophisticated equipment to augment capabilities in electronic warfare and provision of Beyond-Visual-Range armament have taken inordinately long periods, first, to be proven and then to be inducted.

Operationally, availability of aircraft has been poor on account of inefficient repair and maintenance as also the need to conserve assets. Serviceability levels were low in comparison to the approved Unit Establishment for combat, ASW and MRSR aircraft and these levels were achieved only by decreasing the flying tasks to ensure that the

assets are not stretched rather than increasing efficiency. At any given point in time a large proportion of the aircraft assets were under repair, maintenance or storage. Further, the age of assets itself has implied that repair and maintenance activities need to be functioning at a very high level. During 2003 – 08, about 80 *per cent* inspections (repair and maintenance) were delayed at the NAY/Base Support Facility.

Thus, the Naval Aviation Arm is operating under numerous constraints and the existing fleet is not geared to effectively meet the increasing maritime needs of the Navy. This report has also incorporated certain key recommendations which the Ministry and Navy may consider for implementation.

# CHAPTER I: Operation and Maintenance of Mi series Helicopters in IAF





# HIGHLIGHTS

- 1. There was a deficit of 26 per cent in the total availability of helicopters compared to the numbers required for achieving current operational projections. Category-wise short-falls were most apparent in the case of attack helicopters where the holdings were 46 per cent below the actual requirement.*

*(Paragraph 1.2.1.1)*

- 2. Despite availability of funds and a specific acquisition programme for the 10<sup>th</sup> Plan period, IAF was unable to induct even a single helicopter which has adversely affected maintenance of force levels and operational preparedness.*

*(Paragraph 1.2.1.1)*

- 3. The existing fleet is ageing and nearly 78 per cent of the helicopters have already completed their prescribed life and Total Technical Life extension has been carried out on them elongating their life.*

*(Paragraph 1.2.1.2)*



4. *Serviceability levels were low and fell consistently short of the prescribed 75 per cent. Combined with high Aircraft-on-Ground levels, this was indicative of inefficiency in operations, low utilization of Mi series fleet and poor repair and maintenance activities.*

*(Paragraph 1.2.1.4)*

5. *Seven helicopters were modified for 'VIP' role without approval of the Government. Such modification also lacked justification as a separate specialized communication squadron with adequate helicopter for use by VIPs already existed. Modification of helicopters for VIP/OEP use affected availability of helicopters for operation purpose.*

*(Paragraph 1.2.1.6)*

6. *Manpower deployment was not rational with respect to norms fixed per helicopter as there was an overall shortage of pilots ranging from 12 to 27 per cent during 2003-07 while, at the same time, there was an excess of aircrew.*

*(Paragraph 1.2.1.7)*



7. *Achievement with regard to engine overhauls and repair in respect of Mi-8 and Mi-17 helicopters was considerably lower than the tasks fixed. This was due to shortage of spares which resulted from both delayed and inadequate provisioning for these spares. As a consequence, 210 engines were sent abroad for overhaul at a cost of Rs 68.49 crore.*

*(Paragraph 1.2.2.1)*

8. *Satisfaction of AOG demands for spares was delayed in most cases, indicating deficiencies in provisioning and procurement.*

*(Paragraph 1.2.2.3)*

9. *BRDs were not efficiently managed. Not only was the manpower provided considerably below sanctioned strength but there was excess utilisation of man hours and man days in performing tasks. This also added to the cost of overhauls and repairs carried out at the depot.*

*(Paragraph 1.2.2.4, 1.2.2.5 and 1.2.2.6)*





# KEY RECOMMENDATIONS

- 1. A large proportion of the helicopter fleet will reach the end of their operational lives in the near future. Ministry should address IAF's current shortfall in the Helicopter fleet by ensuring that there are no further slippages in the acquisition programmes and expediting on-going procurement processes.*
- 2. Air HQ needs to urgently address the main reasons for shortfalls in serviceability and increased AOG levels and ensure timely repair and maintenance services and availability of essential spares.*
- 3. Air HQ should take effective steps to measure output and performance of repair depots. This would imply setting standard norms for AOG levels and permissible cannibalisation and Category 'D' status.*



4. *Project management and monitoring should be accorded priority so that repair and overhaul facilities needed to support aircraft serviceability are created in-time and are designed to deliver full functionality.*
5. *Shortage of spares should be addressed through careful and prompt provisioning and procurement since shortages create bottlenecks in utilising the capacity of repair and maintenance facilities.*
6. *The quality of services and the level of efficiency in repair and maintenance facilities should be stepped up to eliminate delays, instances of premature withdrawals and use of man hours/ mandays beyond norms.*

## Part I

### Introduction

#### 1.1 Mi series Helicopter Fleet

The Indian Air Force (IAF) operates military helicopters in support of a wide range of operations and since their induction in the 1950s, the helicopter



*Mi-17 Helicopter dropping supplies in Siachin.*

stream of the IAF has become a key component of India's defence capability. In fact, today, helicopters are deployed for a variety of tasks spanning from life-saving missions in peace time to attack operations in a war. As a result, helicopter flying for military roles and tasks has increased considerably over the last two decades. The IAF helicopter fleet is a balanced mix of various types of helicopters. The current helicopter fleet consists of Cheetah, Chetak, Advanced Light Helicopter (ALH) and Mi series helicopters.

Mi series helicopters are Russian origin aircrafts with a number of variants depending upon technical specifications and role performed by the helicopter. They constitute 60 *per cent* of the IAF inventory of helicopters and are distributed across seven different types which are used for medium and heavy airlift and attack operations. These helicopters were inducted into the IAF between 1971 and 2003 and are operated from different locations. The primary role of Mi series helicopters in the IAF, type-wise, is given overleaf.

## **1 Primary role of different Mi helicopters**

<b>Type of Helicopter</b>	<b>Pay load capacity</b>	<b>Primary Role</b>
<b>Medium Lift helicopters (Mi-8, Mi-17 and Mi-17IV)</b>	These helicopters can carry four tons of pay load.	Transportation of troops and supplies, Communication support, Logistic support including air maintenance, Casualty evacuation, Aid to civil power and Special heliborne operations.
<b>Heavy Lift helicopter(Mi-26)</b>	This helicopter has a pay load capacity of 20 tons.	Heavy lift logistic support and air maintenance.
<b>Attack helicopter (Mi-25/25U and Mi-35)</b>		Anti tank, Offensive air operation, Escort for helicopter operation and assault operation

### **1.1.1 Total service life**

A helicopter consists of aero-engines and an airframe, which require maintenance and overhaul at prescribed periods. Each helicopter has a fixed Total Technical Life (TTL) and Time Between Overhaul (TBO). The TTL of airframe and its aero-engines, both in terms of calendar life of years and flying hours, varies with their type and role. The Original Equipment Manufacturer (OEM) of the helicopters specifies the TBO also in terms of both operating hours and year of operations. The initial calendar life of 15 years for medium lift helicopters, 20 years for heavy lift and 20 years for attack helicopters have been extended to 35 years, 25 years and 30 years respectively.

### **1.1.2 Maintenance philosophy**

The operating units are responsible for carrying out first and second line servicing of all types of Mi-series helicopters. Third and fourth line repair and maintenance of airframe and aero-engines of Mi-8 and Mi-17 helicopters are undertaken at a Base Repair Depot (BRD). Repair/overhaul facilities for heavy lift and attack helicopters airframes and their aero engines do not exist in

India. Setting up facilities for these fleets would be economically unviable because of the small fleet size and hence, the helicopters are being sent abroad for repair/overhaul.

### 1.1.3 Scope of Audit

The Performance Audit, conducted between May and August 2008, covered the five years period from April 2003 to March 2008 and was later updated till March 2009. The audit exercise focused on aspects such as fleet serviceability and Aircraft on Ground (AOG)<sup>1</sup>, actual performance of helicopter units, manning position of the squadron, projected requirement of helicopters and adequacy of facilities for repair and maintenance and their use.

Audit acknowledges with gratitude the support provided by the Ministry of Defence, Air Headquarters and all subordinate offices during the course of the Performance Audit and subsequent interactions for the collection of information for updation of the Report.

### 1.1.4 Audit Objectives

The operation of the helicopter fleet and utilization of repair, overhaul and maintenance facilities were examined to seek an assurance that:

- *Helicopters held by the fleet in terms of numbers and quality were adequate to maintain the envisaged force level;*
- *The operational helicopter units functioned efficiently and achieved their assigned tasks;*
- *Serviceability of helicopters was maintained as per laid down standards to minimise helicopters on ground;*
- *Facilities for repair and overhaul of helicopters were timely set up and were adequate to meet the needs of the fleet; and*
- *Servicing and maintenance of helicopters were carried out efficiently, without delay, in a cost effective manner.*

### 1.1.5 Audit Criteria

Important audit criteria used to evaluate actual performance with regard to operation and maintenance of Mi series helicopters are given below:

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<sup>1</sup> Aircraft on Ground (AOG) refers to those aircraft which are not airworthy because of technical snags and demands have been placed on the OEM/repair agencies/equipment depots for spares/repair-work.

- *Authorised unit establishment of helicopters and projected requirement of helicopters.*
- *Sanctioned establishment of operational staff.*
- *Authorised flying task and flying duties assigned.*
- *Desired serviceability level of helicopters.*
- *Adequacy and efficiency of repair and maintenance facilities.*
- *Annual allotment of tasks to repair agencies.*
- *Provision of manuals and directives with regards to 1<sup>st</sup> and 2<sup>nd</sup> line servicing.*
- *Timely extension of TTL and Achievement of TBO life.*
- *Procedure prescribed for provisioning and procurement of spares.*
- *Targets for indigenisation.*

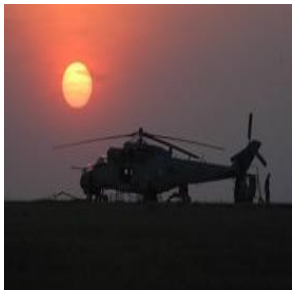
### 1.1.6 Audit Methodology

An 'Entry Conference' was held at Air HQ on 14 May 2008 wherein the scope of audit, objectives of audit and the broad compass of fieldwork planned were discussed with the representatives of the auditee. Subsequent audit scrutiny consisted of examination of documents and records at Air Headquarters(HQ), concerned helicopter units and at the BRD, collection of information through issue of audit memos and questionnaires, interaction with key personnel at Air HQ, Operation and Maintenance units and examination of material collected in past local audits. Field work was based on test check undertaken at Air HQ, ten Helicopter units and one BRD during May-August 2008. However, data was collected and analysed from all helicopter units.

An 'Exit Conference' was held on 28<sup>th</sup> November 2008 wherein the main findings of audit and related recommendations were discussed.



# MI SERIES HELICOPTERS OF INDIAN AIR FORCE



## Part II

### Audit Findings

#### 1.2 Audit Findings

The audit findings are classified under two broad categories – (a) Availability, Operation and Utilisation of Helicopters, and (b) Repair and Maintenance.

##### 1.2.1 Availability, Operation and Utilisation of Helicopters

This section focuses on the discrepancy between the IAF's planned assumptions and capacities actually available. Audit observed that there was a deficit in the total availability of helicopters as well as short-falls in each category compared to the numbers required to fulfill their military tasks. This has been exacerbated, in the recent past, by the substantial aid being given to civil authorities for counter-insurgency and natural disasters, United Nations (UN) missions, requests from friendly nations and unauthorised modification of helicopters for VVIP use. Planned acquisitions and inductions have not materialised. Although audit noticed some improvement in the serviceability of the fleet after operationalisation of a computerised inventory management system<sup>1</sup>, to be fully combat effective, the fleet needs to strengthen itself, not just in terms of numbers but also in quality as much of the fleet has outlived its prescribed life.

##### 1.2.1.1 Force levels and planned inductions

The IAF procured 'M' number of Mi series helicopters of various types between 1971 and 2003. At present, the different variants constituting the existing fleet are as follows: Medium Lift Helicopters (MLH) – 86 *per cent*, Heavy Lift Helicopters (HLH) – 2 *per cent* and Attack Helicopters – 12 *per cent* (as on September 2008). However, as a result of phasing-out, accidents and unserviceability, the total Mi-helicopter fleet strength has come down to 77<sup>2</sup> *per cent* of the total helicopters procured (as on September 2008).

Though there is no deficiency in the over-all holding of the helicopter fleet against sanctioned strength during the audit period (2003-08), category-wise there are significant gaps especially in the holding of attack helicopters, where

<sup>1</sup> IMMOLS – Integrated Material Management On-Line System

<sup>2</sup> Out of these, 12 *per cent* helicopters were deputed to UN mission during the period under review.



the deficiency is 20 *per cent*. Further, the number of helicopters under overhaul / repair is higher than the reserve prescribed, i.e. 20 *per cent*, as a result of which operational availability is curtailed. In fact, in the case of Heavy Lift helicopters, IAF is actually running without a designated reserve.

Moreover, a different picture emerges when we allow for enhanced requirements and planned inductions to meet increased demand on account of a wide-range of tasks. For this purpose, IAF's Long Term Induction Plan during the X<sup>th</sup> Plan (i.e. 2002-07) had projected that three units of Medium Lift helicopters and one squadron of Attack helicopters would be acquired and inducted during the period 2002 to 2007. However, these additions did not materialise and IAF is presently operating with only 74 *per cent* of the helicopters against the numbers actually required as per its current operational projection. Besides such deficiencies, phase-outs without replacement have adversely impacted the number and strength of Mi helicopter units.

Air HQ stated in August 2008 that the procurement schemes of helicopters were being progressed as per laid down procedure and these helicopters were likely to be inducted in the near future. Air HQ also confirmed in August 2008 that due to non-induction of helicopters as envisaged in the X<sup>th</sup> Plan, IAF was facing a shortage in the number of helicopters and this had affected maintaining force level/operational preparedness of IAF.

### 1.2.1.2 Ageing fleet

The quality of the helicopter fleet is also affected by their current age as also the operational life left. Excepting the Mi-17 IV helicopters procured in 2000-03, the remaining fleet was purchased at least 20 years ago. Almost 78 *per cent* of the helicopters have already completed their prescribed life and Total Technical Life (TTL) extension has been carried out on them elongating their life. Even after this, nearly one-fourth of the helicopters have completed 75 *per cent* of their extended operational life by September 2009 as can be seen from the table (next page).

Mi-8 helicopters constitute a major portion of the Medium Lift fleet. The initial life of 15 years of these aircraft expired during the 1990s and, by 2012 -13, about 20 *per cent* of the existing fleet would have completed their

extended life. Although new inductions<sup>3</sup> may materialise by this date, they will not be able to address total requirements<sup>4</sup>.

## **2** Age of fleet

<b>TYPE OF HELICOPTER</b>	<b>NUMBER OF HELICOPTERS (in percentage)</b>	<b>PERIOD OF INDUCTION</b>	<b>REMARKS</b>
<b>Medium Lift Helicopter</b>			
<b>Mi-8</b>	<b>83</b>	<b>1971-80</b>	<b>TTL is 15 years. However, the life is extended up to 35 years.</b>
	<b>17</b>	<b>1981-90</b>	
<b>Mi-17</b>	<b>100</b>	<b>1984-89</b>	
<b>Mi-17IV</b>	<b>100</b>	<b>2000-03</b>	
<b>Heavy Lift Helicopter</b>	<b>100</b>	<b>1985-90</b>	<b>TTL is 20 years. However, the life is extended up to 25/30 years.</b>
<b>Attack Helicopter</b>	<b>100</b>	<b>1981-90</b>	

Additionally, in the case of Attack and Heavy Lift helicopters, all helicopters held in the inventory were planned to be phased out by 2009-10. Although the Defence Acquisition Council has accepted the necessity and given its approval for acquisition to meet the short-fall requirement of 46 *per cent* in Attack helicopters in May 2007 and Requests for Proposal (RFPs) were issued in May 2008, the case for re-issue of RFP was initiated in February 2009 as the proposals received did not meet the Air Staff Qualitative Requirements. These

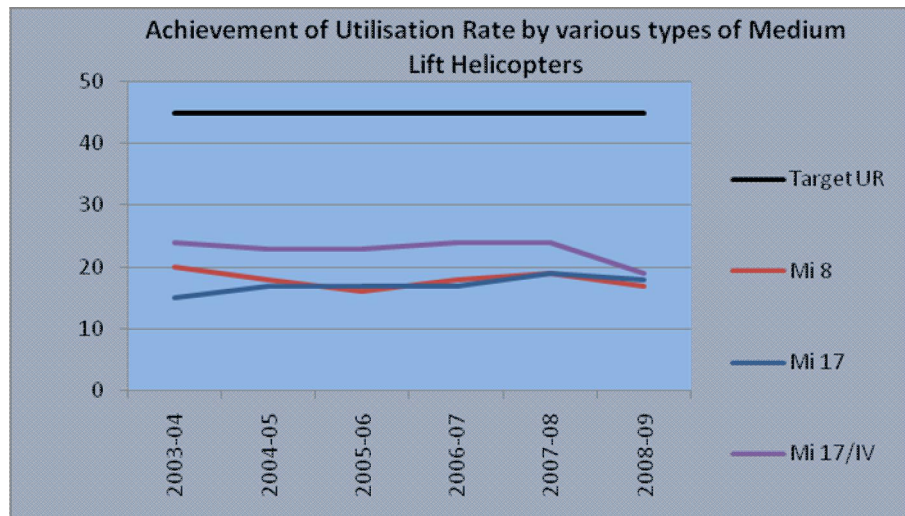
<sup>3</sup> A contract for this type of helicopter has been concluded in December 2008 with delivery schedule to commence in 2011, to be completed by 2013.

<sup>4</sup> New helicopters are required for replacing those phased-out as well as for increasing force levels.

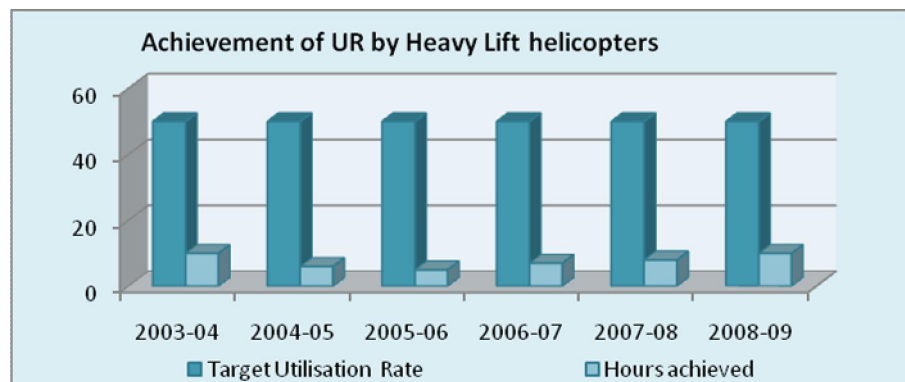
additional helicopters are likely to be inducted during the years 2011-14 if the contract is concluded by end of the year 2010. By this time, all available helicopters would have been phased out and the short fall would continue.

**1.2.1.3 Operation norms not met**

The Government has prescribed a Utilization Rate (UR) of 45 and 50 hours per month in respect of Medium Lift and Heavy Lift helicopters respectively. However, the actual utilisation rate of Medium Lift helicopters and Heavy Lift helicopters varied between 33 to 53 *per cent* and 10 to 20 *per cent* respectively of the prescribed norm fixed by the Government. The year-wise position with regard to flying efforts achieved by the units as compared to the approved UR for the last six years i.e. 2003-09 is given in the graphs.



Out of the total hours flown by the heavy lift unit during 2003-08, only 58 *per cent* of the hours were utilized for the assigned role while the remaining hours were used to train pilots. In addition, one of the helicopters was continuously on ground for over 33 months from July 2004 to April 2007 and another for a period of 20 months from March 2004 to October 2005 during 2003-08.



Under utilisation is also evident from the maintenance schedule as the four Heavy Lift helicopters had completed only 66 *per cent* of their prescribed TBO of 900 flying hours when the airframes had to be sent abroad for overhaul at a cost of USD 15.64 million (Rs 70 crore) since they had completed a calendar life of eight years from the last overhaul.



*The Mi-26 (NATO reporting name Halo) is twin engine turboshaft, military heavy lift helicopter.*

Given the low achievement, from 2005-06 onwards, Air HQ decreased the flying task on account of lower availability of serviceable helicopters and pilots. The flying tasks as of March 2009 are indicated below:

**3 Flying Tasks of different helicopters**

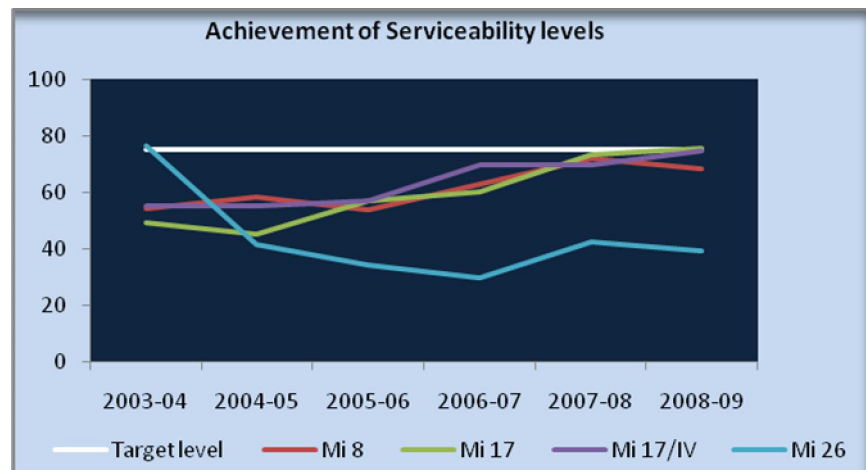
	(In hours)			
Helicopter	Mi-8	Mi-17	Mi-17IV	Mi-26
Approved flying tasks	45	45	45	50
Lowered flying tasks	18	18	25	08

This reduction in authorised flying task was done without the approval of the Government. Reduction in flying efforts also adversely affected the training of pilots at unit level.

**1.2.1.4 Low serviceability and high rate of AOG**

A helicopter is said to be ‘serviceable’ if it is technically available, not subject to 1<sup>st</sup> or 2<sup>nd</sup> line maintenance and has been equipped with necessary role equipment. The Ministry, at the time of procurement, assumed that 75 *per cent* of the fleet would be serviceable and ready to fly at any given point of time. Audit found that the actual serviceability rates for all types of helicopters during the entire period were below the stipulated serviceability level.

The year wise serviceability position for the last six years (2003-09) in respect of Medium and Heavy Lift fleet is given in the graph. Rates for the Medium Lift helicopters ranged between 45.08 to 57.06 *per cent* during 2003-06 and 60.38 to 75.45 *per cent* during 2006-09. In respect of Heavy Lift helicopters, serviceability state showed an initial decreasing trend from 76.59 *per cent* in 2003-04 to 30.03 *per cent* in 2006-07 which improved to 39.51 *per cent* in 2007-09.



Audit noted that the serviceability level of Mi 8, Mi 17 and Mi 17/IV helicopters has improved from 2006-07 onwards after high-level negotiations in which 59 contracts for procurement of 902 lines of spares were finalised and deliveries against these contracts had begun. Operationalisation of “Integrated Material Management On-Line System” (IMMOLS) has also improved maintenance efficiency with reference to provisioning and procurement.

Even though a helicopter may be serviceable, it needs to be ‘**ready-to-fly**’. Audit found that Aircraft on Ground (AOG) levels, i.e the helicopter was unable to fly for technical reasons, were fairly high as shown below:

#### 4 AOG levels for different helicopters

(in percentage)

Helicopter	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Mi-8	29.24	29.70	33.06	26.34	16.47	17.83
Mi-17	33.00	43.94	33.12	25.80	12.15	8.46
Mi-17IV	25.57	36.53	33.12	19.77	13.73	11.03
Mi-26	26.51	40.25	60.55	61.19	36.55	27.49

It was noticed that each unit generally kept one helicopter as AOG for more than six months in order to cannibalize<sup>5</sup> its parts. This indicated that the required number of helicopters were not in ready-to-fly condition affecting their availability to the units for performing their assigned role.

The utilisation rate for Attack helicopters was reduced by 57 *per cent* against the norm prescribed by the Government from 2005-06 onwards. While this statistically ensured satisfactory serviceability levels during the last four years, this was only a temporary measure which did not reflect true efficiency.

#### 1.2.1.5 Diversion of helicopters despite serious shortages

Despite the fact that its own needs were not being met, IAF sent 25 helicopters abroad for participation in UN Missions, allocated another seven for VVIP use



*The Mi-25 is a twin engine turboshaft, assault and anti armour helicopter.*

and diverted six Mi-8 helicopters to the Cabinet Secretariat (Aviation Research Centre). As a result, over all availability was only 61 *per cent* during the audit. Category wise, the situation with regard to Attack helicopters was most vulnerable.

#### 1.2.1.6 Unauthorised modification of Medium Lift helicopters

Although IAF did not possess adequate number of Medium Lift helicopters to meet its operational commitments, Air HQ modified and diverted seven such helicopters from their assigned role during 2003-07 for VIP use. Besides the fact that the modification was done without Government approval, it also

<sup>5</sup> Cannibalisation refers to the removal of assemblies / components from one aircraft for the purpose of making another unserviceable / incomplete aircraft/its system serviceable / complete.



lacked justification since a dedicated Communication Squadron already exists for the use of VIPs/ Other Entitled Persons (OEPs). In fact, one of the units where the helicopters were modified was situated adjacent to the Communication Squadron. Further, audit noted that these modified helicopters were also utilized by persons other than VIPs/OEPs, for example, family members of the VIPs and political leaders, on many occasions.

The issue of unauthorised diversion of transport aircraft for VIP use was also reported in Paragraph No. 1.6.1.5 of Performance Audit Report No.5 of 2007 (Defence Service – Air Force and Navy). In their Action Taken Note, Ministry stated that all the modified aircraft have been de-modified and given assurance that no aircraft would be modified for VIP use in future. In the same vein, modification and diversion of helicopters also needs to be reviewed by the Ministry as it impacts the operational preparedness of the Services.

#### **1.2.1.7 Deployment of operational personnel**

The helicopter fleet would be ineffective without the requisite number of pilots. As per norms, two pilots are required for one helicopter. However, audit noticed that 40 *per cent* of the helicopter units had deficiencies in the number of pilots, i.e. where number of pilots was lower than the number of helicopters available. In these units, the shortages ranged from 5 *per cent* to 37 *per cent*.

Overall, as regards operational staff, there was shortage of pilots against sanctioned strength ranging between 12 and 27 *per cent* and excess of aircrew ranging from 10 to 26 *per cent* during the 2003-04 to 2007-08. In respect of technical staff, against the sanctioned strength the availability of manpower has improved considerably during the last five years (2003 – 2008) showing a surplus in the officers' cadre with a small deficiency of 6 *per cent* in the airmen cadre. However, deficiency in technical manpower would compromise the first and second line servicing activity which would ultimately affect the operational preparedness of the IAF.

Unit authorities informed Audit that deficiency in manpower was met by putting in additional effort by unit personnel in terms of extended hours/working on holidays etc. However, extended working hours may lead to fatigue and tiredness among the personnel which ultimately affect the operation and maintenance of helicopter fleet and the morale of troops.

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### Recommendations

- *A large segment of the helicopter fleet will reach the end of their operational lives in the near future. Ministry should address IAF's current shortfall of Mi Helicopter's fleet by ensuring that there are no further slippages in the acquisition programmes and expediting on-going procurement processes.*
  - *Air HQ needs to address urgently the main reasons for shortfalls in serviceability and increased AOG levels, i.e. timely repair and maintenance services and availability of essential spares.*
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### 1.2.2 Repair and Maintenance

Ensuring that an aircraft is serviceable and in a ready-to-fly state, is the result of the combined efforts of maintenance personnel at front-line units, repair depots and logistics support responsible for procuring and storing spares and other parts. Audit examination disclosed that there were serious delays in setting up of BRD, acute shortage of spares and technical manpower resulting in delays in repair and overhaul of engines, offloading of engines abroad for overhaul and increased AOG as discussed in the succeeding paragraphs:

#### 1.2.2.1 Utilisation of installed capacity for overhaul of engines

IAF has established facilities for the repair/overhaul of aero engines of Mi-8 and Mi-17 series helicopters at No. 3 Base Repair Depot (BRD). Since the Time Between Overhaul (TBO) is fixed as per the maintenance philosophy, Air HQ authorities can work out the number of engines due for overhaul (TBO) well in advance and allot the overhaul task to the BRD. This facilitates in the planning and provision of spares, material etc. required for the repair / overhaul as the concerned authorities can take into account the lead time required for procurement. Within two months of receipt of task of repair/overhaul from Air HQ, the BRD is expected to carry out periodical reviews and submits a list of spares required.



Analysis of the performance of the BRD revealed that although, in general, tasks allotted were as per the installed capacity<sup>6</sup>, the BRD could only complete 39 per cent of the tasks allotted. This implied that the BRD could overhaul

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<sup>6</sup> Installed capacity for overhaul is 25 and 30 aero engine for Mi-8 and Mi-17 helicopters respectively.

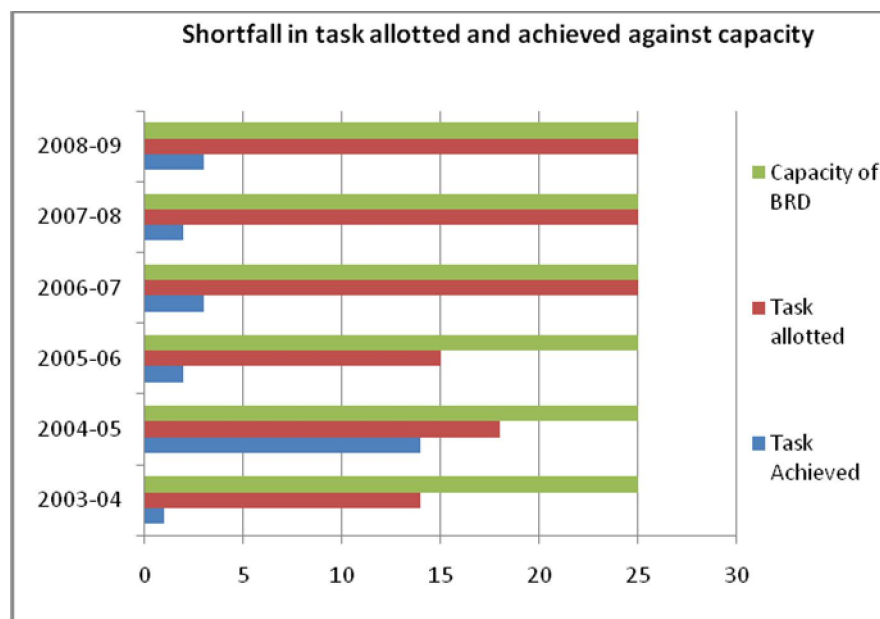


engines to the extent of 35 *per cent* of installed capacity. Besides the shortage of technical manpower, an important reason for the non-achievement of the tasks allotted was the non-availability of imported spares. Air Force authorities failed to plan and procure material required to meet annual overhaul task allotted due to non submission of timely requirement of spares by BRD and lack of non maintenance of reliable data base management for estimation of prices and vendor despite both the forecasted and firm overhaul tasks being identified well in advance.

Audit observed that as a result, to maintain the serviceability of the helicopter fleet, meet AOG demand and avoid accumulation of Category 'D'<sup>7</sup> engines, Air HQ had to send 110 aero engines of Mi-8 helicopters abroad between 2004-07 for overhaul at an aggregate cost of Rs 28.84 crore while keeping in-house maintenance facilities idle. Similarly, 100 aero engines and 15 Main Gear Box (MGB) of Mi-17 helicopter had to be sent abroad between 2005 and 2009 at a cost of Rs 39.65 crore and Rs 45.23 lakh respectively. Helicopter wise position in three cases where facilities have been set up as shown below:

#### Case I: Mi-8 helicopter series

IAF was unable to utilise the installed capacity at the BRD for overhauling 25 engines annually. Tasks allotted by Air HQ ranged from 56 *per cent* to 100 *per cent* of existing capacity during 2003-09 while tasks actually achieved ranged from four *per cent* to 56 *per cent* of capacity during the period.



<sup>7</sup> Aero engine requiring repair are categorised at Cat 'D' aero-engine.

For instance,

- For production year 2001-02, although Air HQ issued the forecast task in September 1996, BRD finalized the requirement of spares only in July 2001 leading to delay in initiating the procurement action. Subsequently, improper selection of vendor led to delay in concluding the contract and ultimately spares required for the production year 2001-02 were received



*The Mi-8 (Russian origin, NATO reporting name “Hip”) is a medium twin-turbine transport helicopter that can also act as a gunship. The Mi-8 is the world’s most produced helicopter, and is used by over 50 countries.*

after 36 months from the start of the production year.

- Even Contracts for Most Critical Material (MCM) for the production years 2002-03, 2003-04 and 2004-05 were concluded after repair task should have been completed.

**5 Delayed conclusion of MCM contracts**

Production Year	CONTRACT Conclusion	Remarks
2002-03	October 2003	Seven months after repair task should have been completed
2003-04	June 2005	15 months after repair task should have been completed
2004-05	July 2005	Four months after repair task should have been completed
2005-06	July / August 2006	Contract concluded for 39 lines of spares out of 90 lines required. Overhaul of aero engines for the year 2005-06 and 2006-07 delayed and only 124 engines available against the requirement of 198 aero engines in September 2005.

It was seen that as a sequel to Government decision to decentralise provision/procurement responsibility to HQ Maintenance Command, Air Force authorities felt the need to give a holiday to provisioning review for a period of two years. However, scheduled repair and maintenance for aero engines is a mandatory requirement and no administrative change ought to affect this schedule, which compromised the operational needs of the IAF.

### Case II: Mi-17 Helicopter series

Facilities set up at the BRD for Mi-17 Helicopter can cater for the repair / overhaul of 60 aero-engines per year. However, annual targets for overhaul fixed for the period 2002-05 could not be achieved as shown in the table.

### 6 Achievement of overhaul tasks

Year	Installed capacity	Task Allotted		Task Achieved	
		Repair	Overhaul	Repair	Overhaul
2002-03	60	15		10	2
2003-04	60	6	20	7	7
2004-05	60	8	26	8	7
2005-06	60	10	27	9	27
2006-07	60	9	30	5	30
2007-08	60	10	30	4	11
2008-09	60	10	30	19	07

The BRD could not achieve its tasks mainly on account of non-availability of spares demanded in November 2002 through the Provisioning Review for 2003-08. The contract for these spares was concluded by Air HQ only in February 2005. Also, unserviceability of critical equipment required in overhaul tasks from 2004 onwards adversely affected the repair/overhaul programmes.

Non-achievement of task by BRD resulted in accumulation of aero engine at BRD and led to increased grounding of Mi-17 Helicopters.

### Case III: Main Gear Box of aero engine of Mi-17 Helicopters

The overhaul facility for VR-14 Main Gear Box (MGB) of the aero engine of Mi-17 helicopter was set up at BRD during 2002-03 and the installed capacity of the BRD is 24 MGB per year. Against this, a forecast and firm task of 16 MGB was allotted to the unit in December 2002 and October 2004 for the



*Mi-17(NATO reporting name “Hip”) is a medium twin turbine transport helicopter that can also act as a gunship.*

production years 2005-06. However, BRD could not achieve the task due to non-availability of four types of spares for which demand was raised by the BRD in November 2002 but contract was concluded only in December 2007 with date of delivery as April 2008. These items are yet to be received (August 2008).

#### 1.2.2.2 Delay in setting up of overhaul facilities for Mi-17IV helicopters

Mi-17IV Helicopter was inducted into squadron service during 2000-03. TTL of the newly inducted helicopter is 25 years or 7000 hours and that of aero engine is 3000 hours. The helicopter and its engine require periodic repair overhaul. Prescribed TBO of airframe and aero engine is 1500 hours/7 years. Ideally, the repair facility for helicopter/equipment should have been established in parallel so that the facilities would have been available by the time their first major repair/overhaul is due in 2010. In November 2007, approval of the Defence Acquisition Council has been taken for establishing the repair and overhaul facilities at a cost of Rs 196 crore.

As of December 2009, RFP for the project had been issued. Clearly, activities are as yet at the inception stage and facilities will not be available by 2010. The delay in setting up of facilities may force Ministry to offload aero engine and airframe abroad for repair and overhaul. Another serious impact of the delay would be that by the time the repair facilities would be fully set up, more than 30 *per cent* of the original life of the helicopter would be over.



*Mi-17IV is multirole version of Mi-17 suitable for duties including flying hospital.*

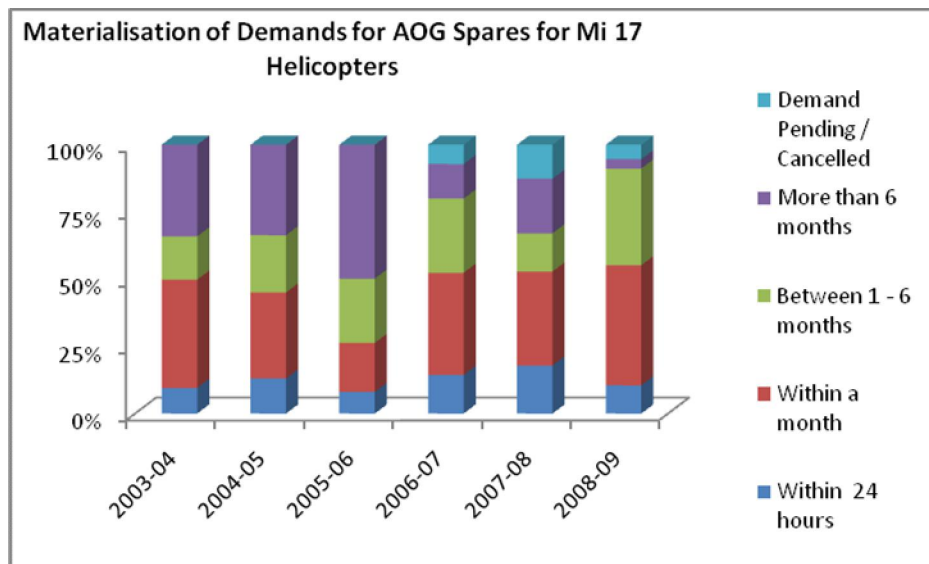
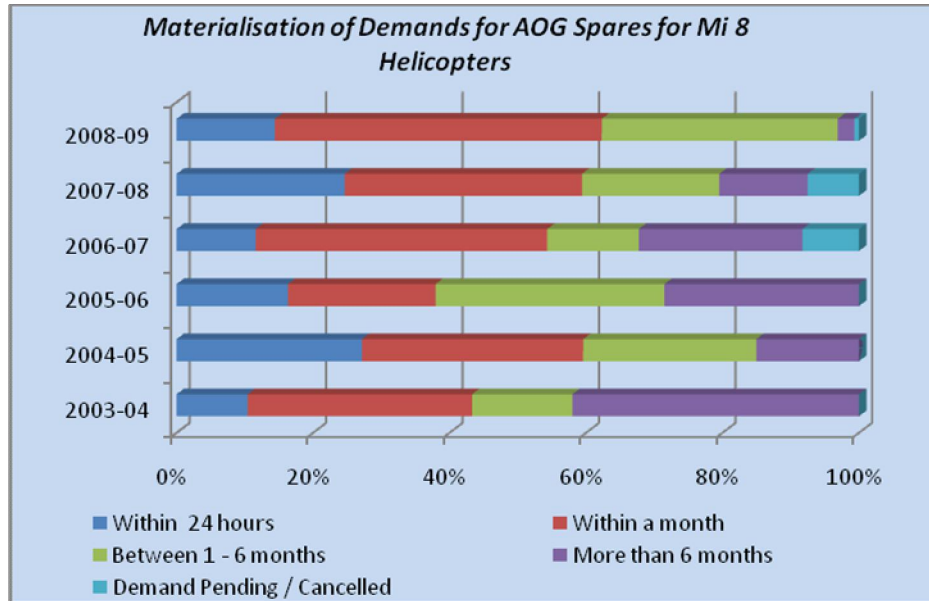
Even though several cases of delay in setting up of repair facilities after induction of aircraft have been highlighted in Defence Audit Reports<sup>8</sup> in the last 15 years, Ministry has not addressed this problem.

### 1.2.2.3 Delay in meeting AOG demands

AOG demands for spares are required to be met within 24 hours so that incidents of AOG and their duration are minimised and the helicopters made serviceable at the earliest.

Details of AOG demand satisfaction level raised by the operating units of Mi-8 and Mi-17 helicopters to the BRD for the period 2003-09 were analysed and the results are given in graphs for each type of helicopter separately.

<sup>8</sup> 1. Paragraph No. 6 of Report No. 9 of 1993  
 2. Paragraph No. 4 of Report No. 9 of 1995  
 3. Paragraph No. 8 of Report No. 8 of 2001



The analysis discloses that for Mi-8 and Mi-17 helicopter taken together only 14 per cent of AOG demands could be met within 24 hours and 33 per cent within 30 days whereas 22 per cent of the demands took one to six months to be met. Around 28 per cent of the demands were met after six months and 3 per cent were never met at all.

Inability of repair agencies to meet AOG demands in reasonable time indicates serious deficiencies in provisioning and procurement of spares and rotables.



#### 1.2.2.4 Shortfall in manpower deployment at BRD

There was a shortfall in the availability of technical manpower both in officers and airmen categories at the Base Repair Depot for the repair/overhaul of medium lift helicopters as indicated in the table below:

#### **7** Shortfalls in manpower across cadres

Year	Deficiency (in percentage)	
	Officers	Airmen
2005-06	41	39
2006-07	40	40
2007-08	46	41
2008-09	46	38

The BRD stated, in July 2008, that the requirement of manpower had been met by putting in extra hours beyond the normal working hours schedule despite the shortfall in manpower. However, as the facility consistently failed to meet targets for overhaul, adverse fall-out of manpower shortages on the capacity and capability of the depot to undertake tasks cannot be ruled out.

#### 1.2.2.5 Delay in third and fourth line servicing of aero engine at BRD

The prescribed time for overhaul of an aero-engine of medium lift helicopters is 12 months. Analysis of records for 109 aero engines overhauled at the BRD during 2003-09 disclosed that only 46 engines were overhauled within 12 months and in the case of the other 63 engines time taken for overhauls was far in excess of the average lead time of 12 months. Details of delays in case of these engines are given in the table.

#### **8** Delays in servicing of aeroengines

Engine of Helicopter	Extent of delay				
	Between 1 to 12 months	Between 13 to 24 months	Between 25 to 36 months	More than 36 months	Total
Mi-8	-	3	12	10	25
Mi-17	23	9	5	1	38
<b>Total</b>	<b>23</b>	<b>12</b>	<b>17</b>	<b>11</b>	<b>63</b>

BRD stated in November 2008 that the main reason for these delays was non-availability of imported spares for a prolonged time.

#### 1.2.2.6 Excess utilisation of man hours on repair and overhaul of aero engine

There are standard prescribed man-hours to be utilised for repair and overhaul of engines. Audit noticed that there was excess utilisation of man hours indicating lack of efficiency leading to extra cost of overhauls and repairs. For instance, for the overhaul of a single aero engine of Mi-8 helicopter, the standard man hours prescribed is 4,100 hour. The BRD, however, used 7,065 man hours per engine for overhaul of 25 aero engines during the period 2003-09. BRD therefore utilised 74,131 man hours extra above the admissible man hours as per norm as shown in the table below:

#### 9 Extra manhours utilised in repair and overhaul

Year	No. of engines	Prescribed Man hours	Man hours utilised	Extra man hours
2003-04	01	4100	8004	3904
2004-05	14	57400	101359	43959
2005-06	02	8200	15638	7438
2006-07	03	12300	19927	7627
2007-08	02	8200	15667	7467
2008-09	03	12300	16036	3736
<b>Total</b>	<b>25</b>	<b>102500</b>	<b>176631</b>	<b>74131</b>

Thus, BRD utilised 42 *per cent* excess man hours in overhaul of aero engines of Mi-8 helicopter. Excess utilisation of man-hours by the BRD besides indicating lack of efficiency also added to the cost of overhaul.

The BRD informed in November 2008 that extra man hours had become necessary due to ageing fleet and non-availability of imported spares which necessitated cannibalisation of spares on which considerable amount of efforts in terms of man-hours were spent. Main reason for non-availability of imported spares was non-submission of timely requirement.



### 1.2.2.7 Withdrawal of aero engines before completion of TBO

TBO of the aero engine of Mi-8 helicopter is 1500 hours. During the period 2003-09, 68 aero engines overhauled at BRD were sent for next overhaul before the prescribed interval. Out of 68 total engines, 17 and 24 aero engines were withdrawn before completion of 25 and 50 *per cent* of their TBO life respectively. This indicated inadequacies in overhauls being conducted in the BRD.

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#### Recommendations

- *Air HQ should take effective steps to measure output and performance of repair depots. This would imply setting standard norms for AOG levels and permissible cannibalisation and Category 'D' status.*
  - *Project management and monitoring should be accorded priority so that repair and overhaul facilities needed to support aircraft serviceability are created timely and are designed to deliver full functionality.*
  - *Bottlenecks in utilising the capacity of repair and maintenance facilities arising out of shortage of spares should be addressed through careful and prompt provisioning and procurement.*
  - *The quality of services and the level of efficiency in repair and maintenance facilities should be stepped up to eliminate delays, instances of premature withdrawals and use of man hours / mandays beyond norms.*
- 

## 1.3 Conclusion

Helicopters are a versatile component of air power. The Mi- series helicopters are thus, a significant element in achieving the IAF's military objectives. However, there are gaps in the requirements and existing force level. Shortfalls in the availability of helicopters and the advanced age of available assets raise serious concerns about the capability of the fleet. It is, therefore, critical that these shortages be met by using the existing fleet more productively through higher serviceability rates and lower AOGs. A critical role in this task will be that of helicopter logistics support, repair and maintenance facilities. This report reveals that this is a major challenge for the IAF as its performance on this account has not been encouraging. Provisioning and procurement activities need to be made more effective and the internal controls in this regard strengthened. Manpower engaged in these tasks needs to be more efficient. Lastly, Ministry of Defence and Air HQ

must achieve their acquisition plans in order that the IAF's helicopter fleet retains its operational advantages.

The matter was referred to Ministry in October 2008; their reply was awaited as of February 2010.

# CHAPTER II: Functioning of the Aviation Arm of the Indian Navy





# HIGHLIGHTS

1. *Indian Navy's Aviation arm is holding a depleted force level. Availability of aircraft was a mere 26 per cent of asset strength on account of the high number of aircraft undergoing repair / overhaul and sluggish progress in acquisition programme.*

*(Paragraph 2.2.1.6)*

2. *Indian Navy's Air Combat capability has weakened drastically as the available aircraft carrier is almost half a century old and is running on borrowed time since it was to be decommissioned in 2007-08. The replacement of another carrier, decommissioned in 1997 will not be in position until 2013.*

*(Paragraph 2.2.1.4)*

3. *Attack capability of the already depleted fighter aircraft fleet on-board the carrier is significantly eroded as they have not been kept in full combat readiness in the absence of a fully functional fitted radar and limited firing of practice missiles. The bombs fitted became obsolescent and the guns are underutilised.*

*(Paragraph 2.2.1.4)*



4. *Reconnaissance activities have been curtailed due to drastic depletion in the force level and limited capability as a result of ageing of the aircraft, outdated equipment and sub-optimal functioning of other equipment.*

*(Paragraph 2.2.1.3 and 2.2.1.5)*

5. *No induction of aircraft for combat, LRMR and ASW role has been done during the period 1990 to 2005.*

*(Paragraph 2.2.3)*

6. *Despite an ESM system remaining unproven even after a decade, Navy again procured the same system at a cost of Rs 51.72 crore for other eight aircraft.*

*(Paragraph 2.2.3.3)*

7. *Modernisation programmes will have limited benefits. Delayed upgradation of an aircraft at a cost of Rs 641.62 crore may not yield the desired results due to short residual life.*

*(Paragraph 2.2.2.1)*



*8. Despite the establishment of facilities for overhauling and repair, engines and components are still being sent abroad for repair on account of inefficiencies in functioning of these facilities.*

*(Paragraph 2.2.4.3)*

*9. Lack of synchronisation of acquisitions with setting up of infrastructure facilities has led to delays in operationalising equipment. This has already occurred with the Unmanned Aerial Vehicles and will be repeated in the induction of aircraft MiG -29K.*

*(Paragraph 2.2.3.5)*



# KEY RECOMMENDATIONS



1. *The Government may expedite finalisation and approval of Navy's Long Term Perspective Plan to give a firm direction towards acquisition and induction of aircraft, management of assets and flow of funds.*
2. *Any change in the Unit Establishment of aircrafts by Indian Navy should be brought to the notice of the Government in order to ensure accountability in utilisation of assets.*
3. *Proactive steps need to be taken to ensure the improved serviceability of the aircraft through timely supply of essential spares. IHQ (N) should take measures to minimise delays in the commencement and completion of inspection so that aircraft down-time can be avoided.*
4. *Fitment of a new system which directly affects the operational capability should be undertaken only when the prototype is proved successfully.*



5. *While encouragement and support to the indigenisation effort should be continued, the limitations, if any, of such efforts should be clearly recognised and should not be at the cost of operational preparedness.*
6. *Second-hand platforms should only be acquired for well-established reasons and should not become liabilities as such equipment will have limited serviceability and maintenance would be a challenge due to obsolescence of spares.*
7. *Creation of repair/overhaul facilities should be planned at the time of induction of aircraft itself so that benefits accrue timely. Feasibility of repair by local agencies should be ascertained before concluding contracts with foreign sources.*
8. *Project management and monitoring should be accorded priority so that civil works facilities essential for the operation and up-keep of the aircraft are created in time.*





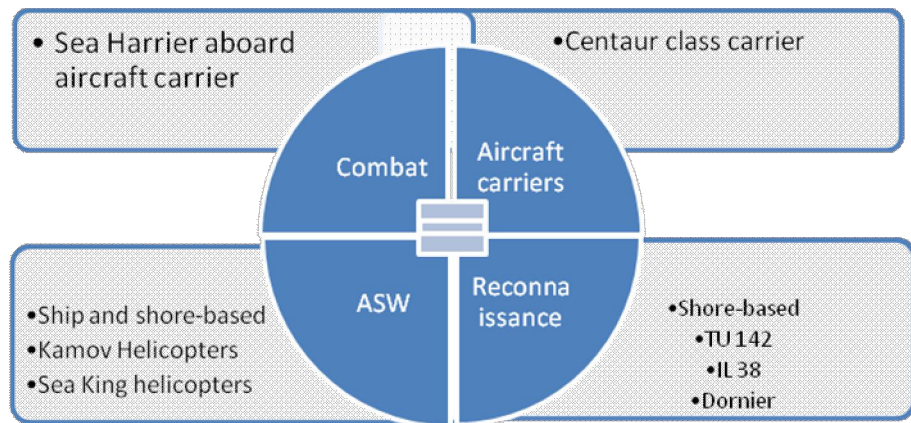
9. *Vital training aids like simulator should be made available to impart quality training.*

# Part I

## Introduction

### 2.1 Naval Aviation

Naval Aviation, i.e. the use of manned air power by a sea-based military force, is a critical element in armed conflicts. The Indian Naval Aviation wing not only significantly augments naval capability but also impacts over-all defence preparedness. The **Naval Air Arm** is, thus, a vital component of the Indian Navy (IN), contributing to combat capability in key areas beyond the reach of conventional land-based Air Force aircraft through aircraft carrier-borne strikes against maritime targets and air defence of fleet. The Wing also performs different roles of reconnaissance and anti-submarine warfare (ASW) using a variety of manned and unmanned aircraft and helicopters which are shore and / or ship-based.



#### 2.1.1 Organisational Structure

The Naval Aviation Arm is manned by a four-tiered organisational structure with the Integrated Headquarters (Navy)- IHQ (N) at the apex level followed by various Directorates, Flag Officers Commanding-in-Chief (FOCs-in-C)/Headquarters Naval Aviation, Naval Air Stations/Aircraft Carriers/Ships and Naval Air Squadrons/Flights. While three technical

Directorates<sup>1</sup> are responsible for selection, operation, maintenance and acquisition of aircraft, the FOCs-in-C are responsible for administrative and logistics support for Naval Air Stations. Flag Officer, Naval Aviation (FONA) is responsible to the Chief of Naval Staff on all matters concerning aviation training, maintenance, flight safety and operational tactics. The Squadron /Flights are controlled and supported by the respective Air Stations/Ships. The Squadron Commander is responsible for the functioning and operational status of his squadron.

### 2.1.2 Scope of Audit

This Performance Audit covers the period 2003-08, later updated up to December 2009 and examines the activities of the aviation arm of the IN. Audit selected 48 *per cent* of the squadrons located across 50 *per cent* of the Naval Air Stations based on their operational importance viz., Combat, Long Range Maritime Reconnaissance (LRMR) and Anti Submarine Warfare (ASW) roles.

Audit acknowledges with gratitude the support provided by the Ministry of Defence, Naval Headquarters and all subordinate offices during the course of the Performance Audit and subsequent interactions for the collection of information for updation of the Report.

### 2.1.3 Audit Objectives

Audit of Naval Aviation Wing was taken up to assess the efficiency and effectiveness with which the planning, asset management, operation, repair and maintenance activities were conducted and to assure that they were conducive to achieving the Naval Aviation Wing's objectives in a cost-effective manner. In particular, the audit reviewed:

- Adequacy of required force level;
- Efficiency and effectiveness with which the assigned tasks were performed;
- Efficiency of execution of capital acquisition projects;
- Timeliness of modernisation/ up gradation programmes to meet future requirements;
- Efficiency of repair and maintenance of aircraft;
- Adequacy of infrastructure at Naval Air Stations for supporting aircraft operations;

<sup>1</sup> Directorate of Naval Air Staff, Directorate of Naval Air Material, Directorate of Aircraft Acquisition

- Availability and serviceability of fleet; and
- Quality of training of pilots and observers.

#### 2.1.4 Audit Criteria

The audit criteria for performance evaluation were derived from:

- Envisaged force level as per the Perspective Plan;
- Naval Headquarters/Government papers/policy in respect of acquisition/up gradation and modernisation of aircraft;
- Authorised holding as per Ministry of Defence orders for each type of aircraft and assigned tasks;
- Maintenance procedure/repair schedule prescribed by Original Equipment Manufacturer (OEM)/ IHQ(N);
- Defence Procurement Procedure / existing guidelines for procurement; and
- Prescribed training programmes and training schedules.

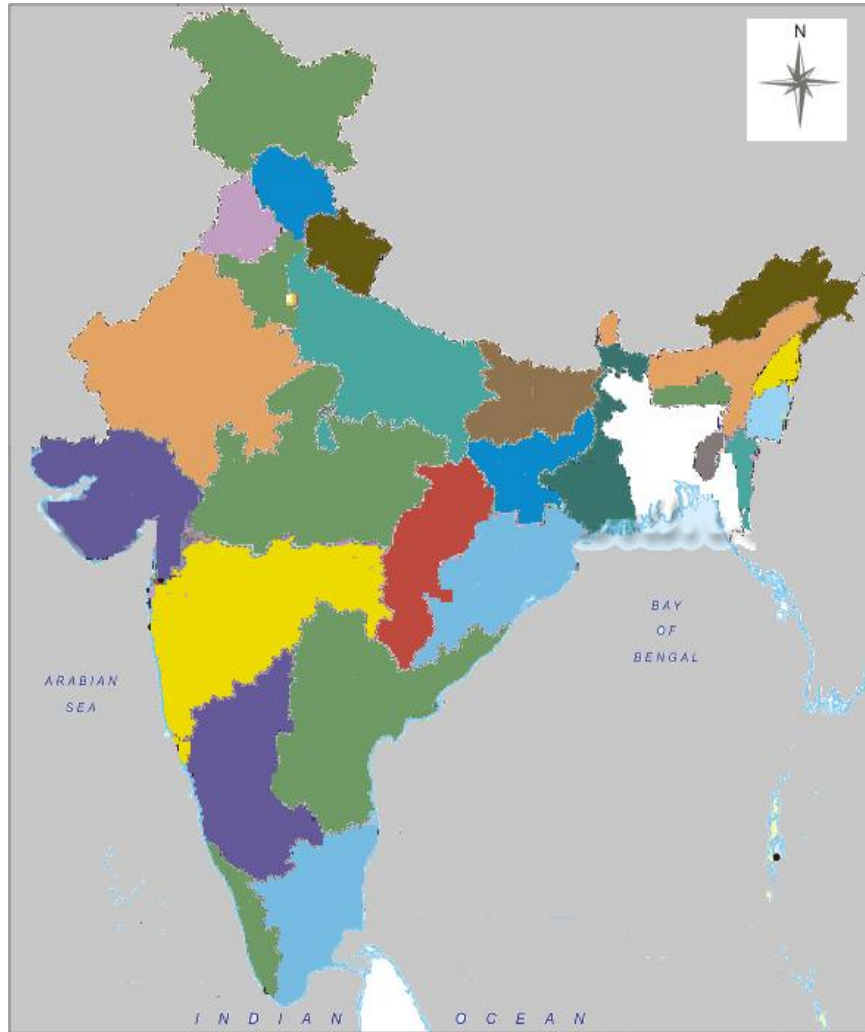
#### 2.1.5 Audit Methodology

An 'Entry Conference' was held on 23 May 2008 with officials from the Ministry of Defence and Naval Directorates dealing with Aviation Wing wherein the scope, audit objectives and criteria were discussed. Field audit was conducted through examination of records, issue of questionnaire and interaction with the concerned officers at the Naval Aviation Directorates at New Delhi, Headquarters Naval Aviation at Goa and selected Naval Air Stations, Material Organisations and Naval Aircraft Yards.

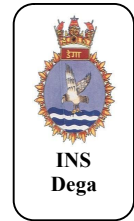
An 'Exit Conference' was held on 5 December 2008 wherein the main findings of audit and related recommendations were discussed.



# NAVAL AIR STATIONS



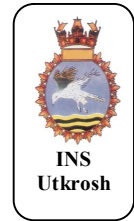
**INS Shikra**



**INS Dega**



**INS Hansa**



**INS Utkrosh**



**INS Garuda**



**INS Rajali**



**INS Parundu**

## Part II

### Audit Findings

#### 2.2 Audit Findings

The audit findings have been categorised under (i) Strength and Capability, (ii) Modernisation and Upgradation, (iii) Acquisitions, (iv) Repair, Maintenance and Spare Management, and (v) Aviation Training.

##### 2.2.1 Strength and Capability

The Naval Aviation Arm is faced with the challenging task of achieving its military goals with appropriate induction of state-of-the-art aircraft carrier, operational aircraft and modernisation of existing assets to effectively respond to ever-changing threat perceptions.

##### 2.2.1.1 Ad hoc planning

In order to fulfill the military objectives of the Naval Aviation Arm, IN requires realistic and rational planning for force levels, its organisation and timely acquisition of equipments. Such planning has to necessarily take into account the present context as also the foreseeable future with respect to induction and de-induction of various aircraft/equipment.

As per the Defence Procurement Procedure (DPP), proposals for acquisition of capital assets flow from the defence procurement planning process. The outcome of the planning process, covering the long-term, medium-term and short-term perspectives, is detailed in (a) the 15 years Long Term Perspective Plan (LTPP), (b) five years Services Capital Acquisition Plan (SCAP) and (c) Annual Acquisition Plan (AAP). Although the Navy has prepared a Long Term Perspective Plan (LTPP) for the period 2002-2017 (revised to 2007-22), this has not yet been formally approved by the Government (as of December 2009). This was noted by the Parliamentary Committee on Defence (2006-07 and 2009-10) which expressed its concern over the delay in preparation and finalisation of the long term plan of the forces as this had a corresponding impact on operational preparedness. The Ministry, in its reply to the Committee, stated that preparation of LTIPP is a pioneering effort and involves seeking and incorporating comments from a host of agencies involved.

In the absence of approved plans, audit noted that decision-making has been geared towards staving off present crises rather than meeting the aims of a long-term structured plan as discussed below:

- Despite knowing that the INS ‘Vikrant’ and INS ‘Viraat’ were to be decommissioned in 1997 and 2008 respectively and that indigenous building of a substitute could take a decade, contract for repair and refit of a second-hand replacement carrier for INS Vikrant was concluded with a foreign country in 2004 whereas the Letter of Intent (LOI) for the indigenous aircraft carrier was placed in August 1999 on Cochin Shipyard Ltd. As of December 2009, while the replacement carrier was expected to be inducted in Indian Navy by 2013, only 35 *per cent* work on the indigenous carrier had been completed.
- Although 100 *per cent* of the LRMR and major portion of the ASW fleet has already outlived its prescribed life and is nearing the end of its extended life, no significant inductions were planned and made during the X<sup>th</sup> plan (2002-07).
- Despite the age and high rate of attrition of the combat aircraft fleet, replacements were planned to be acquired only during 2007-08.
- Modernisation / upgradation decisions have been taken towards the end of the life cycle of crucial and sensitive fleets of combat and LRMR aircraft, e.g. in the case of aircraft Tu-142<sup>1</sup>, IL-38 and Sea Harrier. Such decisions became necessary to maintain force levels despite the limited benefits on account of low residual life.

#### 2.2.1.2 Non- achievement of force levels

The five years Capital Acquisition Plan, indicating the list of equipment to be acquired, keeping in view operational exigencies and the overall requirement of funds has been prepared for various periods. At present, Navy is seeking to achieve the objectives of the XI<sup>th</sup> Plan for the period 2007-12. Audit, however, noted that though some major contracts were signed as envisaged in the X<sup>th</sup> Plan (2002-07), a number of schemes have been carried over to the XI<sup>th</sup> Plan. As a result, achievement of the planned force level as per the XI<sup>th</sup> Plan would be difficult in respect of combat, ASW and LRMR aircraft.

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<sup>1</sup> Modernisation was, however, not taken up ultimately.



### **I Category-wise Force levels likely to be achieved by end of the XI<sup>th</sup> Plan**

<b>Category</b>	<b>Percentage of anticipated force level likely to be achieved</b>
Combat	33
Anti Submarine Warfare (ASW)	63
Long Range Maritime Reconnaissance (LRMR)	26

This is because the acquisition process for these aircraft has either not been initiated or is still at the nascent stage. Anticipated levels may also not be realised in certain cases, such as the ASW group where indigenous development of the Advanced Light Helicopter (ASW version) has not proved successful. Similarly, for combat aircraft, the Indian Navy plans to have a force level comprising the Sea Harrier, MiG-29K and indigenously developed Light Combat Aircraft (LCA). Audit noted that:

- ⇒ The Sea Harrier fleet is planned to be decommissioned by 2012;
- ⇒ In the case of the MiG-29K, a contract has been concluded but it will meet only 19 *per cent* of the required force level; and
- ⇒ In the case of the LCA, the prototype is still being tested.

#### **2.2.1.3 Ageing fleet**

The multi-faceted responsibilities of the Naval Aviation Wing are carried out through a variety of aircraft. However, the fleet is ageing as shown below and requires induction of newer platforms and technologies.

## 2 Age of Naval Aviation fleet

Type of aircraft carrier/aircraft	Vintage/ Year of Induction	Life as on 31-03-09	Remarks
<b>Aircraft Carrier</b>			
INS Viraat	1959 (UK)	50 years	Acquired in 1987 and was to be decommissioned in 2008.
<b>Combat Aircraft</b>			
Sea Harrier	1983 – 86	23 – 26 years	More than 50 per cent fleet lost due to accidents. Obsolete aircraft presenting considerable challenges with respect to maintenance and serviceability.
<b>LRMR</b>			
IL-38	1977	32 years	Planned to be phased out in the year 2002. Government cleared a proposal in 2001 to refurbish and modernise aircraft with 15 years extension of life.
Tu-142	1988	21 years	Total Technical Life (TTL) of 16 years or 5000 flying hours. Outlived its TTL which has been extended from 20 to 25 years.
<b>Anti Submarine</b>			
KA-25	1980	29 years	Recommended for phasing out.
KA-28	1986	23 years	Shelf life was 20 years/3000hours. Life was extended upto 28 years.
Sea King 42-A	1980	29 years	Shelf life was 20 years /3000 hours.
Sea King 42-B	1988	21 years	Shelf life was 20 years/ 3000 hours.

#### 2.2.1.4 Naval Air Combat capability adversely impacted

An aircraft carrier is the corner-stone of the Naval Aviation Wing as its primary mission is to act as a seagoing airbase. The Indian Navy has consistently projected the need for at least two aircraft carriers and, in fact, has sought approval for another carrier as well in order



*INS Viraat was originally commissioned in the Royal Navy as the HMS Hermes on November 18, 1959. The vessel was acquired by the Indian Navy in April 1986. It is likely to remain in service till 2012.*

to meet its full requirements. Indian Navy was able to meet its need of two carriers during the late 1980s and early 1990s. Since 1997, however, there has been a sharp decline in the force level, both in the number of fighter aircraft and aircraft carrier. The replacement for INS Vikrant, decommissioned in 1997, the Admiral Gorshkov is not likely to be inducted before 2013 and construction of the indigenous aircraft carrier is delayed till 2014. In respect of the aircraft carrier in-service, INS Viraat, the ship was not available from March 2008 to August 2009 on account of special refit and repairs to extend its life from 2007 to 2012. As a result, the Navy was without an aircraft carrier in operation for a significant length of time.

More importantly, for INS Viraat to be effective, it has to possess a quality strike force, which it does not. Sea Harriers, IN's only combat aircraft, were procured during the period 1979-1986 to be deployed in one squadron on-board INS Viraat with a Unit Establishment<sup>2</sup> (UE) of 'X' aircraft. During the audit period, on an average, only 42 *per cent* of the UE was available with the squadron. The total inventory itself has also been depleted. Eight accidents took place in the combat aircraft fleet during the audit period. As of December 2009, 65 *per cent* of the Sea Harriers acquired had either crashed or

<sup>2</sup> Number of aircraft authorised by Ministry for holding at the unit

been rendered ineffective. The aircraft also had an alarming number of 18 incidents<sup>3</sup>. High rate of accidents were stated to be due to pilot error or material failure. Although the Indian Navy has received four MiG-29K aircraft by December 2009, however, these aircraft cannot operate from INS Viraat.

Weak operational capabilities were also reflected in the performance of existing avionics, namely the fire control radar, which was unsatisfactory. Audit also noticed that even the practice firing of the on-board 'Magic' missile has not been done since 2003. Bombs required to be carried by the aircraft have been declared obsolete in 2007 and practice bombs have not been utilised during years 2004-05 and 2007-08. Utilisation of the 30 mm guns was negligible.

#### 2.2.1.5 Depletion in ASW and reconnaissance capabilities

An analysis of the force level in ASW and reconnaissance capabilities disclosed that there had been a drastic depletion in the force level and limitation in role capability over a period of time.



*The Ilyushin IL-38 (NATO reporting name "May") is a maritime and anti submarine warfare aircraft designed in erstwhile Soviet Union.*

The situation with the Long Range Maritime Reconnaissance (LRMR) aircraft, i.e. IL-38 and Tu-142, was particularly bleak. As regards the IL-38, not even one aircraft was available for operation during 2003-04 and 2004-05 as they were undergoing a Mid-Life Upgradation (MLU). Four aircraft were received after completion of their MLU mid-way during the audit period between January 2006 and November 2009. The remaining aircraft (one) is still under MLU. Even after the MLU, the aircraft is unable to achieve the desired level of performance in the maritime reconnaissance/ anti-submarine warfare (MR/ASW) role (See Para 2.2.2.2 for details).

<sup>3</sup> Aircraft accidents which are not of major nature are called incidents

In respect of the second LRMR aircraft, Tu-142, only 50 *per cent* of the sanctioned UE was available in the squadron with the available aircraft functioning in a restricted manner.



*The Tupolov (Tu-142), NATO reporting name “Bear F/J”, is a Russian-origin maritime reconnaissance/anti-submarine warfare turboprop aircraft.*

Six aircraft were constantly under repair / overhaul, one aircraft was phased out while the remaining aircraft were nearing completion of their extended life.

Audit observed that the lack of accuracy of the navigational equipment and an outdated weapon sensor fit made the aircraft unsuitable for locating and destroying modern submarines. In fact, during the audit period, 30 *per cent* of the sonobuoys<sup>4</sup> deployed were unserviceable leading to sub-optimal performance. Additionally, the 1970s origin communication and navigation suites and the obsolescence of sensors and equipment fit has resulted in the aircraft being exploited to a much lesser extent than its total technical life.

Short-range maritime reconnaissance (SRMR) is carried out by the Dornier aircraft which are a relatively new induction in the Indian Navy. However, the functioning of the ‘Eagle’ Electronic Support Measures (ESM) system fitted on-board has been sub-optimal.

#### **2.2.1.6 Dilution of Unit Establishment (UE)**

The Naval Aviation Wing is authorised 25 squadrons of different aircraft types, each with its own UE sanctioned by Government. Naval Headquarters

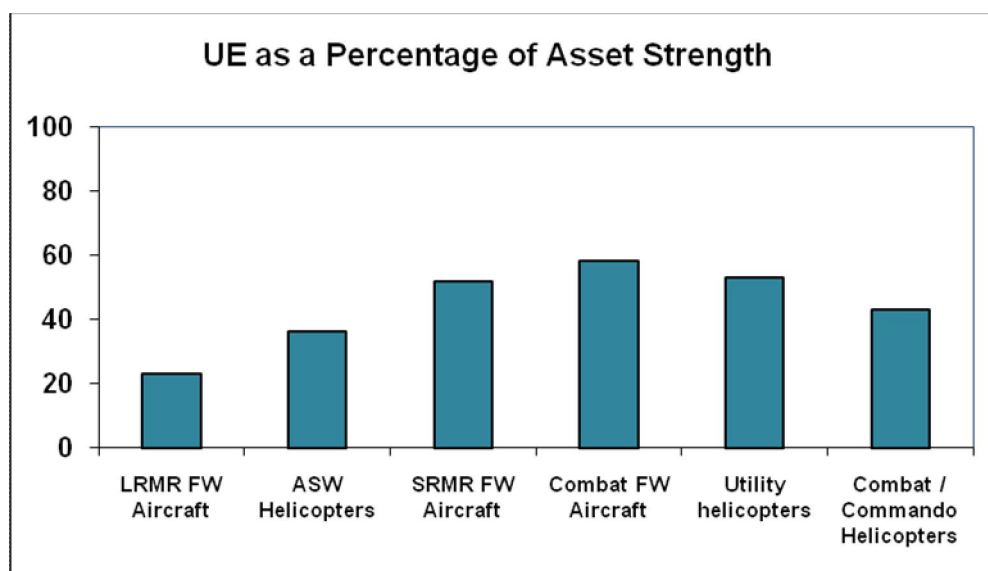
<sup>4</sup> Equipment to detect submarines

(NHQ) has, on its own, decreased the UE prescribed by the Government. The impact of this can be clearly seen from the representative sample given in the table where the percentage reductions range from 38 *per cent* to 67 *per cent*. As a result, while squadrons were being maintained, they did not have an adequate number of aircraft to retain their operational advantages.

### 3 Dilution of UE in selected squadrons

Squadron	Aircraft	UE sanctioned by Government = 100	UE fixed by NHQ
INAS 'A'	Sea Harrier	100	62.5
INAS 'B'	IL-38	100	33.3
INAS 'C'	Tu-142	100	50

On account of the high number of aircraft undergoing repair / overhaul / storage NHQ fixed UEs did not even correspond to 50 *per cent* of their asset strength<sup>5</sup> in most cases, as shown below. The authority and reasons for reducing the UE at the level of NHQ *vis-a-vis* fixed by Government was not clear.

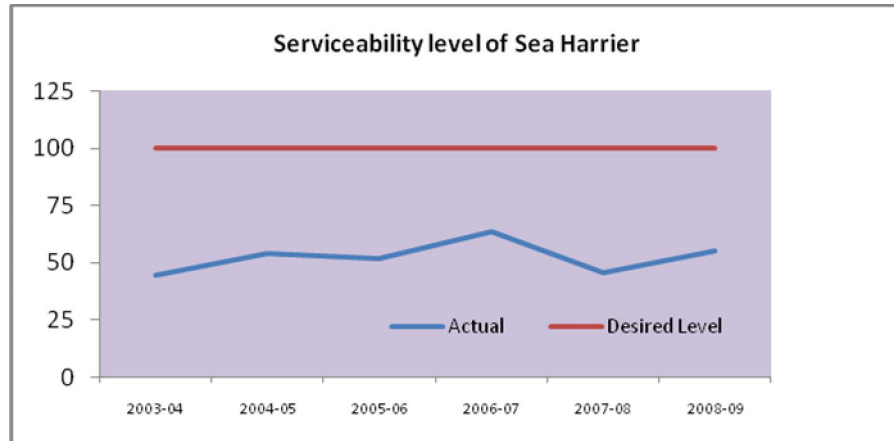


Verification by audit of actual holdings during 2007-08 revealed that out of the total assets of aircraft for combat, ASW, LRMR/SRMR role, only 41 *per cent* could be allotted to squadrons/ flights /ships against the specific UE. This figure fell to 26 *per cent* for the entire Wing including all assets.

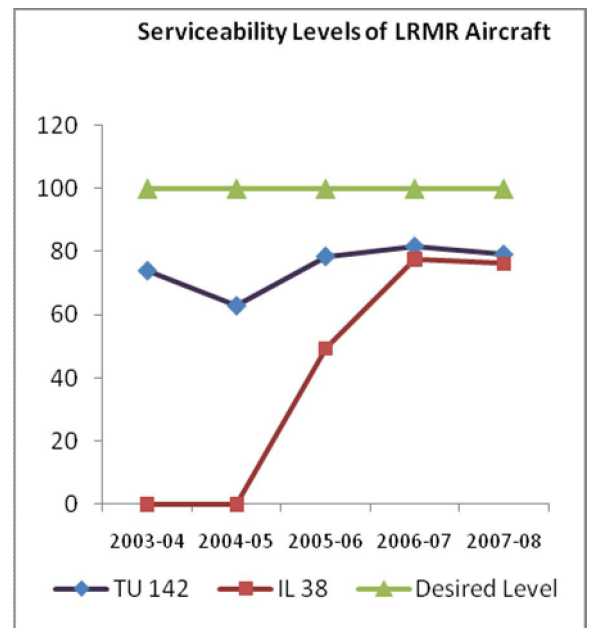
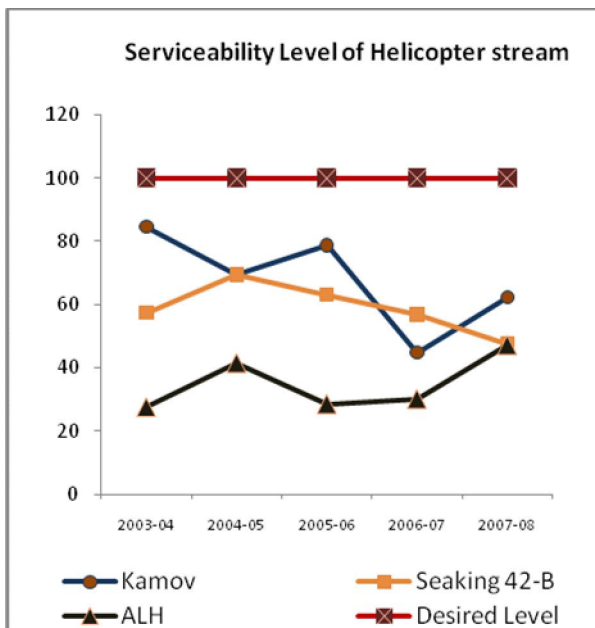
<sup>5</sup> For the purposes of this report, audit has taken 'asset strength' as the complete inventory possessed by IN.

**2.2.1.7 Availability of aircraft**

‘Serviceability’ implies that the aircraft is technically available and is not undergoing a scheduled repair or overhaul at any level. Audit found that the allotted aircraft for UE were not available for operational utilisation at all times during the entire period as the serviceability rates for the aircraft were poor ranging from 27 per cent to 84 per cent.



The main reason for low serviceability was the age of the aircraft or repeated failure of LRUs<sup>6</sup> and also due to non-availability of spares. In the case of the Advanced Light Helicopter, however, poor serviceability was due to technical issues, long repair lead time by the OEM etc. Serviceability of aircraft IL-38 was zero in 2003-04 and 2004-05 as no aircraft were available.



<sup>6</sup> LRU – Line Replaceable Unit – a part which, if not functioning, can be easily and quickly replaced by the squadron itself.



### 2.2.1.8 Achievement of Annual Flying Tasks

Annual Flying Tasks (AFTs) are directives issued to each squadron prescribing the number of hours of flying required to be undertaken each year. At the time of the induction of the aircraft, AFTs are fixed by the Government. However, it was noticed that AFTs were being revised by NHQ based on the availability of the aircraft, aircrew and ships. Data was made available only in two cases as shown below:

#### **4** Annual Flying Task of select squadrons

Aircraft	AFT fixed by Government	AFT fixed by NHQ (2007-08)	Actually Achieved
KA-25	1200 hrs	300 hrs	300 hrs
IL-38	1800 hrs	600 hrs	306 hrs

In audit opinion, not only did this dilute Government directive but also weakened control and supervision mechanisms which would have indicated actual short-falls. Government approved AFTs were not produced to audit except for two squadrons, on the premise that management of assets on behalf of Government is a Service Headquarters function. However, the authority for reducing the AFT at the level of NHQ *vis-a-vis* fixed by Government was not clear.

### 2.2.1.9 Aircraft accidents and incidents

Force levels have also been affected by an increasing number of accidents and incidents during the audit period. From April 2003 to March 2009, there were 36 accidents involving 33 aircraft with the maximum number<sup>7</sup> of accidents taking place in the Sea Harrier and Chetak (helicopter) fleets. The main reason attributed to the accidents has been air crew error including judgment error and material failure/maintenance error. Besides incurring huge financial loss the accidents also affected combat strength in terms of equipment and manpower. Audit also observed that the Sea Harriers were being flown without Flight Data Recorder (FDR) which is of primary importance in accident investigation and has immense training value.

<sup>7</sup> Eight in each fleet

It was also noted that incidents to aircraft continued to rise due to foreign object damage (FOD), ground accident and bird hits from 15 in 2004 to 31 in 2007. In 2008-09, total number of incidents due to all causes across fleets was 215. Such incidents have resulted in aircraft down-time of 592 days thereby affecting availability with attendant cost implications. Navy attributed the increase in aircraft incidents to the unauthorised expansion in human habitation in and around the airfield including hotels and eating joints with non-existent waste disposal systems, slums and other constructions with poor drainage systems and indiscriminate garbage dumping and landfill sites.

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### Recommendations

- *The Government may expedite finalisation and approval of Navy's Long Term Perspective Plan to give a proper and firm direction towards acquisition and induction of aircraft, management of assets and flow of funds.*
  - *Measures should be taken to expedite acquisition process for combat, ASW and LRMR aircraft.*
  - *Proactive steps need to be taken to ensure improved serviceability of the aircraft by timely supply of essential spares.*
  - *Any change in the Unit Establishment of an aircraft by Indian Navy should be brought to the notice of the Government in order to ensure accountability in utilisation of assets.*
- 

### 2.2.2 Modernisation and Upgradation

Due to lack of materialisation of planned inductions, Navy has had to keep its aircraft in service beyond their normal service life, extend the average life of front-line aircraft making them maintenance intensive. This has adversely impacted combat availability of aircraft. Though the life of the airframe can be enhanced, it is not possible to extend the electronic life of the equipment. In order to make the aircraft role worthy, upgradation and modernisation programmes were planned for the Tu-142, Sea Harrier, Seaking 42-B and KA-28 fleets during the Xth Plan period. However, upgradation of only the Sea Harrier and IL-38 has been taken up as of December 2009. Audit review of the programmes disclosed that the projects may not yield the operational benefits as discussed below.

### 2.2.2.1 Imprudent upgradation of an aircraft

The 1970s vintage avionics of the aircraft Sea Harrier necessitated that the aircraft be modernised to retain operational advantages. Accordingly, the upgradation programme proposed replacement of the existing radar with a current generation ‘Look Down’ radar and integration of a new Beyond Visual Range (BVR) missile. As the aircraft had a limited residual life and was due for phase-out in 2012, the project was proposed in October 2001 to be carried out on a fast-track basis as time was of utmost essence. However, Naval HQ decided (June 2002) not to go in for complete upgradation given the low residual life of aircraft.

Later, the contract for limited upgradation was concluded but only in March 2005. The delay was mainly on account of finalising technical requirements, issuing the Request for Proposal, conducting Technical Evaluation for the missile and associated radar. Not only did this delay defeat the very purpose of execution of the project on fast track basis but the Navy would also be able to exploit the upgraded Sea Harrier aircraft for a very limited period only, i.e. about three years or less.

Even subsequently, there were delays in the execution of the programme by Hindustan Aeronautics Limited (HAL) and the first milestone of handing over two prototypes to Navy by February 2007 could not be achieved. Consequently, delivery of the remaining aircraft, scheduled for February 2008 was postponed to December 2009. Audit observed the following:

- The Sea Harrier has had, over the past few years, a very high attrition rate. In fact, subsequent to the time of mooting the proposal, in October 2001, Navy lost two aircraft in August 2003 and December 2004. Despite being aware of these facts, Navy initially committed all its aircraft for the upgradation though they ultimately reduced one aircraft



*Originated in UK, the BAe Systems Sea Harrier is a Naval VTOL/STOVL jet fighter, reconnaissance and attack aircraft*

from the final contract. Further they did not include any provision in the contract for payment on pro-rata basis depending on the number of aircraft upgraded by the vendor. As a result, after conclusion of contract, when more aircraft were lost in accidents, Navy had no option but to make payment of Rs 204.30 crore to HAL towards upgradation of these non-existent aircraft lost in the interim period. Navy would, however, be able to set-off only Rs 16.16 crore payable to HAL for their services.

- In view of the extensive integration requirements, additional flight tests, defects in radar and its integration and the grounding of the fleet, the first milestone of handing over two prototypes to Indian Navy by February 2007 could not be achieved with the initial prototype being delivered in October 2008 and the second in August 2009. The delivery of the remaining aircraft scheduled for February 2008 has been postponed to December 2009. This is, however, optimistic as the original contract envisaged delivery of remaining aircraft 12 months after upgradation of two prototypes. Thus, in all likelihood deliveries of the remaining aircraft will be postponed to mid-2010.
- Only 57 *per cent* aircraft of the total number contracted for upgradation at a cost of Rs 641.62 crore would, thus, be available for operation for about three years since the effective life of the Sea Harrier aircraft is intrinsically linked to the residual life of INS Viraat, which is likely to be in service till 2012 after its mid-life refit-cum-modernisation in 2008-09.
- Furthermore, the success of the upgradation programme is also affected by the equipment already installed on-board. Thus, the age and repeated failure of Line Replaceable Units (LRUs), lack of reliable repairs and non-availability of avionics spares will continue to affect the role worthiness of the aircraft even after the upgradation. Moreover, even though the missile and radar are being upgraded to the latest standard, their successful performance requires that associated equipment like Head Up Display, Navigational Horizon Altitude Reference System and Electronic Unit Weapon Aiming Computer be of an equally high standard. However, the upgrade program does not encompass either modernisation of the existing equipment or procurement of updated versions of the same.

### 2.2.2.1.1 Shortcomings/Limitations of BVR Missile

In pursuance of Naval Staff Qualitative Requirements (NSQR) framed for Beyond Visual Range (BVR) missiles in September 2000, NHQ concluded a contract in March 2005 for 'Y' numbers Derby missiles with M/s Rafael, Israel, the only vendor to respond to the Request for Proposal (RFP) issued in August 2003.

Audit observed that the IN was predisposed towards Derby missiles manufactured by M/s Rafael, Israel even though the missile procured did not fulfill the needs of IN. In fact, the RFP issued in August 2003 stipulated that the IN's requirement was for the Derby missile. As no corrigendum to the RFP was issued, clearly, competition in procurement was ruled out. As a result, although the RFP was issued to seven firms and an extension was granted till October 2003, only the Original Equipment Manufacturer (OEM) of the Derby missile responded.

The trial directives were issued in March 2008 after scaling down the NSQRs at the instance of vendor. Consequently, the acceptable maximum range of the missile was reduced from 'A' Km to 'B' Km, which was 54 *per cent* of the original accepted range. Actual live firing of missile was conducted, in March 2008, on an upgraded prototype Sea Harrier aircraft at a range of 'B' Km for missile in Mid envelope scenario (33 - 67 *per cent*). The vendor was unwilling to guarantee performance of the missile beyond the scaled down range of 'B' Km.

One of the basic aims of the acquisition of BVR Air-to-Air missile was to destroy targets at beyond visual ranges of up to 'C' Km<sup>8</sup>. However, the missiles acquired failed to achieve the desired ranges in the live firing. The capability of the seeker, at the range prescribed in NSQR ('A' Km) was also not demonstrated in live firing. Moreover, the missile launcher design is being used for the first time for airborne operations.

### 2.2.2.2 Refurbishment and modernisation of IL-38

The IL-38 fleet was due for phasing out from the year 1997 onwards but Navy opted, in 2001, to undertake a modernisation programme for these aircraft at a cost of USD 144.5 million. The programme envisaged installation of a maritime reconnaissance / anti-submarine warfare suite, *viz.* the Sea Dragon suite. The aircraft were to be delivered after modernisation by December 2004. Mention was made earlier in Para 2.2 of C&AG's Report No. 5 of 2007

<sup>8</sup> This was twice the scaled down range of 'B' Km.

about the delays in upgradation and the lack of essential avionics and weapon systems in two refurbished aircraft received in January and April 2006. Although a third aircraft was received in June 2008, all three refurbished aircraft did not carry a successfully integrated/proven Sea Dragon Suite in Indian conditions. The Indian Navy received the fourth refurbished aircraft in November 2009. The Sea Dragon Suite could be proven only in 2009. Notwithstanding the refurbishment, there are serious deficiencies related to the fitment of weather radar and communications system, which have restricted the performance of aircraft. Besides, the aircraft is without associated equipment like sonobuoys, missiles and bombs. The reduced availability of the MR aircraft has severely compromised the vigil on the western naval front as Navy could not achieve even one-sixth of the flying hours prescribed by Government during the period 2003-08.

### **2.2.2.3 Unnecessary expenditure on LRMR aircraft**

Eight LRMR/ASW aircraft Tu-142 were inducted into the Navy during 1987-88 with Total Technical Life (TTL) of 16 years or 5000 flying hours. Routine overhauls are to be undertaken after 1500 flying hours or five years whichever is earlier in the assigned TTL. Though the aircraft have been exploited below optimum performance level they have undergone several overhauls at Russia and extension of TTL of five aircrafts has been obtained extending their life ranging from 17 years to 24 years. The overhaul and life extension has been done at a total cost of Rs 902.63 crore. Audit observed that:

- The aircraft have been sent for overhaul even without completing the prescribed flying hours and much beyond the prescribed period of five years in all the cases.
- Till date, the total flying hours achieved by each aircraft in the 20/21 years of service ranged from 1648:37 hrs to 3648:49 hrs.
- In one case, the first overhaul of the aircraft was undertaken after 14 years in 2001 at a cost of Rs 44.91 crore. The aircraft had flown only 792 hours during this period. Nonetheless, just after two years of the overhaul and on completion of TTL, the aircraft was phased out in 2003.



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### Recommendations

- *Modernisation of the aircraft should be planned timely so that operational aircraft are kept with state-of-the-art equipment to meet any operational eventuality and to obtain value for money spent.*
  - *Fitment of a new system which directly affects the operational capability should be undertaken only when the prototype is proved successfully.*
- 

### 2.2.3 Acquisitions

The period 1990 to 2005 could be termed as the lost decades in so far as expansion of aviation assets is concerned. Although nine KA-31 helicopters for the Advanced Electronic Warfare (AEW) role and ten aircraft Dornier for SRMR role were inducted, there was no induction in the combat, LRMR and ASW fleets during this period.



*Kamov KA-31 (NATO reporting name 'Helix') is a military helicopter developed for the Soviet Navy and currently in service in Russia and India for the air borne early warning role.*

This gap has put tremendous strain on the Aviation Arm of the Navy. However, from 2000 onwards, contracts have been concluded / are being finalised for the acquisition of 16 MiG- 29K aircraft for combat role (January 2004), 11 Dornier aircraft for SRMR/ Para drop role (March 2005), 10 Advanced Light Helicopters (ALH) from HAL (without any formal contract), and six helicopters UH-3H (November 2006) from USA for the utility<sup>9</sup> role. Audit found that the acquisitions compromised the operational interests of the Wing as plans were delayed, aircraft procured did not possess required capabilities and final objectives remained unachieved as discussed below.

<sup>9</sup> Utility role is a general purpose role, usually used for transporting people or freight, but also for other duties when more specialised aircraft are not required / available.



### 2.2.3.1 Problems in induction of indigenously developed helicopter

The Navy, since 1984, has projected a provisional requirement for 120 ALH with 51 *per cent* being of the Utility type and remaining being ASW/Anti-Surface Vessel version. These helicopters, to be manufactured by HAL, were to be completely inducted by 2010 to replace the Chetak helicopter and Match role aircraft<sup>10</sup>. Selection of the ALH was done with a view to promote indigenisation and to standardise the types of helicopters in the Indian Navy. Induction of this helicopter was to begin by 1991 but there was a slippage of ten years in the development of the helicopter by HAL. After spending Rs 283.78 crore on design and development of the ALH helicopters and



*A multi role helicopter manufactured by Hindustan Aeronautics Ltd., also known as Dhruv was initially designed with assistance from MBB, Germany*

supply of two helicopters of 'Limited Series' by February 2002, IN reviewed its acquisition plans for the aircraft. It was decided that a reduced quantity (49) of these helicopters (both utility and ASW) of 'Series Production' would be acquired over a period of time till 2017. Notwithstanding HAL's poor track record, IN continued to release payments amounting to Rs 287.92 crore with attendant extensions in delivery dates, without signing a formal contract with HAL.

As of December 2009, only six utility helicopters had been delivered by HAL and these, too, were accepted by Navy with concessions. The helicopter is yet to prove its operational capabilities for off-shore operations in its main utility role viz., Search and rescue operations at sea, since the Automatic Flight Control System is not performing optimally and there are other inherent problems like blade folding. This has prevented IN from gainfully utilising even the limited exploitation potential of this aircraft in utility role. Parts of the associated equipment to be delivered along with the helicopter are yet to be supplied as some of the equipment is still under development. At present,

<sup>10</sup> Certain Chetak Helicopters which performed limited ASW role were called Match Role aircraft

Navy has no plans to induct any more ALH till all outstanding issues are liquidated by HAL.

Although the Utility version has been supplied by HAL, the ASW version of ALH has not materialised at all due to the inability of HAL to meet the laid down NSQRs<sup>11</sup>. Consequently, Navy decided in August 2005 to procure four more Utility variants in lieu of the ASW variants for which Government approval is yet to be obtained. The reason cited for the failure of ASW version was that the weapons and sensors as envisaged in the NSQRs could be met only by a 10 tonne class helicopter and not by a 5.5 tonne class of helicopter like ALH. Audit, however, observed that this was a fact long known to the IN and HAL. This indicates failure on the part of both IN and HAL to visualise the capability of the ALH as per requirements. Non-realisation of the ASW version also had its fall-out on related role equipment. For instance,

- An amount of Rs 137.58 crore was spent on the weapon system integration which has become unfruitful.
- Expenditure of Rs 11.99 crore incurred on a Research and Development Project for developing an Integrated Sonar System became infructuous due to non-availability of the platform for trials even though the project was completed in March 2002. Navy now has also decided against inducting the sonar due to its outdated technology.

### 2.2.3.2 Acquisition of phased out helicopters

The IN acquired six UH-3H helicopters under the Foreign Military Supply (FMS) programme, of a foreign Government, in November 2006, along with training and support facilities at an approximate cost of Rs 182.14 crore. These helicopters were acquired for utility purpose to be used on-board the Landing Platform Dock (LPD), INS Jalashwa, also acquired from the foreign Navy. The helicopters were received in September 2007, embarked on INS Jalashwa's maiden trip to India. Audit examination revealed that the helicopters procured were life-expired and had many defects which would ultimately compromise operational effectiveness.

The helicopters were manufactured between January 1961 and July 1965 and were decommissioned by the foreign Navy in 2005. These aircraft were on the verge of completing their air frame life and are on extended life.

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<sup>11</sup> Naval Staff Qualitative Requirements

- The joint visual inspection of the helicopters as well as the facilities carried out by an IN team in May 2006 reported that the overall condition of the helicopters was good enough to meet the requirements of Indian Navy for the next 10 years. However, citing time constraints, only two helicopters out of the six offered were subjected to minimum strip condition for inspection in the foreign country. The flight evaluation of all six helicopters proposed for purchase was not carried out in the foreign country by IN before acceptance as these were in fully preserved state and had to be regenerated prior to carrying out any flight evaluation. Hence, the actual flight evaluation of the UH-3H helicopter was carried out on



*The Sikorsky SH-3 Sea King (company designation S-61) is a twin-engined anti-submarine warfare (ASW) helicopter of US origin. It has been designed as an all-weather amphibious helicopter.*

*another* helicopter of the foreign Navy of similar make, type and of the same vintage.

- These helicopters were bought in ‘as is where is’ condition with no guarantee of supportability and replacement of defective rotables due to obsolescence. Further, the foreign Government would not be responsible for functioning of any ‘on board’ systems or equipment.
- These helicopters were delivered with many defects including Category A<sup>12</sup> defects resulting in non-availability of the helicopters leading to delay in training and the operationalisation of the squadron.
- The helicopters are devoid of any type of weather/surface surveillance radar, the most important sensor of a utility helicopter during its SAR operations.

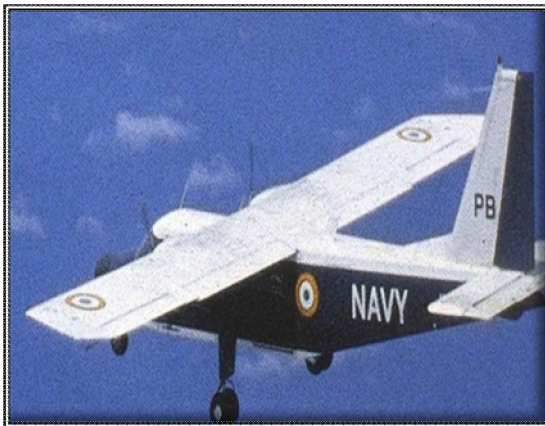
<sup>12</sup> Serious defect which requires replacement

- Delay on the part of Navy in pursuing receipt of LOA<sup>13</sup> before August 2006 resulted in extra payment of Rs 2.28 crore (USD 490,029) to the foreign Government due to enhanced administrative surcharge effective from 1<sup>st</sup> August 2006.

Considering the vintage of the helicopters and the obsolescence of spares, maintenance of the six refurbished helicopters by Indian Navy would be a challenging task and in fact, one helicopter has already been cannibalised to ensure serviceability of the other five helicopters.

### 2.2.3.3 Acquisition of MR Aircraft and its role equipment

In order to replace seven piston-engine Islander aircraft and four other Islanders lost due to attrition, IN concluded a contract with HAL for the supply of 11 Dornier aircraft in May 2005 along with role equipment and maintenance spares at a total cost of Rs 726 crore. These aircraft were delivered between March 2006 and November 2008. The aircraft are to be primarily used for the MRIW<sup>14</sup>/Para drop role.



*The Britten-Norman BN-2 Islander is a light transport aircraft and was designed and originally manufactured by Britten-Norman of the United Kingdom.*

<sup>13</sup> Letter of Offer and Acceptance

<sup>14</sup> Maritime Reconnaissance and Information Warfare



In 2005, the Maritime Capability Perspective Plan recommended that future Medium Range reconnaissance inductions would be those having greater endurance and range. IN already possessed 15 aircraft Dornier for performing the SRMR role and was aware that the aircraft lacked critical role capabilities, were of 1980s design and did not have weapon capability. Despite this, IN did not lay down NSQRs for an advanced MR aircraft and instead, went in for augmentation of their Dornier fleet. Further, although, the Dornier were being acquired in order to replenish the IN's fleet of SRMR due to loss/phasing out of the Islander, the Dornier cannot be termed as an exact replacement of the Islander as it lacks weapon capability.



*Dornier is a German-origin twin engine feeder transport and maritime patrol aircraft. Currently, worldwide sales and marketing rights for Dornier 228 are held by HAL.*

As per contract, HAL had to supply the aircraft after integration of special equipment, in a role-worthy state by the scheduled date of delivery. The aircraft without integration of such equipment was not acceptable to Navy. However, though 11 aircraft were supplied by HAL between March 2006 and November 2008, the aircraft were not (December 2009) role-worthy as the evaluation trials of the role equipment are likely to be completed by March 2010 only. For instance, in the case of the Eagle Electronic Support Measure equipment, although the system procured earlier in October 1999 at a cost of Rs 38.30 crore was yet to be proved, eight more Eagle ESM systems had been procured at a cost of Rs 51.72 crore for eight Dorniers under the current procurement. The performance of Eagle Electronic Support system continues to remain poor and inconsistent (December 2009). A decision was, therefore, taken to fit Time Difference of Arrival Antenna (TDOA) as an “add on equipment” on the Dorniers.

#### **2.2.3.4 Delay in acquisition of new combat aircraft and aircraft carrier**

A contract was concluded with the Russian Federation for a refitted aircraft carrier (Admiral Gorshkov) along with ‘J’ number of MiG-29K aircraft.

The aircraft, to be embarked on the carrier, were to be delivered between November 2007 and November 2008. However, due to delay in the delivery<sup>15</sup> of the aircraft carrier, the aircraft are scheduled for revised delivery between



*The Mikoyan MiG-29K (NATO reporting name “Fulcrum D”) is an all weather carrier based multi role fighter aircraft developed in Russia in the late 1980s.*

December 2009 and October 2010. Four MiG-29K aircraft have since been received (December 2009). The delay in delivery of the aircraft, however, was also attributable to the fact that the prototypes along with the weapon and equipment fit were yet to be proved and certified by the Russian Certification Agencies. Since these aircraft are to be used on the refitted aircraft carrier (Admiral Gorshkov), which is likely to be inducted by 2013 only, they will hardly be used optimally for the next three years.

#### **2.2.3.5 Non-synchronisation of works for establishment of facilities with acquisition of aircraft**

Adequate infrastructure needs to be in place for the operation of aircraft. Audit found that there were slippages in this area rendering the induction less effective for long periods. For instance, the contract for acquisition of ‘J’ MiG-29K aircraft from Russia was concluded in January 2004 with original delivery date as November 2007. However, sanctions amounting to Rs 52.28 crore for civil works to operate the aircraft were accorded only in March 2006, March 2007 and October 2007. Certain works were necessary to meet the urgent limited operational requirement of the first few batches of the MiG-29K and had to be completed by November 2007. However, as of December 2009, physical progress ranged from 73 per cent to 100 per cent in respect of these work services amounting to Rs 25 crore.

<sup>15</sup> Reported in Para no 2.1 of C&AG's Report No.CA 18 of 2008-09



Similarly, Unmanned Aerial Vehicles (UAVs) procured between December 2002 and March 2004 at a cost of Rs 567 crore could not be operationalised optimally as of December 2009 due to delay in creation of infrastructure for their operation. Mention of this was made in Para 2.2 of Audit Report for the year ended March 2005. Thus, non-synchronisation of the civil works with the receipt of UAVs has resulted in their non-utilisation to the optimum level for a period of six to eight years.

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#### Recommendations

- *While encouragement and support to the indigenisation effort should be continued, the limitations, if any, of such efforts should be clearly recognised and should not be at the cost of operational preparedness.*
- *Timeliness in completion of indigenous R&D projects may be improved in order for the expenditure to be fruitful.*
- *Second-hand platforms should be acquired for well-established reasons and should not become liabilities since such equipment will have limited serviceability and maintenance would be a challenge due to obsolescence of spares.*
- *Improve project management and monitoring so that civil works facilities essential for the operation of the aircraft are created in time*

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#### 2.2.4 Repair, Maintenance and Spare Management

The first and second line servicing of aircraft is carried out at the Squadron/Air Station itself while the third and fourth line servicing is carried out at Naval Aircraft Yards (NAY) /Base Support Facility. Overhauling of the engines is carried out either at the OEM<sup>16</sup> abroad or at the facilities created indigenously.

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<sup>16</sup> Original Equipment Manufacturer



### 2.2.4.1 Delay in repair

Repair/ maintenance and overhaul of aircraft in Naval Aviation is termed as inspection. The repair/maintenance of the aircraft is to be carried out on a fixed schedule as prescribed by the OEMs and published by the Naval Aircraft Servicing Development Organisation (NASDO). The duration of the inspections is also prescribed.



*Seaking is a British-made anti-submarine warfare system with fully computerised control systems.*

Out of the total 92 repair and overhaul inspections carried out during 2003-08, it was found that 80 *per cent* of the cases were delayed. Details of the delayed cases are tabulated below:

#### **5** Extent of delay in inspections

Aircraft/ helicopter	No. of delayed cases	Days to be taken as per rules	Days actually taken
Sea King	12	1386	3849
KA-28	13	396	1393
KA-31	10	924	1919
Islander	14	1080	4135
TU-142	20	774	1479
IL-38	5	210	637

\* Inspection in progress has not been taken into account.

### 2.2.4.2 Uneconomical recovery programme for Helicopters

IN had acquired 20 ASW helicopters, Seaking 42-B, from a foreign firm between 1986 and 1989. Seven of the helicopters were placed under Long Term Storage<sup>17</sup> during the period ranging from July 1995 to February 2000.

<sup>17</sup> Storage periods exceeding one year are deemed to be Long Term Storage

These helicopters subsequently became unserviceable due to extensive removal of spares after the post-Pokhran sanctions. In 2003, IN approached the OEM to explore the feasibility of recovery of these helicopters. To avoid the delay involved in provisioning and delivery of a sizeable number of rotables and spares, IN decided to offload the work to OEM (M/s Westland Helicopters, UK) on a “turnkey” basis for timely recovery. Accordingly, IN concluded a contract with the OEM in July 2006 at a total cost of Rs 256 crore. As per the contract, the first helicopter was to be recovered by July 2008 and remaining helicopters by March 2009. However, only two helicopters have so far (February 2010) been repaired and the work is in progress on the remaining 5 helicopters. The total payment made till February 2010 is UKP 28.42 million (Rs 241.03 crore) including UKP 21.71 million<sup>18</sup> (Rs 184.11 crore) for spares and ground support equipments. Audit examination of the papers leading to recovery programme revealed the following:

- Facility and expertise exist at Naval Aircraft Yard (NAY), Kochi for in-house repair of these helicopters, without external assistance of OEM. Nonetheless, the contract for recovery was awarded to the OEM without assessing the feasibility of getting the helicopter repaired by NAY. Subsequently, it was found that the available facility and manpower of NAY would be able to handle the recovery of all the seven helicopters if spares, rotables and BDS<sup>19</sup> were procured. Had this option been examined earlier, the helicopter could have been repaired in a more economical and timely manner and an amount of Rs 58.78 crore paid for administrative<sup>20</sup> services would have been avoided.
- Spares constitute almost 75 per cent of the cost of recovery programme. Defence Procurement Manual stipulates that price reasonableness should be ascertained, especially in single tender cases, based on the last purchase price (LPP), material component, technology involved etc. However, in this case, no such comparison was made. To have a better appreciation, audit selected 35 spares of high value comprising about 45 per cent of the total cost of spares and found that in respect of 14 items where LPP were available (2001- 07), the prices accepted were abnormally high to the extent of 2640 per cent resulting in an extra payment of approximately Rs 26 crore in these cases alone.

<sup>18</sup> 1 UKP = Rs 84.80

<sup>19</sup> Break Down Spares

<sup>20</sup> Process and Programme Planning, Aircraft Recovery Programme Management and Engineering Support

### 2.2.4.3 Delayed setting up of repair / overhaul facilities

Audit noticed that in two cases, repair / overhaul facilities were established when the TTL of the aircraft was about to expire. Despite the creation of these facilities, the assigned overhaul tasks could not be achieved and intended benefits could not be derived as the components are still being sent abroad for repair/overhaul.

#### Case I: Helicopter Seaking 42-A/Seaking 42-B Transmission System

Limited repair / overhaul facilities set up for the Seaking 42-A/Seaking 42-B helicopters at NAY Kochi and HAL Bangalore did not include facilities for the overhaul of certain equipments. Consequent to US sanctions post-Pokhran, repair/overhaul of these items could not be done abroad affecting the operational availability of the helicopter. To overcome such situations, approval was accorded in October 2001 for setting up repair/overhaul facility at HAL for the transmission system components at an estimated cost of Rs 71.68 crore. Thus, the facility was commissioned in July 2004, 20 years after the induction of the last helicopter. Even after such delay, the infrastructure was not able to meet the requirement and could complete only 72 per cent of task allotted and the remaining had to be sent abroad.

#### Case II: Pegasus engine of aircraft Sea Harrier

Sea Harrier aircrafts were inducted during the period 1979-86. However, the facilities for overhaul of four Pegasus engines in a year were commissioned in September 2002 at NAY, Kochi. Audit observed that during the years 2002-03 to 2007-08, NAY, Kochi was tasked to overhaul a total of 21 engines against which only 14 engines could be overhauled. Three engines were also repaired during this period. During this period, three engines were off-loaded to M/s Rolls Royce UK for overhauling at a cost of Rs 88 crore. Thus, even though facilities were set up after a gap of 16 to 23 years, the facilities were not sufficient to cater to the needs of the Navy.

### 2.2.4.4 Inordinate delay in repair of rotables

Rotables<sup>21</sup>, for which repair facilities are not set up in India, are first sent abroad for assessing the extent of repairs required. After the technical evaluation, a financial quote is submitted by the vendor / firm to Navy and accordingly, repair orders are placed. Audit observed that out of 1,779 rotables

<sup>21</sup> Component or inventory item that can be repeatedly and economically restored to a fully serviceable condition

sent for repair after such evaluation, 376 are lying with various agencies for a period ranging from two to more than ten years. In reply, Navy stated that rotables were held with the repair agencies and repair was being expedited by IHQ in respect of foreign agencies and by Material Organisation, Kochi in respect of PSUs and other repair agencies. In audit opinion, the holding of such a large number of costly rotables for long periods indicates a lackadaisical approach on the part of Naval authorities in effectively pursuing timely repair of rotables. Non-availability of the rotables also impacts the availability of aircraft for operational use.

#### **2.2.4.5 Injudicious Provisioning of Spares**

Provisioning of spares in respect of certain aircraft was not rational as the aircraft were either being decommissioned or there existed a large stock, thereby leading to unwarranted expenditure. Details are discussed below.

##### **Case I: Islander aircraft**

The Islander aircraft is more than 30 years old and was envisaged, in 2003, to be phased out by 2008. Nonetheless, orders worth Rs 40.09 crore for minor spares were placed during the period 2004-06 in respect of three Annual Reviews of Demand. Besides the fact that the requirement for these spares should have been examined *de novo*, audit also noticed that as a result of lack of due diligence there was wide variation in rates accepted for same items within nine days of conclusion of two separate contracts, resulting in an avoidable payment of Rs 33 lakh. In response, Naval authorities replied that the spares procured would be consumed as the Islander is expected to be in service till 2012. Audit, however, observed that costly spares received against one order had been sparingly used and based on their Annual Consumption Level (ACL), the existing stock of these spares would last for another 25 years. IHQ, therefore, in July 2008, reviewed the ordered quantity against the purchase order and cancelled the outstanding order for 72 items costing Rs 2.90 crore.

##### **Case II: Sea Harrier aircraft**

Against 'X' number aircraft, Navy is holding 26 engines which become due for overhaul after flying 800 hours each. In the last five years, the total annual flying task for all squadrons of the fleet has been 6500 hours. Of the 26 engines, the engines already fitted on the aircraft have 4,810 hours before the next overhaul. There are another six serviceable engines in inventory with 4,800 hours before the next overhaul. This implies that together the engines

already fitted and those lying in inventory would suffice for the next five years. Ignoring the fact that the aircraft is likely to be in operation only upto 2012, Navy entered into a contract in February 2007 for purchase of spares for overhauling 20 engines at a cost of Rs 387.81 crore which was avoidable.

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## Recommendations

- *IHQ (N) should take effective measures to minimise delays in the commencement and completion of inspection by ensuring timely supply of essential spares and manpower so that aircraft down time can be avoided.*
  - *Creation of repair/overhaul facilities should be planned simultaneously at the time of induction of aircraft itself so that maximum benefits accrue timely.*
  - *Feasibility of repair by local agencies should be ascertained before concluding contracts with foreign sources.*
  - *IHQ (N) should ensure the optimal utilisation of the facilities created by setting the benchmarks for repair and overhaul.*
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### 2.2.5 Aviation Training

*Ab initio* training for naval pilots is imparted at the IAF training academy. Subsequently, Naval Aviation imparts conversion/ re-familiarization training on the specified aircraft. The training is aircraft oriented and carried out on as-required basis.

#### 2.2.5.1 Training of Pilots

In recent years, IN has sent pilots abroad for training. Mention was made in Paragraph No. 2.3 of C&AG's Report for the year ended March 2006 about Navy's failure to synchronise pilot training abroad with the acquisition schedule of the newly-acquired fighter aircraft. In another contract with the Government of the same country, audit noticed that Indian Navy could not sign the Letter of Acceptance in time. As a result, a truncated training programme was agreed upon which was almost half the size of the original programme.

#### 2.2.5.2 Instructors

Although dedicated training squadrons exist in IN, the number of instructors required has neither been identified nor sanctioned. Navy stated that aircrew officers are trained as instructors viz., Qualified Flying Instructors (QFI) and Qualified Navigation Instructors (QNI) based on operational requirements. In

the absence of sanctioned number of QFI and QNI, adequacy of instructors could not be ascertained in audit.

### 2.2.5.3 Achievement of Flying Tasks

In training squadrons imparting training on the Sea Harrier and ALH, there was a shortfall in achieving the authorized flying tasks due to non-availability and poor serviceability of the aircraft held during the period 2003-08. The shortfall ranged from 5 per cent to 57 per cent in the case of the Sea Harrier and 6 per cent to 75 per cent in case of the ALH.

### 2.2.5.4 Training Equipment and Other Aids

- Out of six trainer Sea Harriers procured during 1984-2003, three were lost due to attrition and only one was available in the training squadron with 29.42 per cent serviceability.
- Mention was made at Para 2.8 of Audit Report for the year ended March 2007 regarding delay in upgradation of a Seaking 42-A simulator. The upgradation of the simulator has not progressed further and contract for upgradation is being re-negotiated by IHQ. Meanwhile, during the period 2003-04 to 2007-08, training for 20 pilots and seven observers has been imparted on the helicopter. In the absence of a serviceable simulator, the entire training<sup>22</sup> is being carried out on the aircraft resulting in avoidable expenditure as well as lowered safety levels.

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#### Recommendations

- *A policy for number of instructors, their qualifications and duties in a squadron needs to be promulgated.*
- *Vital training aids like simulator should be made available to impart quality training.*

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## 2.3 Conclusion

Naval Aviation holds the key to achieving the 'blue water' aspirations of the Indian Navy. This report, however, discloses that the current status of the Naval Aviation Wing's fleet would not only render it ineffective in achieving these goals but would rather make it vulnerable to the growing sophistication of enemy capability. The aircraft fleet and carrier are characterized by

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<sup>22</sup> 55/40 hours of training on a simulator before undertaking training on the aircraft.

shortfalls in availability and life-expired assets. Quality of aircraft for reconnaissance and other roles is relatively poor as at any given point, almost two-thirds of the aircraft assets are under repair, maintenance or storage. Several operational assets are functioning sub-optimally with either obsolescent equipment or unproven modifications. Serviceability levels are also low for the approved UE of combat, ASW and MRSR aircraft and these levels have also been achieved by decreasing the flying tasks to ensure that the assets are not stretched rather than by increasing efficiency. Despite the fact that the age of the assets requires quick and effective repair and maintenance, audit found that these activities need greater focus and better management. Finally, augmentation of the Wing's assets both with respect to technology and numbers is critical as delayed and flawed modernisation programmes have not yielded desired benefits.

The matter was referred to the Ministry in October 2008; their reply was awaited as of February 2010.

**New Delhi**  
**Dated:**

**(C.M.SANE)**  
**Principal Director of Audit**  
**Air Force and Navy**

**Countersigned**

**New Delhi**  
**Dated:**

**(VINOD RAI)**  
**Comptroller and Auditor General of India**