

## Transformation of the Indian Air Force over the Next Decade

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### *Summary*

The Indian Air Force (IAF) is in the midst of a major equipment renewal. This process involves the induction of several advanced weapon and combat support systems that are likely to transform the IAF over the next decade. The IAF is additionally expected to address other problems, such as manning shortages, training shortfalls, and organisational inefficiency, which it currently faces, in innovative ways to transform itself into a much more potent and “able-to-deliver” force. While no clear announcement of the IAF’s planned transformation exists in the public domain, it is possible to shed light on the direction being taken from media and open sources. The ongoing transformation is aimed at developing the IAF’s capabilities; this is not necessarily aimed at any other country, but rather to make it capable of delivering what is required of it. Given the very nature of air power and seeing the track record of the IAF since its inception in 1932, the question is not “if” but “how, and at what pace”, the IAF will transform over the next five to ten years.

## Introduction

The Indian Air Force (IAF) is in the midst of a major equipment renewal. This process involves the induction of several advanced weapon and combat support systems that are likely to transform the IAF over the next decade. The IAF is additionally expected to address other problems, such as manning shortages, training shortfalls, and organisational inefficiency, which it currently faces, in innovative ways to transform itself into a much more potent and “able-to-deliver” force.<sup>1</sup> While no clear announcement of the IAF’s planned transformation exists in the public domain, it is possible to shed light on the direction being taken from media and open sources. The ongoing transformation is aimed at developing the IAF’s capabilities; this is not necessarily aimed at any other country, but rather to make it capable of delivering what is required of it. Given the very nature of air power and seeing the track record of the IAF since its inception in 1932, the question is not “if” but “how, and at what pace”, the IAF will transform over the next five to ten years.

## The Transformation Process

### Equipment Induction and Replacement

The Union War Book tasks the IAF with the Air Defence of all Indian territories.<sup>2</sup> It is towards this responsibility that the IAF is in the process of inducting modern Surface-to-Air Missiles (SAMs), such as the indigenously designed and built *Akash* to replace older Soviet era SAM-III systems. Further, the collaboration with Israel towards developing a variant of the existing *Barak* SAM to meet the IAF’s Long Range SAM (LRSAM) project continues. This system should see induction within the next five years in parallel with increasing numbers of the 25 km range indigenous *Akash* SAM. Induction of at least four more Aerostat radar systems imported from Israel should also be completed within the next five years in view of the acceptable performance of the first two such systems purchased by the IAF. In addition to imports of aerostat radars from Israel, a simultaneous induction of indigenous Aerostat systems designed and built by the Defence Research and Development Organisation (DRDO)<sup>3</sup> should also commence in five years and lead to about eight to ten such indigenous systems being in service ten years hence. These aerostats

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<sup>1</sup> See Vivek Kapur, “Major Issues of Immediate Concern for the Indian Air Force,” *IDSA Comment*, available at [http://idsa.in/idsacomments/MajorIssuesofImmediateConcernfortheIndianAirForce\\_VivekKapur\\_110612#.T9WTwrCm-Tw](http://idsa.in/idsacomments/MajorIssuesofImmediateConcernfortheIndianAirForce_VivekKapur_110612#.T9WTwrCm-Tw).

<sup>2</sup> Air Marshal (Retd.) V.K. Bhatia, “Air Defence – Defending India’s Airspace”, *SP’s Aviation.net*, No. 2-12, 2012, available at [http://spsaviation.net/story\\_issue.asp?Article=825](http://spsaviation.net/story_issue.asp?Article=825), accessed 10 March 2012.

<sup>3</sup> “DRDO Aerostat Radars Undergoing Full Payload Trials at ADRDE Labs”, available at <http://www.india-defence.com/reports-4915>, accessed 25 May 2012.

could, it is expected, be supplemented by larger numbers of indigenous *Rohini* and *Reporter* ground-based radars.

The current fleet of three *Phalcon* AWACS could be expected to increase to a total of five such aircraft within the next five years. Starting at about three to four years from now, the DRDO developed indigenous EMB-145 based AEW&C platform should start to enter service, increasing to six such platforms in the next ten years. The radar network (ground and air based) and SAMs would be backed by an Air Defence aircraft force comprising of primarily the *Tejas* LCA aircraft supplemented by a few *MiG-21 Bison* (its phasing out will begin seven to ten years from now) and *MiG-29* upgrade aircraft.<sup>4</sup> A limited number of *Su-30MKI* and *Rafale* could also be expected to be assigned for Air Defence duties depending upon the situation.

In ten years time, the indigenous ballistic missile defence (BMD) system based on the *Swordfish* radar (a modified and enhanced partially indigenous Active Electronically Scanned Radar [AESA] radar derived from the imported Israeli *Green Pine* radar) and the *Prithvi* and Advanced Air Defence (AAD) missiles should be approaching initial operational capability (IOC) in parallel with possible inductions of Israeli *Arrow3* and/or American *Standard Missile (SM)-III* systems in smaller numbers.<sup>5</sup> The BMD capability should be able to protect vital areas of the hinterland as well as forward based forces against known Pakistani and Chinese ballistic missiles on minimum energy, lofted and depressed trajectories.<sup>6</sup>

### **Evolving Shape of the IAF Aircraft Fleet**

The aircraft fleet of the IAF is likely to undergo major changes as well. The *Su-30MKI*, numbering about 272 aircraft, would continue to form the high and heavy end of the fleet. The low end would be comprised of the *Tejas* LCA which, by then, would be in final operational clearance (FOC) configuration. *Tejas* numbers could be expected to be in the region of 350 to 450 aircraft. The current three squadrons of *MiG-29* would be well into their upgrade and would be available in upgraded form about five years hence. Likewise, the three squadrons of *Mirage-2000H* would also be available in upgraded form in a similar timeframe.

The rotary wing fleet should retain the same inventory more or less with the most significant changes being the entry of larger numbers of *Dhruv* Advanced Light Helicopters

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<sup>4</sup> Ibid.

<sup>5</sup> See "DRDO Ballistic Missile Defence System, India", *Strategic Defence Intelligence*, available at <http://www.army-technology.com/projects/drdo-bmd>, accessed on 9 May, 2012; see also <http://www.army-technology.com/projects/drdo-bmd/>, accessed on 29 May 2012.

<sup>6</sup> Dean Wilkening, "The Effectiveness of Indian Ballistic Missile Defense Options", Paper presented at Centre for Air Power Studies, New Delhi, 18 December 2008.

(ALH) as well as upgraded *Mi-8/17/17-1V/ 17-5V*. In addition, the Light Combat Helicopter (LCH) will be inducted starting about five years hence in parallel with the *Apache Longbow-III* attack helicopters.

In the fighter category, the most significant change should be the completion of the development of the Indian Fifth Generation Fighter Aircraft (FGFA) from the *Sukhoi T-50/ PAK FA* baseline by the end of this decade and the commencement of induction of FGFA into service starting about ten years hence against a total order of 250 or more. Older aircraft types would be retired in a phased manner so that the available numbers of aircraft to the IAF does not fall excessively until the force level required has been built up with new inductions.<sup>7</sup> This could see the *MiG-21 Bison*, *MiG-29* and *Mirage 2000* upgrades continue in service well into the 2020s, with carefully staggered retiring of these fleets commencing from 2025.

The IAF's airlift capability would also be considerable as, in the next five to ten years, all 16 *C-17* aircraft and a total of nine to twelve *C-130J* would be in service and be supplemented slowly with the Indo-Russian collaboratively developed Multi-role Transport Aircraft (MTA). The *Il-76* should be commencing retirement from service about the same time.<sup>8</sup>

Weapon induction should also see a change with the indigenous *Astra* missile becoming the standard fit Beyond Visual Range (BVR) standardised across all IAF aircraft fleets in the next ten years. The short range close combat missile of choice is likely to be the Russian *R-73* and its newer variants. Once the *Astra* is in service, there could be indigenous development of short range close combat missiles either derived from it or developed independently. For precision attack, the *Helina* (an air launched variant of the *Nag* anti-tank missile) with an imaging infra red (IIR) seeker backed by an upgraded variant of the currently available algorithm able to discriminate targets including moving targets even in heavy clutter, should be the standard fit across all types of IAF aircraft.<sup>9</sup> Indigenous Precision Guided Munitions (PGMs) with satellite navigation-laser designation/terrain matching/optical hybrid guidance systems developed indigenously should become available in the five to ten year period given that work on such weapons is being pursued, albeit at a slow pace, because these fall under unfunded private research at a few DRDO laboratories in the absence of firm IAF orders and sanction to develop such weapons.

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<sup>7</sup> Air Marshal (Retd.) V.K. Bhatia, "Our Focus is to Transform into a Capability-based Force Rather than Being Adversary-centric", interview of Air Chief Marshal P.V. Naik, *SP's Aviation.net* issue, No. 2-12, 2012, available at [http://spsaviation.net/story\\_issue.asp?Article=736](http://spsaviation.net/story_issue.asp?Article=736), accessed 28 May 2012.

<sup>8</sup> "Interview: ACM P.V. Naik", available at <http://www.forceindia.net/ForceJanuary/OctAirforcepdfs/Interview%20ACM%20P.V.Naik.pdf>, accessed 29 May 2012.

<sup>9</sup> Author's interaction with scientists, engineers and designers at R&D laboratories during September 2011.

## Network Centric Warfare Capabilities

Within five years, the IAF would have its proprietary AFNET network fully in place with enhanced encryption features implemented. The Integrated Air Command and Control System (IACCS)<sup>10</sup> should also be ready with all its modules including encrypted jam resistant wireless component, thus giving the IAF full networked war fighting capabilities. The data link system embedded in the IACCS architecture would enable high situational awareness for all war fighters and the battle commanders even at “remote from the battlefield” locations. The IAF would, in ten years, be moving towards dynamic targeting of ordnance. It would be in the process of developing capability to data link with, say a missile in flight, to reassign its target or modify its attack profile on the fly.<sup>11</sup>

The IAF would be developing Two Stage to Orbit (TSTO) craft in consultation with and through the DRDO and ISRO, to ensure assured space access when required. Interest in micro-satellites for defence support tasks is also likely to increase in view of the fact that such small satellites can be launched by lower lift capability launchers or even from aircraft with suitably modified boosters at much shorter notice than heavy satellites. Such raid satellite launch capability is likely to be crucial for a networked organisation to operate effectively. Ten years from now this project could be expected to be at technology demonstration stage. The IAF should also at this time be commissioning dedicated research into Directed Energy Weapons (DEW) at institutes of higher learning and research centres in the country.

## What Needs to be Kept in Mind

There are a few salient features of the planned transformation of the IAF over the next five to ten years that merit attention.

- The IAF is moving towards advanced capabilities in platforms and systems.
- The focus is slowly shifting towards indigenisation, i.e., production of all major and crucial systems within the country.
- Between license production (which leads to obtaining “know how”), technology transfer, and “know why” (which leads to actual technology transfer and gains in design and development skills), the latter are being preferred. For instance, this aspect may have played a part in the choice of the *PAK FA* over the F-35 JSF offer from the US. The MTA, LRSAM and other projects also demonstrate a bias towards collaborative

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<sup>10</sup> Rajat Pandit, “IAF’s Defence Network Set for December Boost with IACCS”, available at [http://articles.economicstimes.indiatimes.com/2011-10-07/news/30254039\\_1\\_indigenous-medium-range-rohini-radars-lltrs-mprs](http://articles.economicstimes.indiatimes.com/2011-10-07/news/30254039_1_indigenous-medium-range-rohini-radars-lltrs-mprs), accessed 25 May 2012.

<sup>11</sup> See Wilkening, n.6.

development rather than “buy and make” as seen in the MMRCA deal; this MMRCA license manufacture agreement may have been found acceptable in view of the great time pressure to induct aircraft at the earliest given the currently falling numbers of fighters due to unplanned retirement of a few squadrons from IAF service.

- Several high-end systems for the IAF have been developed totally indigenously in the public and the private sectors of the Indian Aerospace Industry. These include the secure and encrypted pan Air Force wide area network (WAN), AFNET, IACCS, and the Advanced Command Air Tasking System (ACATS), to name a few. Other noteworthy indigenous systems in or about to enter service are the *Reporter* and *Rohini* radars, *Tejas* LCA, *Dhruv* ALH, LCH and EMB-145 based AEW&C system.
- Purchases of defence and civil equipment from foreign sources are now accompanied with offset clauses varying from 30 to 50 per cent.
- There are great opportunities for foreign companies to enter into genuine collaboration with Indian players in the public and private sectors of the aerospace industry in India to design and develop new systems and platforms leading to a win-win situation for both sides, given India’s proven “frugal engineering” and Information Technology (IT) skills. Just these two proven skills available in India justify the setting up of joint ventures (JVs) in the aerospace field by foreign technology giants with Indian companies, quite independent of bidding for any civil or military contract and its offset requirements.
- Foreign governments and companies will require to shed their erstwhile “sell and maybe give a license to make” policy in favour of genuine from-the-ground-up collaborative design and development. A step in this direction has been made by the Indo-Russian *Brahmos* project.<sup>12</sup> More than the original *Brahmos* project,<sup>13</sup> this is more applicable to the new hypersonic variant of the *Brahmos* missile being developed jointly.<sup>14</sup> The Indo-Russian collaboration for the *PAK FA* fifth generation fighter aircraft

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<sup>12</sup> “History of Missile”, *Brahmos Aerospace*, available at <http://brahmos.com/content.php?id=10&sid=8> and “Joint Venture” *Brahmos Aerospace*, available at <http://brahmos.com/content.php?id=1>, accessed 10 March 2012.

<sup>13</sup> The Soviet era P-570 “Moskit” supersonic anti-ship cruise missile predates the *Brahmos* by several years. This supersonic cruise missile was also exported to China and remains in service with the PLA. Thus the *Brahmos* was not the world’s first or only supersonic cruise missile. However, no operational hypersonic cruise missile exists as on date. While *Brahmos* is likely to have benefited from earlier Russian know-how from the P-570 era and thus may not have featured true collaboration in design and development with transfer of “know why” aspects, the hypersonic *Brahmos* is likely to feature genuine co-development of a new system through pooled expertise and mutual learning.

<sup>14</sup> “Hypersonic Version of *Brahmos* Missile on the Way”, *The Economic Times*, 9 October 2011, available at [http://articles.economictimes.indiatimes.com/2011-10-09/news/30260244\\_1\\_air-version-stealth-supersonic-cruise-missile-india-s-defence-research](http://articles.economictimes.indiatimes.com/2011-10-09/news/30260244_1_air-version-stealth-supersonic-cruise-missile-india-s-defence-research), accessed on 09 March 2012.

(FGFA) wherein India is partly funding a substantial part of the project in exchange for design involvement and development of a variant to meet India's specific needs is another tentative step in this direction.<sup>15,16</sup>

## Organisational and Structural Changes

The IAF is likely to resolve its current manning issues through the induction of women in all branches and jobs, while at the same time evolving a gender neutral short-service cadre that is assisted to find employment in other sections of the economy post tenure. This would form a ready reserve force for recall during periods of hostility with a permanent commission cadre at its core. There is also likely to be greater emphasis on multi-skilling of personnel from the initial training period itself in order to improve upon productivity and efficiency of IAF manpower. The IAF should also be in the process of completing a re-organisation of its organisational structure and cadre to promote flexibility and efficiency while minimising costs.

The transformation of the IAF will, however, be dependent upon and be influenced by a few major factors:

- The growth of the Indian economy: only robust growth of the economy can ensure adequate funding for the various projects already sanctioned or awaiting final clearance.
- Fructification of a few long period indigenous technology development initiatives, especially in sensors and their integration.
- The geo-political scenario: an increased perceived threat of military confrontation with India's neighbours would spur on the programmes discussed above, while a benign security situation would lead to less urgency to build up capabilities rapidly. The latter situation may further result in other military or non-military programmes taking higher priority for allotment of resources, possibly leading to inadequate allotment of funds and consequent slippages in schedules for IAF's modernisation.
- Any serious natural disaster could potentially disrupt the transformation process both directly (through the impact of such a disaster on the laboratories, etc., involved in the

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<sup>15</sup> Kalyan Ray, "India, Russia Ink Biggest-ever Military Deal" *Deccan Herald*, 21 December 2011, available at <http://www.deccanherald.com/content/122447/india-russia-ink-biggest-ever.html>, accessed on 9 March 2012.

<sup>16</sup> Maj. Gen. (Dr.) G.D. Bakshi, "Exclusive Interview of Chief of Air Staff", *Defence and Security Alert*, available at <http://www.dsalert.org/aerospace-power-in-india/289-exclusive-interview-of-chief-of-air-staff>, accessed 10 March, 2012.

work) and indirectly (through the need to re-prioritise the entire national effort and resources towards disaster alleviation efforts).

- A major unforeseen technology breakthrough in India or abroad that could make the entire transformation effort redundant.

The IAF's transformation process is likely to progress in the manner indicated above. It is important to note that true technology co-operation with foreign vendors who have access to advanced technology is likely to be the greatest challenge and opportunity for foreign as well as Indian companies operating in the aerospace field.

## Conclusion

Being a technology-dependent organisation, the IAF has been in a state of transformation for most of its existence. However, the speed of technological advancements has led to greater emphasis on its current transformation. This process, over the coming decade, appears poised to add to the IAF's combat potential in a major way through induction of advanced weapon and combat support systems. These changes span the induction of new aircraft, radars, and networking equipment to organisational and manning changes. All the aspects of this transformation share the common characteristic of being tailor-made to make the IAF more efficient and effective in execution of the tasks entrusted to it by the nation.