

The Americans Are Back

F-16 for the IAF and F/A-18 for the Indian Navy

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DURING THE LAST year, the Indian Air Force (IAF) and the Indian Navy (IN) confirmed what must have been the worst kept secret in New Delhi: that the Tejas Light Combat

Aircraft, for all its achievements, was unsuitable as a strike-fighter for their near-term modernisation requirements.

Where the IAF was concerned, the request for information (RFI) for a new single-engine fighter issued in the United States, Russia, and Sweden in October 2016 marked a further twist in its long-running saga to complete the Medium Multi-Role Combat Aircraft (MMRCA) acquisition that first began in 2001. After the aborted competition led to an off-the-shelf purchase of just 36 Rafales in 2015 — instead of the 126 aircraft originally intended — the question of how the IAF would overcome the deficit of the 90 remaining fighters was still unanswered. There were some in India who argued that the IAF should jettison the MMRCA requirement altogether and fill out the remainder of the force with more Su-30s at the high-end and additional Tejas fighters at the low-end.

Given the shortcomings of the Tejas — some, but not all, of which can be rectified — it is not surprising that the IAF finally threw in the towel and decided to seek an advanced foreign fighter to satisfy its MMRCA requirements, even if only partially. That the 90 aircraft now considered for acquisition will be single-engined suggests that this segment of the IAF may eventually end up bifurcated. The single-engine platform, which hopefully will be announced in the next year or so, will complement the 83 Tejas fighters already approved for procurement: together serving as replacements for the retiring MiG-21s in the IAF inventory. Because the 90 future selectees and the 123 Tejas aircraft

that will eventually be acquired will still not suffice as one-to-one replacements for the MiG-21s, it is possible that the IAF may consider acquiring additional medium-weight twin-engined Western fighters down the line, if and when finances permit, in order to further strengthen the IAF for counter-air operations involving China and preserve the three-tier force that the service has sought to maintain more recently.

Obviously, there is nothing particularly sacrosanct about a three-tier force structure in the abstract. If the foreign single-engine fighter met the multirole requirement effectively, the IAF could simply expand its numbers to maintain a larger component that straddles the light- and medium-weight categories, as this new acquisition would in any case bring more to the air superiority campaign than a defensive counter-air fighter like the Tejas ever could.

The Indian Navy, in contrast, has moved in a different direction from what appeared to be initially contemplated. Although the navy has been the strongest supporter of India's indigenous defence development efforts, the sea service too finally rejected the naval version of the Tejas that was originally intended for deployment aboard the INS Vikrant — Indian Aircraft Carrier-1 (IAC-1) — currently under construction. This decision is eminently sensible given the navy's special requirements: because an aircraft carrier hosts a rel-

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atively small number of combat aircraft aboard a single-engine fighter is a risky proposition at even the best of times. The technological and operational limitations of the Tejas only implied that these risks would be magnified, even if it were to be deployed merely as a second-string complement to a more advanced strike-fighter, such as the MiG-29K, which has been bedevilled by serious serviceability problems of its own. Consequently, the IN has prudently chosen to seek a new advanced twin-engine fighter that hopefully will populate the entire combat air wing on the INS Vikrant and possibly the follow-on vessel (IAC-2) as well.

Both the IAF and the IN have thus ended up similarly: although the former, seeking a twin-engined airplane originally, has now settled for a single-engine combatant, and the latter, investing in a single-engine fighter initially, is now exploring a twin-engined aircraft, both have decided to look abroad rather than at home for good reason. A direct

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purchase of the aircraft finally selected, however, is not on the cards. Thanks to Prime Minister Narendra Modi's emphasis on 'Make in India,' the final winners in both the IAF's and the IN's competitions will be decided not simply on operational excellence and costs — the traditional criteria that dominated fighter selections hitherto — but equally on how best they leaven India's domestic manufacturing capabilities. And the traditional Indian interest in using its defence acquisitions to strengthen its strategic partnerships abroad still remains unchanged; if anything, these geopolitical imperatives have only intensified since Modi took office.

The renewal of a global search to supply India with advanced fighters has unexpectedly pushed the United States back into the game after both its entrants, the F-16IN Fighting Falcon and the F/A-18 E/F Super Hornet, were ejected from the previous round of the MMRCA competition. Because the IAF's new RFI specifies a single-engine

platform, however, the only two aircraft capable of satisfying this requirement are Lockheed Martin's venerable F-16, offered to India in its latest and most sophisticated Block 70 variant, and Saab's Gripen, which has been offered in a new, larger, and more impressive E variant that flew for the first time on 15 June 2017. The IN's requirement for a twin-engined naval fighter has similarly left only two contestants in the race — Dassault's Rafale, the previous selectee in the IAF's MMRCA competition, and Boeing's Super Hornet, the principal strike-fighter on the US Navy's aircraft carriers today.

The return of Lockheed Martin's F-16 Block 70 Fighting Falcon and Boeing's F/A-18 E/F Super Hornet into the IAF's and IN's competitions respectively has irked some Indian commentators, such as Bharat Karnad, who view them as examples of 'technologically obsolete weaponry.' This criticism is misplaced and fails to appreciate what makes combat fighters effective.

Tricolour Roundels on a Falcon?

Starting with the IAF race first, the F-16 is a storied fighter that has been in continual production since 1976 with over 4,500 aircraft built since. Although designed initially as a light fighter for within-visual-range combat, it has evolved into a formidable multirole platform over time, all the while remaining one of the most agile air combatants ever produced by the United States (US). Today, the F-16 in the US Air Force (USAF), for example, is employed for all-weather counter-air operations: these include both beyond- and within-visual-range air-to-air engagements as well as anti-surface strike (including specialised missions such as the suppression of enemy air defences).

That the F-16's basic airframe has evolved only modestly over the years has proven to be completely irrelevant where manoeuvring superiority is concerned. This is evinced in the fact that, although the aircraft first flew in 1974,

BATTLE-TESTED F/A-18 takes off from an aircraft carrier



its sustained and instantaneous turn performance (when flying without its conformal fuel tanks) at both low and high altitudes is virtually identical to that of the Gripen and its thrust-to-weight ratio is unambiguously superior — not bad for an aircraft that was designed almost 15 years earlier! It would be surprising if the Gripen E, with its heavier airframe in comparison to its predecessor and its lower-thrust engine in comparison to the F-16, could improve upon this feat dramatically.

Success in modern air combat today, however, is not simply a matter of manoeuvring performance, even though the F-16 is fully the Gripen's peer in this regard. Rather, the aircraft's sensors, electronic warfare and information management systems, and weapons make an enormous difference — as do pilot training, doctrine, and the concepts of employment. If pilot training is excluded from the comparison, it is in the other realms that the F-16 has undergone a truly transformative metamorphosis over time, making it a worthy competitor to the Gripen in both the air-to-air and the anti-surface warfare regimes.

The F-16's primary sensor, the AN/APG-83 Active Electronically Scanned Active (AESA) radar, for example, employs fifth-generation AESA radar

technology that is derived from the advanced radars developed for the F-22 and the F-35. The F-16's electronic warfare systems will be sophisticated Israeli systems, selected in accord with IAF preferences, and its weapons are more or less comparable to those of the Gripen E (and are, in fact, interchangeable should India require it). The Gripen's information management capabilities are undoubtedly exquisite, but whether they are superior in an operational context to those of the F-16 is not obvious. At any rate, the F-16's larger weapons load and, when used, its conformal fuel tanks give it a larger radius of action in comparison to the Gripen E, which makes it more attractive for theatre strike operations involving China.

None of this derogates from the Gripen E's technological excellence, which is conspicuous, but it does indicate that the F-16 is at no particular disadvantage to its Swedish competitor where its combat capabilities are concerned. Its age in particular has posed no special impediment as its avionics and weapons — the capabilities that really matter, given that its aerodynamic characteristics are already superlative — have been continuously modernised, as required by the complex operating environment facing its principal and

most demanding customer, the US Air Force (USAF). Parenthetically, it may be noted here that the F-16 Block 70 offered to India is so dramatically superior to the version in Pakistan's employ as to defy serious comparison.

Given the difficult financial constraints facing the IAF today, the unit flyaway and life cycle costs of the two aircraft will be critical factors affecting the Indian decision. Unfortunately, good comparative data on these issues is hard to come by. The original Gripen had a well-deserved reputation for having low operating costs (the F-16's being somewhat higher), but whether this will be equally true for the Gripen E is as yet unclear. In any case, the price at which the F-16 and the Gripen E are being offered to India today is publicly unknown; suffice it to say that, the closer they are in price, the more attractive the F-16 would be to the Modi government, given its other advantages for defence industrial cooperation and deepening the US-India strategic partnership.

It is in these latter arenas that the F-16's advantages over the Gripen E are most pronounced. Because Lockheed Martin is transitioning toward the manufacture of the F-35 in the United States, the company has committed to transferring the entire F-16 produc-

View from the US

tion line to India, should this aircraft be selected in the IAF's single engine fighter competition. The transfer of the line would enable Lockheed Martin and its Indian partner, Tata Advanced Systems, to complete the final assembly of the aircraft in India along with manufacturing of its various structural components, while eventually shifting towards the fabrication of some of its combat system components as well.

While Saab is certain to table a similar offer, sweetening the pot with financing in addition to technology transfer, the Lockheed Martin-Tata joint venture promises to advance Modi's employment generation objectives far more ambitiously because it would integrate India into the global aviation supply chain at a level that Saab cannot match. Beyond supporting the IAF's own F-16s, all future F-16 sales globally — including to the four-six countries that are currently exploring new acquisitions — could occur from production in Indian plants. Furthermore, India would become a critical node in supporting the 3,200 F-16s still in service in 25 countries (including the 950-odd F-16s that will remain in US Air Force (USAF) service for another two decades), in contrast to becoming a supplier for a much smaller market — at best 200-300 Gripens in some six or seven countries — were it to select the Gripen E eventually. The advantages of the F-16's global popularity, and its still expanding market, are thus obvious for India.

The gains to a deepened US-India relationship are no less consequential. At a time when President Donald J. Trump

seeks transactional benefits to the US from all its foreign partnerships, an Indian purchase of American F-16s would go far in protecting its bilateral ties with the US — still the most important power in the international system — without compromising the IAF's capabilities. New Delhi's selection of the Gripen E would obviously strengthen the IAF in similar ways, but a strategic partnership with Sweden is meaningless in the face of the problems posed by China's rising assertiveness in Asia.

The significant proportion of US technologies in the Gripen further complicates matters: it has been estimated that between 40 to 50 per cent of the original version's components are of American origin, meaning that the US license regime would apply even if India purchased the Swedish aircraft. This fact diminishes the attractiveness

Both the F-16 Block 70 and the Gripen E are highly capable multirole fighters, and, as a result, the Indian government will be confronted by the difficult dilemma of juggling operational effectiveness and cost on one hand with the benefits for defence industrial cooperation and deepening the US-India partnership on the other hand

of the Gripen where political considerations are concerned, because New Delhi would end up substantially buying American but without getting the requisite credit. In any event, Saab appears to be attempting to replace the Gripen's American components with other substitutes, but the success of this effort and its impact of the aircraft's effectiveness are thus far unclear.

On balance, therefore, whether India finally chooses the F-16 Block 70 or the Gripen E, the IAF comes out ahead because both aircraft are indisputably superior to the Tejas in manoeuvring performance, sensors, electronic warfare and information management systems, weapons load, and in radius of action. There are marginal differences in operational capability between the F-16 and the Gripen, some favouring the former and some the latter, with the F-16 having an indisputable advantage in range and in the weight of the payload carried. Both aircraft will continue to evolve in the areas that really matter for air superiority over the long term — sensors for passive and active detection, advanced fire and forget weaponry, cooperative targeting using off-board data, and fire control systems for air and ground operations — and therefore, Indian interests would be well served by choosing either airplane for its air force. Both the F-16 Block 70 and the Gripen E are highly capable multirole fighters, and, as a result, the Indian government will be confronted by the difficult dilemma of juggling operational effectiveness and cost on one hand with the benefits for defence industrial cooperation and deepening the US-India partnership on the other hand. Pulling off such a balancing act cannot be easy, but New Delhi is better off being spoilt for choice than having to cope with skimpiness.

Super Hornets at Sea?

If the F-16 is the worthwhile revenant in the IAF's single engine competition, Boeing's F/A-18 E/F Super Hornet actually has an upper hand in the IN's search for a twin-engined fighter for its future aircraft carriers. The fleet's requirements here are complicated by the fact that the aircraft selected as its primary strike-fighter must be capable of operating from both the INS Vikrant, the ski jump equipped short take-off but arrested recovery (STOBAR) carrier currently being built in Cochin, as well as from its future large deck catapult take-off but arrested recovery (CATOBAR) carriers, such as the IAC-2, which will begin con-



HOME GROWN LCA Tejas

SWEDISH SKIES
Saab's Gripen



struction at some point in the future.

The IN has concluded that the Tejas is unsuitable for either vessel because, despite the structural improvements made to the test airframe in support of carrier operations, the final product did not meet the standard of acceptability at a time when Indian naval aviation is preparing to meet formidable adversaries, such as China, in the Indian Ocean.

Being able to successfully defend against — and overcome — Chinese aircraft carriers with their deployed air wings consisting of Su-33/J-15s, and possibly indigenous J-20s and J-31s in the future, should constitute the real metric for judging the acceptability of a given strike-fighter for the IN's prospective carriers. This implies that rather than obsessing over some arcane detail pertaining to the increased tensile strength of the Tejas' undercarriage or the extent of the nose droop improvements intended to expand its pilot's vision, its worth as the mainstay of Indian carrier aviation must be judged by its effectiveness as a combat system rather than merely by its aerodynamic viability.

Obviously, achieving success on the latter count is a precondition for satisfying the former. But the challenge facing the IN here is that the indigenous Tejas is hopelessly behind the times relative to the threat that it faces from more mature opponents in the here and now — adversaries whose war-fighting performance is now steadily being expanded even as the Indian test-bed struggles

to become merely a worthwhile flying platform for carrier operations.

Given this asymmetry, it is not surprising that the IN has chosen to look for an advanced strike-fighter from abroad right away, partly because it cannot wait in hope that the Tejas Mark 2 will eventually make the cut as an effective strike-fighter for the Vikrant. If it is to have a combat aircraft manufactured in India and ready for operations by the time this carrier enters the fleet in 2021, the selection and procurement processes will have to be completed by early 2018 at the latest. Given the development timelines associated with the Tejas Mark 2 thus far, it would be simply miraculous if the aircraft could be certified as combat ready, let alone superior to its likely adversaries, by that date.

Because an aircraft carrier has only a small number of aircraft, the qualitative superiority of both aircraft and pilot are critical, while maintainability — meaning the reliability of the airframe and its combat subsystems as well as the ease of diagnostics and repair — contributes towards the ability to turn an aircraft around quickly for repeated sorties, thus making it a vital combat multiplier, particularly for small- or medium-sized air wings. Of the foreign contestants in the IN's search list, neither the Swedish Sea Gripen — as yet only a notional alternative — nor the Russian MiG-29K have demonstrated the capacity for both ski jump and catapult launches, and the Sea Gripen additionally fails to

meet the RFI's requirement that it must already be in service in its country of origin. Consequently, only the French Rafale and the American F/A-18 Super Hornet remain as plausible contenders and each offers India the opportunity to dominate the adversaries it is likely to face in the Indian Ocean.

But the two rivals are not evenly matched. The Rafale, unlike the Super Hornet, does not have fully foldable wings and, hence, cannot use the Vikrant's elevators without major modifications that would add to its already high unit costs. The IAF's Rafale came out at close to USD160 million per copy and the naval variant, of which less than 50 have been produced, is likely to be even more expensive. But cost aside, the Rafale's lack of fully folding wings implies that fewer aircraft can be spotted on the carrier's flight deck, a disadvantage when more aircraft there mean faster cyclic operations and by extension greater combat capability. And its maintenance requirements and operating costs are much more substantial than that of the Super Hornet.

Beyond these issues, even when both aircraft are compared one-on-one, the F/A-18 E/F compares favourably with the Rafale. The Super Hornet's organic sensors and its capacity for integration with the E-2D airborne early warning aircraft, which is likely to be eventually deployed by the IN ashore and most likely on board the IAC-2, are unparalleled. The F/A-18 E/F's primary sen-



sor, the APG-79 AESA radar, has no peer among fourth-generation combat aircraft, and its huge detection and electronic attack advantages ensure first look-first shot opportunities that even sophisticated rivals often cannot match. Its advanced electronic warfare suites, one area where the Rafale's capabilities are indeed comparable, make it exceptionally survivable in a variety of war-fighting environments, while its ability to swing effortlessly between air-to-air and air-to-surface missions make it just as versatile as its French competitor — but in a much cheaper platform.

To make a long story short, the F/A-18 E/F Super Hornet has been designed for standoff air superiority as well as for flexible multirole operations and for that reason will remain the US Navy's workhorse strike-fighter well into 2040, if not beyond. Both the Super Hornet and the Rafale are superb strike-fighters, but the IN is likely to find the F/A-18 E/F better suited as the primary aviation battery for both its STOBAR and CATOBAR carriers. The cost advantages of the Super Hornet are considerable and, when considerations relating to defence industrial cooperation and deepening strategic partnerships are taken into account, it also does just as well as, if not better, than the Rafale on both counts. Because Boeing already has major production activities underway in India, including a joint venture with Tata that fabricates the fuselage for the Apache attack helicopter, as well as Indian suppliers that already manufacture components for US and

international F/A-18s, such as Sasmoss, Rossell Techsys, and Hindustan Aeronautics Limited (HAL), the selection of the Super Hornet by the IN would yield expanded partnerships with Indian industry for the manufacture of its airframe sections, wings and control surfaces, parts of its engines, and various other subsystems.

These activities, which would result in the transfer of proprietary know-how, advanced manufacturing technologies, and industrial fabrication processes, would help to nurture the production complex that can oversee the delivery of an advanced weapon system that the US has never before sold to India. Developing such an infrastructure would not only create high technology jobs dispersed throughout India, but it would build indigenous proficiency that could aid in the development and manufacture of other civilian and military technologies. Even as these benefits come to fruition, India would position itself to support the nearly 600 F/A-18s that are in operation globally. It would also open the door to possible co-development and co-manufacturing of components for the Advanced F/A-18 Block III, with its conformal fuel tanks, enclosed weapons pod, and an enhanced General Electric 414 engine that could serve as a common power plant for the Super Hornet, Tejas, and eventually the Advanced Medium Combat Aircraft concurrently. These kinds of benefits would obviously not be comparably available with the Rafale because of its smaller global market.

The deepening of the US-Indian strategic partnership would also be an obvious consequence of an Indian decision to purchase the Super Hornet for its prospective aircraft carriers. The same would be true for India's partnership with France were the IN to settle for the Rafale. But important though this latter political affiliation is for New Delhi, the twists and turns in the earlier MMRCAs endgame demonstrated how the extraordinarily high costs of French equipment made it difficult for India to fuel its strategic partnership with France through large defence transactions. In this instance, therefore, the case for the IN selecting the Super Hornet is persuasive because it would bring combat capabilities on par with the Rafale but at much lower cost while simultaneously enhancing India's industrial base and strengthening its partnership with Washington.

Taking the Long View

There is little doubt that India has good options as it moves forward to fulfil its air force and naval requirements for an advanced strike-fighter. In both cases though, there will be challenging trade-offs to be made as the government of India juggles the operational excellence of the various contenders, their unit and lifecycle costs, their contributions to leavening India's defence industry, and their capacity to deepen the country's strategic partnerships.

When these variables are assessed synoptically, the American offerings prove to be remarkably competitive — not entirely a surprise, even if the circumstances that permitted their re-entry were not initially anticipated. In any event, India should treat the winners chosen in both the IAF and IN competitions merely as 'interim' acquisitions despite the fact that these aircraft will be in service for several decades. Because combat aviation is steadily moving towards the dominance of stealthy platforms, India should be seeking to leverage these purchases towards the development or the acquisition of fifth-generation fighters — a technology area where, at least to date, American suppliers dominate in the international marketplace. Perhaps that is one more reason for giving Lockheed Martin and Boeing serious consideration in the current competition. ■

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