



# India's Quest for an Indigenous Aircraft Carrier

by Admiral Arun Prakash, IN

*Arun Prakash is the Chief of the Indian Navy. Here he describes the history of India's quest for an aircraft carrier force, the challenges that have been met over the last 60 years and the successful route to indigenous carrier construction.*

It was indeed fortuitous for our Navy that at the moment of India's independence, those charged with planning for the nation's embryonic maritime force included many men of vision. In 1948, within six months of freedom, a ten-year naval expansion plan had been prepared, largely by Royal Navy officers serving on secondment, for consideration by the Government of India.

The plan was drawn up around the concept of two fleets: one for the Bay of Bengal and the second for the Arabian Sea, each to be built around a light fleet carrier, to be replaced subsequently by a fleet carrier. The grandiose scheme provided for four fleet carriers and 280 ship-borne strike and fighter aircraft within the next few years. This plan received approval in principle from the Governor-General Earl Mountbatten, as well as the Prime Minister of India, Jawaharlal Nehru, but unfortunately failed to materialise because of a variety of reasons.

Hostilities with Pakistan in Jammu and Kashmir in the winter of 1947 had focused India's attention on the Himalayas rather than the oceans, and the young nation's scarce resources were being diverted to the Army. Moreover, the outbreak of the Korean War in 1950 required all World War Two naval aviation surpluses of the Royal Navy to be marshalled once again for service, and there was not enough to spare for the Indian Navy. However, the main impediment that emerged was a change of heart in His Majesty's Government.

The reason why the British were willing to help bolster India's naval

strength was the basic assumption that the Indian Navy would form part of a Commonwealth-based bulwark against any possible depredations by the Soviet 'Bear' in the maritime domain (perhaps looking for warm water ports?).

However, by now India had decided to adopt an equidistant, non-aligned stance between the two 'cold-warriors' and her steadfast refusal to be part of any military alliance considerably dampened Royal Navy enthusiasm and support.

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## Arrival of the First Carrier

The dire financial straits of the fledgling nation also posed many hindrances to the planning process for creating a navy, but the carrier project eventually survived, albeit in a drastically diluted form. In 1957, the unfinished hull of HMS *Hercules*, a Majestic class light fleet carrier was acquired by India and taken in hand for completion in Belfast. Four years later she was commissioned into the Indian Navy as INS *Vikrant*. Sister ships served in the Canadian and Australian navies for some years.

The aircraft complement of *Vikrant* was essentially a Hobson's choice, and consisted of the Armstrong-Whitworth (later Hawker-Siddeley) Seahawk – a straight-wing, first generation ground-attack jet fighter – and the French-built Breguet Alize turboprop ASW machine.

Both aircraft served us faithfully, but by the late 1970s they were long in the tooth and needed urgent replacement.

The Royal Navy's dilemma arising from the Defence White Paper of 1966, which saw her naval aviation being virtually dismantled, was mirrored to an extent in India. The Royal Navy had been deprived of both fixed-wing carriers and aircraft; the Indian Navy had a small carrier but could not find a new aircraft that was compatible.

The one single factor that led to the resurrection of the fleet air arm of the Royal Navy was the 'discovery' of the ski-jump by a young engineer named Lt Cdr Taylor. It was only with the ski-jump installed on board that the small 'through deck cruisers' of the Invincible class could become viable STOVL platforms. We joyously followed suit, and the first Indian Navy Sea Harrier FRS Mk. 51 was vertically landed on the deck of *Vikrant*, off Goa by the author in December 1983.

In the hot and light wind conditions of the Indian Ocean, undertaking STO operations from the flat deck of *Vikrant* in a Sea Harrier (with one outrigger on the catapult track) always remained an 'exciting' event, especially by night. There was much relief in the aircrew room, therefore, when she was fitted out with a 12° ski-jump by Mumbai Dockyard in 1985. The range and payload of the Sea Harrier received a much-needed boost too.

## Search for a Second Carrier

With the *Vikrant* getting on in years, there was serious concern in the Indian Navy that having constructed our operational and tactical doctrines around carrier aviation, we might, one day, find ourselves without a fixed-wing platform at sea. Apart from the operational penalties, what our planners dreaded most was the inevitable loss of flying and other expertise, painstakingly built up

over three decades of ship-borne aviation at sea. Carriers were obviously not going to be available off-the-shelf and a serious thought process was triggered off in Naval HQ regarding the design and construction of an indigenous ship to meet our long-term needs.

The immediate outlook, however, remained bleak until 1985 when we received an offer from the Royal Navy for the sale of the 28,000-ton HMS *Hermes*. Laid down in World War Two, this 25-year-old ship had served the Royal Navy as a fixed-wing, commando and eventually STOVL carrier. The offer was eagerly accepted and, after a refit in Devonport, the Falklands flagship (wrongly claimed to have been struck by an Argentinean Exocet) sailed for India as INS *Viraat*. She had a 12° ski-jump and was well adapted for STOVL flying operations. Some of us had already flown from her deck during the Sea Harrier conversion in Yeovilton.

*Vikrant* was finally de-commissioned in 1997, and the Indian Navy has since been operating with just the *Viraat* at sea, with her complement of Sea Harriers FRS Mk51, Sea King Mk42 ASW helicopters and the Indian-built version of the Allouette III, known as Chetak. Occasional visitors on board include the Kamov-28 (ASW) and the Kamov-31 (AEW) helicopters.

### Indigenous Endeavours

The Indian Navy's small Directorate of Naval Design was, in the 1970s, deeply engrossed in the exciting maiden venture of licensed production of Leander class frigates being undertaken by the Mazagon Dockyard Mumbai. From time to time, they did, however, toss about various aircraft carrier design options, and a concept for the conversion of a passenger ship hull to a 'flat-top' was briefly examined in 1979–80, but discarded since it received no encouragement from any quarter.

By 1987, the Indian Navy had persuaded the Government to approve the commissioning of a concept study by Direction des Construction Navale (DCN), France, of a sea control ship of about 25,000 tons, capable of operating aircraft in the 15-ton category. The DCN report, received in 1989, covered two options: one of a conventional (catapult

equipped) ship and the other of a ski-jump carrier, to be constructed at the Ministry of Shipping-owned Cochin Shipyard Ltd. The report unfortunately came in at a time of financial stringency and had to be shelved reluctantly by the Indian Navy.

However, the DCN exercise was not entirely futile, because it gave a fillip and inspiration to our own designers, and concept designs, first for a simple 16,500-ton 'Harrier-Carrier', and then for a larger, more versatile 20,000-ton ship emerged from the Directorate. The factors and choices for size/configuration of the ship formed a rather complex matrix, and I will need to digress a little to dwell on them.

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### The Options Available

Apart from the dimensions of the hangar, the size of the propulsion plant and capacity of fuel tanks and magazines, the most important determinant of carrier design is the flight deck, whose size and configuration depend on the type of aircraft operations intended.

John F. Lehman (former US SECNAV) in his book *Aircraft Carriers: the Real Choices*, written in 1978, provides some very useful empirical data. Studies have shown that to operate all conventional high-performance aircraft, a deck length of 912ft is required, and this would correspond to a displacement of about 60,000 tons. If heavier aircraft like the F-14 were excluded, the deck length could be reduced to 813ft with the ship displacing about 35,000–40,000 tons. Lower down the scale, a 650–700ft deck would suffice for purely STOVL operations and the ship would displace about 20,000 tons.

In the 1980s and 1990s, the choices of aircraft available to India were severely

circumscribed on account of political considerations. Carrier-borne aircraft of US origin, by far the most capable in the market, were then just not available to us. The Soviets, our main purveyors of military hardware at that time, had only one shipboard fighter – the three-engined VTOL fighter Yak-36 (Forger) – to offer, but experience showed that the Sea Harrier, already in our inventory, was superior in most aspects. And then there were two more options, both at different stages of development: the French Rafale-M shipboard fighter and the Indian-designed Light Combat Aircraft (LCA).

However, at the end of all our studies, one factor emerged clearly: aircraft catapults were manufactured only in the USA, and since this piece of machinery was unlikely to be available to India, we could discard ship designs which were based on conventional aircraft requiring a catapult launch. This eliminated all US-origin deck aircraft as well as the Rafale as viable options. Since we had already decided that the Yak-36 did not have much merit, our ship designers were placed in limbo once again. This is when the ingenuity of the Russians came to our rescue.

### Enter STOBAR

Towards the end of the 1980s, word started trickling out of the USSR of an unusual experiment being undertaken by the Morskaya Aviatsia, the air arm of the Red Navy. Having shed their dogmatic animus of many years to flat-tops, the Soviets were planning to make a dramatic entry into the arcane field of carrier aviation. They planned to shun the trodden path and do this through the medium of ski-jump equipped carriers. But what about the flying machines?

Having realised the limitations of their VTOL endeavours, they chose three (conventional) shore-based combat aircraft and undertook extensive modifications to enable ramp take-offs and hook-assisted 'arrests' on board. The aircraft chosen were the Sukhoi-25 (trainer and strike aircraft), the Sukhoi-27 and the MiG-29. The modified versions of the aircraft were given the suffix "K" (for Korabelnyy, or ship) and this mode of operation added a new term to the lexicon of naval aviation:



STOBAR which stood for 'short take-off but arrested landing'.

### The Air Defence Ship

With this development, our carrier design options began to acquire some clarity, and the Staff Requirements having been reviewed, the designers returned to the drawing board. However, the continuing uncertainty about aircraft availability made their job difficult, and the first tentative design that emerged was for a 20,000-ton carrier named euphemistically the 'air defence ship' or ADS. The ADS would

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operate the Sea Harrier (already in our inventory) and hopefully the indigenous LCA, whose ship-borne version was being explored.

However, a detailed feasibility study of a STOBAR version of the LCA by its design bureau revealed that a safe ski-jump launch and arrested recovery, though feasible, would make extra demands on this radical little strike-fighter. Although equipped with a digital flight control system, the delta wing configuration of the LCA (Navy) would require higher take-off and landing speeds. Consequently, the deck length had to be increased by about 15m, and the redesigned ship now displaced 24,000 tons, with a corresponding increase in cost.

By now the Indian Navy was seriously examining the Russians' offer of their 1980s' vintage helicopter/VTOL carrier *Admiral Gorshkov*, and a choice had to be made of a suitable aircraft. The obvious options were the Su-33 (a derivative of the Su-27K selected for operation from the 67,500-ton carrier, *Kuznetsov*), and the Mig-29K. An evaluation revealed that both aircraft would meet our

operational requirements. The Su-33, though more capable, being dimensionally larger would not only not fit in the smaller hangar of the 44,500-ton *Gorshkov*, but would have marginal wing-tip clearances from the island structure during deck launch. It was therefore decided that the Mig-29K would equip the *Gorshkov*, to be renamed INS *Vikramaditya* in Indian service.

The downstream impact of this decision was instantly felt by the ADS programme, and a fresh design exercise was initiated to assess the implications of MiG-29K STOBAR operations on the ADS design. According to the planners, the ship's basic complement would be a squadron each of MiG-29s and assorted helicopters. The option of operating the upgraded Sea Harriers was also catered for, until the LCA (Navy) received its full operational clearance. The workshops, magazines, deck and lift configurations as well as crew spaces had to be reworked.

The staff requirements having been finalized in 1999, the ADS emerged, in its definitive form, as a 37,000-ton vessel, to be powered by four LM-2500 gas turbines in COGAG arrangement, which would give it a top speed of 28 knots. The 830ft long angled flight deck would have a set of three arrester wires aft rated to handle aircraft of up to 22-ton all-up weight. A set of jet blast deflectors and hydraulic chocks would be installed to provide a 600ft deck run for launch of the Mig-29K and LCA (Navy), from the 14° ski-jump launch using afterburner. The ship would carry an air group of 30 aircraft and helicopters and would be crewed by about 1400 personnel.

### The Indigenous Aircraft Carrier

The project received financial approval of the Government of India in January 2003, and first steel was ceremonially cut in Cochin Shipyard Ltd on 11 April 2005, when the ADS was re-designated as the 'IAC' or indigenous aircraft carrier. Consultancy for propulsion system integration will come from M/S Fincantieri of Italy (now in the final stages of completing the Italian carrier *Count Cavour*) and, for the aviation complex, from M/S Nevskoie Design Bureau of Russia.

Some early problems relating to shipbuilding steel and selection of equipment have been resolved and the yard is optimistic about meeting the delivery schedule of 2012-13. There are no illusions about the complexity of the undertaking and, on account of certain residual imponderables, the shipyard plans to execute the contract in two phases. It is expected that the uncertainties, especially those relating to equipment that needs to be imported will have been resolved by the time work starts on Phase II. The financial estimates for the IAC have therefore remained somewhat flexible so far.

As a practising adherent of ship-borne aviation for the past 45 years, the Indian Navy aims to fulfil its long-term operational commitments in the IOR by deploying two carrier task forces at sea, while a third ship is under maintenance or refit. This would be the embodiment of a concept mooted in our plans as far

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back as 1948.

The arrival of the *Vikramaditya* and her squadron of Mig-29K fighters in 2008 would certainly add considerable combat power to the Indian Navy, and the Service looks forward to the IAC joining the fleet in the next decade. However, while we take up a case for construction of a second IAC, we need to assess the residual life of the sturdy old *Viraat*.

Building an aircraft carrier for the first time is no doubt going to be a challenging task for India's warship designers and builders. The commissioning of this ship in the next decade will not only be a defining event for our industry, but also a concrete manifestation of the determination and resolve with which we have pursued the vision of becoming a 'builders' navy'. ■