EVOLUTION OF IAF HELICOPTERS – I: *INCEPTION TO 1971 OPERATIONS*

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BIRD, AEROPLANE AUTOGYRO HELICOPTER

Humankind's obsession with flying is well documented with it being mentioned in ancient Indian (*Pushpak Vimana*[1]) as well as Greek mythological (flight of the Icarus and the legend of Pegasus[2]) texts. However, the earliest documented flight by any human was in November 1783, in a balloon.[3] The human endeavour was not satisfied with the flight in a balloon and, thus, efforts to overcome the limitations of the balloon continued which ultimately resulted in the first flight by the Wright Brothers in the year 1903.

Indians were no different from people in the rest of the world in their understanding of the limitless opportunities of flying. Their dreams of flying like a bird came closer to being fulfilled with the arrival of the first aeroplane in a crate to Karachi harbour in December 1910.[4] The arrival of this aircraft, followed by displays all over India, motivated many Indians, mainly the rich, to fulfill their dreams of flying in a *vimana* or an aeroplane, and many went ahead and did just that.

Thus, the airplane arrived on the Indian shores in 1910 and by the beginning of World War I, there were many Indians who had set their eyes

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1. Hindu Wisdom, "Vimanas", www.hinduwisdom.info/Vimanas.htm. Accessed on April 12, 2016.
2. ICAO, "Aviation History: The Desire to Fly in Mythology", www.icao.int/secretariat/PostalHistory/aviation_history_the_mythology.htm. Accessed on April 12, 2016.
3. Aeragon.com, "Balloons", www.aeragon.com/air/bal/index.html. Accessed on April 12, 2016.
4. Somnath Sapru, *Combat Lore: Indian Air Force 1930-45* (New Delhi: KW Publishers, 2015), p.3.

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on becoming pilots. This resulted in many of them being commissioned as pilots in the Royal Flying Corps (RFC), as it was called then. The demand of the Indians to be allowed to serve as officers in the RFC as early as 1911, just seven years after the invention of the aeroplane by the Wright Brothers in the year 1903, was fulfilled during World War I.

However, the flight so achieved by the aircraft invariably necessitated attaining a certain speed on the ground before getting airborne. Hence, the human obsession was not satiated as it was still not possible to do what birds could. Man wanted to soar in the sky, fly in all directions at will and land, but most importantly, wanted to take off and land vertically. Many of them may have recognised this to be a safer option also, as they would have seen most of the accidents that occurred on the fixed-wing aircraft during the landing or take-off phases when the aircraft was moving in contact with the ground. Therefore, efforts continued to achieve a true form of flying which would enable man to fly in any desired direction at will.

It was complicated and the earliest work on the principle of rotory thrust was done by Archimedes, as early as the second century BC when he had used it to transfer water from a lower to a higher elevation. The earliest surviving sketch of a helicopter is attributed to Leonardo da Vinci, who, in 1463, converted the scientific work done by Archimedes and applied it to the medium of air. Subsequent efforts failed mainly on account of lack of a suitable power plant.[5] The effort took a back seat after the invention of the aeroplane, but for some, the dream and efforts continued. Much later, on January 9, 1923, it was the autogyro, which came closest to being called a helicopter, was first flown. The autogyro was characterised by an extremely short take-off and landing run owing to a freely rotating rotor which was able to share the aerodynamic load of its wings.

5. Mark Lloyd , *The Guinness Book of Helicopter Facts & Feats* (UK: Guinness Publishing, 1993), p.8.

However, it was in Nazi Germany that the world's first helicopter, the Focke Achgelis Fa-61 took off for its first flight in 1936.[6] By 1941, its subsequent models, the Fa 223 Darche (dragon) and the smaller Flettner Fl 282, were being used by the Germans to transport senior officers, carry equipment between ships and perform reconnaissance and artillery spotting duties.[7]

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Thus, the age of the helicopter began some thirty years after the first fixed-wing flight in 1903 and is indicative of the complex nature of the machine for which a lot of solutions were to be found. Post World War II, however, saw the Fa-61 team shifting base to France where they continued their work. Once the initial hurdles were overcome, further developments were at a rapid pace and their potential was soon realised by the American military also which found ways to utilise the unique abilities of the platform. It was not long before the helicopters arrived in India and the Indian Air Force (IAF) personnel were exposed to both the American way of working, as well as the helicopters being operated by the American commandos in their special operations.

HELICOPTERS IN THE INDIAN SKY: THE FIRST HELICOPTER COMBAT RESCUE

One of the significant events shaping the outcome of the Burma Campaign against the Japanese came with the involvement of the Americans in the form of the American First Air Commando Group (Ist ACG) initiated by Gen Henry 'Hap' Arnold, commanding officer of the United States Army Air Force (USAAF) after his interaction with Col Orde Wingate of the "Chindits" fame in 1943. The general was appalled by the stories of wounded troops being left behind on the first Chindit operation. The Ist

6. Ibid., p.14
7. Robin Cross, *History of War: 50 Events you Really Need to Know* (London: Quercus Editions Ltd., 2012), p.176.

ACG was, thus, formed with the purpose of supporting Wingate with a wide mix of aircraft specifically chosen for the task. The aircraft, in addition to 25 transports (C-47 and C-46), 225 gliders, 100 light aircraft, Mustangs and 12 Mitchell medium bombers, included four YR-4B helicopters.[8] One of these was also used for the first ever combat rescue. It was used to rescue three British soldiers on board an L-1B aircraft, which had come down 100 miles behind enemy lines in Burma after being hit by ground fire on April 21, 1944. The helicopter was ferried from its base at Lalaghat to a forward base at Taro and onto Aberdeen (a temporary airstrip created in Burma) along a circuitous route of over 500 miles by Lt. Harman, with multiple refuelling stops. He reached the crash site on April 25, 1944, to pick up the first of the wounded, and ferried casualties one by one to the nearest fixed-wing landing site. This was also the first time Indian IAF aviators operating in the region interacted with their "easy going" American counterparts. By this time, they had sufficient combat experience and knew the perils of baling out over jungle terrain.

Having seen such a rescue effected by the Ist ACG, they also understood the significant increase in the chances of survivability accorded by airborne rescue specialists and the significance of having own airborne transport assets. This gets reflected in the procurement plans in the post independence defence organisation when these were being prioritised in the aftermath of the post partition division of military assets.

POST-INDEPENDENCE: HELICOPTERS AND RIAF

Post independence, Royal Indian Air Force (RIAF) assets were divided between India and Pakistan. Subsequently, the discussions and evaluations of military requirements continued and many of these requirements were discussed by the army, navy and air force chiefs at the Chiefs of Staff Committee (COSC) meetings.

During one such discussion during the COSC meeting held on April 5, 1949, it was generally accepted that helicopters could be adopted to great

8. Peter Preston-Hough, *Commanding Far Eastern Skies: A Critical Analysis of RAF Air Superiority Campaign in India, Burma & Malaya* (England: Helion & Company Ltd., 2015), p.28.

advantage by the defence Services. The term 'generally' indicates a consensus among the three Services and is also indicative of the fact that the Services were aware of the developments taking place the world over in the field of helicopters. Therefore, in order to formalise the proposal, a Joint Planning Sub-Committee was tasked to study the proposal.

The Joint Planning Sub-Committee composed of Brig (later Field Mshl) SHFJ Manekshaw of the Indian Army, Lt Cdr N Krishnan of the Indian Navy and Wg Cdr M.S Chaturvedi of the RIAF was formed with a specific purpose to examine the proposal for establishing such a flight and to ascertain the approximate cost of the formation of a helicopter flight. The sub-committee evaluated the requirements and submitted a report on July 4, 1949, which was considered at the COSC meeting on July 7, 1949 . The recommendations which appear to have been accepted by the COSC were:

- The formation of the flight to be postponed till marked improvements in the design and maintenance of helicopters are made by the manufacturing countries.
- In view of the limited financial resources available to the defence Services at the time, the question of formation of a helicopter flight to be considered in relation to the allocation of the priorities for the expansion programme of the Services as a whole.

Hence, the proposal which included acquisition of a total of four helicopters, including one reserve, was put on hold mainly due to resource constraints and the setting of priorities.

Further, in 1949, Air Headquarters (Air HQ) had recommended an expansion of the RIAF to a 20 squadron strength. This was in response to the threats against which the government had instructed the Air HQ to plan, and be prepared for. This proposal mainly concerned fighter aircraft and one transport squadron.

Post January 26, 1950, when India had become a republic and the 'Royal' epitaph was removed from the RIAF, the Defence Committee of the Cabinet (DCC), on September 14,1951, approved the raising of a second transport squadron, bringing the sanctioned strength of IAF squadrons to 11. The

helicopter was still relatively low on the priority list, probably owing to the prevailing political and security environment.

In May 1950, as the relations between India and Pakistan became strained, as a part of an emergency measure codenamed "Operational Plan Shikar", approval was given to raise the strength of the squadrons to 15. It was emphasised that it was only an emergency measure. This was maintained at around 14.5 squadron strength till December 1952, when the proposal for a permanent expansion with a timeline commencing in Financial Year (FY) 1953/54 to FY 1957/58 was proposed by the IAF and in which the helicopters did find a mention.

For the first time, this plan included the raising of one helicopter flight of Sikorsky S.55 helicopters. The proposal was to purchase three helicopters against the requirement of five. Despite objections by the Finance Ministry, the DCC, on December 27, 1953, approved the planned expansion with the revised target date of the operation squadrons reaching their full strength as March 31, 1957, instead of the proposed March 31, 1958.[9]

Hence, it took close to four years for the original proposal to be reinitiated and approved. The original proposal had acknowledged that the helicopter might be particularly useful in view of the poor state of communications and the difficult terrain over which the forces may be called upon to operate. Between 1949 and 1952, there were major geopolitical changes which had taken place. The Americans who had assisted the Chinese during World War II were having a major faceoff with them in the Korean peninsula. India, on its part, was also affected by the events within its neighbourhood.

INDIA AND THE KOREAN WAR

In 1950, there were major changes occurring in the geopolitical situation the world over with the major one being the confrontation between the United States of America (USA) and the Chinese, known as the Korean War. India refused to be drawn into the war despite the efforts of the USA and stuck to the "non-aligned" principle. India, however, played the role of a sort of

9. History Cell, Ministry of Defence, GoI, "Experience of Air Force and Air Force Matters", File No. 601/14513/H

go–between, between the Americans and the Chinese and sent a contingent of the 60 Para field medical regiment to help the American forces.

During this war, the Americans had improved upon the lessons learnt in utilising the helicopters post World War II and perfected the helicopter utilisation for what is now known as Combat Search and Rescue (CSAR). In many cases, the time between the ejection and picking up of a casualty was reduced to minutes. It was also an operational necessity as the water temperatures were dangerously low.

The American forces also utilised helicopters for Casualty Evacuation (Casevac) duties, the reports of which were available to the Indian military planners due to the presence of its own personnel who would have been a part of many such Casevac missions.

Hence, it was the effective use of the helicopter during the Korean War which was a factor governing the decision for induction of the helicopter into the Indian armed forces. However, by this time, some of the spirited aviation enthusiasts in India had already introduced helicopters in the civil sector.

CIVIL AVIATION: HELICOPTER FLYING

The civil sector had already taken a lead and imported its first helicopter, the Hiller UH12B. The first Commercial Helicopter Pilot Licence (CHPL) was awarded to Capt Rustom C Captain in 1953. He even flew the then Prime Minister Jawaharlal Nehru and the home minister of Bombay state from Nariman Point to Vaitrana dam in late 1953. Thus, the Indian political leadership of the time was introduced to this versatile machine and the requirement of helicopters by the IAF was deemed to be inescapable and it was decided to induct a passenger helicopter which could be used in multiple roles and also meet the civil aviation certification criteria.

THE FIRST HELICOPTER PIONEERS[10]

As per the plan formulated and approved by the DCC on December 27,

10. History Cell, Ministry of Defence, GoI, "104th Helicopter Unit", File No. Air/HU/254/H Period September 1954-December 1960, Form-1500s.

The first Sikorsky S.55 helicopter, with the tail number IZ-648, arrived in India on March 19, 1954. This was followed by inductions of the IZ-649 and IZ-650 on September 21, 1954, and December 24, 1954, respectively.

1953, the first helicopter flight christened No.104 Helicopter Flight (HF) was formed on March 10, 1954, at 3 Wing (Wg) Palam with Flt Lt A N Todd (3364) GD (P) as the first Commanding Officer (CO). Orders for the Sikorsky S.55 helicopters were, however, placed in early 1954.[11] One of possible factors governing the decision to induct the S.55 helicopter being that it was the first transport helicopter to receive type certification by the Civil Aviation Authority on March 25, 1952.[12] The first Sikorsky S.55 helicopter, with the tail number IZ-648, arrived in India on March 19, 1954. This was followed by inductions of the IZ-649 and IZ-650 on September 21, 1954, and December 24, 1954, respectively.

One of the first tasks for which the helicopter was utilised was the Prime Minister's (PM's) visit to Tilpat on March 28, 1954 for a Fire Power Demonstration (FPD). This was followed by the PM's tour of Uttar Pradesh (UP) on July 8, 1954. Subsequently, the unit was also involved in undertaking the first rescues of Flying Officer (Fg Offr) Sher Karan Singh and Fg Offr Bawa on July 20, 1954 and August 14, 1954, respectively. This was followed by a radiation survey undertaken by Mr D Wadia, adviser to the Government of India (GOI) for atomic research, on September 23, 1954.

One of the earliest examples of the participation by helicopters towards providing Humanitarian Assistance and Disaster Relief (HADR) operations occurred on September 28, 1954, with the rescue of 15 villagers marooned in the Yamuna river. This was followed by a fly-past with the national flags of India and Yugoslavia during the visit of the President of the People's Republic of Yugoslavia Mshl Tito, on December 21, 1954.

Hence, by the time the third helicopter was inducted on December 24, 1954, helicopters had already been utilised for communication, casualty evacuation, radiation surveys, SAR, HADR and air display duties. Their area

11. Chris Smith, *India's Adhoc Arsenal* (UK: SIPRI, Oxford, 1994), p. 235.
12. Sikorsky Archives, "Sikorsky Product History", www.sikorskyarchives.com/S-55.php. Accessed on March 25, 2016.

of operations had also continuously expanded from Delhi, Rajasthan, UP to include Assam and Orissa.

As helicopters were increasingly being utilised for more roles and with the building up of experience, the peculiarities of maintaining a machine which inherently had so many moving parts, came to the fore. Thus, maintaining the machine proved to be different as well as more difficult from the practices being followed for fixed-wing aircraft.

By April 1955, that is within a year of the helicopters' induction, the serviceability of the flight was down to 46.6 percent with two of the three helicopters being Aircraft on the Ground (AOG). This reduction in serviceability started affecting the conversion/continuity training of the pilots, even though only four pilots were held on strength. At the same time, however, the operational demands and tasking on the flight kept on increasing.

On May 11, 1955, the lone serviceable helicopter proceeded to Jorhat for communication duties to assist the civil population of Assam in natural calamities. The operational control was vested with the Assam government, with accompanying instructions that it was not to be utilised for any air force task. Restrictions were imposed in order to ensure effective utilisation of the only serviceable helicopter.

By the end of 1955, helicopters had been extensively utilised for flood relief work in the Assam, Orissa and Punjab sectors and their serviceability further deteriorated. Hence, one of the pilots was posted out to 11 Squadron in February 1956.

This reduction in serviceability was worrisome for the authorities and the maintenance intensive nature of helicopter operations was once again highlighted. The IAF and the maintenance branch were made aware of the pitfalls associated with operating helicopters which required a constant supply of components and adequate logistic support. Subsequently, two helicopters were also involved in accidents in June 1956. The accidents were reported on consecutive days – June 26 and 27, 1956. One of the accidents on the IZ-648 was categorised as Category-Bee (Provisional). The accidents were probably attributable to a combination of factors of inadequate experience

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as well as maintenance related issues and, thus, investigations into the reasons behind the accidents resulted in the unit temporarily moving from Air Force Station Palam to Air Force Station Kanpur by the end of September 1956. No.1 Base Repair Depot (BRD) was located at Kanpur and better maintenance support was expected.

This decision of involving the BRD proved to be correct and the serviceability improved; the helicopter was utilised extensively in the VIP role by the PM and the minister of defence. However, the same could be sustained only till December 1956 when the serviceability once again was adversely affected and dropped to zero. Flt Lt Todd was also posted back to 11 Squadron and the only engineering officer, Fg Offr Appalaswamy, was posted to 3 Wg. With the posting out of the only other pilot to No1 BRD, with effect from February 1957, only Flt Lt SK Majumdar was available in the unit.

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Simultaneously, the IAF also invoked the standby option for the additional helicopter, as per the original statement of the case. Accordingly, the fourth aircraft, the IZ-1589, was taken over by the flight on September 18, 1957, and flown to Kanpur by Mr Graham, the test pilot of the Original Equipment Manufacturer (OEM), Sikorsky. In addition, two more Sikorsky helicopters were erected by 104 Helicopter Flight personnel and flown to

13. Smith, n.11, p. 235.

Kanpur in September 1957. These two in all probability were used to build up the unserviceable helicopters to undertake the tasks placed on the unit. Graham also carried out tropical trials for the aircraft, and high altitude trials in Nainital area. This is reflective of the thought process prevailing in the IAF establishment for utilising the helicopter in areas other than the plains and for additional procurements and/or manufacturing. The limitations of the S.55 would have been evident when they were tried for operations at higher altitudes and, consequently, a test pilot was sent by the manufacturer to validate the graphs and other operational parameters for using the S.55 at a higher altitude.

The purchase of the Bell 47Gs was through M/s Pillman Aircraft Company of Bombay. The then Commandant General of the Home Guards of Bombay state, Shri MJB Maneckji, who had a stake in the aircraft company, went to the Bell manufacturing plant in Fort Worth Texas, USA, for the procurement. In addition to taking over the aircraft, he also received training on the type. Incidentally, the Home Guards, which was purely a voluntary body with Maneckji at the helm since May 1949, had their own air wing to motivate the younger generation to take up flying.[14]

The Bell 47Gs arrived in India by the end of 1957. Two of the Bell 47Gs on which Flt Lt Majumdar had received some training in Bombay in October 1957, were taken over by the unit on December 26, 1957. One of the first tasks undertaken by these two helicopters was of flood relief in a foreign country. On December 27, 1957, they were taken directly to Ceylon (Sri Lanka) for flood relief operations in a Packet aircraft. These were flown by Flt Lt Majumdar and Mr Maneckji himself for close to a month in Ceylon and the effort was well appreciated in the media. Hence, this was also the first overseas mission flown by IAF helicopters. By this time, India's foreign as well as defence policy was being shaped by the geopolitics of the region and this had an effect on future helicopter procurements.

14. The Directorate of Publicity, Government of Bombay, "Bombay Marches on – A Review of the Work and Activities of the Government of Bombay During the Quinquennium 1946-1951", p. 32, www.dspace.gipe.ac.in/xmlui/bitstream/handle/109373/33592/GIPE-030185.pdf?sequence=2&isAllowed=n. Accessed on April 12, 2016

GEOPOLITICS: INDO-US VS INDO-PAK RELATIONSHIP

In the intervening period of 1949-55, the Indo-US and US-Pak relationships underwent a major change. In 1948, inputs by an outside expert in the form of a famous British physicist PMS Blackett were sought to formulate India's defence policy and to balance the defence expenditure against the planned nation building programme. "The Blackett Report"[15] had a major impact on the state of readiness of the Indian defence forces. Much later, during a press conference to celebrate the silver jubilee of the Defence Research and Development Organisation (DRDO) on January 12,1984, the Chief Scientific Adviser to the Ministry of Defence (MoD), Dr VS Arunachalam criticised the report as a "ruse" to retard the development of India's indigenous defence capability.[16] Hence, despite the advice of the chiefs of staff, described as "wild" by Mr Blackett, a narrow and circumspect defence policy was adopted by the Cabinet in 1949. This policy, coupled with that of non-alignment, along with initial efforts towards demobilisation of the defence forces and a passive participation in the Korean War, had a major impact on the Indo-US relationship.

The relationship is highlighted by remarks made by US Secretary of State Dulles in 1954, describing the Indian policy of non-alignment to be "an immoral conception". This, coupled with Pakistan fitting into the general scheme of things for containment/encirclement of Russia, resulted in Pakistan signing an agreement with the USA in 1954, which paved the way for military aid to Pakistan. The aid was with a rider that Pakistan cooperate in a regional defence network directed at the USSR. Pakistan readily accepted this and by the end of 1955, it had joined both the Central Treaty Organisation (CENTO) and Southeast Asia Treaty Organisation (SEATO).[17] With military aid now flowing freely to Pakistan in the form of advanced weapon systems and aircraft, a reappraisal of defence procurements by India was initiated as early as 1954.[18] In this, of the three Services, the Indian Navy was able to put forth its case more effectively.

15. Smith, n. 11, p. 48.
16. Ibid., p. 53.
17. Ibid., p. 14.
18. Bharat Kumar, *Unknown and Unsung: Indian Air Force in Sino-Indian War of 1962* (New Delhi: KW Publishers, 2013), p. 83.

The Indian Navy's proposal for two light fleet carriers with a mix of different types of aircraft totalling 117 was approved by the Defence Minister's Committee (Navy) on October 26, 1949, and passed by the Standing Committee of the Parliament on November 13,1950. The carriers were proposed to be acquired in 1956 and 1959.[19] The Defence Committee of the Cabinet (DCC) finally approved the proposal on April 30, 1956. Accordingly, a refit process, beginning in 1957 with the acquisition of the keel of the "Hercules", resulted in the commissioning of the *Vikrant* into the Indian Navy on March 4, 1961, in Belfast, England. However, these carriers required availability of on-board rescue helicopters for conduct of carrier operations by fixed-wing aircraft.

The experience gained by the naval pilots in closely observing the performance of helicopters being operated by the British and French governed their selection of the Alouette. Further experience gained on the Alouettes on loan from the French Navy greatly influenced the acquisition of a "common helicopter" for the three Services.

Hence, en route to India, two Alouettes were loaned to the ship by the French Navy for Search And Rescue (SAR) duties at sea and for carrying out 'plane guard' tasks. These Alouettes, which were on loan, were operated by Indian Navy pilots from May 23, 1961, till October 6, 1961. The experience gained by the naval pilots in closely observing the performance of helicopters being operated by the British and French governed their selection of the Alouette. Further experience gained on the Alouettes on loan from the French Navy greatly influenced the acquisition of a "common helicopter" for the three Services.

COMMON HELICOPTER?

By 1957, helicopters had carved out a niche for themselves and it was firmly established that the tasks undertaken by a helicopter were an inescapable necessity and this versatile platform was required by all the

19. Satyindra Singh, "Blueprint to Bluewater", http//indiannavy.nic.in/sites/default/themes/indiannavy/images/pdf/chapter4.pdf. Accessed on April 6, 2016.

Jointness in the highest decision-making was highlighted when the army chief was said to have spoken to the air chief and thereafter handed over the telephone to the naval representative Cdr Douglas, who then spoke to the air chief and conveyed his views.

three Services. The search, therefore, began for a common helicopter which would meet the requirements of the army, navy and air force. The then Defence Minister Mr Krishna Menon, through the naval chief, deputed Cdr (later Cmde) George Douglas to recommend a helicopter common to all, after liaising with the army and air force.

On approaching the Air Chief, Air Mshl Subroto Mukherjee, he was informed that as far as the air force was concerned, the army requirement would be paramount.[20] This was significant when contextualised in relation to a decision taken on the Joint Planning Committee Paper No 28(49) in response to the Army Headquarters' proposal for having an inter-communication flight of its own for carriage of VIPs, air ambulance work and signal use (carriage of despatches and signals, reconnaissance of land lines, cable laying). The decision, as taken on November 15, 1949, stated that the RIAF should continue to provide the army with aircraft on "as is required basis".[21] Hence, here, once again, the IAF considered the helicopter to be used primarily for army tasks.

Army Chief Gen KS Thimayya, on his part, projected the requirement as "a helicopter capable of lifting fifteen fully armed soldiers to an area of seven to twelve thousand feet altitude". Cdr Douglas recommended that the Alouette II would be able to meet the requirements and stated that the French had a successor helicopter in the form of the Alouette III which should be recommended for the final purchase.

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20. Ibid., Ch 4, p. 33.
21. n. 9.

Displaying great foresight, Cdr Douglas made an additional recommendation that the Alouette III be assembled initially at Hindustan Aeronautics Limited (HAL), Bangalore, before gradually giving way to an Indian manufactured one (licensed version). This telephonic conversation between the air chief and Cdr Douglas in the army chief's office resulted in the recommendation by the air chief to commence the bidding/ procurement process and for evaluating various helicopters in India under operational conditions in Assam, Kashmir and in sea level monsoon situations.[22] Hence, the quest for expanding the existing helicopter fleet, while meeting the requirements for the three Services, began in this "joint" manner.

The raising of units at Jorhat and Srinagar with a detachment at Leh was undertaken primarily for communication duties in difficult terrain whose diversity ranged from the high altitude barren mountains in the north to the predominantly hilly jungle terrain in the east.

PLANNING FOR EXPANSION

By early 1958, the plans for expansion of the helicopter fleet commenced with the posting in of additional pilots to 104 HF. The consolidation phase and conversion training of the pilots continued throughout 1958, and by April 1959, the conversion training of one navy pilot, Lt Cdr PKK Menon,[23] was also progressed and completed by May 1959. Hence, training of fixed-wing as well as helicopter pilots of the navy was being undertaken by the IAF.

On November 23, 1959, a second helicopter unit designated 105 Helicopter Unit (HU) was raised at Jorhat and equipped with Bell 47G helicopters.[24] This was followed by the raising of 107 HU at Srinagar on January 1, 1960, and equipped with S-55s and Bell 47 G IIIs. 107 HU used to maintain a detachment at Leh also and moved permanently to Leh on May 13, 1961.

22. Singh, n.19, Ch. 4, p.33.
23. Ibid., Ch. 4, p.13.
24 Rajesh Isser, *The Purple Legacy* (New Delhi: Pentagon Press, 2012) , p.1

A major factor affecting future helicopter acquisitions and having a direct bearing on the operations by the IAF helicopter fleet was the onset of the era of the Soviet-made Mil Mi-4.

The raising of units at Jorhat and Srinagar with a detachment at Leh was undertaken primarily for communication duties in difficult terrain whose diversity ranged from the high altitude barren mountains in the north to the predominantly hilly jungle terrain in the east. The requirement of a more capable helicopter which could operate in the diverse terrain, as envisioned by Gen Thimayya, was also felt, and as a logical consequence, Sikorsky was approached for meeting this requirement and it was also at this time that the USSR offered the Mi-4 for evaluation.

Hence, in 1960, the acquisition process for helicopters was accelerated with two Sikorsky S-62A[25] helicopters being acquired for evaluation trials. These were also deployed initially for VIP duties with 104 HU – one of them was lost in the Ladakh region.[26] During extensive trials, these were compared with the Russian Mi-4 helicopter in July 1960. The Mi-4 which looked similar to the S-55, outclassed the S-62 in almost all aspects and was, thus, selected for induction. The Mi-4 used during the evaluation was thereafter placed with 104 HU which at one time was operating all the three helicopter types: S-55, Bell 47 and Mil Mi-4 . By this time, 104 Helicopter Flight had become a unit and the total number of helicopter units were set to further expand from three units and necessitated the setting up of a dedicated conversion training establishment.

HELICOPTER CONVERSION AND TRAINING

To meet the training needs of the planned expansion of the helicopter fleet, an acute need was felt for a separate flying training establishment. This helicopter training unit was formed on April 2, 1962, at Palam.[27] It was equipped with

25. Smith, n.11, p. 235.
26. Kumar, n. 18, p.131.
27. Isser, n.24, p.2.

some of the 12[28] additional Bell 47Gs acquired in 1962. On December 1, 1962, it was renamed as the Logistics Support Training Unit (LSTU) and shifted to Allahabad, and later to Jodhpur, on May 22, 1967. Much later, it moved to Hakimpet, on October 15, 1973, and was renamed the Helicopter Training School (HTS). However, a major factor affecting future helicopter acquisitions and having a direct bearing on the operations by the IAF helicopter fleet was the onset of the era of the Soviet-made Mil Mi-4.

THE Mi-4 ERA

With the placing of an order for 10 Mi-4s in October 1960 and the subsequent disposing of the second S-62 to Thailand, the era of Soviet manufactured helicopters was ushered in. These were procured from the Border Roads Organisation (BRO) funds for transporting BRO equipment in difficult terrain and at high altitudes. The initial order for 10 helicopters was thereafter followed up with an additional order of 16 in 1962.[29]

The training course for the conversion of the pilots and the technicians onto the Mi-4 was conducted between April and June 1962 in Russia. The helicopters were erected at Bombay and flown to the respective units via circuitous routes involving many halts.

Some of the new Mi-4s were handed over to 107 HU and with the rest, 109 HU was raised at Chandigarh on August 26, 1961. 109 HU maintained a permanent detachment at Tezpur and this detachment converted into 110 HU with the induction of the Mi-4 helicopters in September 1962. The unit had six helicopters ready and serviceable by September 1962, just in time for the 1962 War.[30] This expansion, which in addition to the Mi-4, included An-12s, necessitated dedicated maintenance support. The distinct shift of sourcing military equipment from the West to Russia also necessitated a reorientation of maintenance practices and, hence, Chandigarh was chosen to be the overhaul complex for the Soviet origin aircraft and a repair depot was established.

28. Smith, n.11, p. 235.
29. Kumar, n.18, p.131.
30. Melville C Rego, Bharat-Rakshk, "In the Line of Fire-No 110 Helicopter unit, IAF," Bharat-Rakshak.com, May 23,2011, http://www.bharat-rakshak.com/IAF/History/1962war. Accessed on April 6, 2016.

NO.3 BASE REPAIR DEPOT (3 BRD)

No 3 BRD was established in February 1962 to meet the maintenance and overhaul needs of Soviet origin aircraft at Chandigarh. By 1967, the existing facilities were expanded significantly for overhaul and repair of Mil Mi-4 engines, sub-assemblies and components. Meanwhile, the procurement process initiated in the late 1950s for a common helicopter for all the three Services culminated in the selection of the Alouette III. What was even more significant was the selection of Hindustan Aeronautics Limited (HAL) for the task of licensed production of the helicopters.

HAL AND ALOUETTE III

The Alouette III was selected as the "common" helicopter meeting the requirements of the three Services. In all, 20 helicopters were to be procured in fly-away condition, and for the rest, bilateral agreements were signed for their licensed production in India.

The signing of agreements between HAL and M/S SNIAS of France in June 1962 paved the way for the licensed production of the Alouette III, christened "Chetak" at Bangalore. An agreement with Turbomeca of France was also executed for the manufacture of the Artouste engine. Subsequently, another licence agreement with SNIAS in September 1970 permitted production of the Lama (Cheetah) helicopter, utilising the same engine, rotor and transmission systems. Over 400 Chetak and Cheetah helicopters were produced between 1965 and 1983. This figure reached close to 600 produced by the year 2000.[31] With this, the aspiration of indigenised production of helicopters received a major boost and laid the foundation for major expansion of the technological skills required for helicopter production. But the challenges faced by the Indian armed forces during the 1962 conflict with China also had a significant impact on the modernisation efforts by the Indian armed forces.

31 Hindustan Aeronautics Limited, "Helicopter Division Bangalore: Brief History", www.hal-india.com/Helicopter%20Division%20Bangalore/M_124. Accessed on April 12, 2016.

1962 OPERATIONS

The literal "baptism by fire" for both the air crew and the recently acquired helicopters during the 1962 War in undertaking active operations resulted in the testing and redefining of the limits to which the helicopter could be subjected.

During the build-up phase itself, one Mi-4 was lost due to faulty construction of the helipad. The mission involved airlifting a part of a dismantled gun to a newly constructed helipad. On landing, the aircraft sank in the loose top surface, resulting in extensive damage being sustained by the helicopter.

In the North-Eastern Frontier Agency (NEFA), three Bell 47s were lost. Two of these were lost at Tsangdhar, as a result of direct enemy action, and the third unserviceable helicopter had to be left at Tawang when the Chinese overran the post.[32] The helicopter fleet also suffered the first battle casualty during active operations in the form of Squadron Leader (Sqn Ldr) Vinod Sehgal who was commanding 104 HU (Palam) and operating a detachment at Tezpur .The loss of the first of the Bell-47GIIs, which were operating in a single pilot configuration in direct support of the army for reconnaissance, communication and Casevac duties, was followed by the loss of a second helicopter flown by Sqn Ldr AS Williams who was fired upon when he went to investigate what had happened to the first helicopter. He was fortunate to survive the crash.

Meanwhile, in the Ladakh sector, operations by the Mi-4s of 107 HU were of similar nature, involving air maintenance of forward posts, Casevac and subsequent airlifting of the withdrawing personnel. The differences from the NEFA operations lay in the difficulties posed by the higher altitude of the operations.

It was during these operations that the unique abilities of the helicopters were utilised to the fullest extent by the pilots and technicians even with their limited experience. The operating limits of 4,000 to 5,000 ft altitude were exceeded routinely, with landing at altitudes as high as 7,000 ft.[33] Evacuations were undertaken under hostile fire and trying conditions. The operational experience so gained proved to be a boon for the IAF and shaped the

32. Kumar, n. 18, p.199.
33. Ibid., p. 230.

During the 1962 operations, the Chinese had unhesitatingly fired upon helicopters, even on those on which huge red crosses were painted while being used as air ambulances.

formulation of Standard Operating Procedures (SoPs) and training programmes.

The air crew, thus, tested the machines to their limits by transporting troops in the initial phases to evacuating casualties and providing food to the retreating troops. Some of the Service personnel were even rescued at night. This was significant as the helicopters were not cleared for night operations and night landing 'facilities' were improvised, often without previous coordination, by army personnel manning the helipads.[34] Besides the direct effects on the outcome of individual battles, the availability of the versatile platform also had a morale boosting effect on the troops.

The 1962 War, thus, moulded and transformed the entire philosophy of helicopter deployment and utilisation. The close coordination with the army entailed establishment of procedures and proved to be the start of an everlasting relationship between the IAF helicopters and the army. Proving of the machine in varied conditions paved the way for further expansion of the fleet in the form of an additional order for 76 Mi-4 helicopters.[35] This also necessitated logical establishment of additional units and this 'baptism by fire,' so to speak, resulted in the helicopter being utilised in a slightly different role during the large scale 'infiltration' bid by Pakistan in 1965.

THE 1965 WAR

While processing the case for procurement of helicopters, the planners did not envisage the utilisation of helicopters in an offensive role. This, along with the fiscal prudence being exercised by the Government of India, resulted in the decision of not opting for the armed version of the Mi-4 helicopter.[36]

34. Ibid., p. 202.
35. Smith, n.11, p. 235.
36. Premananda Goswami, "Helicopter Operations in J&K-111HU," October 1, 2015, http://www.bharat-rakshak.com/IAF/history/1965war/1338-premananda-goswami.html. Accessed on February 24, 2016.

Originally, the Mi-4 was designed to operate a 12.7 mm machine gun from a gondola mounted under the belly, along with air-to-surface rocket pods and bomb racks.[37] This was a part of the Soviet policy of deploying the helicopter in an assault configuration.

In addition to the conventional roles undertaken by helicopters, of communication, logistic support, Casevac and reconnaissance, an offensive role in the form of bombing and strafing was also added.

During the 1962 operations, the Chinese had unhesitatingly fired upon helicopters, even on those on which huge red crosses were painted while being used as air ambulances. Lacking the means for a suitable counter, it was natural for the air crew to feel helpless, and they must have desperately wanted to retaliate.[38] Not having the means for retaliation stimulated the thinking in the IAF of equipping the Mi-4 with some means of retaliation, and arming them. Therefore, local modification work was undertaken in the intervening period of 1962 to 1965, with multiple trials in various configurations of mounting guns as well as bomb racks, sourced from fixed-wing aircraft.

This was finally accomplished at No 1 BRD Kanpur by using a .5mm Browning gun of a Liberator and fixing it on a gondola under the belly of an Mi-4. The gunner would thereafter sit astride and fire at the targets straight ahead, as instructed by the pilot. Modification to drop 25-pounder (lb) bombs were also made by attaching a chute with three vertical channels from which nine bombs could be released by the gunner, on indication by the pilot. These chutes would thereafter be manually reloaded.[39] This innovative approach led to helicopters of the IAF undertaking another role in which they had appeared to be deficient. That is, in addition to the conventional roles undertaken by helicopters, of communication, logistic support, Casevac and reconnaissance, an offensive role in the form of bombing and strafing was also added.

37. Lloyd, n. 5, p. 44.
38. Rego, n. 30.
39. Isser, n.24, p. 55.

With local modification, the Mi-4s were now ready to undertake "offensive" operations against infiltrators entering from Pakistan on August 5, 1965. In order to once again assist the army, the IAF formed a task force with helicopters drawn from 107,109 and 111 HUs. This task force was positioned at Chandigarh, Jammu and Srinagar and placed so as to undertake operations in direct support of the army.

The unique use of the Mi-4s entailed getting airborne with a logistic load for a particular destination, bombing and strafing enemy positions before landing at the destination, delivering the load and picking up casualties on the return leg. This task force carried out 79 offensive sorties from August 20, 1965, onwards, till the cessation of the war. The use of the helicopter in this manner is estimated to have had a great demoralising effect on the infiltrators.[40]

The lessons learnt from this war highlighted the capabilities of helicopters in the entire spectrum of air operations as an effective platform in support of ground operations. The main beneficiary of helicopter support remained the army but valuable lessons were also learnt by the IAF which firmed up procedures and built up the required skill set for future operations. It was not long before helicopters were tasked to take part in counter-insurgency operations.

HELICOPTERS IN COUNTER-INSURGENCY (COIN) OPERATIONS

A myriad factors had caused the rise of insurgency in the northeastern region of India. Insurgency in Nagaland as a political movement commenced as early as 1929, with the Nagas petitioning the Simon Commission. However, the army was called in to help the Assam Rifles only in 1955-56, when the first act of violence occurred, in June 1954. The army thereafter commenced its operations by February 1956.[41] Operating in the difficult hilly jungle terrain of NEFA justified the demands of the army for air support.

40. Harbaksh Singh, *War Despatches: Indo-Pak Conflict 1965* (New Delhi: Lancer International, 2011), p. 227.
41. Gautam Das, *Insurgencies in North-East India* (New Delhi: Pentagon Press, 2013), p. 100.

In Mizoram (then Lushai Hills), armed insurgency reared its head on March 1, 1966, when Mizo rebels, numbering about 8,000, attacked 30 towns and military posts in all the districts. The insurgency was led by a retired havildar of the Indian Army, Lal Denga (later the chief minister of Mizoram) and had its origins in the famine of 1959. The movement was facilitated by the then East Pakistan government, when many Mizos crossed over to receive arms training there.[42] Both the army and IAF were involved in launching COIN operations in support of the Assam Rifles.

The initial close air support operations in Nagaland began in August 1960 when the Naga insurgents surrounded an Assam Rifles post and the Dakotas were 'air maintaining' the post by carrying out low level drops. During one such mission, a Dakota was hit and had to force land. Thereafter, four Ouragans and four Vampires fired T10 rockets and used 20mm cannons to repulse the attack.[43] This was probably the first time that fighters were deployed to repel an insurgent attack and sustain the post.

The response was slightly different during the Mizoram insurgent attack of 1966 with the availability of Mi-4s. When the Government of India directed the army and air force to put down the insurgency, emergency troops, totalling a battalion strength, were inducted by Mi-4 helicopters into Aizawl under cover provided by Toofanis firing T.10 rockets. This was probably the first and only time when helicopters were used to transport troops with Close Air Support (CAS) to retake an 'occupied' territory within the Indian boundary, and the operation was completed within hours.[44] The operation which took place in March 1966, gave tremendous credence to the use of helicopters in direct support of the army, the success of which totally depended on the successful insertion of troops into the hostile area by helicopters.

Subsequent analysis and assessment of employment of available air assets in such a manner, along with the lessons learnt during the 1965 War, ushered in major organisational changes in the existing defence organisational

42. Anil Athale, *Counterinsurgency and Quest for Peace* (New Delhi: Vij Books, 2012), p. 40.
43. Pushpinder Singh, *History of the Indian Air Force: Volume II* (New Delhi: The Society for Aerospace Studies, 2007), p.109.
44. Ibid.

structure. It was, therefore, decided to put in place a support structure to ensure coordinated actions between the armed forces, especially the IAF and army.

In 1969, to ensure close cooperation between the army and air force, Advance HQ of the Western Air Command (WAC) and Eastern Air Command (EAC) were established, alongside the respective Army Commands. Further Tactical Air Centres (TACs) were established at each Core HQ.[45] In this manner, a structure was in place for effective utilisation of available assets by military planners and to ensure close cooperation between the two Services. The positive results of such reorganisation were soon evident in the 1971 operations for the liberation of Bangladesh. This reorganisation was supplemented by the experienced and dedicated skill set which was now available among the helicopter air crew as well as in the supporting ground crew largely due to the experience gained during the 1962, 1965 and COIN operations.

1971 OPERATIONS

During the early part of 1971, the IAF was busy planning for a war that Pakistan was likely to start in order to divert the attention of its people and, indeed, of the world at large, from the crisis in East Pakistan. These plans depended on the existing politico-military situation which was changing continuously. By this time, the IAF had also built up its capabilities in accordance with the Tata Committee report of 1963, envisaging expansion to a 45 Squadron force. The priorities, as specified by the IAF were:

- Defence of the home base.
- Support to the army in the field, and in order to do this, to gain and maintain a favourable air situation over the tactical battle area. This was to be achieved by carrying out counter-air operations, reconnaissance, interdiction and other operations having a direct bearing on the outcome of the land battle.
- Provide transport and maritime support to the army and navy.

45. Ibid., p.156.

The order of battle for helicopters in December 1971 included a mix of units flying the Mi-4s and HAL Chetak. No(s) 105 HU, 107 HU, 109 HU, 110 HU and 111 HU were flying the Mi-4s, and No(s) 104 HU, 112 HU, 115 HU, 116 HU and 117 HU operated the Chetaks.[46] The initial batch of Mi-8s, which had been acquired from the Soviets, had arrived, but were not used during the 1971 operations. The total strength of helicopters under the Eastern Air Command (EAC) amounted to 82. Of these, 60 were Mi-4s and the rest were a mix of Bell 47GIIIs and Chetaks. Another positive aspect of the build-up was the synergy existing between the army and the air force commanders which percolated down to the local TAC commanders as well as the helicopter air crew.

During the preparatory phase itself it was evident that the operations were to be in support of liberating Bangladesh for which local support was a mandatory requirement. This support was vailable in the form of the Mukti Bahini. In addition, material help was also extended in the form of training their pilots to fly an armed Chetak helicopter which was specially modified by the BRD with a twin-barrel machine gun and rocket pods fitted on either side. The rocket pods could fire seven rockets in pair or salvo modes. When the operations commenced, this helicopter was used initially for undertaking operational tasks by night and acted as a self-contained mobile hitting unit. It was used to attack ammunition trucks, boats and barges ferrying troops by night on the Meghna river and other targets of opportunity such as enemy troop concentrations. Subsequently, it was also used to give cover to the troops being inducted by the Mi-4s.[47] The successful translation of an operational thought by the IAF, no doubt, borrowed from the French who had pioneered the use of the helicopter as an offensive platform in French Indo-China, laid the foundation for this additional role for the helicopters. By this time, the modifications on the Mi-4s, as used during the 1965 operations, were abandoned, and the Mi-4s were used mainly for the communication, troop transport, logistics and Casevac roles.

As the war progressed, besides undertaking crucial reconnaisance and communication tasks, including conveying the commander-in-chief

46. Ibid., p.158.
47. Isser, n.24, p.70.

The synergistic use of heli-power, thus, made a significant contribution to the overall war effort in achieving the overall objective for the liberation of Bangladesh.

and chief of staff of Bangladesh, helicopters were utilised for a series of Special Heliborne Operations (SHBO) tasks mainly in the eastern theatre. The first was the heli-lift of over 584 troops and field artillery weighing 12.5 tons to a Drop Zone (DZ) south of Sylhet by night. The use of the helicopters in this manner outmanoeuvred the enemy, in addition to overcoming the natural obstacles and essentially compressing the planned timeframes. The second one being the Meghna river crossing in which ten Mi-4s heli-lifted 656 troops and 8,000 kg of equipment. The third and the largest one was the heli-lift of 2,563 troops and 79,370 kg of equipment in the Narsingdi and Baidyabazaar area. These operations were undertaken under hostile conditions and most of the helicopters were hit by small arms fire but did not sustain significant damage. To the credit of the ground crew, the battle-damaged helicopters were flown out after undertaking field repairs.

Meanwhile, in the western theatre, besides undertaking crucial roles of reconnaissance, logistic supply and Casevac, helicopters were also used to support long range, deep penetration actions by the para commandos. Ably assisted by helicopters, troops of 10 Para Commando captured the District HQ of Chhachro, around 45 km inside Pakistan, south of the Gadra road. This post thereafter continued to be air-maintained by ferrying in of supplies, reinforcements, and ferrying out of casualties. During one such Casevac during the battle of Naya Chor, an Mi-4 was engaged by two Sabres and two F-6s. The crew and the aircraft even survived the strafing and bombing (the 500 lb bomb dropped on it).[48] The other significant Casevac missions included those in the Uri and Kargil sectors, sometimes under constant shelling by the enemy, in which over 89 battle casualties were evacuated.[49]

The net effect of the helicopter operations on the outcome of the battle and, more importantly, on the morale of the troops during the operations

48. Singh, n. 43, p.193.
49. *Siachin Pioneers, 114 Helicopter Unit, IAF* (Hyderabad: Vamsi Art Printers Pvt Ltd, 2005), p.7.

in both the eastern and western theatres, can well be imagined.

The synergistic use of heli-power, thus, made a significant contribution to the overall war effort in achieving the overall objective for the liberation of Bangladesh. The helicopter losses in the eastern theatre amounted to two Mi-4s. Total IAF losses included two Chetaks, of which one was attributed to direct enemy action.

The following table summarises the helicopter effort in the eastern theatre excluding that of the armed Chetaks:[50]

The army, thus, started viewing helicopters as a platform essential to fighting a land battle to achieve these aims and even instituted the commemorative Sylhet Trophy with a model helicopter acknowledging the significant contribution made by the helicopters during the 1971 operations.

Table 1

Aircrft Type	Sorties	Hours Flown	Load Carried (Tons)	Passengers	Casualties
Mi-4	1,397	922:05	111.1	4,065	866
Chetak	894	726:35		809	282
Bell 47G	113	84			31
Total	2,404	1,802:40		4,874	1,179

The successful conduct of the 1971 operations significantly turned the attention of the then military commanders to the significance of involving air power in terms of both fighters and transport aircraft (comprising both fixed-wing and rotary-wing assets, as defined by the air force) as an integral element of the four fundamental principles of war, as defined by the army. These are manoeuvre, mass, surprise, and economy of force.[51] The army, thus, started viewing helicopters as a platform essential to fighting a land battle to achieve these aims and even instituted the commemorative Sylhet Trophy with a model helicopter acknowledging the significant contribution

50. Isser, n.24, p. 63.
51. Vijay Oberoi, *Indian Army Aviation-2025* (New Delhi: KW Publishers, 2007), p. 10.

made by the helicopters during the 1971 operations. This idea also shaped the future modernisation plans of IAF helicopters as well as the organisational structure of the armed forces, especially that of the army.

CONCLUSION

The above narrative attempts to answer certain fundamental questions regarding IAF helicopters. The circumstances leading to their induction, and the factors affecting the expansion of the fleet have been examined. The events shaping the induction of helicopters and their evolution from primarily passenger transports to platforms utilised in the offensive role and their role in support of land operations have been discussed, including in the last major war fought by the Indian armed forces.

In the forthcoming part of this continuum, certain additional factors governing the further expansion of the helicopter fleet, along with enhancement of their roles and development of indigenous capabilities post 1971 operations, would be examined. And this would pave the way for understanding some of the contemporary issues affecting IAF helicopters.