Embraer bullish on its range of business jets Pg 38

Special Issue
AERO INDIA
2009

Aero India '09: 7th edition & growing despite the turbulent times Pg 16

SP's Aviation

AN SP GUIDE PUBLICATION

News ... nce. Every Month. From India.

WWW.SPSAVIATION.NET

ISSUE 1 • 2009

LastWord Page 48
Shelf Price *vs* Life Cycle Cost

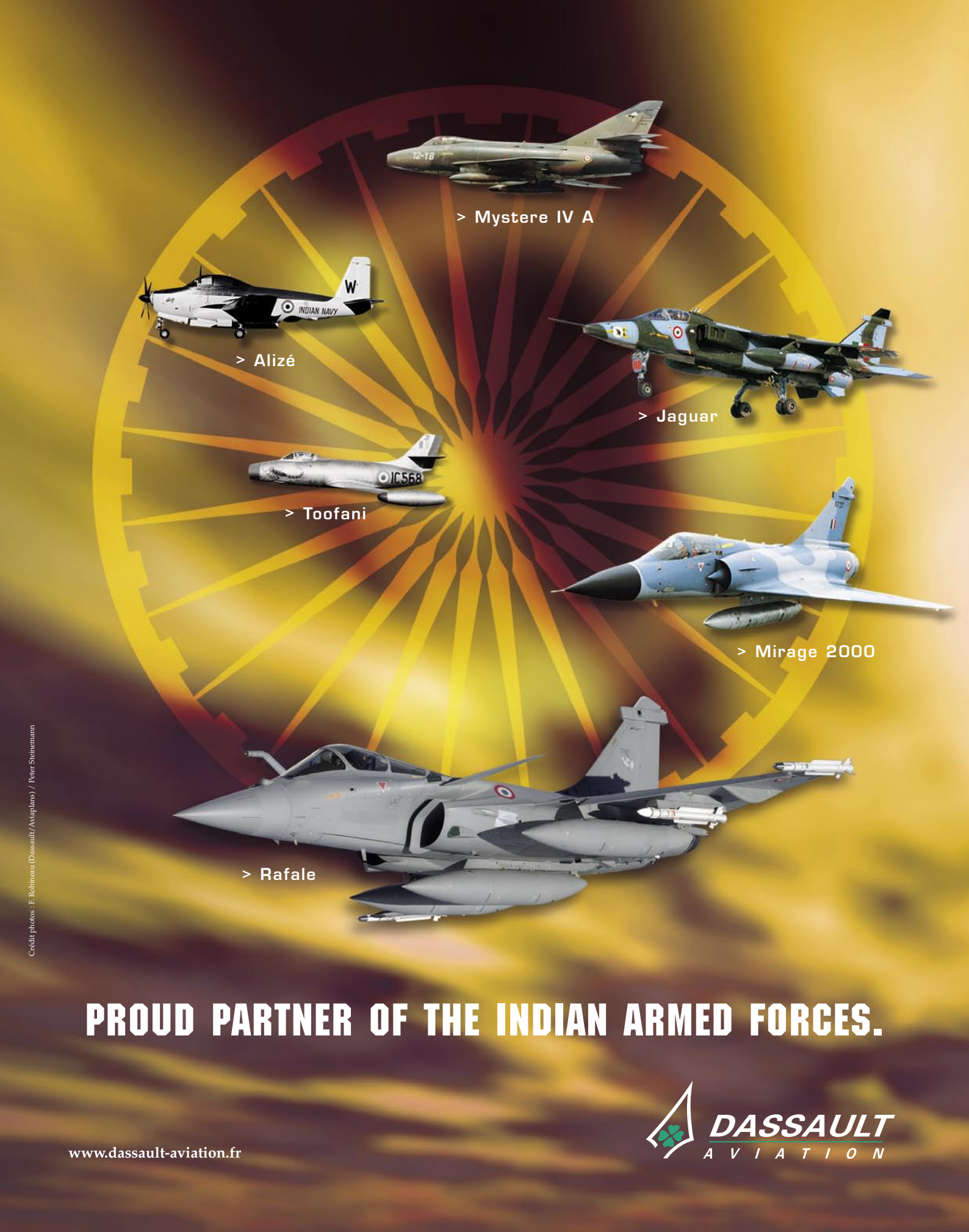
Equipped & Ready

but

to what extent?

See you in
Hall C, Booth 14

RNI NUMBER: DELENG/2008/24199



Crédit photos : F. Robineau (Dassault/Aviaplans) / Peter Steinemann

PROUD PARTNER OF THE INDIAN ARMED FORCES.

www.dassault-aviation.fr

DASSAULT AVIATION

Further on.

FINMECCANICA
1948 - 2008
A legacy for the future.

Your solution.

As a global leader in helicopters, AgustaWestland offers you complete solutions designed specifically for you and your mission. From vertical lift support of military and police forces to corporate and offshore transport, to the demands of disaster relief, SAR and air medical operations.

AgustaWestland tailors solutions for you.

agustawestland.com

AgustaWestland

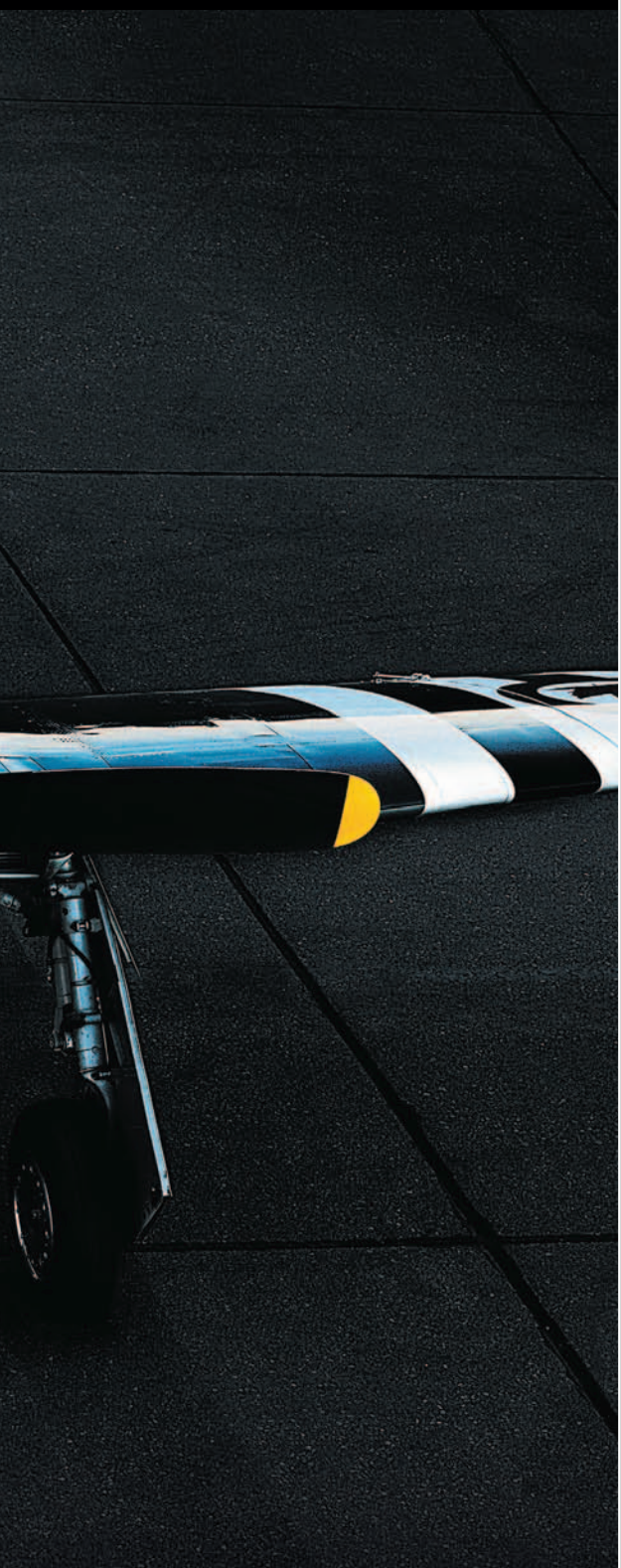
FINMECCANICA

Pure Performance

Absolute

unlimited air racing, reno, nevada.

Precision



BREITLING
1884

INSTRUMENTS FOR PROFESSIONALS™

Pure performance. Absolute precision. Here at Breitling, we are driven by a single passion, a single obsession: to create ultra-reliable instrument watches for the most demanding professionals. Each detail of their construction and finishing is driven by the same concern for excellence. Our chronographs meet the highest criteria of sturdiness and functionality, and we are the only major watch brand in the world to submit all our movements to the merciless scrutiny of the Swiss Official Chronometer Testing Institute (COSC). One simply does not become an official aviation supplier by chance.

Emergency
Chronograph with built-in 121.5 MHz emergency transmitter. Optional Co-Pilot module for flight-time measurement. Officially chronometer-certified by the COSC.

WWW.BREITLING.COM

Table *of* Contents

SP's Aviation
AN SP GUIDE PUBLICATION
News Flies. We Gather Intelligence. Every Month. From India.
ISSUE 1 • 2009

FLASH FORWARD: As the IAF stands poised on the threshold of significant modernisation, the need of the hour is for the government to offer meaningful and timely support to accelerate the modernisation programme.
(Seen here is a Mirage 2000 of the Indian Air Force in flight.)

PUBLISHER AND EDITOR-IN-CHIEF
Jayant Baranwal

ASSISTANT EDITOR
Arundhati Das

SENIOR VISITING EDITOR
Air Marshal (Retd) V.K. Bhatia

SENIOR TECHNICAL GROUP EDITORS
Air Marshal (Retd) B.K. Pandey
Lt General (Retd) Naresh Chand

SUB-EDITOR
Bipasha Roy

CONTRIBUTORS
INDIA
Air Marshal (Retd) P.K. Mehra,
Air Marshal (Retd) N. Menon,
Group Captain (Retd) A.K. Sachdev,
Group Captain (Retd) Joseph Noronha
EUROPE
Alan Peaford, Phil Nasskau, Rob Coppinger
USA & CANADA
Sushant Deb, LeRoy Cook, Lon Nordeen,
Anil R. Pustam (West Indies)

CHAIRMAN & MANAGING DIRECTOR
Jayant Baranwal

ADMIN & COORDINATION
Bharti Sharma

REGULAR DEPARTMENTS

Cover Photo: To facilitate the IAF's drive to regain its original force levels, the number of Su-30 MKIs which are already under production at HAL can be effectively increased.

Photo Credit: IAF

ASSOCIATE ART DIRECTOR:
Ratan Sonal

GRAPHIC DESIGNER:
Vimlesh Kumar Yadav

ANNUAL SUBSCRIPTION
Inland: Rs 850 • Foreign: US$ 250
Email: subscribe@spguidepublications.com

FOR ADVERTISING DETAILS, CONTACT:
guidepub@vsnl.com
shikha@spguidepublications.com
r.ranjan@spguidepublications.com

SP GUIDE PUBLICATIONS PVT LTD
A-133 Arjun Nagar, (Opposite Defence Colony)
New Delhi 110 003, India.

Tel: +91 (11) 24644693, 24644763, 24620130
Fax: +91 (11) 24647093
Email: guidepub@vsnl.com

POSTAL ADDRESS
Post Box No 2525
New Delhi 110 005, India.

REPRESENTATIVE OFFICE
BENGALURU, INDIA
534, Jal Vayu Vihar
Kammanhalli Main Road
Bangalore 560043, India.
Tel: +91 (80) 23682534

MOSCOW, RUSSIA
LAGUK Co., Ltd., (Yuri Laskin)
Krasnokholmskaya, Nab.,
11/15, app. 132, Moscow 115172, Russia.
Tel: +7 (495) 911 2762
Fax: +7 (495) 912 1260

www.spguidepublications.com

NEXT ISSUE: *Evolution of Commercial Aviation in India*

IT DEFINES MULTIROLE SUPERIORITY.

The network-enabled F/A-18E/F delivers unrivaled multirole capability with leading-edge weapon, radar and avionics systems, whether the threat is on the ground, in the air or at sea. The Super Hornet provides the optimum value of advanced technology and lower life-cycle costs to help ensure security and affordability for decades to come.

Raytheon GE NORTHROP GRUMMAN BOEING

India plays host to the bigwigs of the global defence industry out to strut their wares and woo their prized customer. We bring you all the buzz surrounding Aero India 2009.

India is shopping. And the world's largest defence manufacturers are out to woo their prized customer, eyes glued to the swelling pie of budgetary allocation. Be it the massive $10 billion (Rs 49,000 crore) deal for Medium Multi-Role Combat Aircraft for the Indian Air Force (IAF) or the huge inventory of helicopters the armed forces are looking to pick from the foreign defence market at a cost running into some staggering figures, lure of the lucre and the rich bargains to be struck have fuelled the race like never before.

Ending months of anticipation, deliberation and preparation, the curtains have at last gone up on the seventh chapter of Aero India. Cynosure of defence manufacturers across the globe, from February 11 to 15, India plays host to the bigwigs—and what a queue up it's promising to be! Drawn to the steadily lengthening shopping list, the event has inexorably attracted a horde of celebrated players from the industry worldwide. Aero India 2009 is expected to provide an insight into the latest developments and technologies in military and civil aviation, including systems and sub-systems. A range of military and civil aircraft will be participating in flying and static display.

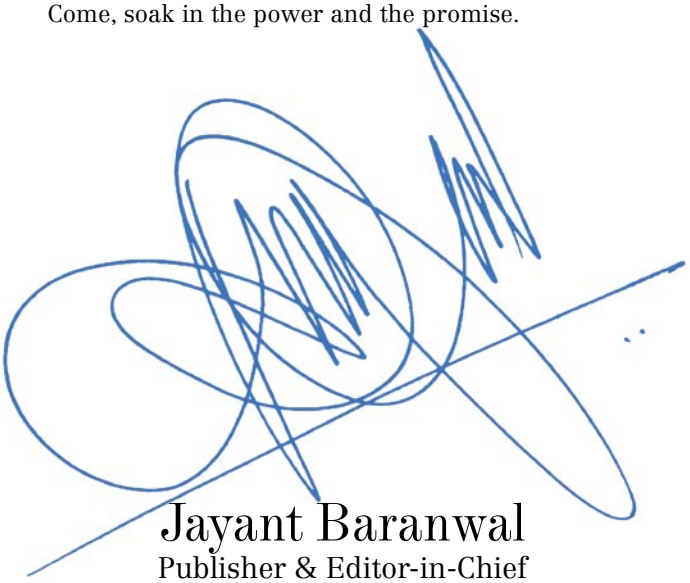
Defying the gloom and global recession, around 550 companies from 50 different countries, including India, are showcasing their products and services in the show. At the forefront are companies from Germany and France with 31 each. Following close on their heels are UK (26), Russia (24), the US (22), Italy (19), Belgium (17), Israel (11) and Australia (10). Over 100 aircraft—military and civil, as also UAVs—are expected to take part in flying and static display.

Capturing all the buzz surrounding this prestigious airshow, this Aero India 2009 special edition of *SP's Aviation* deliberates on the modernisation thrust of the IAF. The present leadership staunchly believes the IAF is not a tactical force but a full-fledged strategic aerospace power. However, while the IAF may have the right intentions, it has to travel a long distance and achieve many modernisation milestones to acquire the capabilities it aspires for.

That said, these are exciting times for the armed forces and the Indian defence industry. The team at SP's heartily congratulates the event organisers—the Ministry of Defence and the Confederation of Indian Industry—for their immense effort to make this airshow a resounding success.

Come, soak in the power and the promise.

THE BUZZ JUST GOT BIGGER: AT AERO INDIA 2007, MINISTER OF STATE FOR DEFENCE M.M. PALLAM RAJU WITH RATAN TATA, WHOSE PRESENCE AT THE EVENT GRABBED HEADLINES



Jayant Baranwal
Publisher & Editor-in-Chief

FINMECCANICA
1948 - 2008
A legacy for the future.

PUBLICIS

60 years serving our country: the world.

At Finmeccanica our people share a common vision:
to build a future on the strength of competence,
technology and research.
Giving greater security for everyone's tomorrow.

FINMECCANICA
Further on.

KIRAN CRASH CLAIMS PILOT

An IAF fighter pilot from the acclaimed Surya Kiran Aerobatics Team (SKAT) was killed when a Kiran trainer aircraft crashed during a training sortie on Wednesday, January 21. Wing Commander R.S. Dhaliwal had joined the SKAT recently and was on the indigenous Kiran Mk II (HJT-16) trainer aircraft in a routine sortie, when the accident occurred at 8.45 am, IAF sources said. The aircraft, which took off from Bidar, crashed a few minutes later at a vacant plot near the air force station, but no loss of civilian life or property was reported in the incident, the sources said. The Air Headquarters immediately ordered a court of inquiry into the mishap.

VIEWS

Surya Kiran, the prestigious nine-aircraft aerobatic team, is the pride of the Indian Air Force (IAF). Institutionalised in 1996, the team has performed in practically every part of the country and also at major air shows in different parts of the world. It is now counted among the leading formation aerobatic teams in the world.

Equipped with Kiran Mark II (HJT-16) built by the Hindustan Aeronautics Limited (HAL), SKAT replaced the Thunderbolts, the first nine-aircraft formation aerobatic team of the IAF equipped with a much more powerful and versatile Hawker Hunter, a legendary combat aircraft of British origin and highly rated by fighter pilots the world over. Raised in the early 1980s, the Thunderbolts were patterned on the lines of the Red Arrows of the Royal Air Force. What is probably not widely known is that the initial experiment at formation aerobatics with the Kiran Mark I was undertaken by the Flying Instructors' School (FIS) of the IAF at Tambaram by way of creation of a three-aircraft aerobatic team, christened Silver Streak. The name was attributable to the unpainted shining and silvery appearance of the Kiran Mark I aircraft sported.

Silver Streak comprised experienced Qualified Flying Instructors posted at FIS. This team put up a relatively simple profile as equipped with the Viper, a comparatively low-powered engine, the manoeuvre envelope of the Kiran Mark I was per force limited. Following news of the four aircraft formation aerobatic team of the USAF, the Thunderbirds going into the ground while practicing over the deserts of Arizona in 1982, Silver Streak was hurriedly disbanded. However, with the arrival of the Kiran Mark II equipped with a more powerful Orpheus engine, the Surya Kiran was constituted and based at Air Force Station Hakimpet near Hyderabad. Surya Kirans took over from the Thunderbolts as the Hunter aircraft was being phased out and was later relocated at Air Force Station Bidar. SKAT has now been assigned the status of an Air Force Squadron, No. 52 to be precise, and has a defined operational role as well.

Shocking as it is, the fatal accident at Bidar on January 21 comes at a time when the SKAT was busy gearing up for the forthcoming Aero India 2009. Contrary to media reports, the pilot involved was quite proficient and not newly inducted. Loss of one of the most experienced members of the team could lead to some difficulties for the team vis-à-vis the forthcoming event at Yelahanka. Incidentally, in the last three years, this is the second mishap with SKAT. In March 2006, two experienced pilots were killed in a flying accident at Bidar during a practice aerobatic sequence by the team.

The Kiran aircraft was introduced into the IAF trainer fleet in the early 1970s though the Mk II version was produced in the 1980s. This aircraft has side-by-seating for the two pilots, restricting 360 degree view of both the pilots. This is therefore not the ideal arrangement for a nine aircraft team manoeuvring in close formation. But the IAF had no option as this was the only machine available in the numbers required, suitable for the task. However, with the HAL built Intermediate Jet Trainer also known as the HJT-36 and the British Aerospace Hawk, both with tandem seating arrangement being inducted into the IAF, there will be better alternatives available in the near future. While the on-going Court of Inquiry delves into the million pieces strewn in the vicinity of Air Force Station Bidar in search for clues to establish the probable cause of the tragedy, perhaps it is time for the IAF to initiate the thought process to give the Surya Kiran Aerobatic Team a new ray of light. SP

— Air Marshal (Retd) B.K. Pandey

ILLUSTRATION: MAMTA

MIRACLE ON THE HUDSON

The pilot of a US Airways jetliner has been hailed as a hero after he masterfully ditched in the icy Hudson River off Manhatten, New York and 155 people onboard were rescued by a flotilla of converging ferries and emergency boats. The plane lost power in both engines, possibly from striking a flock of geese, soon after taking off from La Guardia airport in the afternoon hours of Thursday, January 15. "We've had a miracle on the Hudson," New York Governor David Paterson told a news conference. "The pilot somehow, without any engines, was able to land this plane... without any serious injuries," he said.

VIEWS

Captain Chesley B 'Sully' Sullenberger III, pilot of the flight US1549, his co-pilot Jeffrey Skiles and cabin staff indeed pulled off an incredible feat. Recovering the powerless Airbus A320 in the frigid waters of Hudson River through a flawless 'dead-stick' ditching manoeuvre, they averted a disaster that may well have killed off the ailing US Airways. The US Federal Aviation Agency has confirmed that both CFM engines of the aircraft failed, with one engine reported to have caught fire after hitting a flock of geese shortly after take-off from La Guardia airport en route to the US Airways hub at Charlotte, North Carolina.

What might have been a catastrophe was averted by the 57-year-old Captain Sullenberger's quick thinking and deft handling of the crippled aircraft, and by the presence of rescue boats in the vicinity, a combination that both witnesses as well as officials termed as miraculous. The entire episode—from take-off to ditching and commencement of rescue—takes less than 10 minutes. The flight gets airborne at 3.26 pm (local time) from New York's La Guardia airport. A minute later, on the climb out, Captain Sullenberger reports birdhits on both engines. At 3.28, La Guardia controllers ask him to land at a small airport, Teterboro, in New Jersey. Unable to reach Teterboro, the pilot ditches the plane in city's Hudson River. Air temperature is -7.7 deg Celsius, water 1.6 deg, time 3.31 pm. On touchdown, the Airbus A320 floats, drifts south. Soon after, passengers wearing life-jackets stream out through emergency exits on rubber slides, some stand on the wings of the floating jet. Rescue boats and ferries close in immediately and start the rescue work. The Captain is the last to come out of the flooded aircraft having walked twice up and down the aisle to ensure that nobody is left behind. End result: no fatalities.

Was it really a miracle? Or a brilliant combination of a highly competent pilot on the flight-deck of a high-tech, state-of-the-art jetliner? Damaged and dysfunctional, the Airbus A320's robust CFM engines continued to spew out enough power to take the 70 plus-tonne airplane to 3,200 ft height before quitting. Even though the height gained was not sufficient to reach the nearest landing ground at Teterboro, it at least afforded some reaction time to the pilot to mull an alternative plan of action. It was an extraordinary but brilliant command decision on his part to go in for a landing on the waters of the Hudson River. The airplane's alternate systems, such as the Auxiliary Power Unit and the ram air turbine, continued to supply electric and hydraulic power and allowed the pilot full use of the jet's flight-control system till touchdown. The rest was left to the pilot.

"A water landing is typically even more destructive than a ground landing. It is amazing an Airbus jet was able to land in the river without breaking up," said Max Vermij, an air accident investigator speculating that the plane would have hit the water at a speed of about 140 knots (260 km/h) where, typically, the wings and engines would break off on impact, water would plow into the aircraft and tear apart the fuselage. That none of this happened speaks volumes of not just the flying skills of the pilot but also his calm and collected demeanour in the face of crisis. Sullenberger received initial flying grooming as a fighter pilot in USAF, where he served for close to a decade flying the famous F-4 Phantom combat jets. Quick reaction to 'bold-letter' emergencies is a built-in factor in military flying training. Hopefully, this factor and the need to conduct regular evacuation drills are also being taken note of by the airlines in India, in the conduct of recruitments and flying operations. SP

— Air Marshal (Retd) V.K. Bhatia

ILLUSTRATION: MAMTA

IAF MODERNISATION

Engineering Metamorphosis

The IAF has to travel a long distance and achieve many modernisation milestones before it acquires the capabilities it aspires for

A little over three years ago, in December 2006, a seminar on Indian aerospace power conducted in Delhi was themed 'Indian Air Force: From a Sub-continental to a Continental Force'. The outcome of the seminar was indicative of the Indian Air Force's (IAF) aspiration to take another step forward in transforming itself into a true strategic air force with regional and extra-regional capabilities to keep pace with the changing geo-political and geo-strategic scenarios. But it took a long time for the IAF to change its mindset.

The IAF, which evolved from the erstwhile Royal Indian Air Force (RIAF) in the 1930s, was one of the few air forces established as an independent force and not as part of the Indian Army. However, in keeping with imperial policies of the time, the RIAF was given a subsidiary (tactical) role like army cooperation and battlefield reconnaissance (with the Royal Air Force retaining the primary roles like bombing and air warfare). Post-Independence, the IAF was equipped with its own bomber force and long-range (in comparative terms) strike aircraft but, somehow, the mindset of it being a fair-weather, tactical air force remained unchanged.

Transformation of this thinking process took a long time—more then half-a-century. However, in the 1990s and especially after the first time formulation of its doctrine in 1995, the IAF started to look at itself in an enhanced role as a strategic aerospace power. Successive air chiefs have reiterated and comprehensively articulated on the subject. Former Chief of the Air Staff Air Chief Marshal S.P. Tyagi had defined the IAF's vision as a sub-set of India's vision. Quoting Prime Minister Manmohan Singh, he had observed, "A growing regional power, India's 'strategic footprint', based upon its interests and responsibilities, stretches from the Horn of Africa, through the CAR (Central Asian Republics), South-East Asia and to the far reaches of the Indian Ocean. The burgeoning economy of a resurgent India, makes energy and trade security as important as the country's territorial security." In other words, the IAF would be called upon to take on increasing responsibilities to meet India's security challenges which, demands a shift in its focus.

In 2007, the IAF celebrated its Platinum Jubilee. Speaking on the occasion of Air Force Day Parade on October 8, the present air chief, Air Chief Marshal F.H. Major, spoke about the new challenges and opportunities and how the IAF was heading for exciting times in the coming years. A year later, speaking from the same podium, he reaffirmed that the IAF was in fact in a state of transformation with a variety of aircraft, sensors, weapons, communication equipment in varying stages of induction and improvement in infrastructure in the pipeline.

While some inductions and infrastructure improvements are indeed taking place, what the IAF has to evaluate is whether these are sufficient to generate the required capabilities. For instance, would the IAF:

- Have been sufficiently equipped to be the prime repository of India's credible conventional deterrence capabilities while providing critical components of credible nuclear deterrence?
- Have truly changed from a sub-continental, geographical limited force to one with continental reach and effect?
- Have acquired capabilities for strategic effect?
- Have acquired increasing ability to exploit space capabilities for enhancing military operations?
- Have shifted from a pure line-of-sight capability to substantially beyond-visual-range capabilities?
- Have inducted new technology systems, like Airborne Warning and Control System, fully into service?
- Have recovered combat power to the authorised levels?
- Be equipped to provide full, seamless and 24-by-seven air defence cover to its entire territory and other areas of interest?
- Be ready to serve a variety of national interests in contingencies inside and outside the country?

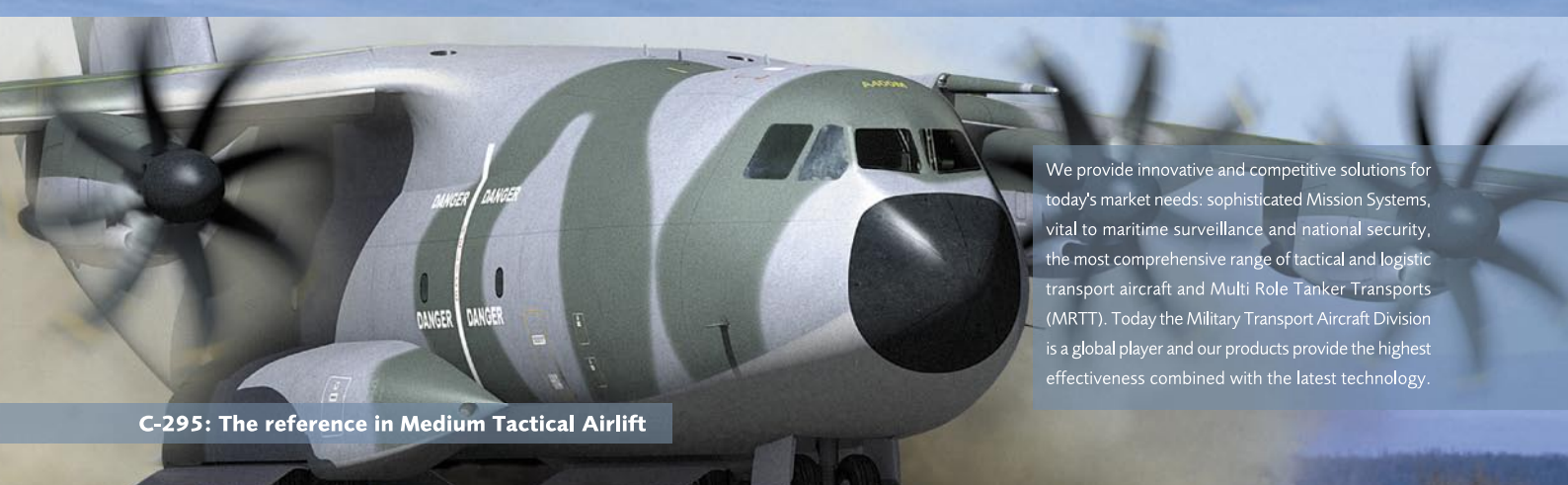
The present IAF leadership staunchly believes the IAF is not a tactical force but a full-fledged strategic aerospace power. However, while the IAF may have the right intentions, it has not been able to create the strategic/tactical capabilities in adequate measure. The IAF has to travel a long distance and achieve many modernisation milestones before it acquires the capabilities it aspires for. So, what are the shortcomings that the IAF needs to address to meet future challenges? Forum dwells on one of the major challenges posed by accretion of combat aircraft in the neighbourhood. SP

—Air Marshal (Retd) V.K. Bhatia

PHOTOGRAPH: IAF

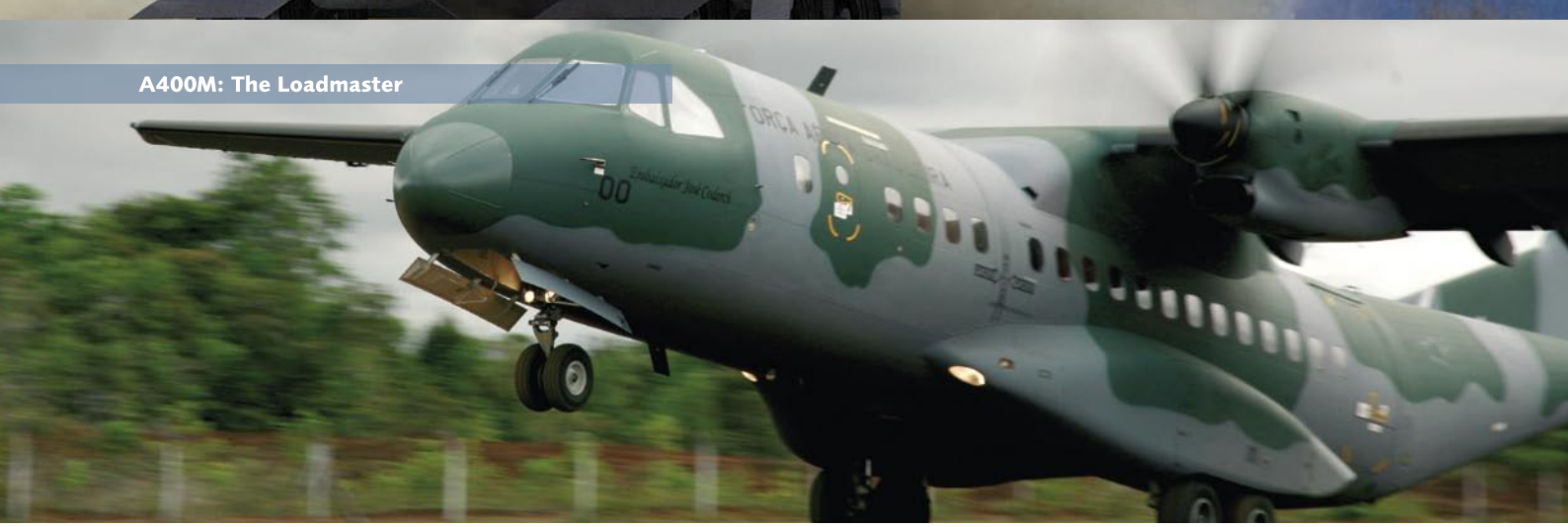
Global vision, global player

A330 MRTT: The most capable Tanker Transport



C-295: The reference in Medium Tactical Airlift

We provide innovative and competitive solutions for today's market needs: sophisticated Mission Systems, vital to maritime surveillance and national security, the most comprehensive range of tactical and logistic transport aircraft and Multi Role Tanker Transports (MRTT). Today the Military Transport Aircraft Division is a global player and our products provide the highest effectiveness combined with the latest technology.



A400M: The Loadmaster

AIRBUS MILITARY

AIRBUS MILITARY. Avda. de Aragón, 404. 28022 - Madrid (Spain). Tel.: +34 915 857 362 / 208 - fax+ 34 915 857 366 - http//www.eads.net

Walk the Line

In the final analysis, the Indian government needs to carry out empirical studies to assess the likely requirements for the future in keeping with the rise in air power capabilities of China and Pakistan

Any appreciation of the direction to be taken to create future capabilities for the Indian Air Force (IAF) must rest on its role in the overall national defence, including likely capabilities of countries whose air power could impinge on Indian security, most importantly, China and Pakistan.

China's military modernisation has been progressing purposefully for two decades now which is shifting the military balance in its favour. The access to Soviet/Russian military technology has provided a major leap into the future. The PLAAF (Chinese Air Force) would be expected to deploy upwards of 400 Sukhoi Su-27/Su-30 class of aircraft, over 700 newer versions of the MiG-21 (F-7) types besides the newer designs such as the FC-1 and J-10 which have been already under production and started entering operational service. This formidable combat power is supported by a plethora of force-multipliers like AWACS, aerial refuelling systems, and modern air defence systems, space-based command, control, and communications infrastructure, modernised ballistic and cruise missiles.

Pakistani Air Force (PAF) riding on the status of a 'frontline state' has time and again been the recipient of high technology weapon systems such as the F-16 jet fighters from the US. During leaner times, it has been able to exploit its closeness to China to fill the deficiencies in its combat power. Today, it has already become a joint manufacturer of the JF-17 (Chinese FC-1) of which it has plans to build up to 250. In addition, it is also looking at acquiring up to two squadrons of the Chinese state-of-the-art J-10 jet fighters. Under the renewed military aid package from the US by jointly fighting the war against terror, the PAF is to receive improved version of F-16s which in the ultimate overall tally may reach a planned figure of 110 aircraft. In addition, the PAF is also in the hunt to acquire force-multipliers such as airborne early warning systems from Sweden (SAAB-2000 with 'Erieye') and China. At present, the PAF has around 530 jet fighters on its inventory with about 400 being operational at any given time in approximately 25

squadrons. In 2006, talking about the US imposed sanctions in the wake of Pakistan's nuclear weapon tests and the resulting disparity between the IAF and the PAF, the then Chief of the Air Staff of the PAF, Air Chief Marshal Kaleem Saadat, had said, "We have to bridge this gap in the manner that we can deny the advantage that our neighbour has." Three years later, the gap has evidently been filled to a great extent.

Most defence analysts in India feel that the possibility of a full-fledged two-front war against it by China and Pakistan is remote. That may be so but what India is facing right now is a two-front aerospace power modernisation of unprecedented scale and technological dimensions. Secondly, as Air Commodore (Retd) Jasjit Singh, one of India's leading defence strategists suggests, "The strategic nexus between the two at the nuclear and conventional military levels has to be factored into our thinking." In the next five years, China would be well on its way to be operating a modern sophisticated air force with close to 1,500 state-of-the-art combat aircraft and all possible force-multipliers and combat support systems. It would also be well advanced to exploit space for military purposes.

It would be equally interesting to see which way Pakistan would be heading in the next five years. If all goes well, Pakistan would have received enough F-16s (most of them advanced versions) to raise the inventory of this high performance multi-role combat aircraft to 110—a formidable force indeed. Another high-tech induction into the PAF is the jointly developed JF-17 (Joint Fighter-17) Thunder with China (known there as FC-1 or 'Fierce Dragon'). Soon after the induction of the first two JF-17s, specially flown into Pakistan to participate in the Pakistan Day Joint Services Parade on March 23, 2007, the PAF chief, Air Chief Marshal Tanvir Mahmood Ahmed said, "PAF would soon induct Fourth and Fifth Generation high-tech fleet of fighter-bomber aircraft with the aim to modernize the country's air force, which includes the induction of 10 to 12 squadrons of JF-17 Thunder aircraft." Remarkably, development of the JF-17 has been one of the fastest in the history of military aviation. Secondly, its production has already commenced at the Pakistan Aeronautical Complex at Kamra putting Pakistan in the category of only a small number of countries that can produce jet fighters. The production will soon be increased to 20 to 30 per annum giving PAF the capability of having a fleet of 100 to 150 aircraft in the next five years. Ultimately, the PAF may acquire 250 to 300 aircraft of this type to replace its older models such as the F-7 and Mirage III/V aircraft.

"AIRPOWER WILL BE THE PREDOMINANT FACTOR IN WARS OF TOMORROW... WE WILL NEED NUMBERS AND BETTER QUALITY OF MACHINES... THE IAF IS PUSHING FOR AT LEAST 40 JET-FIGHTER SQUADRONS, ALONG WITH MORE FORCE-MULTIPLIERS."
—AIR CHIEF MARSHAL S.P. TYAGI, SOON AFTER TAKING OVER THE REINS OF THE CHIEF OF AIR STAFF IN 2005

"IT WOULD APPEAR ON THE FACE OF IT THAT THE 64 SQUADRON (45 COMBAT SQUADRONS) FORCE EARLIER PLANNED WOULD BE A GOOD INITIAL TARGET... THIS WOULD AMOUNT TO THE BAREST MINIMUM GOAL."
—AIR COMMODORE (RETD) JASJIT SINGH, DIRECTOR, CENTRE FOR AIR POWER STUDIES

The massive combined accretion in the form of 2,000-plus high-tech state-of-the-art aircraft in India's neighbourhood poses a formidable challenge. How has India and the IAF, in particular, responded to the challenge? But first, a bit of history. The original proposal (1959) for a 64-squadron force (with 45 combat squadrons) later reinforced after the 1962 debacle against the Chinese—as it often happens—got lost in the bureaucratic fog. What finally got to be accepted was a combat force level of 39 1/2 squadrons (with 1/2 squadron of dedicated maritime strike aircraft). The IAF, after having achieved this figure in the 1980s still enjoyed a comfortable superiority in number of squadrons over the PAF (Chinese Air Force capability conveniently taken out of calculations)—a ratio of close to 2:1 in the IAF's favour. But the modernisation drought in the 1990s started to show its adverse effects, which coupled with obsolescence plus hasty and premature retirement of MiG-23 BN fleet owing to some technical problems led to the downslide of the force's combat squadrons. Today, the IAF has dropped to a hitherto unimaginable low level of 28 to 29 combat squadrons. Air Chief Marshal S.P. Tyagi, soon after taking over reins of the Chief of the Air Staff in 2005, had said, "Airpower will be the predominant factor in wars of tomorrow... we will need numbers and better quality of machines. The IAF is pushing for at least 40 jet-fighter squadrons, along with more force-multipliers." Later the same chief had to send an SOS to the Ministry of Defence urging the government for outright purchase of 40 additional Su-30s to stem the dwindling numbers.

Today, the PAF alone is on the threshold of equaling or even surpassing the IAF in terms of number of squadrons in their respective combat fleets. India has taken some steps to correct this dismal situation but the painfully slow processes need to be speeded up. The good news is that the government has accepted the IAF's proposal for the outright purchase of additional 40 Sukhois, plus HAL has stepped up the home production of the Su-30 MKIs, aiming at a total of 230 of these aircraft into the IAF by about 2014. This alone however, will not be sufficient to stem the rate at which the PAF is closing the gap in combat capabilities. India's second move to acquire 126 Medium Multi-role Combat Aircraft through global tendering is trudging along and is at present at the technical evaluation stage. There is little hope of seeing these aircraft in the Indian skies before 2014-15 with the total induction process stretching up to 2020. Similarly, the development of the indigenous LCA is plagued with delays and it would be a miracle if the first lot of Final Operational Clearance aircraft becomes available for induction into the IAF before 2012. Even then, the IAF will find it extremely difficult to restore its combat squadrons' strength to the earlier 39-and-half level.

In the final analysis, the government needs to carry out empirical studies to assess the likely requirements for the future in keeping with the rise in air power capabilities of China and Pakistan. According to Air Commodore (Retd) Singh, "It would appear on the face of it that the 64 squadron (45 combat squadrons) force earlier planned would be a good initial target. This would amount to the barest minimum goal." This by itself would necessitate increasing the induction by another 10 squadrons over and above what is already planned and achievable till 2020. But the IAF would face phenomenal challenges in achieving such a minimum objective.

Finally, this is only one aspect of the modernising process. The IAF will have to do much more to achieve the metamorphic transformation it aspires for and emerge as one of the leading continental and balanced air forces in the world. SP

— Air Marshal (Retd) V.K. Bhatia

INDRA – Excellence in Airborne Solutions

Indra is a multinational information technology and defence & security systems company with headquarters in Madrid, Spain, that recently opened an office in Delhi. Indra utilizes a client-oriented approach and its own technological base to establish a leadership position in the global market for sophisticated electronic systems in the aerospace and defence fields. Indra employs over 28,000 highly qualified engineers and development staff in over 30 international locations. Annual turnover exceeds €2 Billion, a third of which is from international sales.

Indra's range of systems and solutions has wide applicability to India. The company's defence & security offerings include an array of systems covering communications, command and control, radars, electronic warfare, electronic intelligence, self-protection, surveillance, identification, protection, crisis management, simulation, automatic test systems and satellite ground segment. As one of the meaningful references for our airborne solutions, Indra's wide-band digital radar warning receiver ALR-400 and self-protection suite SIMBA, which also integrates missile and laser warning systems, are supplied for the European transport aircraft Airbus A400M, Spanish Air Force F-18, Eurocopter platforms including NH-90, Tigre and Cougar, as well as Boeing's Chinook and German Army Sikorsky's CH-53. The Indian MoD is in fact currently acquiring for various platforms a number of advanced wide band digital receiver electronic warfare systems supplied by Indra. Indra's core defence technologies and systems are fully developed and owned by the company. This includes one of the largest and most modern RF hybrid clean-room facilities in Europe, digital radio frequency memory designs, wide band digital receiver designs, radio frequency hybrids, infra-red optics, advanced digital processing hardware, software and firmware. India is a focal market for Indra Sistemas. The company is committed to become a key technological partner to the Indian end-user and domestic industry alike. ■

Curtain Raiser

Despite the unfavourable global developments, indications are that participation is likely to be as good if not better than in 2007

By **Air Marshal (Retd) B.K. Pandey, Bangalore**

Not many may recall that the globally acknowledged international air show Aero India commenced in 1991 as a privately organised aviation exhibition by Delhi-based company Convex essentially with a view to rejuvenate the Indian aviation industry. Appropriately dubbed a 'Trade Show', the exhibition comprised a handful of stalls at Hotel Ashoka. This pioneering effort of Convex proprietor Anand Sethi was repeated two years later on a much larger scale in the form a full-fledged air show called Avia India at Air Force Station, Yelahanka.

As the business of aviation in those days was dominated largely by the military and the public sector, it is not surprising that this aviation related activity was soon appropriated by the government. The next air show held in 1996 was rechristened Aero India and organised by the Department of Defence Production & Supplies under the Ministry of Defence (MoD) duly supported by the Indian Air Force (IAF), Defence Research and Development Organisation (DRDO), Ministry of Civil Aviation (MOCA), Department of Space and the Government of Karnataka.

Aero India 1998, held in December that year, witnessed substantially enhanced participation from foreign aerospace companies—174, to be precise. With only 20 Indian companies participating, it was literally a token representation. Nevertheless, a beginning had been made. On account of the sanctions in the wake of Pokharan-II, participation by American companies was restricted to the commercial divisions of Boeing and Bell Helicopters. Both these companies were supporting large fleets operating in India in the regime of civil aviation.

Dictated by considerations of weather, for future air shows, it was decided to shift the event to February, a month known for moderate temperatures and clear skies. Hence, the next air show was held in February of 2001. US sanctions continued to inhibit the event and as such, the number of participants in Aero India 2001 did not register significant increase over the air show in 1998—194 to a mere 229. Representation by Indian companies, however, multiplied threefold.

Aero India 2003 had 250 Indian and foreign participating companies, once again dominated by the aerospace industries of Russia and France. There was a marginal increase in American presence possibly inspired by the news of India's forthcoming mega tender for 126 Medium Multi-Role Aircraft (MMRCA). Lifting of sanctions, move towards globalisation of the Indian economy, favourable policy changes related to Foreign Direct Investment and the incorporation of the Indian private sector in the defence manufacturing activity paving the way to joint ventures, injected a new spirit into the air show. The Prime Minister of France, Jean-Pierre Raffarin, visited the air show.

By Aero India 2005, Air Force Station Yelahanka had been selected as the permanent venue for this international event. The 2005 event was marked by the presence of a large American delegation and aerospace majors with a distinct military bias signaling a clear shift in US policy towards India. There were 380 exhibitors representing the world's leading aerospace industries. There was also a healthy growth in the

PHOTOGRAPHS: SP GUIDE PUBNS

participation by the Indian private industry. Aero India 2007 witnessed a ballooning in the number of participants to 500, with the strength of Indian companies rising to nearly 200. Multi billion dollar programme to modernise the IAF and the unprecedented boom in the Indian civil aviation industry, presented exciting opportunities that drew aerospace majors from around the world to Yelahanka, boosting the status of Aero India as one of the major air shows in the world.

AERO INDIA 2009

With a track record of six successful air shows, Aero India is now acknowledged as the fourth largest air show in the world bringing together players in the global aerospace industry, big and small, to showcase their products and capabilities and to explore new opportunities for collaboration. More importantly, the exposition would provide a unique platform for the Indian aerospace industry, both in the public and private sector, for networking and integration with the global aerospace industry. Aero India 2009 is expected to provide an insight into the latest developments and technologies in military and civil aviation including systems and sub-systems. There would a range of military and civil aircraft participating in flying and static display. One would get to see the latest in the regime of Unmanned Aerial Vehicles (UAV), especially the miniature UAVs from Israel.

PICTURE PERFECT: THE KIRAN MARK II-HJT 16 IN SURYA KIRAN COLOURS; (LEFT) RATAN TATA IN AN F-16 FIGHTER JET AT THE AERO INDIA 2007

The new events added this year include Vintage Aircraft Show, Space Pavilion, Business Meetings and Aerospace HRD Focus. As usual, this year too, this prestigious international air show is being organised by the Defence Exhibition Organisation (DEO) under the MoD with the management of the event entrusted to the Confederation of Indian Industry (CII). The Defence Public Sector Undertakings are expected to participate in strength in the exposition with their best foot forward.

OMINOUS SHADOWS

Logically speaking, Aero India ought to have larger number of exhibitors than the previous show two years earlier. However, Aero India 2009 is being held in the shadow of a few ominous events. Firstly, the global economy is in the midst of perhaps the most serious crisis in recent history and despite the rhetoric, the end is not yet in sight. The civil aviation industry is consequently in turmoil. Over 31 airlines of which many in the US, have closed down and the remaining severely mauled by the unprecedented rise in the price of ATF and fall in traffic in 2008, are engaged in a desperate struggle for survival.

On the Indian scene, the cumulative losses by the end of the current fiscal are estimated to reach a staggering figure of Rs 10,000 crore ($2 billion). There have been a number of mergers and alliances in the airlines in the recent past. A slew of cost cutting measures are also being implemented by all airlines: rationalisation of routes, reduction of excess capacity, downward revision in salaries, lay-offs, progressive phasing out of high-cost expatriate captains and trimming of frills for employees. Air fares have risen and orders for aircraft are being cancelled or delivery rescheduled. Employment opportunities in the aviation industry have rather suddenly evaporated and the demand for flying training has slowed down consider-

ably. The world of business aviation has also been afflicted in a similar fashion though to a somewhat lesser degree.

Despite the developments, the two leading manufacturers of commercial aircraft as also business jets continue to be optimistic about the potential of the Indian market. Encouraged by the sharp drop in the price of ATF in the recent past, the industry views the present difficulties as transient but, at the same time, expresses apprehensions that 2009 could still be a bad year. However, they are reasonably confident that the industry would recover and re-establish a respectable growth trajectory in not too distant a future. This optimism was visible in the civil aviation trade show India Aviation 2008 held at Begumpet airport, Hyderabad in October last year even though not a single deal was signed during the event. This year, Embraer of Brazil, an emerging player in the global business jet market will showcase a number of executive jets including the Phenom 100 VLJ, the Phenom 300, the new mid-light Legacy 450 and the mid-size Legacy 500, the popular super mid-size Legacy 600 and the ultra-large luxurious Lineage 1000. Embraer claims that all of the jets are best-in-class, offering superior comfort, excellent performance at low operating costs.

Aero India has traditionally had a military aviation bias primarily because the civil aviation industry in India prior to 2004 had a low profile. However, in view of the boom in civil aviation that began in 2004, MOCA acknowledged the need to project the civil aviation market potential in India quite independently. Hence was born India Aviation 2008, which is intended to be held every two years at Begumpet, Hyderabad. This step could affect participation by the civil aviation industry in Aero India 2009. Overall the prevailing mood in the civil aviation industry does not appear to be inspiring or conducive to the spirit of Aero India

Another episode that could affect Aero India 2009 is the disconcerting security situation in the country in the aftermath of the attack on Mumbai.

MILITARY AVIATION: IN GOOD HEALTH

The situation with regard to military aviation in India is quite different as it remains immune to the economic crisis. In fact, governments usually resort in increase spending to provide stimulus to the economy in the event of an economic slowdown or recession. There is therefore reasonable certainty that modernisation programmes for the aviation wings of the armed forces will continue without interruption. As per HAL Chairman A.K. Baweja, "The global recession has had no impact on HAL's business and currently HAL's hands are full with orders worth Rs 57,000 crore, including several hundred crores worth of exports. We have seven programmes running and seven more are in the design stage." HAL has already begun preliminary work to design, develop and produce indigenous light utility helicopters (LUH) and medium lift helicopters for the three services. HAL hopes to locate a foreign partner for the two projects during the air show.

INDIA'S PRIDE: SURYA KIRAN PERFORM AN AEROBATIC FEAT; (INSET) NISHANT, THE COUNTRY'S INDIGENOUS UAV DEVELOPED BY DRDO

PARTICIPANTS

Despite the unfavourable developments, there are indications that participation is likely to be as good if not better than in 2007. Around 550 companies from 50 different countries including India are expected to participate. Aerospace majors and armament manufacturers from the US, UK, Russia, France, Germany, Italy, Israel, Belgium, Brazil, Spain, Ukraine and

Netherlands are believed to have confirmed their participation in the air show. Italy will be attending for the first time with a joint presentation organised by ICE, the Italian Trade Commission. The Italian aerospace industry which ranks fourth in Europe and seventh in the world considers the Indian market to be particularly important for its aerospace industry.

FREEZE FRAME: ONBOARD AN F-18, RATAN TATA INTERACTS WITH A FIGHTER PILOT; (BELOW) THE BOEING C-17 GLOBEMASTER TRANSPORT AIRCRAFT

Over 100 aircraft—military and civil, as also UAVs—are expected to take part in flying and static display. An international seminar on "The Future of Aircraft Development and Research" sponsored by the DRDO will be held prior to the air show, from February 9 to 11. CEOs and prominent scientists from the global aerospace industry and several Chiefs of foreign air forces are expected to participate, many of whom would present papers.

In the regime of combat aircraft, the contenders who continue to be in the race for the 126 MMRCA contract for the IAF are likely to occupy the centre stage. The other project that could be of interest would be the deal between the HAL and the United Aircraft Corporation of Russia for the development of the Fifth Generation combat aircraft, the PAK-FA, which is likely to be inducted into the IAF around the year 2015. Helicopters such as Agusta/Westland, Sikorsky of the US, Eurocopter Fennec, and the Russian Kamov who are in the race for the contracts to supply 197 Utility and 22 Attack Helicopters for the Indian Army and the IAF are likely to showcase their products on offer. Bell and Boeing are reported to have already pulled out of the race.

Visitors to Aero India 2009 are likely to witness the HAL built Intermediate jet Trainer (IJT) or the HJT 36, fly with a new Russian AL-55 I engine, a scaled down version of the AL-31 FP engine fitted on the Su-30 MKI. The AL-55 I has a higher thrust rating than the French Larzac engine currently fitted on the IJT. Also on display will be the NAL developed 14-seat Saras light transport aircraft to be manufactured by HAL.

AN ABERRATION

Although Bangalore now has a brand new international airport at Devanhalli well outside the city, flying activities related to Aero India would impinge on scheduled domestic and international civil air traffic as Air Force Station Yelahanka is in close proximity as the crow flies. For reasons of air safety, Bangalore International Airport Ltd (BIAL) is required to close the airport to civil air traffic from 10 am to 12 noon between February 7 and 10. On the days of the actual air show, from February 11 to 15, the airport will be closed for an additional two hours from 2.30 pm to 4.30 pm. A NOTAM has already been issued to this effect. The website *www.bengaluruairport.com* records all the changes to airport operations. SP

Flash FORWARD

As the IAF stands poised on the threshold of significant modernisation, the need of the hour is for the government to offer meaningful and timely support to accelerate the modernisation programme

By **Air Marshal (Retd) V.K. Bhatia**

Throughout its long and mostly turbulent history, the IAF has sometimes 'super-cruised' and, at other times, literally stalled in its quest to create operational capabilities to meet the multifarious challenges. This has by and large been due to the 'knee-jerk' policies of the government which is known to respond only in a reactive mode as far as the country's defence needs are concerned. In the past, after each war it was forced to fight with its neighbouring countries, India embarked on a soul-searching mission to rationalise its defence needs. In the 1960s, post two quick conflicts against China and Pakistan, respectively, various studies were conducted to strengthen the armed forces and, as far as the IAF was concerned, a recommended force level of up to 64 (with 45 combat squadrons) was reinforced to effectively fight against its belligerent western neighbour while maintaining a defensive posture against its northern neighbour . The closest that the IAF has been able to come to this was the officially declared figure of 39 1⁄2 squadrons achieved during the 'golden era' of late 1970s/80s. This was made pos-

PHOTOGRAPH: AIRQUALITY.UCDAVIS.EDU

See us at
Aero India
Israel Pavilion
#A-9

GAIN THE RAFAEL EDGE

SUPERIOR PERFORMANCE FOR ALL YOUR AIRBORNE MISSIONS

RECCELITE
TACTICAL RECONNAISSANCE SYSTEM

DERBY
BEYOND VISUAL RANGE AA MISSILE

LITENING
TARGETING AND NAVIGATION SYSTEM

PYTHON-5
SHORT RANGE AA MISSILE

SPICE-1000
AUTONOMOUS STAND-OFF GUIDANCE KIT

RAVNET-300
AIRBORNE VOICE & DATA COMMUNICATION NETWORK

SPICE-2000
AUTONOMOUS STAND-OFF GUIDANCE KIT

SKY SHIELD
AIRBORNE SUPPORT JAMMER

Gain the edge that only high-precision impact can deliver. With stand-off airborne precision weapons, real-time data delivery and advanced EW protection, Rafael gives you the power to gain a critical edge in tomorrow's fiercest encounters.

60 Years of Innovative Solutions

RAFAEL

SMART AND TO THE POINT

E-Mail: intl-mkt@rafael.co.il
www.rafael.co.il

sible with the massive induction of a variety of aircraft such as Jaguars, MiG-29s, MiG-23 variants, MiG-25s and the Mirage 2000 multi-role combat aircraft.

These were truly happier times for the IAF but, unfortunately, the golden period did not last for too long. The beginning of 1990s witnessed the then unimaginable and sudden disintegration of the Soviet Union as also the dire financial state that India found itself in. While the former had a crippling effect on the flow of spares and equipment of Soviet origin, which still formed the backbone of the IAF's operational inventory, the latter made it impossible to acquire new equipment due to the then prevailing financial constraints. At the turn of the century and as the time passed, gaping deficiencies began to surface in the IAF's inventory, brought on by obsolescence and retirement of aircraft, especially the older MiG variants. Even though some transfusion in the form of the new Su-30K and later Su-30MKI air dominance fighters took place and a third squadron of Mirage 2000 was squeezed out from limited fresh inductions and available resources, the net result was not good enough to stem the downslide in the number of fighter squadrons. The IAF which had maintained a 39 1/2 squadron combat aircraft strength till 2001, was last year down to 29 squadrons having lost more than a quarter of its combat potential.

IAF UNDER TRANSFORMATION

While the new millennium saw the quick reduction in the IAF's force levels, its doctrinal perceptions went through fundamental and far-reaching changes to propel the IAF into a new realm. For instance, the IAF fully shed the notion of being called a mere tactical air force meant primarily for the support of the surface forces. It strongly reinforced its case for being a strategic air force in conformity with all other leading aerospace powers in the world. With India emerging as the new economic power house, the resultant geo-political and security scenarios require it to possess comprehensive military capability characterised by flexibility, quick response, mobility and transportability of all forms of national power as well as long reach and precision-targeting fire power with minimal collateral damage—all the attributes of a modern air force.

PRESENT CAPABILITIES

How do the IAF's current force levels, support equipment and infrastructure measure up to do full justice to its enhanced roles? One doesn't have to look too deep to realize that there are a large number of deficiencies in the IAF's arsenal in practically all areas of desired capabilities. For example, it has the strategic airlift capability, so aptly demonstrated during the Maldives crisis, but it is limited in nature. Similarly, its strategic offensive capability is also restricted. The IAF lacks adequate precision attack capability, both by day and by night. For terminal defences, its existing Surface-to-Air Missile (SAM) squadrons have already crossed the threshold of obsolescence and cannot be stretched much further. This has caused serious erosion in the SAM defence capability. As far as the Network Enabled Operations (NEO) or the more advanced infrastructure for Network Centric Warfare (NCW) is concerned, the IAF is still at a nascent stage.

MODERNISATION OF IAF

The IAF—it has been stated at several forums—is now poised on the threshold of significant modernisation. The Air Chief in his recent message on the eve of IAF's 76th anniversary stated, "The IAF is in the process of transformation. A large number of aircraft, sensors, weapons, communication equipment and infrastructure are in varying stages of induction." However, while he is hopeful of the IAF leapfrogging a generation ahead shortly, he succinctly admits that the process will actually be slow and laborious. The need of the hour is adequate budgetary support for meaningful and timely modernisation. In the present scenario, if the government commits to spending around 3 per cent of GDP on defence as it had done in the 1980s; sufficient resources would be available for meaningful modernisation. Major weapon systems, equipment and capabilities are required for the IAF to attain the status of a balanced modern air force of a continental stature.

Fighter Force: Three major types of aircraft needed by the IAF to fulfil its assigned roles are the air dominance/air superiority aircraft, multi-role combat aircraft and the tactical fighter aircraft or light combat aircraft in the ratio of 1/3rd each for a 40 to 45 (desirable) squadron combat force. Some steps have recently been taken by the government to arrest the alarming rate at which the IAF is losing its combat capability. The Su-30 induction has been accelerated for an eventual total of 230 aircraft of this type. The technical evaluation of the contenders for the 126 MMRCA project is almost complete with flight trials due to commence in the near future. However, the induction process is lengthy and they are not likely to start entering squadron service before 2013-14. Similarly, while the indigenous LCA with IOC (Initial Operational Clearance) might start getting inducted into the IAF by 2011, there is no commitment from HAL as to when the LCA would achieve FOC (Full Operational Clearance). Even if things move smoothly, owing to imminent phasing out of its upgraded MiG-21 Bisons and the MiG-27s, by 2020 timeframe, the IAF would still be a 34 to 35 combat squadron force (see table below).

Even if things move smoothly, owing to imminent phasing out of its upgraded MiG-21 Bisons and MiG-27s, by 2020 timeframe, the IAF would still be a 34 to 35 combat squadron force

Keeping in view the fast pace of accretion and modernisa-

IAF: LIKELY COMBAT FORCE BY 2020 WITH PRESENT PLANNED INDUCTIONS

Role	Aircraft Type	Number of Aircraft	Squadrons
Air Dominance	Su-30 MKI	230	11 to 12
Air Superiority	MiG-29	50 approx	3
MRCA	Mirage 2000	50	3
MMRCA	'Yet to be selected'	126	6
Strike	Jaguar	110	5
Light Combat	LCA (Tejas)	125	6
Grand Total	-	**660 approx**	**34 to 35**

India and Rolls-Royce

a powerful partnership

Rolls-Royce has had a long and proud history of partnership with the Indian Air Force for over 75 years. We have powered many of its front-line aircraft and look forward to continuing this important relationship. Our partnership with Hindustan Aeronautics (HAL), which is now in its 53rd year, is equally significant.

The success of these partnerships is founded on continuous development. In Rolls-Royce, we believe the development of technology, supported by a solid foundation of experience, makes a vital contribution to the future success of our customers and partners. **Trusted to deliver excellence**

POWERING THE INDIAN AIR FORCE
Rolls-Royce
SINCE 1933

ROLLS ROYCE
Rolls-Royce

tion of China and Pakistan air forces (see Forum for details), it would be desirable for the IAF to not only aim to regain its original force levels but move up to the approved levels of 45 combat squadrons. The likely achievable rate of production of the indigenous LCA would preclude increasing the number of Tejas squadrons than already predicted. The gap could be filled by increasing the number of Su-30 MKIs which are already under production at HAL as also the MMRCA aircraft which would also be on active production line at one of the HAL facilities within the 2020 timeframe. By extending the production run of the Su-30 assembly line and accelerating the rate of indigenous production of the MMRCA, the IAF could aspire not only to restore its combat squadrons' strength to the original figure but also to reach the approved strength of 45 squadrons (see wish list for details).

Transport Force: Though not as bad as the fighters, the transport force of the IAF is also short on capabilities, especially in view of the new and emerging scenarios. The IAF's strategic airlift capability is limited and its IL-76 fleet which was acquired more than two decades ago cannot meet the single wave requirement of a present day 'Rapid Action Force'. The IAF's reported proposal to issue a Request for Proposal (RFP) for a 70 to 80 tonne-payload heavy airlifter would be a step in the right direction. In addition, a proposal for the joint development of a medium transport aircraft (MTA), between India and Russia is being progressed. Also, the IAF's workhorse, AN-32 is being upgraded and some more Dornier DO-228 light transporters have been ordered. However, presently, only six C-130Js are on order for special operations and other tasks. These would have to be augmented. For VVIP/VIP duties, while the BBJs have arrived and put into operational service, the IAF needs more Embraer Legacy aircraft to fulfil its VIP commitments. Approval is reportedly being sought to acquire four additional 'Embraer' to increase the figure to eight aircraft.

Helicopter Force: The IAF's helicopter force is also suffering from obsolescence as well as deficiencies in numbers in the face of ever growing demands of not only the army and paramilitary forces, but also to meet other national commitments such as disaster relief work, etc. The IAF is reportedly acquiring 80 Mi-17 V5 from Russia with inductions to be completed by 2013. In the lightweight category, the indigenously designed HAL, Dhruv, Advanced Light Helicopter (ALH) with French Turbomeca engines is getting inducted into the IAF with 38 on order plus another 16 of the armed version. In addition, RFPs for acquiring 125 light-weight helicopters to replace the ageing Chetak/Cheetah helicopters and, 22 attack helicopters to replace the existing 30 Mi-25/Mi-35 helicopters have also been issued. The IAF has also reportedly selected AW101 (EH101 until June 2007) to replace the existing Russian-built helicopters in its VIP Squadron. The contract for an expected eight helicopters is likely to be signed before March 2009, with deliveries beginning in early 2010.

Air Defence: A gap free radar cover for the entire air space and adjoining areas of a country is a prerequisite in building up a proper air defence environment. Notwithstanding the individual localised needs for air defence, it is imperative to integrate all radars and other air defence equipment, civil or military, into a seamless system under the overall control of a single authority, not only during war but also during peacetime in view of the existing terror threats from across the borders. The IAF needs to induct radars of different types to remove the current deficiencies. These range from the high and medium power radars of western origin to the Low-Level Transportable Radars (LLTR) of Russian or Israeli origin. The recent induction of the indigenous 'Rohini' MPR into the IAF will help meet its medium-power radar requirements. As far as aerostats are concerned, only two have been acquired and deployed so far. These are needed in greater numbers to meet the actual requirement. Similarly, three AWACS on order, first of which is likely to be inducted into the IAF soon, would need to be augmented to meet the overall service requirements. In addition to the Israeli Phalcon system, India is also developing locally through DRDO its own Airborne Early Warning and Control (AEW&C) systems with ESM/SIGINT/CSM capabilities for which, it has chosen the proven Embraer ERJ-145 (three on order) as the carrier platforms. These are intended to act as vital backup nodes to the more

WISH LIST FOR A BALANCED & CAPABLE AIR FORCE
2020 Timeframe
(Operational Airborne Platforms Only)

Role	Type of Aircraft	Number of Aircraft	Number of Sqns
Fighter Force			
Air Dominance	Su-30 MKI	230 + *(130) = 360	18
Air Superiority	MiG-29	50 approx	3
MRCA	Mirage 2000	50	3
MMRCA	**Yet to be Selected**	126 + *(74) = 200	10
Strike	Jaguar	110	5
Light Combat	LCA (Tejas)	125 approx	6
Total	**-**	**900 approx**	**45**
Transport Force			
HETAC (45-50 ton)	IL-76	24	2
VHETAC (70-80 ton)	To be Selected	6-12	1
METAC (20 ton)	C-130J	12	1
+Spl Forces	+ MTA (when acquired)	40-50	3
Tact Tpt	AN-32	70-80	5
Total	-	**160-170 approx**	**12**
Force Multipliers			
FRA	IL-78	12	1
AWACS	Phalcon System	6	1
UAVs	-	-	-
+UCAVs	Heron, Searcher +HALE	80-100	5
Total	-	-	**7 Sqns**
Grand Total	-	-	**64 Sqns**
Helicopter Force			
Heavy lift	Mi-26, for instance	12	1 Unit
Medium Lift	Mi-17 variants	150 appx	12"
Light Utility	ALH + The New Variant	150-200	12-15"
Attack	LCH	40-50	3"
Total	-	**400+**	**30 units appx**

**Note: Additional aircraft which could be manufactured by HAL for augmentation to 45-sqn combat strength*

TRAINING & SIMULATION

NEW TOOLS FOR NEW RULES

F-16I Full Mission Simulator

Mi-8/24 Full Mission Simulator

F-4 Avionic Simulator

Training Superiority = Air Superiority

Maintain peak proficiency. Pre-fly the mission. Elbit Systems' comprehensive training and simulation solutions cover everything from Computer-based Trainers (CBT), Part Task Trainers, Full Mission Simulators, through complete Training Centers equipped with mission planning and debriefing systems. In addition to leading-edge techniques and technologies, all incorporate generations of pilots' operational experience, translated into the highest fidelity training and simulation.

Training Superiority - the sure way to Air Superiority.

Visit us at
AERO INDIA '09
Israel Pavilion, Hall A

Elbit Systems

NEXT IS NOW

marcom@elbitsystems.com
www.elbitsystems.com

expensive Phalcons for an indepth air defence network.

For the protection of VAs and VPs, greater dependence should be on the surface-to-air weapon systems, thus freeing the manned fighters for air dominance and offensive strike roles. An impregnable air defence cordon can be created around the VAs and VPs by employing a judicious mix of normal, quick-reaction and shoulder fired missiles coupled with Air Defence (AD) guns. In this context, the ageing Pechora systems are in immediate need of replacements. The signing of the deferred Indo-Israeli agreement for the IAF to finally go in for 18 Israeli Spyder air defence systems (three squadrons) is a step in the right direction. Similarly, the Indo-Israeli joint venture for the development and production of MR-SAM system needs to be pursued vigorously. The IAF has also ordered two squadrons worth of the indigenous Akash SAM systems but these must be thoroughly tested and if required, developed further before placing additional orders.

Networking/Space: The full potential and capability of any aerospace power can only be realised if it becomes a fully networked force. Efforts are being made in the IAF to connect all its operational sites through 'Air Force Network' (AFNET). An 'Operational Data Link' (ODL) is also planned to seamlessly connect airborne platforms, sensors, UAVs and SAM systems to exchange secure voice, data and real-time pictures. The entire architecture will form the 'Integrated Air Command and Control System' (IACCS). Utilisation of Space assets including creation of such capabilities is an integral part of this plan.

It can only be hoped that all the plans are converted into real-time capabilities soon as, without them, IAF will be unable to fully apply aerospace power at the time and place of its choosing.

IN CONCLUSION

With aspirations to become a transcontinental strategic force and in keeping with India's status as an emerging global economic and military power, the IAF is going through a transformation in its perspective, doctrine, mission and role. To meet its tasks effectively, the IAF needs to be equipped for long-reach, persistent, all-weather precision, networked and space-enabled force capability. As the IAF stands poised on the threshold of significant modernisation, the need of the hour is meaningful and timely government support to accelerate its modernisation programme. Only this way, can the IAF grow to the stature of a transcontinental strategic air force and truly merit the sobriquet of 'Fourth Largest Air Force in the World'. SP

UAVs at the Centennial 2018

PHOTOGRAPH: IAF

Most UAV manufacturers are developing payloads and synergetic support systems for non-military applications like counter-terror operations, disaster management, border and urban surveillance, ground and sea traffic monitoring, crop diagnosis and ground mapping

By **Air Marshal (Retd) B.N. Gokhale**

I heard some one say the other day ".....last of the fighter pilots may already have been born." It wasn't music to my ears, especially having been a fighter pilot all through my career and even after hanging my overall recently, I read with great interest the progress of the Medium Multi Role Combat Aircraft (MMRCA) programme of the Indian Air Force (IAF), as well as the futuristic Indo-Russian Fifth Generation Fighter Aircraft (FGFA) programme. But this operator of Unmanned Aerial Vehicle (UAV) was very emphatic about what he had said and began enumerating a number of futuristic applications on the anvil in this field. These sound interesting.

The century of manned aviation was celebrated just six years ago and in just a decade from now, on March 6, 2018,

we will celebrate the 100th anniversary of unmanned aviation. As per the broad definition, unmanned aviation encompasses a wide range of airborne platforms, starting originally from an 'aerial torpedo' or the forerunner of today's cruise missile and Precision Guided Munition (PGM), to the futuristic astral-planes being developed to fly in the atmospheres of other galaxies. Other applications from this 'family tree' include the recoverable aero models, target drones, decoys, reconnaissance as well as armed platforms; which are collectively known as Unmanned Aerial Vehicle (UAV). This term is already changing to Unmanned Aircraft Systems (UAS), with increasing number of 'dull and dangerous' missions; at present flown by combat pilots both, fixed and rotary wing, being taken over by such robotic flying machines.

In addition to the flight itself, the development of unmanned aircraft hinged on the confluence of three critical technologies. There was a need to incorporate automatic stabilisation, remote control and autonomous navigation. Elmer Sperry of USA was the first person to attempt an unmanned aircraft design to address all the three issues on a single platform. The efforts resulted in the invention of an Aerial Torpedo. Soon after this event, efforts were being made both in the US and the UK to design radio controlled recoverable aerial targets which were successfully flown in September 1924. Target drones were introduced in 1930 as a spin-off from these early efforts. Prior to World War II, a large number were being flown regularly in both the countries to train anti-aircraft gunners. Interestingly, some of these were assembled by one 19-year-old Norma Jean Dougherty, an employee, who later became a successful Hollywood star popularly known as Marilyn Monroe!

In the later years, unmanned aviation progressed rather slowly, with USAF using such machines mainly as reconnaissance drones in the Vietnam War. Although research work on miniaturisation, incorporating inertial navigation and GPS as well as data link continued, it was the Israeli Defence Forces that were the first to exploit the capability of these platforms. In the Yom Kippur war of 1973 with Syrian intention of recapturing the Golan Heights, Israel used their UAVs to gain critical information on the advancing armour, which helped them set up an ambush and achieve decisive victory despite Syrian numerical superiority. However, the world came to know about the potential of the UAV only after the 1982 Bekaa Valley operations, where Israel used these as force multipliers.

IAF planners saw a great potential in these platforms and inducted UAVs in 2000. Searcher II and Heron UAVs have distinguished themselves over the past few years by delivering electro optical/infrared (EO/IR), Electronic Warfare (EW) and now Synthetic Aperture Radar (SAR) intelligence, without exposing pilots to risk. Within a short span of their induction, the IAF has been able to exploit ground and airborne relays to extend operating ranges and also use them in different terrains including the Himalayan heights. The preparations during Operation Parakram have given the IAF the expertise in reducing the 'sensor to shooter' cycle. On the other hand, deployment in different parts of the country has enabled the IAF to acquire additional infrastructure, which will help in exploiting the UAVs in different roles including disaster management and internal security. Apart from the IAF, the Indian Army and the Indian Navy have also bought similar platforms enabling commonality in training, sharing of infrastructure and maintenance. DRDO, meanwhile, has also embarked on indigenous programmes for three different types of UAVs, Rustam Medium-Altitude Long Endurance (MALE), Pawan optimised for short-range and Gagan, a tactical UAV.

Various roles for which UAVs are being utilised by the IAF include collation of intelligence, including reconnaissance and surveillance of the designated area, UAV assisted fighter/helicopter strike (UAFS/UAHS) as well as laser designation of targets. In addition, these can be used for Battle Damage Assessment (BDA) and for real time inputs during BAS/BAI missions to strike aircraft. Use of SAR and IR gives this platform near all weather 24-by-seven capabilities. UAVs are also used for gathering ELINT and using the inputs along with COMINT to evade and intercept enemy fighters and helicopters. Other role being considered is a weapon platform like the American Predator, paving way to future use of UCAV. Additionally, long endurance of UAVs enables availability for extended periods, a distinct advantage over manned aircraft if engaged in similar roles.

Most of the UAV manufacturers are developing payloads and synergetic support systems also to be used for non-military applications, including counter terrorism operations, disaster management, border and urban surveillance, ground and sea traffic monitoring, crop diagnosis and ground mapping. With micro and nanotechnologies developing rapidly their applications in both military and civil UAVs are also being worked upon. The unmanned systems acquired by the IAF have been continuously upgraded. Add-ons such as Automatic Take Off and Landing (ATOL) systems, satellite communication data links, better radio relays and advanced payloads are also being contemplated. It is a very versatile platform, a force multiplier and hence it needs to be accorded the necessary impetus for attaining an integrated operational status.

Though the UAV is unmanned, operators and maintenance crew are required on the ground to operate it. The Operation Crew which is responsible for the conduct of the mission generally consists of a Mission Commander (MC) double banking also as an Internal Pilot (IP), an External Pilot (EP) and an Observer (OB) who also works as the Special Load Operator and Imagery Interpreter. The technical team is headed by a Technical Officer / System Engineer who not only ensures maintenance of UAV and systems but also doubles up as a Data Acquisition System (DAS) operator for health monitoring of UAV and systems. The UAVs are not only technology intensive but have marginal error tolerance especially in critical conditions of flight like take-off and landing, evading enemy interception and during emergencies such as loss of link . The fleet, therefore, requires highly skilled and motivated manpower.

The ability of this system to exchange data with a number of other systems has been proved beyond doubt. This aspect of interoperability has been demonstrated recently in all operations of UAV in Operation Enduring Freedom, conflict in Lebanon and in the Afghan war. The IAF, too, is capable of streaming live videos for all C4I2 users along with provision of ESM data. Successful trials reveal that ESM and SAR imagery can be very usefully integrated. Due to its wide coverage, long endurance and continued presence in the AOR, use of UAV can be exploited with synergy of effort. Multiple payloads can facilitate this vehicle to locate and designate hostile emitters, with live video streaming for any Commander to decide and shape the battle. The present usage of this platform is a stepping stone for more complex and interwoven air campaigns in which the UAV will be the eyes of any commander. SP

Awaiting AWACS

The Israeli Aerospace Industries are to supply the IAF three Phalcon AWACS radar systems. India also has an indigenous programme with DRDO for the development of the AEW&C.

Media was recently abuzz with reports that the first of the three Phalcon Airborne Warning and Control System (AWACS) aircraft from Israel had arrived quietly at New Delhi's Palam airport technical area on January 11 on a stopover from Israel. Reports claimed it had been inspected by senior IAF brass, including the Chief, Air Chief Marshal F.H. Major, before flying out to Agra. The newly formed No. 50 Squadron of the IAF is likely to be equipped with the aircraft with Air Force Station Agra as its home base. However, while the media went into a tizzy with the breaking news of a vital force-multiplier being inducted into the IAF and its implications, especially in view of the present standoff between India and Pakistan over the Mumbai terror attacks, official agencies maintained a studied silence on the subject.

In March 2004, India and Israel signed a $1.1 billion deal (Rs 5,375 crore) according to which the Israeli Aerospace Industries are to supply the IAF three Phalcon radar systems. India had signed a separate deal worth an additional $500 million (Rs 2,440 crore) with the Ilyushin Corporation of Russia for the supply of three IL-76 air-lifters, which were to be used as platforms for these radar systems. The first of the modified aircraft was to have arrived in India by September 2007. However, in November 2007, Indian defence officials revealed that there had been significant delay in the supply of the Russian IL-76 platforms and the induction of the Phalcon system was consequently postponed to 2009-10. As per the revised schedule, the first system is to be delivered to the IAF in March-April 2009 with the second and third slotted for induction in September 2009 and April 2010.

There is little doubt that the Phalcon system would be a tremendous force-multiplier, being able to provide real-time intelligence and command & control needed to attain and maintain air superiority in selected airspace over the combat area and to enable surveillance deep inside enemy territory. The Phalcon (Phased Array L-band Conformal radar, EL/M-2075) has been developed and produced by ELTA using active phased array electronic scanning technology rather than a mechanically rotating antenna (rotodome) used by current AWACS, giving Phalcon much greater flexibility and performance.

Data gathered by four sensors—phased-array radar, phased-array IFF, ESM/ELINT and CSM/COMINT—is incessantly cross-related by an unique fusion technology. When one of the sensors reports a detection, the system automatically initiates an active search of the complementary sensors. In the IAF system, the phased-array radar is mounted on top of the aircraft inside a stationary dome with three fixed equilateral scanners providing full 360 degree coverage. The electronically steered beam delivers a tremendous advantage over mechanical rotating antenna, as it supports the tracking of high manoeuvring targets. The radar can detect even low flying objects from distances of hundreds of kilometers, by and night, under all-weather conditions. Flying at 30,000 ft altitude, the system can detect targets up to 370 to 400 km with radar cross section of three sq m. Compared to the 20 to 40 seconds with a rotodome radar, track initiation is achieved within two to four seconds. The IFF data is automatically correlated with the phased-array radar for quick identification of friend from foe. It also collects and analyses ELINT data.

> The Phalcon system would be a tremendous force-multiplier, being able to provide real-time intelligence and command & control in selected airspace over the combat area

The Phalcon's CSM/COMINT receives in UHF, VHF and HF, rapidly searching for airborne, shipborne or ground communications signals of interest. A DF capability locates targets. Detected signals can be assigned to monitoring receivers instantaneously. The system makes extensive use of computers to reduce the load on operators. The aircraft communicates, via its data-link, with Air Defence Direction Centres. Data from additional air defence sensors are fused to create a complete spatial picture. Eventually the system will also be networked with other air force assets through satellite to provide a network-centric warfare capability. The IAF is keen to acquire three more Phalcons to have a total of six such systems in its inventory. Reports emerging in early November 2008 suggested that India may have already contracted for a fourth system with an option for two more. India also has an indigenous AWACS programme with the DRDO for which it is acquiring three Embraer 145 platforms. The first delivery is scheduled for 2011. Centre for Air Borne Systems (CABS), a unit of the DRDO, will be the central agency for integration of the indigenous sensors.

P.S. At the time of going to print, Air HQ confirmed that the Phalcon system has still not entered the Indian skies. SP

— Air Marshal (Retd) V.K. Bhatia

ISSUE 1 • 2009 | **SP'S AVIATION** | 29

Hawk-*ish* manoeuvres

PHOTOGRAPHS: SP GUIDE PUBNS

Once the entire force of 106 Hawk trainers are inducted, there would be a significant improvement in the already high training standards of the IAF

By **Air Marshal (Retd) Narayan Menon, Bangalore**

Transforming a relatively raw individual into a skilled professional capable of piloting a weapon of war as powerful as a fighter aircraft is a process replete with challenges, both for the individual and the systems of training that are responsible for bringing about this metamorphosis. The process begins with selection of candidates for the flying branch of the Indian Air Force (IAF). This process is elaborate and is designed to assess every facet of one's personality.

Candidates who clear the initial screening tests are subjected to stringent medical examination to verify fitness level essential for the demanding work-load of a pilot. Visual acuity and superb physical condition are vital requirements. Mental agility, ability to perform as a team and social compatibility are also prerequisites that are duly verified. A special series of 'Pilot Aptitude Battery Tests' gauge the motor co-ordination skills and spatial orientation capability of the candidates. A failure in this invites permanent unsuitability for a flying career in the military.

TRAINING FOR F(P) BRANCH

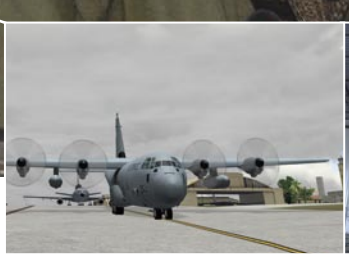
Aspirants to a career in military aviation have the option to join the Flying Pilots or F(P) branch, of the IAF and route through the National Defence Academy (NDA) at Khadakvasla near Pune. In this institution, cadets of all three services, the Indian Army, the Indian Navy and the IAF are trained together. Cadets assigned to the F(P) branch are introduced to elementary powered flying on the Super Dimona aircraft in their final term which is of six months. On completion of a three-year training programme at the NDA, cadets of the Flying Branch are then routed to the Air Force Academy (AFA) for Stage-I training. The AFA is a unique institution where trainees of all branches of the IAF, that is, flying, technical or engineering and ground duty, are trained jointly for the first six months.

At the AFA, basic flying training is imparted on the HPT-32 aircraft designed and built by the Hindustan Aeronautics Limited (HAL). All trainees destined for the flying branch, including ex-NDA, direct entry and women cadets, are required to undergo a common flying training syllabus of approximately 65 hours during Stage-I, which is the basic stage. In the first 15 hours or so it becomes apparent whether the flight cadet is capable or not of going 'solo', in other words, of being entrusted solely with the aircraft. The first solo flight is an achievement unlike any other. Flight cadets who prove incapable of going solo within the stipulated number of hours are weeded out. The process of rejection on account of failure to achieve the minimum standards of proficiency continues throughout all stages of flying training. During Stage-I basic flying manoeuvres are taught. The concerned flying instructor continuously evaluates and meticulously records a flight cadet's performance during each 'sortie' so that by the end of Stage-I, a comprehensive overall assessment of the

mission ready

For the Indian defence and homeland security forces, training serves to meet one objective: mission readiness. CAE-Macmet is India's leading supplier of simulation, training, and mission rehearsal systems. Macmet has been a company synonymous with simulation in India for a decade. Over the past 60 years, CAE has earned a reputation as the world's leading simulation and training company. CAE acquired Macmet Technologies in 2007 and now, Bangalore-based CAE-Macmet is bringing the full breadth of CAE's world-class simulation technologies to India's Army, Navy, and Air Force. From expertise to perform training needs analysis and training system design to in-house capability to manufacture the most advanced simulation equipment and provide a full range of services, you can trust CAE-Macmet as your simulation and training partner. Our people, products, and services will help you stay one step ahead and achieve your objective: mission readiness.

Come visit CAE's booth (Hall H, Booth #23) at Aero India 2009 to see and learn more about CAE's world-class simulation and training solutions.



CAE Medallion™-6000 visual system

Full mission simulator

UAV simulator

AM102

CAE

one step ahead

cae.com

individual's capability and progress is available.

The batch of flight cadets completing Stage-I training is trifurcated into different streams of the flying branch: fighters, transport and helicopters. Undoubtedly, all three streams demand challenging flying skills but individuals have differing aptitudes and dispositions. The flying instructors are trained to spot these nuances of personality and recommend in respect of each flight cadet, the stream for which the individual is best suited from the point of view of capability and temperament. As per regulations currently in vogue, women cadets are restricted to being assigned to either the transport or the helicopter stream.

ACQUIRING 'WINGS'

For Stage-II, trainees of the fighter stream move to Air Force Station Hakimpet, Hyderabad. Stage-II consists of approximately 80 hours of flying on Kiran Mark I or Mark IA aircraft over a 24-week period. Transport trainees fly the Dornier DO-228 and Avro/An-32 aircraft at Yelahanka while the helicopter trainees fly the Chetak and Mi-8 at Hakimpet and Yelahanka, respectively. Unlike the HPT-32, the Kiran Mk I/IA is a jet aircraft capable of much better performance. Advanced aerobatics, close formation flying and basic fighter manoeuvres are taught to the cadets during Stage-II. All flight cadets are awarded the coveted 'wings' and commissioned into the IAF at the end of this Stage. In a few years time, the Kiran aircraft is scheduled to be replaced by the HAL manufactured Intermediate Jet Trainer, HJT-36 aircraft.

TRAINING TOOLS, INTERNATIONAL AND DOMESTIC: (PREVIOUS PAGE) HAWK IN IAF COLOURS; (ABOVE) DOMESTIC PROGRAMME IJT AWAITS INDUCTION

The IAF currently is in a change-over process for Stage-III or the Advanced Stage of training for fighter flying. All fighter trainees proceed to Air Force Station Bidar for a period of six months. The lot is divided into two groups. One flies the Kiran Mk II for nearly 90 hours and then proceeds to MiG Operational Flying Training Units located in Eastern Air Command and South Western Air Command. This stage of training is split into two semesters and the officer trainees fly about 140 hours on the MiG-21M over 12 months before joining frontline fighter squadrons of the IAF. The second lot flies 65 hours on the newly inducted Hawk Advanced Jet Trainer (AJT) in the first six months. In the next 12 months they would fly another 100 hours on the same type and then be routed to operational squadrons. As many as 24 Hawk 132 aircraft from British Aerospace have already been received and are flying. HAL is to deliver the remaining 42 over the next three years. As additional aircraft are inducted, Stage-III training will be conducted in totality on the Hawk fleet at Air Force Station Bidar.

OVER TO THE HAWKS

Induction of the Hawk AJT has been a true milestone in the history of flying training in the IAF. After the Vampire and the Hunter aircraft were phased out, the IAF resorted to the MiG-21FL initially and later the MiG-21M aircraft for the conduct of Stage-III training. Acquired in the early 1960s, the MiG-21FL, also referred to as Type 77, was designed primarily to intercept US bomber aircraft intruding Soviet airspace at high altitude and speed. Without any alternative at that point in time, the IAF diverted the MiG-21 FL to the operational training role. The MiG-21 FL was an excellent interceptor, but it did not have the attributes of a combat trainer and hence was hardly suitable for the newly assigned role.

Although adopted as a measure for the interim, endemic delays that afflict India's acquisition programmes resulted in a time lag of over two full decades between the projections to the government of the need for a new combat training aircraft, the AJT, and the receipt of the first batch of Hawk aircraft. An AJT must facilitate smooth and easy transition for under training fighter pilots to higher performance machines. The MiG-21FL, with its Russian instrumentation and lack of modern avionics, fell somewhat short in this regard. The Hawk is much better suited as an AJT since it has been designed specifically for this role. It has modern avionics, glass cockpit, better ergonomics and excellent handling characteristics, attributes that hopefully would make transition to modern fighters like the Su-30 MKI, Mirage 2000, Jaguar and MiG-21 Bison considerably easier.

A major problem with the MiG-21 was low availability of trainers, resulting in lower 'dual' hours for the trainee. This drawback has been completely eliminated as all IAF Hawks have two seats for the pilots and are arranged in tandem. The instructor will be able to impart much more of dual training in air combat, airborne interception and armament delivery techniques that are the bread and butter of fighter pilots. India has ordered 57 additional Hawk AJT aircraft, 40 for the IAF and 17 for the Indian Navy. IAF is likely to commission a Hawk training base in the Eastern Air Command for conducting live air-to-air firing practice.

As many as 24 Hawk 132 aircraft from BAE Systems have been received and are flying. HAL is to deliver the remaining 42 over the next three years.

Once the entire force of Hawk trainers are inducted, there would be a significant improvement in the already high training standards of the IAF and its fighter pilots would be ready and fully prepared to take on all future combat missions with complete confidence. SP

Flying TUTORS

A pilot aspiring for the Indian Airline Transport Pilot's License to advance from a First Officer status to captaining an airliner has to work hard to earn it

By **Our Staff Reporter**

Responsibility for regulating aviation training and licensing procedures related to aviation in India lies with the Director General Civil Aviation (DGCA). To the credit of the DGCA, its regulatory framework in this regard is diligently drawn up and designed with adequate safety factors built into the system of licensing in such a manner that adequate training becomes predicated to the licensing process. However, there is a problem with manning in DGCA which prevents adequate on-location oversight or even a reassuring system of audit to ensure that the 28 government-run flying institutions and seventeen private flying clubs in India (several of them not functioning at the moment) strictly follow the training philosophy in letter and spirit.

Occasionally, one hears unconfirmed rumours that some of the alumni of these flying schools have far less hands on flying experience in the cockpit than their flying log books proclaim. This problem has now been neutralised by the fact that airlines can pick and choose the best of the lot. One estimate is that there are around 8,000 unemployed CPL holders in India and thus, candidates with weak training background are eliminated during the selection process.

Not all of the 45 flying institutions listed on the DGCA site are functional. The problems hounding them are many. Lack of flying instructors as many have fled to more lucrative airline jobs, poor funding and inadequate infrastructure have stunted their role in training pilots. This had forced many youngsters—disappointed with the prospect of prolonged delays at these institutions—to seek alternatives. Those who could afford it, grabbed slots at flying schools in the US, Australia and Philippines where flying facilities abound and certification rules, in comparison to Indian regimes, are lax. At one point there was a fairly viscous flow of graduates in disciplines not remotely connected with aviation towards flying training in institutions abroad. The end result was an overflow for the system.

NEW ENTRANTS

There is reason to cheer in the news that Indira Gandhi Rashtriya Uran Akademi (IGRUA) is planning to upgrade its output from 40 to 100 cadets per annum through a management contract with CAE, Canada. This endeavour is supplemented by the setting up of a National Flying Training Institute at Gondia, Maharashtra which will also be run on the lines of IGRUA. Another facility that deserves a mention here is Punj Lloyd's Chimes Aviation Academy at Dhana, Madhya Pradesh. Punj decided to study the Indian aviation sector extensively and after dropping the idea to start an airline business, started a pilot training academy. With an initial capital investment of Rs 30 crore, the academy is established on the IGRUA model and offers a 12-month course, for which it has the capacity to enroll 120 students a year with a fee of Rs 22 lakh.

PHOTOGRAPH: ASHISH SHAH

Meeting training commitments of airlines is a major activity of the flight operations department. Small airlines remain dependent on hiring of simulators and other facilities but the three affluent ones have been taking steps to enhance their capabilities in the training domain. In April last year, Jet Airways became India's first airline to get a DGCA approval for its Type Rating Training Organisation (TRTO), thus becoming empowered to conduct endorsement courses and examinations in house ---of course under the supervision of DGCA. Incidentally, the TRTO did not come up overnight but evolved from a training school that was first approved in 1995 by DGCA. Air India too has a TRTO at its Central Training Establishment at Hyderabad for its Airbus A320 and Boeing 737-800 aircraft crew including ab-initio trainee pilots as well as those converting from other types of aircraft. The CTE is of course older than Jet Airways' school and has been imparting civil aviation related training to airline personnel with qualified instructors, examiners, check pilots and ground instructors. The recognition as TRTO has enabled it to conduct endorsement training, refresher/recurrent training, checks and specialised training for pilots on A310, A320, B737-800 and B747-400 aircraft.

In an interesting and encouraging development, Birla Institute of Technology, Mesra has signed an MoU with the Jamshedpur Cooperative Flying Club to establish a joint venture flying training institute that will provide the flying training required for a new three year B.Sc. (Aeronautical Sciences) degree course proposed to be offered at BIT. The proposed new course will integrate a broad based education with the ground instruction and flying training prescribed by DGCA for the Commercial Pilots License (CPL), which is the basic license required by students aspiring to become commercial pilots. The syllabus is designed in such a manner that will allow the pilots trained under BIT's programme to take up management positions in the aviation industry. In another development, Bird Group has entered into a deal with France-based simulator manufacturer Alsim to offer its products in India. Alsim's Flight Training Devices are versatile and compliant with Federal Aviation Administration (FAA) and Joint Aviation Authorities regulations. The tie up will definitely provide for more state-of-the-art training facilities in India.

Last year, Kingfisher Training Academy announced plans to set up 25 centres by 2010 in the country, including in non-metro cities, with the objective of training 6,000 to 8,000 students per year in the field of aviation and the allied hospitality sector. Livewel Aviation, a 35-year-old company with diverse interests in the aviation sector, is also in the process of setting up training institutions offering training for airport ground services, cabin crew, aviation cargo, aviation security, hospitality, customer services, pilots and flight dispatchers. However, some other plans for training facilities fell by the wayside during the last year due to the general disillusionment with the aviation industry in India and indeed worldwide. Jet Airways had to abort its plans to set up a training facility in conjunction with Brussels-based Sabena Flight Academy that would have supplied around 200 candidates annually. Similarly, Deccan Aviation shelved its plans to establish a residential flying training centre with a planned outlay of Rs 65 crore. NACIL too has shelved plans for training facilities in association with aircraft manufacturers Boeing and Airbus SAS, at least for the time being.

A host of training centres continue to do fairly good business training prospective cabin crew. Avalon Academy recently inaugurated aviation training centres in Dehra Dun, Meerut and Bijnor. Avalon has strategic alliances with over 37 leading domestic and international airlines. It specializes in providing high quality training to aspirants interested in making a career in Aviation, Travel & Tourism industry, as well as preparing students for the corporate world.

CLOSER TO GROUND

Perhaps the only sub-set of the aviation industry where there has been no drop in takers is that of aviation maintenance engineers. There does not appear to be a glut in the market and salaries have not dropped. Also surprising is the absence of retrenchment of engineers by airlines; perhaps the cause for this differentiation is that irrespective of how much an airline reduces its utilization of its aircraft, there is no substantial difference in the number of engineers it requires in proportion to the number of aircraft in its strength.

Indira Gandhi Rashtriya Uran Akademi is planning to upgrade its output from 40 to 100 cadets per annum through a management contract with CAE, Canada

As for training of commercial staff working for airlines at airports, in-house training appears to be the trend with stress on customised training designed to meet airline's specific needs. Some of this is set to change drastically when the new ground handling policy announced by the Ministry of Civil Aviation is enforced on July 1, which will usher in an entirely new regime, one under which airlines would be forced to use services of one of two or three alternatives offered at each airport by the airport operator. Some of the differentiation on account of an airline's culture vis-à-vis customer handling is set to change. So will their individual needs to train staff for the jobs taken over by the services offered by the airport operators.

DGCA, to reiterate a point, has a robust training and licensing regime. The Indian Airline Transport Pilot's License (ATPL), a mandatory requirement for an Indian pilot to advance from a First Officer status to captaining an airliner in India, is rather hard to obtain and an aspiring pilot has to work hard to earn it. This iteration is complete only when one states that, in comparison, an FAA equivalent licence is much easier to obtain. A couple of enterprising Indian First Officers, in despair after several, successive attempts to obtain the Indian ATPL, espied and snatched upon an opportunity provided by a chink in DGCA's otherwise robust regime. They used the legitimacy of a foreign license by foreign pilots on Foreign Aircrew Temporary Authorisation as a subterfuge for circumventing the stringent ATPL examination regime.

In defence of DGCA, it must be stated that it has discovered the chink and is in the process of cementing it to ensure that its overall regimen of a very high standard of aviation training in India is not only maintained but also seen to be maintained. This good intent on the part of DGCA continues to be one of the reasons for cheer for the aviation industry in India. SP

cfm

THE POWER OF FLIGHT

THE RECIPE FOR A GENUINE CFM* ENGINE.

FIVE LARGE BIRDS
500LBS OF HAILSTONES
3 SLABS OF ICE
AND LOTS OF WATER.

They're just some of the ingredients of our success. CFM takes all the above and uses them to simulate bird strikes, monsoons and severe hail storms. They're called ingestion tests. They're costly. They're exacting. They help produce the world's most reliable engine. The CFM56 family. Facts the alternative materials manufacturers should chew over before they claim their parts are equal to ours. Develop a taste for proven durability, reliability and long-term savings. Visit www.cfm56.com now.

Eclipsed & edged out

PHOTOGRAPH: IAF

Most armed forces, including those of the major powers, are equipped with transport aircraft of the 1960s and 1970s vintage that are technologically obsolete and operationally inadequate

By **Group Captain (Retd) Joseph Noronha, Goa**

Less glamorous than the fighter fleet, military transport aircraft are a vital constituent of the inventory of the land and air forces of a nation. Yet, these are accorded lower priority and less budgetary support with little publicity. During the last two decades, inter-theatre war-fighting, peacekeeping and humanitarian interventions have become the order of the day. The need is for swift response at short notice, often over long distances, hauling bulky stores both military and civil. Such missions are often against ill-defined threats or in the midst of the unbelievable chaos in the aftermath of natural disasters. In this age of shrinking military budgets, strict financial limits also need to be maintained.

Crises often reveal glaring deficiencies in contingency planning with air transport capability lagging woefully behind. Much of the soul-searching following November's carnage in Mumbai revolved around why it took so long for the National Security Guard (NSG) commandos based near Delhi, to reach the scene of action. The government has now sanctioned dedicated transport fleet for the NSG.

LOOMING CRISIS, WORLDWIDE

Most armed forces including those of the major powers are equipped with transport aircraft of the 1960s and 1970s vintage that are technologically obsolete and operationally inadequate. The current global military transport fleet consists of more than 2,300 tactical airlift aircraft with an average age of 26 years and around 50 strategic airlift aircraft of which most are operated by the US and the Commonwealth of Independent States. The ubiquitous Lockheed Martin C-130, for instance, began production in 1954. It is strange, therefore, that the last two decades have seen the launch of just three new designs In military transport aircraft: the Boeing C-17 Globemaster III, the EADS-CASA C-295 and, last year, Alenia's C-27J Spartan.

Airbus's own much-awaited A400M has been dogged by delays and is yet to get airborne. Indeed, the state of the military air transport fleets of the major powers is rather depressing. The American scene appears particularly bleak. The global war on terror has sharply accelerated aircraft utilisation rates, yet plans to induct new aircraft seem lost somewhere in the political labyrinth. The C-17 Globemaster III remains the backbone of US inter-theatre transport opera-

tions around the world. Its ability to operate from shorter and unprepared runways makes it especially valuable. Improvements in the C-130J Super Hercules, which entered production in 1997, have improved the plane's range, cruise ceiling, time to climb, speed and airfield requirements. Yet, the trend in airlift demand is likely to place a premium on aircraft that can carry more than a C-130J. Consequently, the levels of C-17 flight hours remain well above USAF projections, and are likely to continue being so. Some experts say this would shorten the C-17 fleet's expected lifespan by five years. Some even predict a US airlift crisis in the coming decade.

Stretched by the demands of the war on terror, particularly the frequent need to land on unpaved airstrips, the RAF is badly affected by the revised delivery schedule of the Airbus A400M. The 25 new planes on order that were to arrive in 2010, will be delivered in 2012. Meanwhile, NATO has been trying to make good its shortfall in strategic airlift. In March 2006, under the Strategic Airlift Interim Solution, NATO put a multinational airlift contract into effect. Six Antonov An-124-100 strategic airlift aircraft, leased from Russia, will be available to 15 NATO members. NATO also plans to buy three C-17s. Member countries will receive allocated flight hours relative to their participation. This pool would enhance Europe's defence capabilities through the new heavy lift aircraft. Side-by-side, the European Air Transport Fleet initiative, which could enter operation in 2014, will pool aircraft like the A400M and the C-130J.

Russia in this respect is no better off. There are around 300 transport aircraft in service with the Russian Air Force, including An-12 Cub, An-72 Coaler, An-124 Condor and Il-76 Candid planes. Most of these entered service in the 1960s and 1970s and are considered unsafe by modern standards. However, comprehensive upgrading could extend their service life until 2020-2025. The Chinese situation has hitherto been a couple of notches worse than the Russian, but the much stronger Chinese economy will probably permit it to keep pace with military transport aircraft requirements in the foreseeable future.

Dogged by obsolescence and shortages in its transport fleets, the Indian Air Force (IAF) operates 14 Ilyushin Il-76 aircraft for tactical and strategic airlift, and six IL-78s for in-flight refuelling. Apart from the obsolescent HS-748 Avros, it has a fleet of 90 Antonov An-32 and 28 Dornier Do 228 utility aircraft. In an effort to infuse fresh life into its transport fleet, the IAF will begin an upgrade programme for its An-32s and Do 228s this year. The upgrade is intended to improve the avionics, increase the engine lifespan, and improve range and payload so they can remain operational for another 15 to 20 years. Six C-130J Super Hercules have also been contracted for delivery in 2011.

AIRCRAFT ON OFFER

The Airbus A400M is a direct result of a commonly felt need by eight European air forces for a new generation, multi-role military transport to replace the ageing C-130 Hercules and C-160 Transall. The aircraft incorporates leading state-of-the-art technology including a fly-by-wire flight control system, a flight envelope protection system, advanced structural design incorporating extensive use of composite materials, four high performance turboprop engines and high flotation landing gear, allowing operation from short, unpaved airfields. The A400M can operate in many configurations including cargo transport, troop transport, MEDEVAC, aerial refuelling, and electronic surveillance. Since the survivability of transport aircraft in the tactical battle area is open to question, the A400M could be fitted with an extensive ECM suite, besides armour plating crew protection, bullet-proof windscreens, engine exhaust treatment for infrared emission reduction, and inert gas explosion retardation and fire retardation in the fuel systems.

A series of smart design decisions regarding load carrying capacity, extensive use of modern materials, multi-role capability and a multinational industrial program were expected to leave the aircraft well positioned to take overall market share from Lockheed Martin's C-130J Hercules. The catch: It won't be ready in time. In January, EADS announced that the first A400M delivery would be postponed until at least 2012. Critics also say it is overweight and underpowered. As a result, Lockheed Martin expects to sell more of its competing planes. The traditional Boeing-Airbus rivalry is absent in this segment since Boeing seems too preoccupied with its 787 Dreamliner woes to think about producing a military transport plane.

Dogged by obsolescence and shortages in its transport fleets, the IAF operates 14 Ilyushin Il-76 aircraft for tactical and strategic airlift, and six IL-78s for in-flight refuelling

Embraer is also considering a new transport aircraft, the C-390, which will be the company's first cargo plane and its heaviest aircraft, carrying approximately 19 tonnes of freight. Size-wise it will be between the C-27J and the C-130J. This multi-role aircraft would be used for midair refuelling, MEDEVAC as well as to transport troops. The C-390 is proposed as a twinjet replacement for thousands of ageing Lockheed Martin C-130s. The aircraft's first flight is expected around 2011.

Turning to light military transport aircraft, there are three main options at present: Alenia's C-27J Spartan, EADS-CASA's C-295M and that old faithful—Antonov's An-32. The C-27J Spartan is a twin-turboprop, medium-sized military transport aircraft. The aircraft was selected as the Joint Cargo Aircraft for the US military. Italy received its first C-27J in October 2006 and the US Army received its first in September last year.

So far as India is concerned, the success of the BrahMos missile project needs to be replicated in the Indo-Russian Multi-role Transport Aircraft (MRTA) project. In 2002, the two countries agreed to a 50-50 joint venture between Hindustan Aeronautics Limited and Ilyushin Aviation Complex/Rosoboronexport to develop the MRTA with a payload capacity of 18.5 tonnes, a range of 2,500 km and a speed of 870 km/hour. The twin bypass turbo-jet is expected to fly soon and enter service by 2015. While the IAF plans to acquire 45 such aircraft, the Russian market could absorb 100 planes within the next 12 years. However, latest reports suggest that the deal has not been finalised as yet. If the deal doesn't come through, India could look at partnering the Embraer's C-390 programme which is very similar to what is needed by the IAF and also in an advanced stage. SP

Em

PHOTOGRAPHS: ASHISH SHAH, MUMBAI

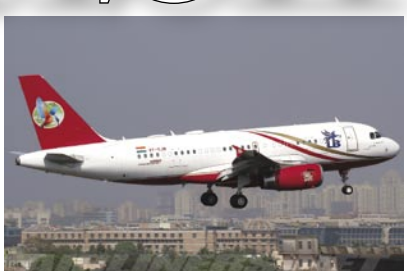
Embraer *bullish* on its range of business jets

Upbeat and looking to consolidate its position, Embraer for the first time in India showcased the cabin cross-section of the ultra-large Lineage 1000 executive jet from January 19 to 23 in Mumbai. The company also named Indamer as its authorised service centre for India. Embraer will promote its entire portfolio of executive jets at Aero India 2009.

1. The plush interiors of Lineage 1000; **2.** The Lineage 1000 jet was designed with comfort and luxury as top priorities; **3.** Jose Eduardo Gandara Costas, Vice President, Sales and Marketing, Asia Pacific, renders an overview of the Asian market; **4.** Andre de Castilho Silva, Director, Customer Support & Services, Asia Pacific, announces Mumbai-based Indamer Embraer's authorised service centre for India; **5.** Lineage 1000 cabin mock up; **6.** Captain Manfred Baudzus, Director, Business Development, Asia Pacific, explains the attributes of the Phenom 300 to a prospective customer; **7.** Captain Baudzus addresses the media; **8.** Lineage 1000 model and mock up; **9.** Andre de Castilho Silva presents a model of the Phenom 100 to Bharat Malkani, Managing Director, Indamer, after anointing the company Embraer's Authorised Service Centre for India; **10. & 11.** The line of Embraer Executive Jets—the Lineage 1000, Legacy 600, Legacy 500 and Legacy 450; **12.** Bharat Malkani makes his acceptance speech

PLUSH INTERIOR: INSIDE DR VIJAY MALLYA'S A319 ACJ AND (BELOW) THE AIRCRAFT IN FLIGHT

Rising Star



Business aviation in India, discounting an odd hiccup here and there, is in the ascendant for the coming years

By **Our Staff Correspondent**

As if the injury inflicted on the US business aviation industry by developments detrimental to aviation wasn't enough, a prickly provision of the recently introduced Troubled Assets Relief Programme Bill piled on the insult. According to the Bill, companies bidding for and receiving federal bailout funds are required to relinquish their corporate fleets or jet leases as part of the bailout deal. The proposal is the fallout of outrage expressed by a section of the politicians over three heads of US car manufacturers flying to Washington on individual business jets on a joint mission to seek a government bailout. Saner voices insisting that the use of business jets was hardly the underlying cause for the economic state of the US were brushed aside even as the Bill's provisions reflected the erroneous perception in aviation circles about business aviation, that it is less of a necessity and more of a luxury.

Back home, there is no such visible blow to the tenacious hold corporate houses maintain on their business aircraft. Perhaps because the clamour for bailout packages is neither as noisy nor the plight of most business houses so sorry as to attract public opprobrium for their aircraft holdings. Moreover, the US phenomenon, which in a single stroke rendered corporate aviation an icon of extravagance and callous affluence in times of economic downturn, is unlikely to be repeated here in India for the simple reason that with elections round the corner, business aircraft are going to be extensively utilised during the campaign. Indeed, several new helicopters are going to exercise their rotors in Indian skies just before electioneering commences in earnest.

INCREASINGLY ATTRACTIVE

In the last few months, over 30 airlines worldwide have either shut down or filed for bankruptcy, but the market for business aircraft has not registered a corresponding dip. A key reason is the fall in prices, rendering business jets more and more affordable. Business aircraft options in terms of size and variants are also expanding. Moreover, there is seemingly a change in perception of what business aviation represents from a macro viewpoint. The direct and tangible contribution that a business aircraft makes towards facilitating the functioning of a business enterprise is very difficult to quantify. It would be a good

PHOTOGRAPHS: AIRLINERS.NET

idea to view business aviation collectively as a national asset without breaking it up into component aircraft or holdings in terms of their owners.

According to one estimate, at least 10,000 entities in India have the wherewithal to own and operate at least one business aircraft. Some of these can easily afford more than one. A large number of business houses, such as Reliance Industries, Videocon, the UB Group, Raymond, GMR, Bharat Hotels, Taj Air and Oberoi, own aircraft including jets like Falcon, Cessna, Bombardier, Beech King and Gulfstream. One noticeable trend is the obfuscation between pure business aviation and charter operations. The latter is a secondary role and complementary inasmuch as it utilises gainfully the spare flying effort available on privately owned aircraft.

Understandably, the preference for aircraft types used for business purposes lean towards the jet barring a small minority opting for helicopters and/or turboprop aircraft due to limitations of airports where they operate from. Business jets represent some of the most technologically complex and advanced products being manufactured today. Breaking off from military hand-me-downs in the US, and starting with the Lockheed JetStar in 1957, business jet technology came into its own and has not looked back since then. Today, the business jet scene has an aircraft to match almost every need. There is the Very Light Jet with a small size, a small price tag, but a huge demand. Then there is the Super Sonic Business Jet which promises to provide a solution for the business traveller in a hurry to reach international destinations or even distant domestic ones in quick time.

CUSTOMISED SERVICE

Apart from these niche classes, business jets of all sizes and with all kinds of customised embellishments await the attention of corporate houses with the desire and the money to spend on fast travel for their owners and executives. The availability of diverse business jets is matched by the demand for them in India and there is no sign yet that there is going to be a sharp drop in that demand in the near future. Apparently, India Inc. is confident that the current global recession is transitory and the Indian growth story is far from over. The underlying message for business aviation in India holds good cheer for the future albeit last year's estimates by the Business Aviation Association of India that the annual growth in the numbers of business aircraft in India would be 30 to 40 per cent over the coming years does not appear realistic at the moment.

Although traditionally, business aviation in India has been dominated by turboprop aircraft, the predilection for business jets has been manifest in recent times. According to Jose Eduardo Costas, Vice President, Sales and Marketing, Asia-Pacific for Embraer executive jets, the last order from India was for a Legacy 600, a $28 million (Rs 138 crore) aircraft, and the order was placed as recently as November 2008. A total of 155 Legacy 600 planes have been ordered globally, including eight by Indian buyers. Four more are to be ordered soon. Currently, India is reported to have over 90 business jets and about 100 turbo-prop aircraft. Of the 20 orders worldwide for the Lineage 1000 priced at $45.25 million (Rs 222 crore), two are from India.

Recognising the trend as an opportunity, Embraer has tied up with Indamer Company Pvt. Ltd, a wholly owned subsidiary of European Aviation Holding Co. Pvt. Ltd, an authorised executive jet service centre. This is the first Maintenance, Repair and Overhaul (MRO) Company to serve Embraer's Phenom and Legacy 600 jet customers in India. Based in Mumbai, Indamer has 1,200 sq m of space for its hangar and facilities, and can provide warranty support and heavy maintenance services for customers of Phenom and Legacy 600 jets. Besides handling routine checks, it will also offer rescue teams. Operations are scheduled to begin in the first half of 2009.

Indeed, the growing potential of the business jet market in Asia and India, even if temporarily set back by global events, is reflected in the mushrooming of new MRO facilities. Other than the Embraer MRO in India, Dassault Falcon is planning to open up a spares distribution centre in May this year in Mumbai, India, with $1.5 million (Rs 7.35 crore) worth of spares. This will complement a similar centre in Shanghai and a regional distribution centre in Singapore. Hawker Beechcraft has seven authorised service centres in Asia, stretching in an arc from northern Japan through Taiwan and China's Hainan Island. It has opened a new authorised service centre at the Indira Gandhi International Airport at Delhi. Travel conglomerate InterGlobe General Aviation Limited expanded into service and sales last June. It is now the region's authorised dealer and intends to establish new service centres across India as it boosts sales.

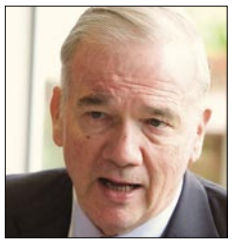
At least 10,000 entities in India have the wherewithal to own at least one business aircraft. Some of these can easily afford more than one.

BREAKING NEW GROUND

Although the business aviation sector appears to be well entrenched and to be holding good potential, some recent developments need to be mentioned to complete the picture. Airnetz Aviation, a leading air charter service in India, recently introduced business class service for corporate passengers over third party operated small aircraft. The service is advertised as being able to take passengers to over 400 airfields in India. The idea is revolutionary in that passengers can request a business class ticket to a destination according to their required time and date. The flight request is then also sent to over 2,000 travel agents in India who are Airnetz resellers. Other corporate passengers then join the pool. Airnetz plans to facilitate over 500 such flights every month, especially to routes where schedule airline service is not frequent or does not exist at all. Something like a car pool, the service, it is claimed by Airnetz, is cheaper than luxury cars and offers passengers an unbeatable option to travel anywhere, anytime with other corporate passengers they know.

Simultaneously, there is an assault by airlines to woo business class travelers through promotional offers (free travel for spouse, et al), corporate deals at concessional fares, incredible frequent flier programmes, and so on. However, the charm of owning a captive aircraft for corporate travel is an idea that is unlikely to lose its lustre even when surrounded by the glitter of economically sound and less risky options. In short, business aviation in India, discounting an odd hiccup here and there, is in the ascendant for the coming years. SP

'ISSA creates a safety zone around airports'



Admiral (Retd) Walter F. Doran, President Raytheon Asia outlines the company's plans to expand awareness of its products and capabilities

SP's Aviation **(SP's): Outline the company's profile. What are Raytheon's defence technologies and products?**
Admiral (Retd) Walter F. Doran (Doran): Raytheon is a global defence technology company that does business in about 80 countries. We have 72,000 employees, more than half of whom are engineers. That gives us a lot of capability in developing and manufacturing innovative solutions to problems. Some of Raytheon's major areas of focus include precision engagement, radar and sensors, integration of sophisticated systems and training.

SP's: For how long has Raytheon been in India and has it been productive?
Doran: Raytheon has been associated with India for more than 40 years, but the strategic landscape is changing very rapidly now. This is something I have personally hoped for since my days as a student in India. Till a few years ago, Raytheon, despite smaller defence projects like the Firefinder radar for the Indian Army, was known in India largely for its civilian interests, particularly in the area of air traffic control. The satellite-navigation system we developed with ISRO, known as GAGAN, has proven a success in the technical demonstration phase. We are now looking to expand awareness of Raytheon's products and capabilities.

SP's: What are Raytheon's fighter aircraft systems for air dominance?
Doran: Yes, Raytheon provides a variety of cutting edge sensor technologies along with advanced weapons systems that ensure our customers are fully equipped to execute their mission and return safely. Most of the weapons packages for US fighter aircraft are produced by Raytheon Missile Systems. Products include AIM-9X, AMRAAM, Maverick, Paveway, JSOW. These are the world's most advanced and most lethal air-to-air and air-to-ground weapon systems. Raytheon Space and Airborne Systems produces radar systems and electronic warfare systems that combined with our weapons all but guarantee air dominance for the US and its allies. Our integrated fighter solutions support a variety of manned and unmanned systems. These provide decision makers with the most actionable information available, and give pilots and aircrews the edge no matter what platform they're flying.

SP's: Can you tell us something about your partnership with ISRO for GPS and Geosynchronous Augmentation System (GAGAN) and the Chandrayaan programme?
Doran: We are in close collaboration with ISRO and AAI and are working on the final operational phase of the GAGAN programme. Raytheon also developed the sensing technology that was placed on the Chandrayaan to help determine whether the polar regions of the moon contain ice. Raytheon provided the antenna, transmitter, analog receiver and software for the sensor, as well as systems engineering.

SP's: What are the systems you provide for civil aviation?
Doran: Raytheon is one of the world's largest providers of air-traffic control systems, including in Mumbai and Delhi. The company also has submitted bids on providing air traffic management systems in Kolkata and Chennai.

SP's: Do you provide systems for integrated airport security?
Doran: Raytheon has developed a solution that ensures the safety and security of passengers within an airport facility. The Integrated Security Systems for Airports (ISSA) is a comprehensive system that detects, observes, assesses and tracks intrusions to secure areas and aids airport security personnel in dispatching the appropriate response to the intrusion. Raytheon is currently implementing this system in New York area airports.

SP's: Raytheon has been trying to expand its presence in the Indian armed forces for the past two years. What has been your experience?
Doran: As I said, this is an emerging market for us, but an important one for our future growth. Raytheon's philosophy is to build long-term sustainable relationships so that means working closely with customers/potential customers. We're making progress in building these closer relationships with government, military and industry officials so they better understand Raytheon's products and capabilities and we better understand their needs. So far, that's working well.

SP's: What is the assurance level of product support by Raytheon during the life cycle of a system?
Doran: Raytheon has a strong record of providing lifetime support for our products, as well as extensive training for those using the equipment.

SP's: How does your company view Transfer of Technology and offsets?
Doran: We do business in some 80 countries and each has requirements for technology transfer and offsets, in some form or another. We are quite adept at working technology arrangements and the US has historically been supportive of sharing technology with its allies. SP

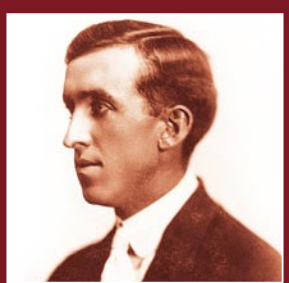
PHOTOGRAPH: RAYTHEON

WOULD ANY PRUDENT PILOT choose to take off and land from an 'airstrip' racing across the ocean at 30 knots? Not likely. That naval pilots—admittedly prone to execute incredible manoeuvres—have made it a routine procedure on aircraft carriers the world over is largely creditable to Eugene Ely, the first pilot ever to take off and land an aircraft aboard ship.

Eugene Burton Ely was born in Iowa on October 21, 1886. At 18, he began to take a passionate interest in automobiles, and their engines, quickly becoming one of America's first racing drivers. In 1910, when a friend bought a biplane and didn't know how to fly it, Eugene volunteered to try. He probably thought that flying should not be too difficult for a racing driver. Of course, he returned to earth with a tremendous bump. Feeling remorseful about the crash he bought the wreckage and proceeded to painstakingly repair it till it was airworthy again. This time he approached the task with greater caution, making the briefest of straight-line hops just to get the feel of the machine. Despite the initial mishap he took to flying naturally. Within weeks he had taught himself to fly and was awarded a certificate by the Aero Club of America. The next few months were intensely active, touring the entire country and giving flying demonstrations.

In the years following the Wright Brothers' conquest of the air in 1903, pressure intensified on the US Navy to evaluate the new machines and their significance for naval operations. Glenn Curtiss was probably the person responsible for persuading the navy to act. He prophesied: "The battles of the future will be fought in the air. The aeroplane will decide the destiny of nations... Encumbered as (big ships) are within their turrets and military masts, they cannot launch air fighters, and without these to defend them, they would be blown apart in case of war." Captain Washington Chambers, who worked for the Secretary of the US Navy, was convinced and roped in Eugene Ely for a demonstration.

On November 14, 1910 Eugene Ely took off from a temporary platform erected on the deck of the USS Birmingham. The wheels of the plane actually hit the sea before it attained enough speed to climb away. Eugene made it safely to shore—a distance of about 2 1/2 miles. The feat not only demonstrated the practicality of aviation at sea, but catapulted Ely to the front pages of virtually every newspaper in America.



EUGENE B. ELY (1886 – 1911)

On November 14, 1910 Eugene Ely took off from a temporary platform erected on the deck of the USS Birmingham. The wheels of the plane actually hit the sea before it attained enough speed to climb away. Eugene made it safely to shore—a distance of about 2 1/2 miles. The feat not only demonstrated the practicality of aviation at sea, but catapulted Ely to the front pages of virtually every newspaper in America.

Taking off from a ship was, no doubt, a remarkable feat. But could a plane land on a ship? Eugene Ely believed it could. This time the cruiser *Pennsylvania* was chosen. Its deck was modified with the first ever tail-hook system to safely 'grab' the aircraft during its landing run. On January 18, 1911 Eugene, in a Curtiss pusher biplane specially equipped with arresting hooks on its axle, took off from Selfridge Field and headed for the San Francisco Bay. Sighting the *Pennsylvania*, he headed straight for the ship, cutting his engine when he was only 75 feet from the fantail, and allowed the plane to glide onto the deck, touching down at a speed of 40 mph. As the biplane raced along, the hooks on the undercarriage caught the ropes stretched between large bags of sand that had been placed along the entire length of the 'runway', exactly as planned. The forward momentum of the aircraft was quickly retarded and it was safely brought to a complete stop. The cruiser's Captain Charles F. Pond called it "the most important landing of a bird since the dove flew back to Noah's ark". He later reported, "Nothing damaged, and not a bolt or brace startled, and Ely the coolest man on board." Eugene Ely was greeted with a barrage of cheers, boat horns and whistles. There is no doubt that his daring flight that day, during the early history of aviation, was one of the most outstanding achievements made by any of the pioneer aviators.

However, Eugene Ely's triumph was short lived. On October 19, 1911 he misjudged a steep dive during a demonstration flight and crashed, dying minutes later. He was only 26 years old. He was actually a rather modest human being and a cautious and expert flyer who did not believe in daredevil flying. However, as with all barnstormers and stunt flyers of the era he knew that some day his time would probably be up. His aviation achievements had been accomplished within the space of a year and a half. He was awarded the Distinguished Flying Cross posthumously in 1933. Aircraft carriers to this day use the same basic design for take off and landing as he did. Could there be more compelling proof of Eugene Ely's lasting legacy? SP

—Group Captain (Retd)
Joseph Noronha,
Goa

MILITARY

Asia-Pacific

Indian Air Force appoints first woman navigator
Seventy-five years after its formation, the Indian Air Force (IAF) has finally broken the gender barrier with a young woman reaching out to the skies as its first woman flying officer (Navigator). Determined to add more firsts to her career, Jaipur-based Kavita Barala has her sights set on learning to navigate the frontline fighter jet Su-30 and becoming the first female co-pilot of a multi-role aircraft. The career choice of a navigator in the IAF was available to women since they were inducted into the force a decade-and-half ago, but no one had opted for the branch till now.

Airbus Military initiates testing of A330 MRTT

An A330 MRTT built for the Royal Australian Air Force completed another major milestone when the A310 Boom demonstrator, used as test bed for the new EADS fly-by-wire boom, made a series of contacts during a flight test over waters off the coast of southwest Spain. The A330 MRTT is equipped with two wing-tip mounted 'hose-and-drogue' refueling pods, an advanced aerial refueling boom in the tail, as well as complete capabilities in navigation, military identification and military communications, including a tactical data link and defensive countermeasures equipment.

Boeing finishes first aerial refueling of 737 platform
The Boeing Company has completed the first aerial refueling of a 737 platform. The historic flights were conducted for Project Wedgetail, Australia's AEW&C programme. The 737 received approximately 14,000 pounds of fuel during two connections with the tanker. The aircraft achieved another aerial-refueling first when it received fuel from an air force KC-135 tanker. Project Wedgetail includes six 737 AEW&C aircraft plus ground support segments for mission crew training, mission support and system maintenance.

India gets Warrior Satellite Surveillance Systems
At the Pacific Telecom Conference in Hawaii, Antenna Technology Communications Inc., a provider of commercial satellite communications systems, announced the deployment of its Warrior Satellite Monitoring and Surveillance System for the Indian region. The Warrior Satellite Monitoring System can simultaneously provide complete observation for satellite activities spread over 140 degrees. However, with the added upgrades, the system goes beyond the monitoring that is being offered by rival systems today. Designed for the unique requirements of government and military entities, Warrior allows the operator an in-depth view of not only the spectrum usage/geo-location issues involved in satellite carriage, but also the ability to manage, control and archive the data, voice and video content being carried on any given satellite on any given transponder in its viewing arc simultaneously.

Americas

General Atomics to develop algae derived jet fuel
General Atomics (GA) has been awarded a contract from DARPA to develop scalable processes for the cost-effective large-scale production of algae triglyceride oil and an algae-derived JP-8 jet fuel surrogate. The contract has a total value of up to $43 million (Rs 210 crore) if all phases of the development programme are completed. GA will lead a team of university and industrial partners that will examine all aspects of the algae to JP-8 production process. From a technical perspective, algae oil can be produced and converted to JP-8. The goal of this 36-month programme is to reduce the cost of doing so to a level that will offer the US Department of Defense an affordable, reliable long term supply of JP-8.

Deployed F-22 Raptors arrive at Andersen
Twelve F-22 Raptors deployed from Elmendorf Air Force Base, Alaska, have arrived at Andersen Air Force Base, Guam for a three-month deployment in support of Pacific Global Deterrence mission. As part of the continuing force posture adjustments to address worldwide requirements, additional forces like the 90th Expeditionary Fighter Squadron (EFS) continue to deploy throughout the Western Pacific. While deployed here, the airmen of the 90th EFS will fly alongside those of the 23rd Expeditionary Bomb Squadron, in support of numerous exercises and missions, showcasing the US commitment to security and stability throughout the Pacific.

Rockwell Collins bags deal for F-22 avionics

Rockwell Collins has been awarded a 32-month Depot Activation contract by Lockheed Martin to provide test capability, training and integration support for F-22 avionics at Warner Robins Air Logistics Center (WR-ALC). The contract is valued at $23.8 million (Rs 115 crore). The contract was developed through Rockwell Collins' engineering services to provide total support solutions to WR-ALC and other government customers by ensuring the warfighter is pro Guam for a three-month deployment in support of Pacific Global Deterrence mission.

QuickRoundUp

AEROSPACE INDUSTRIES

• Aerospace Industries Association President and CEO Marion Blakey said aerospace and defence industry "is a source of economic strength that should be tapped in the stimulus bill to help lead our nation out of very challenging times". One way to take advantage of the industry's strength would be to include several aviation infrastructure provisions in the bill, he added.

AIR AUSTRAL

• Air Austral, the airline based in Saint Denis, La Reunion, has signed an MoU with Airbus for the purchase of two A380s in a single-class configuration. In such a configuration, the A380 will offer unique level of fuel economy, further emphasising the eco-efficient nature of the aircraft.

ALENIA AERONAUTICA

• As part of Alenia Aeronautica's contract with Italy's Direzione Generale Armamenti Aeronautici (Aeronautical Armaments Procurement Agency) for the supply of four ATR72 maritime patrol aircraft, SELEX Galileo, a Finmeccanica company, will integrate its Airborne Tactical Observation and Surveillance System mission system with the Seaspray AESA Radar for the first time for installation on an Italian aircraft.

BELL-BOEING

• Bell-Boeing Joint Project Office, Amarillo, Texas, has been awarded a cost-plus-incentive fee, indefinite-delivery, requirements contract with an estimated value of $581.5 million to provide Joint Performance Based Logistics support for the Marine Corps (MV-22), Air Force, and Special Forces Operations Command (CV-22) aircraft during the production and deployment phase of the V-22 Programme. The contract is expected to be completed by November 2013.

BELL HELICOPTER

• Bell Helicopter, a Textron Inc. company, ended 2008 with delivery of the ninth OH-58D aircraft to be modified under the current Kiowa Warrior Safety Enhancement Programme (SEP) contract. Bell's SEP line had been closed down and after work was completed on the previous SEP lot

Raytheon awarded MALD-J study contract
The US Air Force has awarded Raytheon Company a $12.2 million (Rs 75 crore) contract to study the feasibility of increasing power and adding a data link capability for the MALD-J, a state-of-the-art, low-cost flight vehicle that is modular, air-launched and programmable. It weighs less than 300 pounds and has a range of approximately 500 nautical miles (about 575 statute miles). The contract requires Raytheon to integrate a data link and more powerful jammer amplifiers into the baseline MALD/MALD-J vehicle. Raytheon will also determine the technical feasibility and performance capability of MALD-J Block II prior to building and flight testing the new vehicle.

Europe

France's DGA to modernise avionics
France's defence procurement agency DGA recently announced it would modernise the avionics in the Armee de l'Air's 14 C-135FR aerial tankers in order to keep them compliant with ICAO regulations for operation in civilian airspace. The €37-million (Rs 230 crore) contract will be handled by Air France. The first modernised aircraft is scheduled for delivery in 2011, with the rest re-entering service between 2011 and 2013. The modernisation will allow France to keep the aircraft in service until at least 2015.

DGA selects Dassault Aviation to develop nEUROn
On February 9, 2006, French defence procurement agency DGA named Dassault Aviation prime contractor for developing nEUROn, an European combat aircraft vehicle (UCAV) demonstrator. This signaled the active launch of the project. To date, 85 per cent of the total budget has been awarded to the Industry by DGA, which acts on behalf of the six partner states (France, Sweden, Italy, Spain, Greece and Switzerland). During the first half of 2008, all major nEUROn systems underwent design reviews with the industrial partners, thus ensuring overall programme consistency. Interface design is now almost complete, paving the way for more detailed work on the systems and airframe. Meanwhile, Ruag, the Swiss partner, carried out two specific wind tunnel tests in 2008, results of which were very positive. Simultaneously, the AVE-C drone carried out a demonstration flight on June 30, 2008. Work is progressing well with the maiden flight scheduled during end of 2011.

New approach for the A400M Programme
In a bid to find a new programme approach for the A400M, Airbus Military and EADS have proposed a new programme. Airbus Military and EADS want to discuss the programme schedule along with changes to other areas of the contract including technical characteristics of the military aircraft. Airbus Military has suggested that series production should be resumed once adequate maturity is reached, based on flight test results.

Swiss' Partial Tiger: RFP delivered to manufacturers
With the delivery of the second request for proposal (RFP), the three manufacturers Dassault, EADS and Saab, the Swiss evaluation of a successor for the F-5 Tiger is proceeding as planned. In the updated RFP, the manufacturers were asked to submit an offer for 22 aircraft. In addition, defence procurement agency Armasuisse has set the budget at $1.92 billion (Rs 9,370 crore) and inquired how many aircraft can be delivered for this amount. The further selection schedule is as follows:
- The selection of the aircraft type is planned for July.
- Together with the bill on Armament Program 2010, the collective Federal Council will approve the procurement of the selected type and submit it to Swiss Parliament.
- Approval of the Partial Tiger Replacement by the Swiss Parliament is likely by 2010.

CIVIL AVIATION

Asia-Pacific

As elections draw near, buyers queue up for aircraft
There had been an abrupt rise in the orders of smaller aircraft like Cessnas, C-90s and helicopters with the elections round the corner. Managers of some top politicians are scouting for aircraft before the campaign gains momentum to cover long distance in minimal time. The orders are also coming from small and medium entrepreneurs of non-metros. According to a Delhi-based aircraft lease rental and purchasing company, an automobile ancillary unit owner at a small town in Punjab has placed an order for a six-seat second hand aircraft. Promoter of a cement-manufacturing unit in Haryana has also shown keen interest in buying a helicopter. The bulk of the orders are coming from Ludhiana, Amritsar and Dehradun, with prices ranging between Rs 7 crore and Rs 10 crore.

INDUSTRY

Americas

Boeing finishes 2008 with 662 airplane orders
The Boeing Company in 2008 recorded 662 net commercial airplane orders, bringing its backlog of unfilled commercial orders to more than 3,700 airplanes. The Next-Generation 737 remained the company's best seller, with 484 chosen last year by customers from nearly every region of the world. Demand for the all-new 787 Dreamliner also remained strong with 93 ordered, primarily by Middle East customers. The twin-aisle 777 captured 54 orders from customers in Europe, the Middle East, North America and Asia. The 767-300ER (Extended Range) logged 28 orders, and the 747-8 Intercontinental added three to the orders list. During 2008, 375 airplanes were delivered to customers worldwide: 290 737s (including six Boeing Business Jets), 14 747s, 10 767s and 61

QuickRoundUp

in December 2007. Workers applied Textron Six Sigma processes and tools to accomplish a lean restart of the SEP line during May 2008.

BOEING

- The Boeing Company has announced that the US Air Force has authorised the Commonwealth of Australia's provision of $234 million (Rs 1,140 crore) for Boeing to complete production of the sixth Wideband Global SATCOM (WGS) satellite. With this authorisation, Boeing is now fully funded for the production of all three WGS Block II satellites, and is on track to deliver the first in this new series in 2011.

BOMBARDIER AEROSPACE

- Bombardier Aerospace has announced that Colgan Air, Inc., a wholly owned subsidiary of Pinnacle Airlines Corp., has signed a firm order to acquire 15 Q400 NextGen turboprop airliners. The transaction involves the conversion to firm orders of 10 conditional orders and the exercise of five options placed by Pinnacle in 2007. Colgan Air's operations are based in Manassas, Virginia.

FRENCH DEFENCE AGENCY

- The French Defence Procurement Agency (DGA) has ordered a further 22 NH90 TTH (Tactical Transport Helicopter) helicopters for the French Army Aviation during December 2008 from NHIndustries (NHI) consortium. With this second batch, after the initial 12 aircraft ordered there are now 34 NH 90 TTH to be delivered to the French Army from 2011 onwards. NHI is the NH90 programme joint venture established between Eurocopter, AgustaWestland and Stork Fokker.

EADS

- There is no discussion within EADS about a scenario to withdraw from the A400M programme, contrary to what has been circulated in the press. Over 6,000 persons are at present working actively on the programme inside EADS, and there are ongoing discussions with OCCAR and the customer governments. This aircraft will be the best in its category, with outstanding specifications and no alternative programme in competition on the world market.

APPOINTMENTS

KAYANAKIS NAMED VP OF FALCON WORLDWIDE
Jean Kayanakis was recently named Vice President of Falcon Worldwide Spares for Dassault Falcon. Kayanakis was previously Director, Eastern Hemisphere Spares.

ANARK APPOINTS GARCIA SENIOR VICE CHIEF OF BUSINESS DEVELOPMENT
Anark has appointed Garcia as new Senior Vice President of Business Development. He will leverage his experience within the computer-aided design and product lifecycle management industry to form new tie-ups and channel partnerships for Anark's products and solutions.

NEW HEAD OF CORPORATE MEDIA RELATIONS AT EADS
Alexander Reinhardt has been appointed Head of Corporate Media Relations at EADS effective from January 26, succeeding the new Head of Corporate Communications, Pierre Bayle.

THIERRY IS BOMBARDIER'S NEW BOARD MEMBER
Bombardier Inc. on January 21 announced the appointment of Thierry Desmarest to its Board of Directors. Desmarest has been Chairman of the Board of Directors of Total since 2007.

NEW EXECUTIVE VP OF CFM INTERNATIONAL
Chaker Chahrour has been named as the new Executive Vice President of CFM International from February 1.

DCNS PROPOSES BOISSIER AS CHAIRMAN & CEO
The DCNS Board on January 14 co-opted Patrick Boissier as a member and appointed Chairman of the Board to the President of the French Republic. The Board delegated Boissier in the position of Chairman and CEO.

GRUMMAN APPOINTS SCOTT A. LEE VP
Northrop Grumman Corporation has named Scott A. Lee Vice President of space systems for the company's Electronic Systems sector.

777s. Boeing also debuted the first 777 Freighter and began flight testing on that programme, while the first P-8A Poseidon—a derivative of the Next- Generation 737 for use by the US Navy—completed final assembly.

Support remains high for Joint Strike Fighter
Decisions about the F-35 Joint Strike Fighter and F-22 Raptor aircraft programmes are expected early in President Barack Obama's administration. Based on initial indications and inquiries from Obama's transition team, Air Force Maj General Charles R. Davis said he's confident the F-35 programme begun during the Clinton administration will continue, even if budget restraints force scale-backs. Davis made the comments here as keynote speaker at a Brookings Institution forum, "The Joint Strike Fighter and Beyond". However, he acknowledged that the programme might not get scaled back. Davis conceded he gets many questions about the F-35's cost which is expected to be $80 million (Rs 390 crore) to $90 million (Rs 440 crore), depending on the variant and delivery schedule. And if fewer aircraft are built, each will cost even more. "We lose two airplanes in our (fiscal 2009) appropriation, and every other one of the airplanes being bought in that year goes up $3 million (Rs 15 crore)," he said. Another consideration, he said, is the cost of maintaining the aging legacy fleets the F-35 would replace if production is cut. The F-35 is the first aircraft to be developed within the Defense Department to meet the needs of three services, with three variants being developed simultaneously and will replace the legacy F-16 aircraft for the US Air Force and the F/A-18 and AV-8 aircraft for the Navy and Marine Corps, as well as numerous legacy aircraft for the international partners participating in the F-35 programme.

Bombardier delivers first 415MP aircraft to Malaysia
On January 23, Bombardier Aerospace announced that Malaysia's coast guard agency, the Malaysian Maritime Enforcement Agency (MMEA), has taken delivery of the first of two Bombardier 415MP amphibious aircraft ordered by the Malaysian government in June 2008. The Malaysian government is the launch customer in Asia for the specialised Bombardier 415MP aircraft. The first Bombardier 415MP aircraft delivered to Malaysia is equipped with a state-of-the-art surveillance suite that includes two side-looking airborne radars, one forward-looking infrared radar, an airborne maritime surveillance system and other avionics and communications equipment.

First avionics-equipped F-35 rolls out at Lockheed Martin
Lockheed Martin has completed the first F-35 Lightning II equipped with mission systems, a milestone that will lead to the first avionics testing on board an F-35 aircraft. The short takeoff/vertical landing (STOVL) F-35 variant left the factory on January 21, and goes to the fuel facility for functional fuel system checks before it is scheduled for delivery to the flight line by the end of January. Its first flight is expected this summer. The aircraft, called BF-4, will carry the Northrop Grumman AN/APG-81 Active Electronically Scanned Array radar and Integrated Communications, Navigation and Identification suite, and the BAE Systems Electronic Warfare system. The Block 0.5 mission systems software, which incorporates more than half of the combat-ready Block 3 software, will drive the system. BF-4 will be updated with additional equipment and software through Block 3, the last block in the System Development and Demonstration program.

Europe

Airbus ready to take market challenges of 2009
President and CEO Tom Enders conveyed at a press conference on January 15 that Airbus is ready to build on its solid performance of 2008, entering the new year with confidence that comes with having

Quick Round Up

FINLAND

• National daily Helsingin Sanomat had reported that the Finnish military is considering replacing its Russian-made surface-to-air missile system 9K37M, which were delivered during 1996 and 1997, as part of Soviet era debt. The report also said the replacement system would be NATO compliant. The Finnish defence ministry, however, did not confirm the report.

FRANCE-INDIA

• As per Jean-David Levitte, Diplomatic Adviser to French President, France wants to develop a new short-range surface-to-air missile (SR-SAM) in cooperation with India. Negotiations are nearing conclusion, a report said. This new system may be the Maitri, which may incorporate technology from India's Trishul SAM and MBDA's MICA.

GE AVIATION

• GE Aviation has completed on schedule the Critical Design Review of its new GE38 turboshaft engine, clearing the way for full-engine testing in 2009. A key component of GE's growth strategy for turboshaft engines, the GE38 will power Sikorsky Aircraft Corporation's next-generation CH-53K heavy lift helicopter being developed for the US Marine Corps. In addition to powering the CH-53K, GE envisions the GE38 as the future cornerstone for a new turboshaft/turboprop family.

INDONESIAN AIR FORCE

• JSC 'Komsomolsk-on-Amur Aircraft Production Association named after Yury Gagarin' (KNAAPO) delivered the third Su-30 MK2 fighter to Indonesia under the contract signed on July 27, 2008 for the delivery of six aircraft; three Su-30 MK2 and three Su-27 SKM to the Indonesian Air Force. In December 2008, two Su-30 MK2 fighters were delivered to Indonesia. The Su-27 SKMs are planned for delivery in 2009-2010.

JAPAN

• F-22 Raptors took to the sky over Japan as members of the 27th Expeditionary Fighter Squadron began flight operations with Kadena Air Base officials.

SHOW CALENDAR

11 February – 15 February
AERO INDIA 2009
Air Force Station Yelahanka, Bangalore, India
URL: *www.aeroindia.in*

22 February – 25 February
AIRPORT SECURITY MIDDLE EAST 2009
Renaissance Dubai Hotel, Dubai
URL: *www.airportsecurityme.com*

22 February – 26 February
IDEX 2009
Abu Dhabi National Exhibition Centre, Abu Dhabi
URL: *www.idexuae.ae*

26 February – 28 February
2009 WOMEN IN AVIATION INTERNATIONAL CONFERENCE
Hyatt Regency Hotel, Atlanta
URL: *www.wai.org*

26 February – 27 February
DIRECTED ENERGY WEAPONS 2009
Thistle, Marble Arch, London
URL: *www.defenceiq.com*

26 February – 27 February
AIR WEAPONS INTEGRATION 2009
Thistle Marble Arch, London, Greater London
URL: *www.airweapons.co.uk*

12 March – 13 March
CYBER SECURITY CONFERENCE
Holiday Inn Hotel & Suites, Washington, DC, Virginia, USA
URL: *www.ttcus.com*

19 March – 20 March
AIRBORNE NETWORKS CONFERENCE
Caesar's Palace Hotel & Casino, Las Vegas, NV, USA
URL: *www.ttcus.com*

23 March – 24 March
MILITARY SPACE OPERATIONS & SECURITY 2009
The Thistle, Marble Arch, London, United Kingdom
URL: *www.iqpc.com*

25 March – 27 March
AIR SURVEILLANCE & RECONNAISSANCE
Cafe Royal, London
URL: *www.asarcevent.com*

a highly competitive product line, a strong management and employee team, and the benefits of ongoing internal improvement, company consolidation and effective cash management programmes. The Airbus' results for last year were also presented to international journalists. Enders said the 777 net orders booked by Airbus in 2008 represented an "impressive performance," which gave Airbus a 54 per cent share of the market for commercial aircraft with passenger capacity above 100 seats. Deliveries last year totaled 483, which surpassed the 2007 level by 30 aircraft and marked another new record for the company. Airbus' overall order volume on December 31, 2008 was 9,215, with total deliveries reaching the 5,500 mark.

ATR registers record turnover in 2008
On the occasion of the ATR annual press conference, which took place on January 23 in Paris, Stéphane Mayer, ATR CEO, announced a record turnover of $1.3 billion (Rs 6,310 crore) for 2008. Such result continues the strong growth of ATR since the recovery of the turboprop market in 2005, and represents an increase of around 140 per cent in the last three years. "The outstanding annual turnover achieved in 2008 is the recognition to the strong efforts that we have done in a particularly difficult year taking into account the global economic context. Despite such difficulties, we have achieved an important rate of growth, including a doubling of aircraft deliveries in two years, while keeping one of our highest historical backlogs. In such complicated times we are especially gratified by the confidence shown both from our current operators and our new customers", he said. ATR finished 2008 with a backlog of 169 aircraft, which represents over two and a half years of production. Among the backlog, there is a total of 39 ATR -600 series aircraft, thus showing the confidence the customers placed in this new version.

SPACE

Americas

NASA debuts Global Hawk Autonomous Aircraft
NASA and the Northrop Grumman Corp have unveiled the first Global Hawk aircraft system to be used for environmental science research, heralding a new application for the world's first fully autonomous high-altitude, long-endurance aircraft. The debut took place at NASA's Dryden Flight Research Centre.

NASA and Northrop Grumman are returning NASA's two Global Hawk aircraft to flight this year under a space act agreement signed in May 2008. NASA plans to use the aircraft for missions to support its Science Mission Directorate and the earth science community that require high-altitude, long-distance airborne capability. Global Hawk can fly at altitudes up to 65,000 ft for more than 31 hours at a time. The National Oceanic and Atmospheric Administration is also partnering with NASA to develop this new airborne research tool.

Europe

Arianespace to Launch Egyptian satellite Nilesat 201
On the occasion of the visit of the French Prime Minister in Egypt, it was announced that Arianespace has been chosen to launch the Nilesat 201 satellite, as part of a turnkey contract that Thales Alenia Space signed with Egyptian operator Nilesat. Nilesat 201 will be placed into geostationary transfer orbit by an Ariane 5 or Soyuz rocket launched from the Guiana Space Centre, Europe's Spaceport in French Guiana, during the first quarter of 2010. Built by Thales Alenia Space, Nilesat 201 will weigh nearly 3,000 kg at launch. •

QuickRoundUp

NORTHROP GRUMMAN

• Northrop Grumman Corp., Integrated Systems, has been awarded a $30.86 million (Rs 150 crore) modification to a previously awarded firm-fixed-price contract to exercise an option for the procurement of 30 centre barrels and loose and miscellaneous parts for the F/A-18 A/B/C/D aircraft. Work is expected to be completed in November 2011. Northrop Grumman Systems Corp., Integrated Systems Sector, has been awarded a $40 million not-to-exceed modification to a previously awarded firm fixed price contract for the procurement of three Low Rate Initial Production Vertical Takeoff and Landing Tactical Unmanned Aerial Vehicle units, including support by March 2011.

MITSUBISHI INDUSTRIES

• Mitsubishi Heavy Industries has decided to participate in development of the Rolls-Royce Trent XWB aero-engine for the Airbus A350 XWB, which is expected to become Airbus's mainstay commercial aircraft.

THALES ALENIA SPACE

• Thales Alenia Space has won five contracts for geostationary communications satellites out of a total of 26 ordered in 2008, a market share of 23 per cent, plus contracts for four communications payloads, one observation satellite and the low Earth orbit constellation for O3b Networks, comprising 16 satellites.

SPANISH AIR FORCE

• The Spanish Air Force has signed an agreement with Indra, the IT premier multinational in Spain and a leading IT multinational in Europe, to co-manage the commercial exploitation of its Parachuting simulation centre in Alcantarilla, Murcia, in a public private partnership. The service includes use of facilities with a state-of-the-art wind tunnel, where users practice jumps and movements which will be performed in the air later.

UNITED LAUNCH ALLIANCE

• United Launch Alliance's Delta IV Heavy rocket carrying a payload for the National Reconnaissance Office successfully lifted off from Space Launch Complex 37 at CAPE CANAVERAL AFS.

Lifetime *Commitment*

There is no doubt that Life Cycle Cost is now the dominant factor that provides a true indicator of the best low cost and cost-effective procurement options

Two years ago, in a press interview, commenting on the MMRCA tender floated for the Indian Air Force (IAF) S.P. Tyagi the then Chief of the Air Staff, said, "Earlier the IAF used to buy on the lowest tender system. Now we are saying not the lowest tender, but we want to see what the life-cycle cost is. How do you calculate life-cycle cost? This is a new area, so we have to devise a formula. So, to get a consensus and to make sure it is fair and everybody believes it is fair, it will take some time." This public statement signaled a profound shift in the underlying philosophy that has thus far shaped the procurement policy and procedure related to aircraft and weapon systems for the IAF. However, the Air Chief's statement also indicated that as this was a new concept with which the IAF was not quite familiar, the modalities would have to be worked out carefully and correctly to ensure credibility of the procurement procedure. Incidentally, the concept of Life Cycle Cost was first developed in the mid-1960s but for reasons explained below, the Indian system of procurement of defence equipment has remained immune to it all these years.

In the days of the Cold War, the IAF procured military aircraft and weapon systems largely from the Soviet Union on highly attractive financial terms. There was neither a practice nor requirement for an open tender system when dealing with the Soviet Union. The position of the Indian Army and the Indian Navy in this regard would have been no different as all three services were tethered to the same source for hardware. Nearly 80 per cent of the inventory of the three services was of Soviet origin. Being the only source available for frontline military equipment and cutting edge technology, cost was never an issue and as such the question of Life Cycle Cost never arose. Hence it was never factored into the procurement process.

Although the unit cost of hardware of Soviet origin was much lower than contemporary western equipment, expenditure on maintenance, overhaul, servicing or replacement of components and upgrade over the Total Technical Life of the equipment was considerably higher than on the western equivalents. However, this did not matter as payments were based on a barter system on a favourable rupee-rouble exchange rate unlike in the case of western equipment where the outflow was in hard currency. But now with the globalisation of the Russian economy, the favourable terms of yesteryears are no longer available and all transactions are required to be in hard currency. Besides, as the nation now has easy access to non-Russian sources for the procurement of military aircraft and weapon systems, Life Cycle Cost has acquired as much relevance as unit cost, if not more.

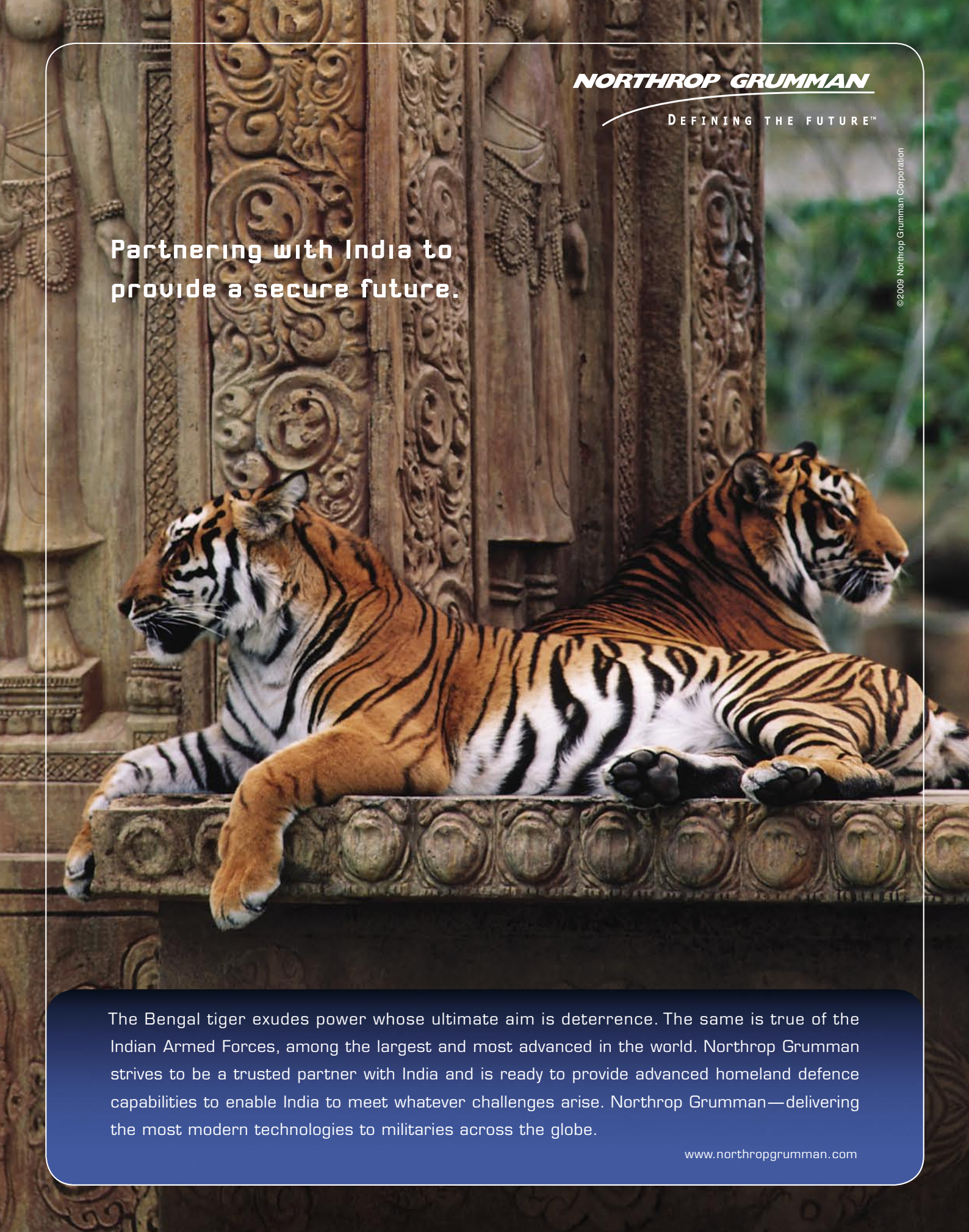
In a follow up announcement, there were indications that the requirement to evaluate Life Cycle Cost in respect of the six competing aircraft in the tender for the 126 Medium Multi-Role Combat Aircraft would not apply. However, the RFP issued August 2007, clearly states the responsibility of the manufacturer in this regard as, "Manufacturer would be responsible to provide parameters for computation and verifiable analysis of Life Cycle Cost for the life time usage of the aircraft." The methodology of computation of Life Cycle Cost of military equipment is indeed complex especially on account of the imponderables involved. While it may be possible to estimate Life Cycle Cost in respect of equipment in use for years with a fair degree of accuracy, in case of aircraft under development, the exercise may not provide as accurate a result. Besides, how does one compare the Life Cycle Cost of a single engine fighter with a twin engine fighter which has just entered operational service? What is needed is a consistent demand from the user or buyer that a good computation of Life Cycle Cost accompany each proposal. This will force the industry to make/evolve good accurate models for such calculations.

Perpetually escalating cost of military aircraft and weapon systems coupled with shrinking budgets in real terms on account of erosion in purchasing power has compelled nations to take a serious look at the shape and size of their armed forces and the quality as also the quantity of hardware they can afford to procure. Inaccuracies and limitations in the methodology of computation notwithstanding, there is no doubt that Life Cycle Cost is now the dominant factor that provides a true indicator of the best low cost and cost-effective procurement options. In order to make defence related hardware affordable, Life Cycle Cost must in due course be given the importance and emphasis it deserves in the Defence Procurement Procedure and procurement decisions. SP

— Air Marshal (Retd) B.K. Pandey

ILLUSTRATION: MAMTA


Have a FEEL of services we can offer by
• Flipping through the pages of our 5 publications
• Browsing through our 7 websites
YOUR Success is OUR Business
Visit us at
Aero India 2009, Bangalore, Hall C, Booth 14
beyond the boundaries of excellence
www.spsmilitaryyearbook.com
www.spsaviation.net
www.spsairbuz.net
www.spslandforces.net
www.spsnavalforces.net
www.spshomelandsecurity.com
SP GUIDE PUBLICATIONS
www.spguidepublications.com


NORTHROP GRUMMAN
DEFINING THE FUTURE™
Partnering with India to
provide a secure future.
©2009 Northrop Grumman Corporation
The Bengal tiger exudes power whose ultimate aim is deterrence. The same is true of the Indian Armed Forces, among the largest and most advanced in the world. Northrop Grumman strives to be a trusted partner with India and is ready to provide advanced homeland defence capabilities to enable India to meet whatever challenges arise. Northrop Grumman—delivering the most modern technologies to militaries across the globe.
www.northropgrumman.com