



CENTRE FOR AEROSPACE POWER AND STRATEGIC STUDIES

REMINISCENCES OF IAF FROM THE PAST

16/2026

12 January 2026

A History of Partnership: The Indian Air Force and Growth of Indigenous Basic Trainer Production in South India

Mr Atul Chandra

Research Scholar, Unni Kartha Chair of Excellence



Caption: The HPT-32 'Deepak' was India's second indigenously developed basic trainer aircraft.

Credit: Bharat Rakshak



Disclaimer: The views and opinions expressed in this article are those of the author and do not necessarily reflect the position of the, Centre for Aerospace Power and Strategic Studies [CAPSS]

This work is licensed under Creative Commons Attribution – Non-Commercial – No Derivatives 4.0 International License.



Centre for Aerospace Power and Strategic Studies |



@CAPSS_India |



Centre for Aerospace Power and Strategic Studies |



Centre for Aerospace Power and Strategic Studies

Keywords: IAF, HAL, Bangalore, HT-2, HPT-32, HTT-34, HTT-40, Basic Trainer

Introduction

The Indian Air Force (IAF) has a proud legacy of undertaking basic flight training in South India. IAF air bases and training establishments located in the region, have made it the 'cradle' of military flight training in India. Since Independence, the IAF's requirements for basic trainer aircraft have also aided in the growth of aeronautical manufacturing in Southern India. Since 1948, a total of three indigenous basic trainer aircraft, the HT-2, HPT-32 and more recently, the HTT-40 have been developed and manufactured in India. While the latter two basic trainers were vitally important in the growth of India's nascent domestic aeronautical design and development capability, the completion of design and development of the HTT-40 signals the maturity of the nation's domestic aerospace and defence ecosystem, which is today producing fighter aircraft, trainer aircraft, utility and attack helicopters. The deliveries of the HTT-40 to the IAF are now slated to begin in Q1 2026.

As we strive towards the goal of 'Atmanirbhar Bharat' and self-sufficiency in defence production, it is important to note that the IAF, from 1948 till now, continues to drive the growth of India's aeronautical industry and will continue to do so.

This is the second of a 3-part-series on indigenously developed basic trainers for the Indian Air Force

PART 2

Piston Pioneer

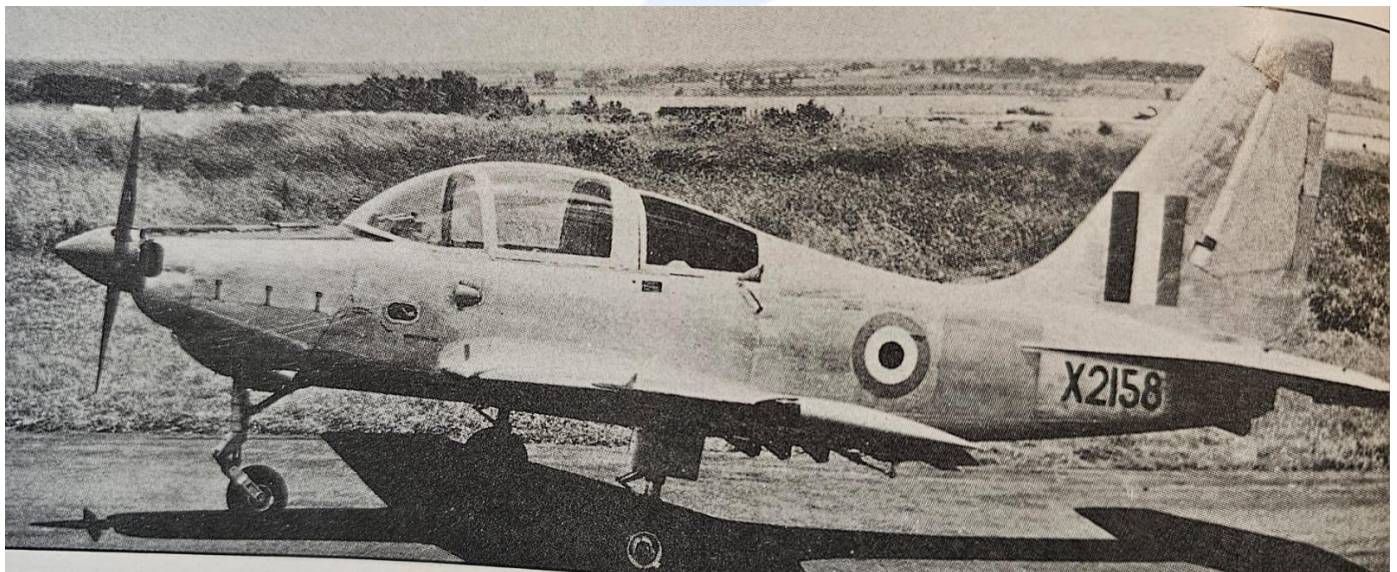
Following in the footsteps of the HT-2, in 1975 HAL began preliminary work on the development of a new basic trainer for the IAF. The Government sanctioned the design and development of a new basic trainer aircraft in 1976 at a cost of INR 5.53 crores. The requirement was for a total of 161 trainer aircraft and work was proceeding in earnest by 1977.



Caption: The HPT-32 'Deepak' was India's second indigenously developed basic trainer aircraft.

Credit: Bharat Rakshak

The design of the Hindustan Piston Trainer 32 (HPT-32). proceeded swiftly, with the first 1st HPT-32 prototype (X 2157) making its maiden flight in Bangalore on 6th January 1977, piloted by Wg Cdr Inder Chopra, HAL's Chief Test Pilot (CTP). The second HPT-32 prototype made its maiden flight in March 1979, incorporating several modifications. The third and last prototype made its maiden flight on 31st July 1981 and was representative of the final production version and significantly lighter than the first two prototypes.¹



Caption: The HPT-32 'Deepak' had side-by-side seating for two persons under a rearward sliding jettisonable framed canopy.

Credit: *The Flying Machines of the Indian Air Force 1933 to 1999* by Vijay Seth. 2000.

The HPT-32 is a cantilever, low-wing monoplane and of all-metal construction. Unlike the HT-2, the HPT-32 was a nose wheel aircraft with side-by-side seating for two persons under a rearward

sliding jettisonable framed canopy. The HPT-32 also had the provision for a seat behind the instructor and trainee, along with space for some luggage. This was due to the fact that HAL had also planned to offer the aircraft to undertake liaison roles. The aircraft had a non-retractable tricycle type landing gear. The aircraft was powered by a Textron Lycoming AEIO-540-D4B5 flat-six 260 hp engine, driving a Hartzell two-blade constant-speed metal propeller. Fatigue life was quoted as 6,500 hours.



Caption: An HPT-32 'Deepak' is displayed at HAL's Heritage Museum in Bengaluru.

Credit: Warbirds of India

The IAF went on to place an initial production order for the new basic trainer in 1981, ordering 40 aircraft with an additional requirement for 100-150. At the time, the cost of each aircraft was estimated at INR 19.25 lakh.²

The HPT-32 was inducted into the Indian Air Force in March 1984. The trainer aircraft was used for Stage 1 flight training providing pupils with 65 AIAF hours of flying.

HAL completed the delivery of 40 HPT-32s by March 1987. Just as it was with the HT-2, the Navy also acquired the HPT-32, ordering nine aircraft. INAS 550-B Flt at Kochi which was equipped with Islander aircraft in 1976, went on to induct the HPT-32 in January 1986. The squadron completed basic flying training on the HPT-32 in October 1987, for the first batch of six naval pilots. However, training on the HPT-32 was discontinued soon after, and the squadron ceased further basic flying training on the type.³

The IAF placed three additional orders for the HPT-32 in August 1988, January 1990 and March 1992 for 40, 30 and 24 additional aircraft respectively. In total, the IAF placed orders for 134 HPT-32s.

A turboprop version of the HPT-32, called as the HTT-34 took to the air for the first time on 17th June 1984 piloted by Wg Cdr Ashok and another pilot. "The aim was to enhance its performance, while also overcoming the nagging supply problems of high-octane fuel. A turboprop engine uses turbine fuel (refined kerosene). "The more powerful engine on the HTT-34 gave the aircraft excellent performance," Wg Cdr P Ashoka (retd)" said in his autobiography.⁴ HTT-34 prototype was in fact the HPT-32 third prototype which was modified.⁵

However, despite the HTT-34s improved performance, HAL never received any orders for it.

The HTT-34 was also demonstrated as a trainer aircraft at the Farnborough (UK) and Paris Airshows in 1984 and 1985 respectively. "Later we (HAL) took it to Nigeria and Ghana in Africa on a marketing mission. Our aerobatic displays were greatly appreciated and some of the foreign pilots who flew the aircraft, were also duly impressed. Unfortunately, this did not result in any sales, probably for financial reasons," Wg Cdr Ashoka added.⁶

Troubled Trainer

The HPT-32 took over the basic training role (Phase I) in the IAF in entirety from 1988 onwards, following the retirement of the HT-2.⁷ According to a CAG report released in 2019, the HPT-32 aircraft was besieged with difficulties related to reliability and safety including engine failure, poor glide characteristics and absence of an ejection seat.

Due to a large number of accidents, the entire HPT-32 fleet was grounded in July 2009.⁸ This decision followed the crash of an HPT-32 on 28th July 2009 due to engine failure.⁹

A High-Power Study Team (HPST) was constituted by Air HQ and HAL's Transport Aircraft Division in Jul 2009 to undertake an in-depth analysis of maintainability and reliability of HPT-32 aircraft and its engine. The HPST was tasked to undertake technical investigation to find out the cause of engine failures and suggest remedial measures

However, in August 2009, the IAF decided to discontinue flying of the HPT-32 fleet till the finalization of HPST report. The HPST report released in December 2009 stated that the HPT-32 aircraft was designed and developed in the early 1980s and did not meet present day standards (at the time). The technical investigation carried out by HAL was inconclusive in its findings.

As per a CAG report released in 2013, it observed that engine cut-off issues had resulted in 189 incidents/accidents on HPT-32 aircraft. Originally slated for retirement in 2014, the HPT-32 fleet was grounded in 2009 and resulted in HAL's HJT-16 Kiran Intermediate Jet Trainer (IJT) being used for Stage I training from 2010 to 2013. In June 2012, the IAF opted not to return its HPT-32 fleet back into service, which at the time numbered approximately 116 aircraft.^{10 11}

In total when combining the HT-2 and HPT-32, 300 trainers were produced by HAL. The HPT-32 remained in service only for 25 years as compared to the HT-2, which remained in service for 34 years. Despite the trials and tribulations with the development of indigenous basic trainers, it would not be out of place, to say that the HT-2 and HPT-32 set the stage for the development of a new, modern and state-of-the-art basic trainer for the future.

A Unique Experience of Flying the HT-2, HPT-32 and HTT-40

Air Chief Marshal V.R. Chaudhari (retd) was commissioned into the Indian Air Force in December 1982 and has the unique distinction of having flown the HT-2, HPT-32 and HTT-40.



I joined the National Defence Academy (NDA) on 15 January 1979 and passed out from the NDA in December 1981. We reported to what was then called Elementary Flying School (EFS) at Bidar on 1 January 1982. Bidar at the time was the home base for the HT-2. The HT-2 was based only in two locations, Bidar and FIS Tambaram. It never flew in Dundigal, which had the T-6 Harvard and later the Kiran Intermediate Jet Trainer (IJT). We underwent a brief one-week orientation course, getting our flying clothing and so on. In the second week of January, we started flying. At EFS Bidar, we also had ground school. This was ground training and primarily about seven to eight subjects, all aviation related. We had a little bit of exposure to all these subjects in the final term in NDA. So it was building up on the basics that we were taught there on aerodynamics and navigation and avionics and aviation medicine and meteorology.



Caption: Air Chief Marshal V.R. Chaudhari was commissioned into the Indian Air Force in December 1982 and has the unique distinction of having flown the HT-2, HPT-32 and HTT-40.

Credit: Air Chief Marshal V.R. Chaudhari (retd)

Prior to us joining EFS Bidar and a year earlier, the HT-2 fleet there had experienced a spate of accidents. I cannot recollect the numbers but there were several fatal accidents. As a result, the decision was taken not to allow solo flying in the HT-2, instead our course would have what was then called Dual-cum-Solo (Dolo). This meant that we had a safety pilot in the rear during our 'Solo' sorties. The instructor would not provide any guidance or handle the controls but acted as a safety pilot in the rear seat. We were the first batch at EFS Bidar to perform Dolo sorties. I flew 30.5 hours on the HT-2, which included all types of sorties including general handling, aerobatics and getting a feel of the aircraft. There was no night flying on the HT-2 at that time. If I recollect correctly - and

going by my logbook - my 21st sortie was the solo check clearance for going solo. I never flew the HT-2 solo but instead flew 4-5 Dolo sorties.

I have an anecdote to narrate here on the HT-2 which was a tail wheel aircraft. The tail wheel was held by two strong springs on either side to allow it to caster. So, when one landed the aircraft, it was important to touch down on the two main wheels. There were occasions however, when the aircraft would actually swing from side-to-side because of non-centering of the tail wheel. It could happen for many reasons; drift while landing, a strong cross wind or incorrect rudder inputs. When we applied the rudders the tail wheel also used to move along with the rudder. On the first day when our course started flying, we had two cases of HT-2s swinging on landing, with our entire course all lined up along the runway and in the ATC watching our first few course mates taking to the air.

The HT-2 was a very tricky aircraft to fly and we had quite a lot of attrition during basic flying training in our time. In our course along with 30 cadets from the army and from the air force (NDA and direct entry) we had 78-79 cadets. If I recall correctly when we left Bidar, only 65-70 of us remained in total. Only about 53 passed out from the Air Force Academy (AFA) eventually. Prior to flying the HT-2, I had only done some gliding at NDA and so flying a powered aircraft was a completely alien experience. But I adapted quite easily and quite well.



Caption: Air Chief Marshal V.R. Chaudhari (retd) pictured here as a young Flying Officer at EFS Bidar.

Credit: Air Chief Marshal V.R. Chaudhari (retd) archives

I have another interesting anecdote on the HT-2. In the cockpit the RT channel change box was on the right side. There were only four preset channels on the RT, so after take-off we had to change from the ATC frequency to the radar frequency. This involved just a change of RT channel, which required one knob selection. But for that the pilot had to take off his right hand from the stick and move the RT knob. This meant that the aircraft had to be trimmed very accurately, otherwise it would start pitching up or going down. So this emerged as a major challenge to most of my course mates.

The other aspect was that the HT-2 did not have an ejection seat. So in case something went wrong with the aircraft, we would have to bail out. There was no time to jettison the canopy also, so part of the downwind checks before coming in for landing was to open the canopy. It was a sliding canopy and when we had it open had the wind on our faces and that was a great experience while landing.



Caption: Air Chief Marshal V.R. Chaudhari (retd) pictured here as a young Flying Officer at EFS Bidar with a HT-2 basic trainer.

Credit: Air Chief Marshal V.R. Chaudhari (retd) archives

Taxying the HT-2 on ground was another experience, because you just could not see over the aircraft nose, due to the angle. So while taxying we did what was called a 'snake taxying' procedure, where we would weave from left to right. So, when you weave off the center line, go to

the right and from the left side, now you see that the path ahead is clear. Then you weave to the left and then look over your right and see that the path is clear. It was certainly interesting but if one had the basic psychomotor skills, not so difficult after all.

I recall that the Cirrus Major engine was very reliable and there were not many cases of engine cuts and things like that. Though, yes, the occasional one was there, like in our course, also we had maybe one or two. But I think that was par for the course in those days. Being a tail-dragger aircraft, for take-off when we reached a speed of 55 knots or something like that, we had to push the stick forward to lift the tail wheel up first and then only when we were flying on the main wheels, we would rotate the aircraft by pulling back on the stick.

I have some recollections here from my diary. I had written on my first air experience sortie which took place in January 1982. In fact, I wrote that it was not as exciting as my first sortie in a glider! After my second sortie on the HT-2, I noted that "I must try one more cushion at the back." We had to carry our own parachutes and seat cushions. On my third sortie I did aerobatics for the first time and noted that after the instructor demonstrated aerobatics, I did two loops, two barrel rolls and one roll, followed by stall turns. I noted that I had no issues with G forces.



Caption: The distinctive lines of the HT-2 are evident in this photo, as is the nose-up angle of the cockpit. Air Chief Marshal V.R. Chaudhari (retd) is on the right.

Credit: Air Chief Marshal V.R. Chaudhari (retd) archives

We flew one sortie a day, which would be approximately 50-60 minutes duration. The HT-2 could stay in the air for even longer. We also used to do a running change-over on the aircraft. The instructor would remain strapped in the aircraft for three sorties, and the cadets would swap during the running change-over.

From Bidar, we went to the Air Force Academy (AFA) in Dundigal. The HAL Kiran Mk-1As were just entering service at that time. At the time the course consisted of about 30 hours on the HT-2, followed by 80 hours on the Kiran Mk-1A.

I was commissioned into the fighter stream of the IAF in December 1982 and moved to Hakimpet. As of December 1982, I had 116 hours total on the Kiran and the HT-2 put together at AFA. Here I flew the Polish Iskara IJT. Those of us who flew the Iskara went to fly MiG-21, MiG-23 and so on. I flew about 106 hours in the Iskara in day sorties with another eight hours of night flying. Coming back to the Kiran Mk-1A which was an indigenously developed jet trainer, it was certainly better to fly as it was a little faster, but it had its own minor idiosyncrasies. I would say, each aircraft has some peculiarities, accuracy in flying for example on the Kiran was challenging due to its wing design and high-lift devices. Maintaining accurate speeds or other parameters during manoeuvres was quite a challenge. So, as an example, if I just do a 360 degree turn, maintaining height within a few feet was very difficult on the Kiran.

In summary, the HT-2 was a very good basic trainer aircraft; it took a lot of beating while being operated by young cadets and served the nation for 34 years. It did what was asked of it, no doubt about that.

HPT-32 'Deepak'

In 1990, I was sent for the Flying Instructors course to Tambaram. Ours was the first batch which started training on the HPT-32 and this was in June 1990. The batches previous to us had flown the HT-2. We also had to fly the Kiran IJTs so we did half the course on the Kiran and half the course on the HPT-32.

The HPT-32 had several peculiarities; it had very poor glide characteristics. For an aircraft with a not very reliable engine, at least its glide characteristics should have been half as good (at least) as the Kiran or HT-2. If we had an engine failure in the Kiran, we could still glide and make it to the nearest airfield. The HPT-32 just came down rapidly and had very poor glide characteristics. So, one needed to be on the ball all the time. When you have an aircraft which does not have an ejection seat and bad flight characteristics, safety lies in altitude. So, the higher we flew, the safer

we felt. But unfortunately, the HPT-32 didn't have a very good climb performance, it took forever to climb.

We were flying absolutely brand-new HPT-32s, they were still being maintained by HAL not only at Tambaram but even in AFA. In our time we didn't have so many engine cuts and that began many years later. The problem with bringing down the aircraft safely following an engine-cut was that the Deccan plateau is a rocky area, so it was challenging to find a flat piece of land. To bail out from the HPT-32, we had to get out of the aircraft and walk on the wing and then jump-off.

In its later years, the HPT-32 fleet engine cut-offs while in the air was too frequent and was a little too high for comfort.

The HPT-32 was also very different from the HT-2 due to having a nose wheel and dual-seating. I am afraid that the HPT-32 did not have too many positives. One of the positives, however, was that the side-by-seating for pilot and instructor, The latter could watch the cadets flying habits closely, this was of-course not possible in a tandem-seat trainer like the HT-2. Apart from this, the HPT-32 had good flying endurance, and we could have running-changeovers here too. Its avionics and flying instruments were a generation ahead of the Kiran Mk-1A.

The Kiran on the other hand, had very benign spin characteristics so when we put it in a spin, we could actually demonstrate something to the cadet and tell him about the nose down angle, how fast the aircraft is spinning, count the turns, etc. The HPT-32 spun so rapidly that it didn't give time for instructing, we could do post-sortie debrief. The HPT-32 was a huge difference from the Kiran, which had very care-free handling.

I later flew the HPT-32 again as an instructor at AFA and then as an Air Force examiner and accumulated around 270 hours on the type. In comparison to the HPT-32, the HT-2 served the IAF well even though it was a very rudimentary aircraft. It definitely honed our skills in basic flying and for its age and vintage it was a good aeroplane that sufficed for our requirements.

The HPT-32 could have been a much better designed aircraft and should have served the IAF as long as the HT-2 or the Kiran. The design aspects required improvement. Like I said, the glide ratio, the spin characteristics, the power to weight ratio, poor climb performance, and so on. All this could have been much better. With the power of hindsight, I can say that HAL should have looked at a design that was little more futuristic even for a basic trainer. The HPT-32 entered service in the nineties and could have featured better avionics, an ejection seat, capability to teach somebody instrument landing procedures which occupies so much time on fighter aircraft. There

were quite a few aspects on the HPT-32 which were lacking for a basic trainer in the nineties, and it was a design that was not ahead of its time.

HTT-40

In addition to flying the HT-2 and the HPT-32, I also s an opportunity to fly a prototype of the HTT-40. There of course will be a difference between a prototype aero plane and the aircraft which eventually enters serial production. The prototype HTT-40 which I flew was a little heavier than the PC-7 MKII and it had modern avionics. The cockpit comfort was very good and the aircraft had ejection seats. Its engine is also quite reliable. I did not undertake any manoeuvres or aerobatics nor did I fly the aircraft to the extremities of its envelope.

My Time with the HT-2

Air Marshal Anil Khosla retired from the Indian Air Force as Vice Chief of the Air Staff. He was commissioned into the Indian Air Force in December 1979.



My very first impression of the HT-2 as a cadet was that it looked simple and almost modest, yet purposeful. As a young flight cadet in the Indian Air Force during the early 1970s, my first encounter with the HT-2 was both exhilarating and a bit intimidating. The aircraft was a sleek, all-metal design with tandem seating and it was simple yet robust. The controls were responsive, but it demanded precision right from the start; a sloppy approach could lead to a bumpy landing on those narrow landing gear.



Caption: A highlight of the 2025 Air Force Day parade was the addition of the Hindustan Aeronautics HT-2 trainer to the Air Force Heritage Flight.

Credit: Akshay Daniel

In total I flew a total of 215 hours on the HT-2. This included 40 hours of ab-initio training, 65 hours during the Flying Instructors' Course, and 110 hours during instructing at Flying Instructors School (FIS) Tambaram. At FIS Tambaram I instructed on the HT-2 teaching young IAF pilots how to become instructors.

My abiding memories are vivid and multifaceted. I remember the distinctive sound of the engine starting up. I Remember the smell of gasoline during stall turns. One unforgettable sortie for me, was my second solo flight, during which, after take-off, I had an engine failure and had to force-land the aircraft.



Caption: Inducted in 1955 as the air force's new basic trainer, the HT-2 was India's first indigenously designed and developed aircraft and manufactured by Hindustan Aeronautics Limited. Credit: Akshay Daniel

The HT-2 was considered challenging to fly, however, it had many attributes that made it such a long-serving basic trainer in the Air Force. The HT-2 earned its reputation as challenging aircraft to fly as it tended to swing on the ground on landing. It required total concentration and focus to prevent over-controlling, especially in crosswinds. It was known to be somewhat unforgiving if mishandled, especially in the stall/spin regime.

Yet, these very challenges made it an excellent trainer for basic flying skills. It remained in service for over three decades (from the 1950s until the late 1980s), with over 120 aircraft produced.

Its attributes included: -

- Rugged airframe.
- Easy to maintain (indigenously available spare parts).
- Excellent visibility from the front cockpit.
- Low operating costs.
- Indigenous production with no dependency on foreign suppliers.

The aspects of the HT-2 that I liked and disliked were many.

Likes:

- Handling and Stability—perfect for building confidence in novices.
- The response to controls was direct, making it great for learning coordination.
- The bubble canopy and raised instructor's seat provided panoramic views.
- The engine was smooth and powerful enough for basic aerobatics.
- Execution of aerobatic manoeuvres gave a lot of satisfaction and a boost to the confidence level.

Dislikes:

- The narrow-track undercarriage made landings tricky as it was prone to swinging on the ground.
- The seats weren't the most ergonomic for extended sessions, causing back aches during prolonged flying.
- The seat was fixed without height or position adjustment.

The parachute strapped to the pilot was not very comfortable or easy to bail out.

Notes:

¹ Global Security Org, "content" <https://www.globalsecurity.org/military/world/india/hpt-32.htm> accessed on August 25, 2025

² Vijay Seth, *The Flying Machines of the Indian Air Force 1933 – 1999* (New Delhi: Seth Communications, 2000), p. 41,

³ Indian Navy NIC, "content" <https://indiannavy.gov.in/content/dorniers-2>

⁴ Wg Cdr P Ashoka, *Riding the Wind* (New Delhi: Viji Books, 2011), p. 140.

⁵ Vayu Aerospace Review 1984

⁶ *ibid*

⁷ Performance Audit Report of the Comptroller and Auditor General of India on Capital Acquisition in Indian Air Force, Report No. 3 of 2019

⁸ Performance Audit Report of the Comptroller and Auditor General of India on Capital Acquisition in Indian Air Force, Report No. 3 of 2019

⁹ PIB.GOV.IN, "content", <https://www.pib.gov.in/newsite/PrintRelease.aspx?relid=75579®=3&lang=2> accessed on Oct 1, 2025.

¹⁰ Audit Report of the Comptroller and Auditor General of India on Capital Acquisition in Indian Air Force, Audit Report No. 34 of 2014

¹¹ Performance Audit Report of the Comptroller and Auditor General of India on Capital Acquisition in Indian Air Force, 2017