

Mi-17s carrying the flags of India and the Indian Air Force led the flypast during the opening ceremony of Aero India 2017. All pictures by Piotr Butowski



Aero India

Piotr Butowski brings us the latest news from this year's Aero India, held between February 14 and 18



Aero India, like every big air show is driven by money. After the conclusion of the Medium Multi-Role Combat Aircraft (MMRCA) fighter tender and several other procurement programmes for the Indian Ministry of Defence, a brief respite. Only 549 companies took part in this year's 11th exhibition at Yelahanka Air Base near Bangalore (there were 623 in 2015 and 650 in 2013). The exhibition was opened

by Minister of Defence Manohar Parrikar, followed by an air parade headed by three Mi-17 helicopters, suspending the flags of India, the Indian Air Force and Aero India. 'Made in India' was the theme of the formation which featured a group of Dhruv, Rudra, LCH and LUH helicopters and then a group of Tejas, Su-30MKI, Do-228, Hawk-i and HTT-40 aircraft. Aero India focuses exclusively on military aircraft and there were no token civilian aircraft present this year.

New Show, Old Tale

The author has reported from Aero India since 2005. His reports usually

contain details of aspirations of the Indian Air Force including its objective to have 42 fighter squadrons operational by 2022; how the MiG-21 fighter fleet is close to the end of its service life; and how the expected deliveries of new Light Combat Aircraft (LCA) Tejas and MMRCA Rafale fighters have yet to begin.

There are currently 33 fighter squadrons in the Indian Air Force order of battle comprising about 700 aircraft; a squadron complement is 18 aircraft plus a few more for maintenance reserve and strike off wastage.



Fighter Mania

In early October 2016, the Indian Ministry of Defence issued a Request for Information (RFI) about a new fighter with just two conditions: the aircraft is to be a single-engine design (thus cheaper than the Rafale) and production is to be undertaken in India. Consequently, the list of contenders is short, just two types qualify as single-engine designs: Lockheed Martin's Block 70 F-16 and SAAB's JAS 39E Gripen.

SAAB had a significant presence at Bangalore, displaying a mock-up of the Gripen E and three JAS 39C Gripens on the flight line.

Lockheed Martin, was as usual supported by the US Air Force with two F-16C Fighting Falcons on the flight line.

Assessing the chances of both candidates is difficult. Most observers lean toward the Gripen, but Lockheed Martin can play a trump card: an offer to produce an export version of the F-35 Lightning II in India in the more distant future.

Since December 31, Chief of the Air Staff Air Chief Marshal Birender Singh Dhanoa stated selection of the new fighter would not only be a choice of the aircraft, but also the choice of a strategic partner that will launch a production line in India, provide transfer of technology and, in the more distant future, help India with the development of a next generation of indigenous fighter aircraft.

Current squadron count includes 11 squadrons of MiG-21s and MiG-27s, soon to be deactivated, which means India must purchase 400 fighters to equip 20 squadrons by 2022. Since the introduction of the MiG-29 and Mirage 2000 fighters 30 years ago, India has only introduced the one type of fighter, the Su-30MKI *Flanker*, albeit in large numbers. Despite its urgent need for 126 MMRCA fighters, the procurement programme was cancelled and India ordered just 36 expensive Rafale fighters instead; the first batch should arrive in India in 2019. Three Rafales took part in Aero India 2017, two flying and one on static display.

India's Ministry of Defence has not included the number of single-seat fighters required in the Request for Information. Dhanoa has simply said the Indian Air Force will maintain an optimum ratio of light, medium and heavy class combat aircraft.

Minister Manohar Parrikar quite unexpectedly mentioned at Bangalore that India was considering a further fighter competition (presumably for a twin-engine type) that will only be addressed once the tender for the first competition is concluded. Because India has already placed orders for two squadrons of Rafales, six LCA Tejas squadrons and two Su-30MKI squadrons; tenders for a single, and perhaps a twin-engine fighter, may involve 200 aircraft.

Naval MRCBFs

At a press conference on December 2, 2016 (Navy Day), Chief of Naval Staff Admiral Sunil Lanba caused a storm stating the Indian Navy is not considering the indigenous Naval LCA as the aircraft for India's new aircraft carriers, but would look overseas for a new ship-borne fighter type. In reality, Admiral Lanba said nothing new – a decision that the first variant of the Naval LCA would not be used operationally was made as early as December 2009. At that time six Mk1 aircraft, built for evaluation and pilot training, were ordered and development of the highly revised Mk2 began.



Single-seat Naval LCA 3002 (c/n NP-2) is one of two prototypes and was on static display at Bangalore.

During Aero India 2017, Parrikar softened the Admiral's statements, thanking the team of the Aeronautical Development Agency (ADA) for its good work and emphasised that the Indian Government will still fund the Navy LCA programme. Nevertheless, the Mk2 Navy LCA will not be ready soon; the ADA is aiming for the Mk2's first flight in the 2020-2021 timeframe. At Bangalore, single-seat NP-2 (Naval Prototype) 3002 (one of two existing Navy LCA aircraft) was on static display.

In January, the Indian Navy issued an RFI for 57 Multi-Role Carrier Borne Fighters, dubbed MRCBF. The detailed document poses many questions, but does not specify a launch configuration; catapult assisted take-off but arrested recovery (CATOBAR), or ski-jump assisted short take-off but arrested recovery (STOBAR). Time is an important criterion: Admiral Lanba set a five to six-year timeline for the MRCBF's introduction into service. This deadline limits candidates to two: Boeing's F/A-18 Super Hornet and Dassault's Rafale M; a naval Gripen M or Lockheed Martin's F-35C Lightning II Carrier Variant are less probable, and Russia's MiG-29K is not being considered. The fact that the Indian

Navy is insisting on a new tender rather than further MiG-29K purchases may indicate the service is not satisfied with the type; complaints from the Indian Navy concern poor maintenance and limited payload and endurance.

Indigenous Tejas

Progress of the Tejas LCA programme is much slower than announced. Two years ago, the then chairman of Hindustan Aeronautics Limited, R.K Tyagi said the company would manufacture six Tejas aircraft in FY2015-2016 (ended in March 2016) and eight more in FY2016-2017.

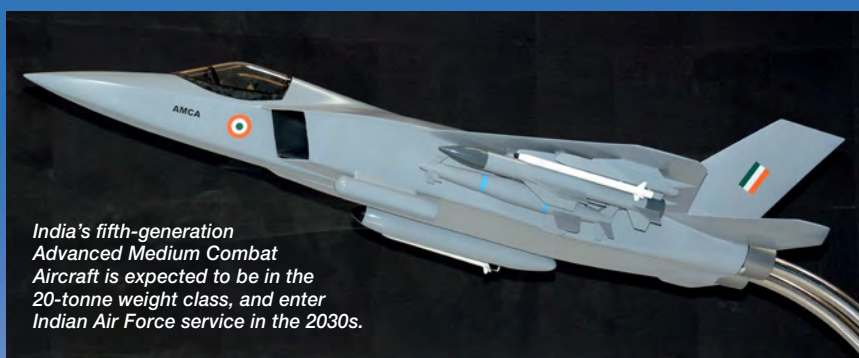
Only three were built.

On July 1, 2016, the initial two series production aircraft (c/n SP-1 and SP-2) were delivered to the first operational unit, No.45 Squadron 'Flying Daggers', temporarily based at Bangalore.

Aircraft LA-5001 (SP-1) was on static display at Aero India 2017, other aircraft made demonstration and customer flights during the show.

Two orders currently exist: the first from 2006 for 20 Mk1 aircraft compliant with the requirements of the initial operational clearance standard, and a second from 2010 for 20 aircraft compliant with the final operational clearance configuration. According to current plans, No.45 Squadron is to be fully equipped with 20 aircraft in 2018 and the other 20 will be completed in FY2019-2020, that is by March 2020.

A further four squadrons were to be equipped with the new LCA Mk2 version with the more powerful GE-F414-INS6 engine, slightly enlarged airframe and more advanced systems. However, the plan recently changed; the Mk2 configuration was shifted to the more distant future and instead a new, interim Mk1A configuration appeared, featuring the existing airframe and engine, but the new systems planned for the Mk2. The Mk1A will feature an active electronically scanned array (AESA) radar; an electronic warfare suite with an internal radar warning receiver and podded self-protection jammer; an aerial refuelling capability; and carry beyond-visual range air-to-air missiles.



India's fifth-generation Advanced Medium Combat Aircraft is expected to be in the 20-tonne weight class, and enter Indian Air Force service in the 2030s.

The Naval LCA is reportedly underpowered, so the Indian Navy intends to use it for evaluation and pilot training purposes only. For operational tasks, 57 carrier-borne fighters will be acquired instead.





HAL's Light Utility Helicopter (LUH) prototype ZG-4620 (c/n PT-1) made its debut at Aero India this year. The LUH is expected to achieve certification by December 2017 and subsequently enter production at Tumkur.

Maintenance improvements include easier access to equipment and interchangeable modules. In December 2016, RFIs were sent to equipment manufacturers. During Aero India 2017, all manufacturers from everywhere, including Sweden and Russia, declared a readiness to supply an AESA radar system for the Mk1A. There is also an indigenous radar option, called the Uttam made by the Electronics and Radar Development Establishment (LRDE), part of DRDO.

In November 2016, the Defence Acquisition Council cleared procurement of 83 Mk1A aircraft, production of which, according to HAL Chairman and Managing Director T Suvarna Raju, will begin in 2019 and be complete by 2027-2028. To meet this plan, according to Raju, HAL is setting up a second Tejas assembly line, allowing for an increase in the production rate from eight to 16 per year with an increased level of outsourcing.

Another Reincarnation

India's Aeronautical Development Agency (ADA), which builds the Tejas LCA, is also working on the fifth-generation Advanced Medium Combat Aircraft (AMCA). In the initial configuration, shown in pictures from more than ten years ago, the design featured a tailless configuration of the Tejas with two engines.

A model of the AMCA in a more traditional configuration featuring an empennage was displayed at Aero India 2009. This year's exhibition included a model of the fourth AMCA variant featuring changed wing and empennage shapes. One model featured an open internal weapons bay.

The AMCA design includes characteristics typical of new generation fighters; low observability (including internal weapons carriage); supercruise capability; the latest sensors and weaponry and network-centric warfare capability and it's classed as a medium-weight fighter with a 20,000kg (44,000lb) take-off weight.

The AMCA programme continues at a general research stage.

Reportedly the ADA is currently building a full-scale AMCA mock-up primarily intended for testing the stealth characteristics of the airframe. Once the problems of the Tejas programme have been corrected, the AMCA programme may be speeded up, although the type's maiden flight cannot realistically be expected in less than ten years.

Where fifth-generation fighters are concerned, the Indian-Russian Prospective Multirole Fighter (PMF) based on the Russian T-50 PAK FA programme continues to shift further and further back in time. Remarkably, HAL's exhibition hall displayed nothing about the PMF. At the 2013 and 2015 editions, HAL displayed a model of the PMF in Indian Air Force markings. Both parties, India and Russia, conceded there are some problems and said talks are in progress. An Indian Government committee, established to thoroughly evaluate the PMF programme, is soon expected to deliver its results.

Helicopters

India purchased so many Russian Mi-17 transport helicopters that HAL eventually proposed an indigenous helicopter in this

niche. If the Indian Multi Role Helicopter (IMRH) comes into being, it will be the heaviest indigenous helicopter ever developed. A full-scale mock-up of the IMRH debuted this year at show central in HAL's exhibition hall; the type was ceremonially unveiled by Indian Minister of Defence Manohar Parrikar on the first day of the show.

Powered by two engines, the type is yet to be unspecified, the IMRH mock-up featured a five-blade composite main rotor and four-blade tail rotor; a tall fuselage that allows passengers to stand upright inside the cabin; retractable landing gear; state-of-the-art mission equipment and avionics with a glass cockpit. Although the IMRH mock-up was displayed in a leather-upholstered VVIP configuration, its design is primarily geared for the military market configured for a wide range of missions from transport of 24 troops, through combat search and rescue (CSAR), to anti-submarine warfare in carrier-based version with folding rotor blades. This latter version would replace Indian Navy Sea King helicopters.

Back in 2009, HAL displayed a poster of the IMRH project with the same specification but the design featured aft-mounted engines, driving the main gearbox mounted in front of them. Engines on the latest

Two, two-seat Tejas fighters flew customer orientation and familiarisation flights during the show. Note the Israeli Litening targeting pod carried on the under-fuselage hard point.




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Above: By February all four of HAL's Light Combat Helicopters had accumulated 850 flights. Sensors and weapons integrated on the LCH are systems already fitted to the Rudra. Below: Weighing 12.5 tonnes, the Indian Multi Role Helicopter is the heaviest helicopter ever developed in India. A full-scale mock-up was placed in the middle of HAL's exhibition hall for its Aero India debut.

IMRH CHARACTERISTICS

Main rotor diameter: 18.0m (59ft 1in)

Tail rotor diameter: 3.7m (12ft 2in)

Fuselage length: 17.5m (57ft 5in)

Fuselage width: 2.6m (8ft 6in)

Height without rotor: 5.6m (18ft 4in)

Cabin length: 5.7m (18ft 8in)

Cabin width: 2.1m (6ft 11in)

Cabin height: 1.9m (6ft 3in)

Max take-off weight: 12,500kg (27,558lb)

Payload: 3,500kg (7,716lb)

Never-exceed speed: 148kts (275km/h)

Max speed: 124kts (230km/h)

Service ceiling: 21,325ft (6,500m)

Range: 500km (270nm)

Range with additional tanks: 800km (430nm)

serial number ZG-4620. It lifted off for the first time on September 6, 2016 and made its first full-flight on October 28. The LUH programme is a priority for HAL faced with an urgent need to replace old Cheetah and Chetak helicopters. The company plans to achieve LUH certification by December 2017 and to start production at a new facility in Tumkur, 75km (45 miles) from Bangalore.

However, like the Russian Mi-17 being a rival to the IMRH, the Ka-226T (originally developed for an Indian programme for 197 reconnaissance and surveillance helicopters) is a rival to the LUH. Forty Ka-226Ts built in Russia are due to be delivered to India and a further 160 will be produced at Bangalore by an Indian-Russian joint venture. Since the Indian armed forces estimate a demand for about 485 light helicopters, there is a place for both the Ka-226 and LUH.

Light Combat Helicopter

During Aero India all four existing examples of the Light Combat Helicopter (LCH) appeared; the newest, technology demonstrator (c/n TD-4), serial number ZF-4604, completed its first flight on December 1, 2015. By February 2017 the four LCH helicopters had accumulated 850 flights since the maiden flight of TD-1 on March 29, 2010. Current testing involves weapons and the fire control system.

In 2016, the Defence Acquisition Council cleared procurement of ten limited series production helicopters. According to an earlier letter of intent, HAL expects an Indian Army order for 114 and one from the Indian Air Force for 65.

The Light Combat Helicopter uses the engine, transmission and rotors of the Dhruv Advanced Light Helicopter, but has a new, narrow fuselage with a crew of two seated in tandem. Armament and targeting

mock-up are mounted in front of the main gearbox. It is not known why this change has been made; a configuration featuring aft-mounted engines is generally considered better because it reduces aerodynamic drag and cabin noise, and is safer in the event of an emergency landing. All-in-all, the current design looks very old-fashioned.

Russian Helicopters announced at Bangalore they were expecting another order from India for 48 Mi-17V5s by the end of the year. To date, India has received 151 Mi-17V5s under two contracts placed in 2008 and 2012, not to mention about 400 examples of older Mi-8 versions.

Light Utility Helicopter

Making its flying debut at the show was the first Light Utility Helicopter prototype (PT-1)





Top Left: HAL's Weapon System Integrated Advanced Light Helicopter (WSI ALH) MkIV Rudra, the combat version of the Dhruv, received its initial operational clearance in February 2013 and is now in production. Top Right: Dhruv ZD-4146, is a rare example of an Indian Air Force Dhruv configured with a wheeled retractable tricycle landing gear. Most are equipped with skids; wheels are typical for the Navy's variant. This variant is equipped with a self-protection suite similar to the system fitted to the Rudra.

systems were taken from the ALH MkIV, called the Rudra, in production and service since February 2013.

HAL's helicopter complex in Bangalore currently builds 22 to 24 ALH Dhruv/Rudra helicopters per year. By February 2017, the production plant had delivered 136 of the 159 ALH helicopters ordered (105 by the Indian Army and 54 by the Indian Air Force) in various versions, and awaits orders for a further 73. After launch of full-scale series production of the LUH and LCH helicopters, India will produce a combined total of 85 to 90 ALH, LCH and LUH helicopters per year.

Trainers

India's 100th Hawk Mk132 built by HAL's Aircraft Division in Bangalore, named Hawk-i and painted blue and white, was on display at Aero India 2017. The Hawk-i aircraft, which took part in the flying display, is an upgraded Indian version of the Hawk with an indigenous mission computer; a digital map generator to improve situational awareness; a new embedded virtual training system; data link and secured voice communication.

A more advanced Hawk upgrade was presented in the static display by BAE Systems using company demonstrator aircraft ZJ100. The Advanced Hawk has greater ordnance carrying capability on

seven hard points for a total payload of 3,000kg (6,614lb) and can serve as a lead-in fighter trainer or light combat aircraft. The demonstrator was converted at HAL's facility in Yelahanka. The aircraft was displayed with a Paveway IV precision-guide munition; a Brimstone air-to-surface missile; ASRAAM air-to-air missile; and an Israeli Litening targeting pod. The wing was retrofitted with combat flaps and adaptive leading-edge slats to improve

turn rate and landing performance; the aircraft has reinforced landing gear and a refuelling probe. New Rolls-Royce Adour 951 engines provide 14% more thrust than the previous Adour 871. The cockpit has a large-area multifunction display and a new head-up display.

HAL previously made 99 Hawk aircraft for the Indian Ministry of Defence; the first contract in March 2004 for 42 and another contract in July 2010 for 57 aircraft (40 for the Indian Air Force and 17 for the Indian Navy). Prior to that, India purchased 24 aircraft built by BAE Systems in the UK. India's fleet of Hawks has accumulated more than 100,000 flight hours. During Aero India 2017, the Surya Kiran aerobatic team gave its first performance with Hawks.

The HTT-40 turboprop basic trainer (Hindustan Turboprop Trainer) made by HAL from its own funding without an order also debuted at Bangalore this year. The first aircraft (c/n PT-1), serial number TSR001 (flying since May 31, 2016) took part in the flight display, while the yet-to-fly TSR002 (c/n PT-2), stood on static display. HAL's HTT-40 has a strong rival in India: the Pilatus PC-7 MkII, 75 of which were ordered by the Indian Air Force, and one – P-143 – took part in the flying display.

LIGHT UTILITY HELICOPTER CHARACTERISTICS

- Main rotor diameter:** 11.6m (38ft 1in)
- Tail rotor diameter:** 1.8m (5ft 11in)
- Fuselage length:** 11.5m (37ft 9in)
- Fuselage width:** 1.6m (5ft 3in)
- Height without rotor:** 3.4m (11ft 2in)
- Max take-off weight:** 3,117kg (6,872lb)
- Empty weight:** 1,910kg (4,211lb)
- Payload:** 500kg (1,102lb)
- Cruise speed:** 127kts (235km/h)
- Service ceiling:** 21,325ft (6,500m)
- Range:** 350km (190nm)
- Range with additional tanks:** 800km (430nm)

Below: The one hundredth Hawk assembled and upgraded by HAL, was presented as the Hawk-i, seen in formation with an example of the indigenous HTT-40 turboprop basic trainer.

