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AERO INDIA 2011

BIGGER & BETTER

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16 SP's M.A.I. (Military, Aerospace and Internal Security), a fortnightly, was unveiled by the Minister for Defence A.K. Antony during Aero India 2011. Ratan Tata, Chairman of the Tata Group visited SP Guide Publications stall.

Cover Story

BIGGER & BETTER

Aero India 2011 brought together the latest in aerospace technology and a wide array of products including military aircraft, UAVs, business jets, etc from 675 countries

Cover Photo:
The Red Bulls aerobatic team from Czech Republic was the star performer at Aero India
Image by Anoop Kamath

NEXT ISSUE:
Quality Pilots in India

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SP'S IN PARTNERSHIP WITH THE CENTRE FOR JOINT WARFARE STUDIES (CENJOWS) ORGANISED A SEMINAR TITLED 'EMPLOYMENT OF SPECIAL FORCES: CHALLENGES AND OPPORTUNITIES FOR THE FUTURE' ON MARCH 10 AND 11. SEEN IN THE PHOTOGRAPH ARE SP'S PUBLISHER AND EDITOR-IN-CHIEF JAYANT BARANWAL PRESENTING A MEMENTO TO THE CHIEF GUEST, CHAIRMAN CHIEFS OF STAFF COMMITTEE, AIR CHIEF MARSHAL P.V. NAIK.

MR JAYANT BARANWAL, IN HIS VOTE OF THANKS, EXPRESSED THAT INDIA REQUIRED A WELL-LAID OUT NATIONAL POLICY ON SPECIAL FORCES, A VITAL ELEMENT IN THE SECURITY OF THE NATION.

The euphoria of Aero India 2011 is still fresh in ones memory while the governments and companies have got down to business in right earnest. The Indian Government has made its intent known by enhancing the budgetary allocation for defence, thus underlining both its capabilities as well its requirements.

First, the premier defence and aerospace event in the region, of which SP Guide Publications was the official media partner, had a successful run with the global majors in full strength. The focus, no doubt, was the yet to be finalised medium multi-role combat aircraft (MMRCA) for which companies from the US and Europe pitched hard. The US had a strong contingent, led by none other than the US Commerce Secretary, Gary Locke, while the European side had both the UK Minister for Defence Equipment, Peter Luff and the German Minister for Defence, Karl-Theodor zu Guttenberg visiting.

In a comprehensive post Aero India 2011 event review, Air Marshal B.K. Pandey points to the various highlights and how many original equipment manufacturers benefited from their presence here and making "long-term" commitments for India. The next Aero India 2013 is to be held from February 6 to 13.

As for the defence budget, which Air Marshal (Retd) V.K. Bhatia has analysed in this issue, it is up by 11.6 per cent from the previous year. Of the total capital outlay of ₹69,199 crore, only ₹55,000 crore has been earmarked for new acquisitions, an increment of nearly 10 per cent, which will mostly be accounted for by annual inflationary movements. Of the total defence budget, the Indian Army continues to get a hefty 50 per cent, followed by the IAF at 30 per cent and the Indian Navy at 15 per cent. The remaining five per cent goes to the DRDO.

From defence, we move to civil aviation and it is with pride we celebrate the centenary celebrations of civil aviation in India—from the historic flight between Allahabad and Naini on February 18, 1911 till date, the "flight" has been filled with milestones and continues to hold promise, ever than before. Joseph Noronha has captured this flight path brilliantly.

The global civil aviation outlook is tempered and is likely to hit air pocket, in the background of the prices of aviation turbine fuel going past the $100 a barrel mark. The article by R. Chandrakanth pegs the issues that are acting as dampeners, whereas in another article the author delves on regional jets which may find momentum from aggressive marketing in emerging markets. In these same markets, A.K. Sachdev talks about the pitfalls that exist while buying business jets and has listed out the different types of aircraft available worldwide.

The scenario, both defence and civil, nevertheless is growing to be an exciting one and *SP's Aviation* is keeping pace with these developments, in its bid to keep the reader well-informed.

Jayant Baranwal
Publisher & Editor-in-Chief

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CENJOWS

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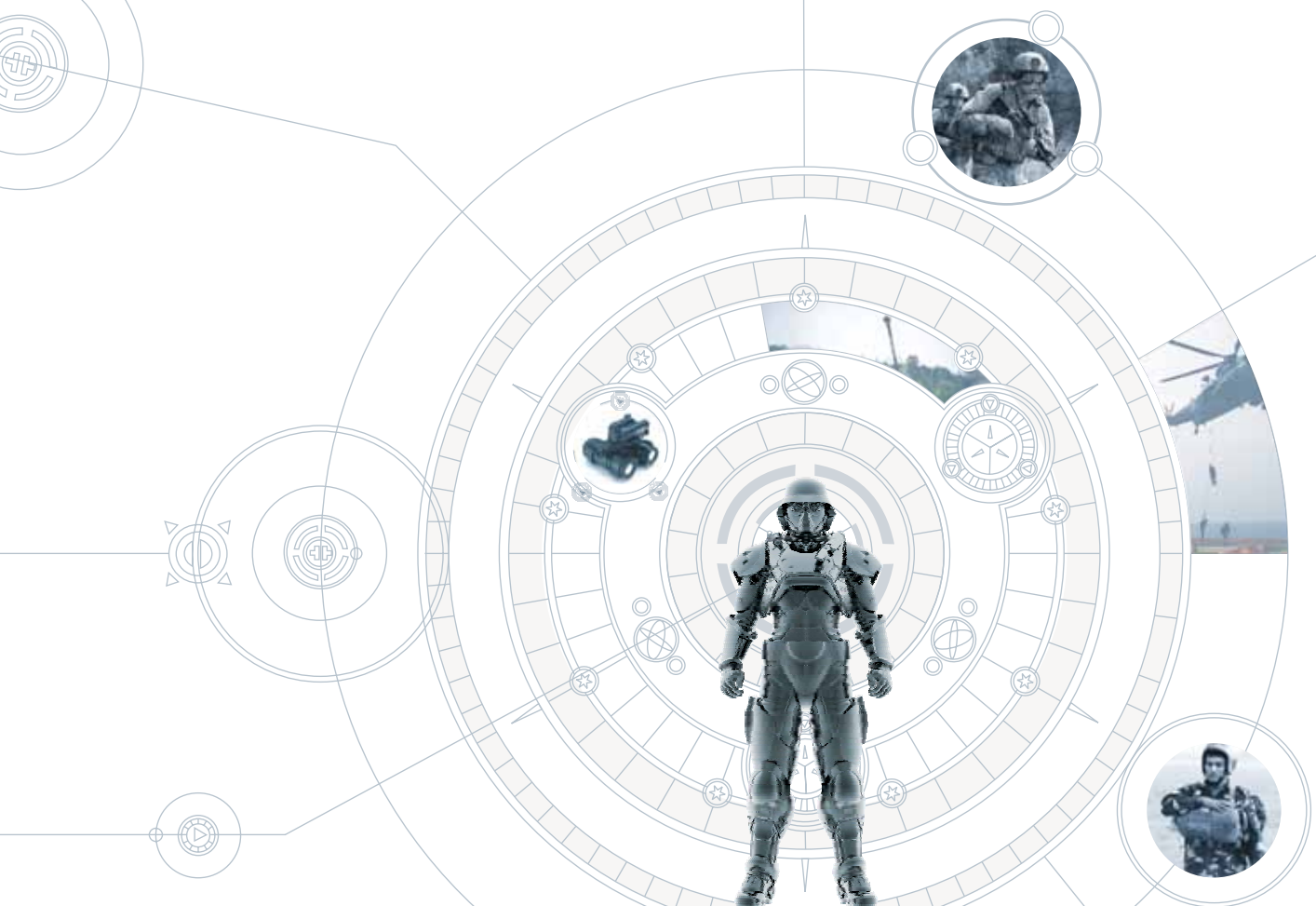

"EMPLOYMENT OF SPECIAL FORCES: CHALLENGES AND OPPORTUNITIES FOR THE FUTURE"

10th - 11th March 2011

Two days of exploring the challenges and opportunities related to employment, modernization and organization structure of the Special Forces in India and its neighbourhood. Prominent defence personnel from world over will chair and participate in the seminar..

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Tail-less Unmanned

PHOTOGRAPH: NORTHROP GRUMMAN

Northrop Grumman X-47B UCAS-D aircraft for US Navy completes first flight

THE NORTHROP GRUMMAN X-47B Unmanned Combat Air System Demonstration (UCAS-D) aircraft has successfully completed its historic first flight at Edwards Air Force Base, California. The X-47B is Northrop Grumman's tailless aircraft built for the US Navy, which is moving closer to carrier trials in 2013.

This event marks a critical step in the programme, moving the team forward to meet the demonstration objectives of a tailless fighter-sized unmanned aircraft to safely take off from and land on the deck of a US Navy aircraft carrier.

Northrop Grumman is the Navy's UCAS-D prime contractor and leader of the UCAS-D industry team. Conducted by a US Navy/Northrop Grumman test team, the flight lasted for 29 minutes. Taking off under hazy skies, the X-47B climbed to an altitude of 5,000 feet, flew several racetrack-type patterns, and landed safely. The flight provided test data to verify and validate system software for guidance and navigation, and the aerodynamic control of the tailless design.

As with all test programmes, the first flight represents the culmination, verification and certification of pre-flight system data collected and analysed by both the Navy and Northrop Grumman. Airframe proof load tests, propulsion system accelerated mission tests, software maturity and reliability simulations, full system taxi tests, and numerous other system test activities were all completed and certified prior to the first flight.

The aircraft will remain at Edwards AFB for flight envelope expansion before transitioning to Naval Air Station Patuxent River, later this year. There, the system will undergo additional tests to validate its readiness to begin testing in the maritime and carrier environment. The UCAS-D programme is preparing the X-47B for carrier trials in 2013.

The US Navy awarded the UCAS-D prime contract to Northrop Grumman in August 2007. The six-year contract calls for the development of two X-47B fighter-sized aircraft. The programme will demonstrate the first-ever carrier launches and recoveries by an autonomous, unmanned aircraft with a low-observable-relevant platform. Autonomous aerial refuelling will also be performed after carrier integration and at-sea trials. SP

Fly in, Fly out

AeroVironment develops world's first fully operational life-size Hummingbird-like unmanned aircraft for DARPA

It is capable of climbing and descending vertically, flying sideways left and right, flying forward and backward, as well as rotating clockwise and counter-clockwise, under remote control and carrying a video camera payload. The Nano Hummingbird has been developed by AeroVironment, Inc which can fly in and out of a building through a normal-size doorway.

The unmanned air vehicle has been manufactured as part of the contract awarded to AeroVironment by the Defense Advanced Research Projects Agency (DARPA) to design and build a flying prototype "hummingbird-like" aircraft for the Nano Air Vehicle (NAV) programme.

The Nano Hummingbird is a controlled precision hovering and fast-forward flight of a two-wing, flapping wing aircraft that carries its own energy source, and uses only the flapping wings for propulsion and control.

"The historic achievement made by the Nano Hummingbird is an example of the leading-edge innovations introduced and deployed almost routinely by the AeroVironment UAS team," said Tom Herring, Senior Vice President and General Manager, Unmanned Aircraft Systems, AeroVironment. "From the battle-proven Raven, Wasp and Puma small UAS to the tiny Nano Hummingbird to Global Observer, the largest, highest and longest flying UAS, AeroVironment continues to define the future of unmanned aircraft systems. Our mission in doing so is to provide our customers with advanced tools that help them succeed," he added.

The hand-made prototype aircraft has a wingspan of 16 centimetres (6.5 inches) tip-to-tip and has a total flying weight of 19 grams (2/3 ounce), which is less than the weight of a common AA battery. This includes all the systems required for flight; batteries, motors, communications systems and video camera. The aircraft can be fitted with a removable body fairing, which is shaped to have the appearance of a real hummingbird. The aircraft is larger and heavier than an average hummingbird, but is smaller and lighter than the largest hummingbird currently found in nature.

The Nano Hummingbird has achieved many milestones—demonstrated precision hover flight within a virtual two-metre diametre sphere for one minute; hover stability in a wind gust flight which required the aircraft to hover and tolerate a two-metre per second (7.2 km per hour) wind gust from the side, without drifting downwind more than one metre; a continuous hover endurance of eight minutes with no external power source; it demonstrated controlled, transition flight from hover to 17 km per hour fast forward flight and back to hover flight; demonstrated flying from outdoors to indoors, and back outdoors through a normal-size doorway; demonstrated flying indoors heads-down where the pilot operates the aircraft only looking at the live video image stream from the aircraft, without looking at or hearing the aircraft directly; fly in hover and fast forward flight with bird-shaped body and bird-shaped wings, etc. SP

E-mail your comments to:
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PHOTOGRAPH: AEROVIRONMENT

MMRCA DEAL BY SEPTEMBER

During a press conference held on February 10, during Aero India 2011, Air Chief Marshal P.V. Naik, Chief of the Indian Air Force (IAF), said that India's highly anticipated medium multi-role combat aircraft (MMRCA) competition could be wrapped up by September 2011. "We submitted our report to the Ministry in end-July 2010...and we believe the price negotiations will begin in a week or two. I am hopeful of a decision by September," said Naik. Defence Minister A.K. Antony had also made a statement earlier that India's search for the MMRCA was coming to a head and the purchase was expected to be completed in the coming financial year.

VIEWS

WAS THE IAF CHIEF truly echoing the Defence Minister's views or as is generally believed by the industry observers, was it a veiled but urgent plea aimed at pushing the Ministry of Defence (MoD) into accelerating the decision-making process? By now, it is almost an open secret that the senior leadership of the IAF is deeply concerned of the MoD's tardy decision-making process which is affecting the service's operational preparedness. The IAF had indeed burned in substantial amounts of the proverbial 'midnight oil' and submitted the 'field evaluation' report of all six competing aircraft viz. the US Boeing F/A-18E/F Super Hornet and Lockheed Martin F-16IN Super Viper, the French Dassault Rafale, the Eurofighter Typhoon, the Swedish Gripen IN and the Russian RSK MiG-35, to the MoD by July end last year. Thereafter, almost three months were spent in answering the queries of the Ministry officials. The Technical Oversight Committee (TOC) was finally formed in November last year. Normally, as per the Defence Procurement Procedure (DPP), the TOC is required to complete its task within a month of its constitution, but clearly in this case, it did not happen. One of the reasons being attributed for the delay is the issuance of new DPP 2011, enlarging the scope of offset commitments for defence deals to also include internal security and civil aerospace products. It is reported that the vendors were asked if they would like to reshape their offset offers in light of the new DPP, but none seemed to have responded so far.

There is still a huge fog index pertaining to the offset clauses/vendor commitments. And even though a specific Defence Offset Facilitation Agency (DOFA) has been created in the Ministry of Defence under the Department of Defence Production as a single window agency to facilitate implementation of offset programmes, the fact of the matter is that the Agency itself is on a learning curve due to the absence of any past experience in this field. There are also misgivings on the part of some of the vendors and even their governments' representatives in absorbing the large offsets that will accrue from the MMRCA deal.

The good news is that after almost half-a-century of stagnation, the Indian defence establishment is finally ready to shed its 'licence-production syndrome' and move towards self-reliance with the transfer of state-of-the-art defence technologies through the offset route in defence deals. Clubbed under four main areas of airframe, engine, avionics and accessories, a large number of key technologies have been identified for transfer of technology (ToT). These include; under airframe—super plastic forming, NC loom manufacturing, robotic riveting, composite radomes, etc; under engine—thrust vectoring, titanium and aluminium castings, radio crystallography, single crystal blade technology, forgings (rotor blades, stator vanes) etc; under avionics—weapon control radar, FLIR, flight control computer, EW suite. MMR, HMD, etc and; under accessories—brake pads, heat exchangers ejection seats, etc. The above list is merely representative and by no means exhaustive as the offset commitments now also include areas of internal security and civil aerospace. What stands out, however, is that India's thirst for acquiring latest defence/dual-use technologies is bordering on being unquenchable.

Under the silent prodding by the IAF, the MMRCA deal may soon be taking another step forward in its long and tortuous journey with the MoD opening the commercial bids and the linked offset proposals of the competing vendors. The dog fights in the Bangalore skies during the recent Aero India 2011 air show may be over but the intense jostling for winning the 'mother of all defence deals' continues. Undoubtedly, many factors such as merit, geopolitical compulsions, strategic concerns and L1, etc would influence the outcome, but could the content and continuity with which a particular vendor was willing to provide the much needed ToT to India be the clincher for the deal? Let's wait and watch. SP

—Air Marshal (Retd) V.K. Bhatia

ILLUSTRATION: ANOOP KAMATH

PHASE OUT MiG-21

On February 23, the government stated that it was planning to phase out the Russian-origin, accident-prone MiG-21aircraft from the Indian Air Force (IAF) by 2017 and replace it with more modern aircraft. Defence Minister A.K. Antony stated in the Rajya Sabha that a number of modern aircraft such as the Su-30 MKI, light combat aircraft (LCA) and the medium multi-role combat aircraft (MMRCA) would be procured to replace the squadrons of MiG-21s. "The Air Force has got a clear-cut plan to phase out these aircraft by 2017," said Antony while replying to a member's query on flight safety during Question Hour in the Upper House of Parliament.

VIEWS

DEVELOPED IN THE MID 1950s, induction into the IAF of the first supersonic air defence aircraft the MiG-21FL began in 1964. This was followed by the newer versions also capable of strike role—the MiG-21M (Type 96) and later the MiG-21 Bis (Type 75). The fleet of MiG-21 Bison was subsequently upgraded and re-christened as MiG-21 Bison. Although the MiG-21 fleet has remained the mainstay of the combat element of the IAF for over three decades, its atrocious safety record earned it the sobriquet of "flying coffin". However, on account of the interminable procrastination in the operationalisation of the indigenous LCA Tejas, the IAF had no option but to continue to operate the MiG-21 fleet albeit in diminishing numbers and in the process losing both aircraft and trained pilots with disconcerting regularity. The matter was and continues to be of serious concern not only for the IAF but for the government and for the nation as well.

In 2005, divulging the findings of a committee set up by the government to study the problem of high accident rate in the IAF, Pranab Mukherjee, the then Minister of Defence, stated that accidents in the IAF attributable to technical failure constituted 39 per cent of the total number as opposed to accidents due to human error that stood at 43 per cent. Many of the pilot error accidents that took place in the initial years of service of the MiG-21 fleet in the IAF were attributable to lack of proper understanding on the part of pilots of the somewhat difficult and tricky handling characteristics of a delta wing platform especially in the low-speed regime. Accidents due to technical failure were largely related to poor reliability of the engine especially of those overhauled in India. Being a machine with just a single engine, its failure invariably resulted in the loss of the aircraft.

Over the last 10 years, a sizeable number of the older types as also the complete fleet of MiG-23 have been phased out resulting in alarming decline in the strength of fighter squadrons in the IAF from the authorised level of 39.5 to under 30. The nearly 25 per cent reduction in the size of the fleet of fighter aircraft would have resulted in significant erosion of combat potential of the IAF. However, for obvious reasons, it is not possible for the top brass in the IAF to publicly accept degradation of capability. The few remaining Type 96 and the fleet of 120 odd Bison aircraft still constitute a substantial portion of the combat fleet and in the absence of any replacement by way of the LCA Tejas or the speedy induction of 126 combat jets under the MMRCA tender; the IAF continues to be dependent to a large extent on the troublesome MiG-21 fleet.

The declining combat capability of the IAF however, is certainly not in conformity with the rising status of the nation emerging as a regional power to reckon with and aspiring to be an economic and military power of global status. Against the minimum requirement of 45 combat squadrons to cope with simultaneous conflict on two fronts, the government has finally accepted increase in strength to 42 squadrons by the end of the decade based on the induction of the LCA Tejas and the MMRCA as and when the deal is finalised and the selected aircraft is inducted. While the timeframe for the induction of the Tejas into the IAF cannot be predicted with any degree of certainty, the IAF has been trying to compensate for the depletion in the combat potential of the IAF through accelerated production of Su-30 MKI as also the procurement of 126 modern combat jets to close the capability gap. However, given the excruciatingly tardy pace at which both the Tejas programme and the MMRCA tender are progressing, the stated time frame of replacement of the MiG-21 fleet by 2017 does not appear to be realistic. The IAF is therefore unlikely to shed the MiG-21 Bison fleet for a long time to come, at least not in the foreseeable future. SP

—Air Marshal (Retd) B.K. Pandey

PHOTOGRAPH: WIKIPEDIA

Defence Allocation Up

The capital-intensive IAF has once again scored over the other two wings of the armed forces getting the lion's share at ₹30,699 crore of capital outlay compared to the Army at ₹18,986 crore and the Navy at ₹13,008 crore.

PRESENTING THE UNION BUDGET in the Parliament on February 28, Finance Minister Pranab Mukherjee announced that he was allocating a sum of over ₹1,64,000 crore ($36 billion approximately) for defence spending during the financial year 2011-12. The coming year's allocation shows an increase of about 11.6 per cent over the last year's ₹1,47,000 crore ($32.6 billion) at the Revenue Estimate (RE) stage. Percentage wise, the Indian Army's share works out to a hefty 50 per cent followed by the Indian Air Force (IAF) at roughly 30 per cent and the Indian Navy at 15 per cent. The remaining five per cent or so has been earmarked for the Defence Research and Development Organisation (DRDO) and its research establishments.

On the revenue side, the breakdown of expenditure stands at ₹64,521 crore for the manpower heavy Army while it remains much lower for other services with the Navy at ₹10,589 crore, Air Force at ₹15,928 crore and the DRDO ₹5,624 crore, respectively. The capital-intensive IAF, however, once again scores over the other two wings of the armed forces getting the lion's share at ₹30,699 crore ($6.82 billion) of capital outlay compared to the Army at ₹18,986 crore ($4.22 billion) and the Navy at ₹13,008 crore ($2.9 billion), respectively.

Of the total capital outlay amounting to ₹69,199 crore, however, only ₹55,000 crore ($12.2 billion) have been earmarked for new acquisitions, i.e. for all the wings of the defence forces. If it were to be compared with the fund allocations for capital expenditure for the preceding three years—₹48,007 crore for 2008-09; ₹54,824 for 2009-10 and ₹60,000 crore for 2010-11, it would become clear that this year's allocation has also followed the routine yearly increment of close to 10 per cent which does nothing except to cater, if at all, to the annual inflationary pressures—global and domestic. It may also be noteworthy that barring the yet to be proved claims of the Ministry of Defence of having exhausted the 2010-11 capital allotments to the last rupee, in all previous years, the allocations have not only been revised—overall downwards—but the Ministry have had to also surrender considerable portions of funds under the capital expenditure, which could not be spent during the concerned financial years.

For the coming year also, while on the face of it, ₹69,199 crore may appear to be a considerable increase over the previous year, in absolute terms there may be little reason to cheer as far as acquisition of the major hardware for the armed forces is concerned. It may be noted that these allocations do not permit quicker modernisation of the services so desperately wanting to match the feverish pace at which India's two neighbourhood adversaries are arming themselves namely, China and Pakistan. The IAF, for instance, even though given maximum portion of the 'Capital Pie' will be able to rapidly absorb the allocated amounts on the ongoing programmes such as the Hawk AJT, the Phalcon AWACS systems, the ongoing Su-30 MKI programme, the Tejas inductions, to name a few. But it would be left with little money to initiate other long pending and urgent new projects. However, it is hoped that during the current year, the Ministry of Defence would be able to conclude the much awaited medium multi-role combat aircraft (MMRCA) contract for acquiring 126 fourth generation jet fighters for the IAF and that the IAF will have the necessary budgetary support available to pay off the first tranche of the $10-11 billion 'mother of all defence deals' financial commitments. The deal has the potential of going up to $15 billion or more if the option of acquiring up to 200 aircraft is exercised.

But the IAF, which is currently embarked on a mission to transform itself rapidly into a full-fledged modern continental air force with attributes of strategic reach, persistent ISR, all-weather precision strike in a network-centric warfighting scenario is still far away from acquiring the necessary qualitative and quantitative capabilities. For example, it is more than an open secret on how deeply the combat squadrons' strength of the IAF has been eroded due to the retirement of old and unsustainable aircraft inventories. A major part of the leftover fleets themselves are facing the heat of obsolescence and are in dire need of upgrades to remain relevant for some more time. Clearly, funds allocated to the IAF for capital acquisitions, though seemingly considerable especially when compared to the other services, are still far from sufficient for its modernisation in a timely manner. Actually, the shortage of funds is universal and applicable to all the three services.

In the final analysis, there is a fundamental need for the government to transform its approach on the questions of national security and the resulting requirements of budgetary support for the country's defence. Turn to Forum for views and opinions/suggestions. SP

—Air Marshal (Retd) V.K. Bhatia

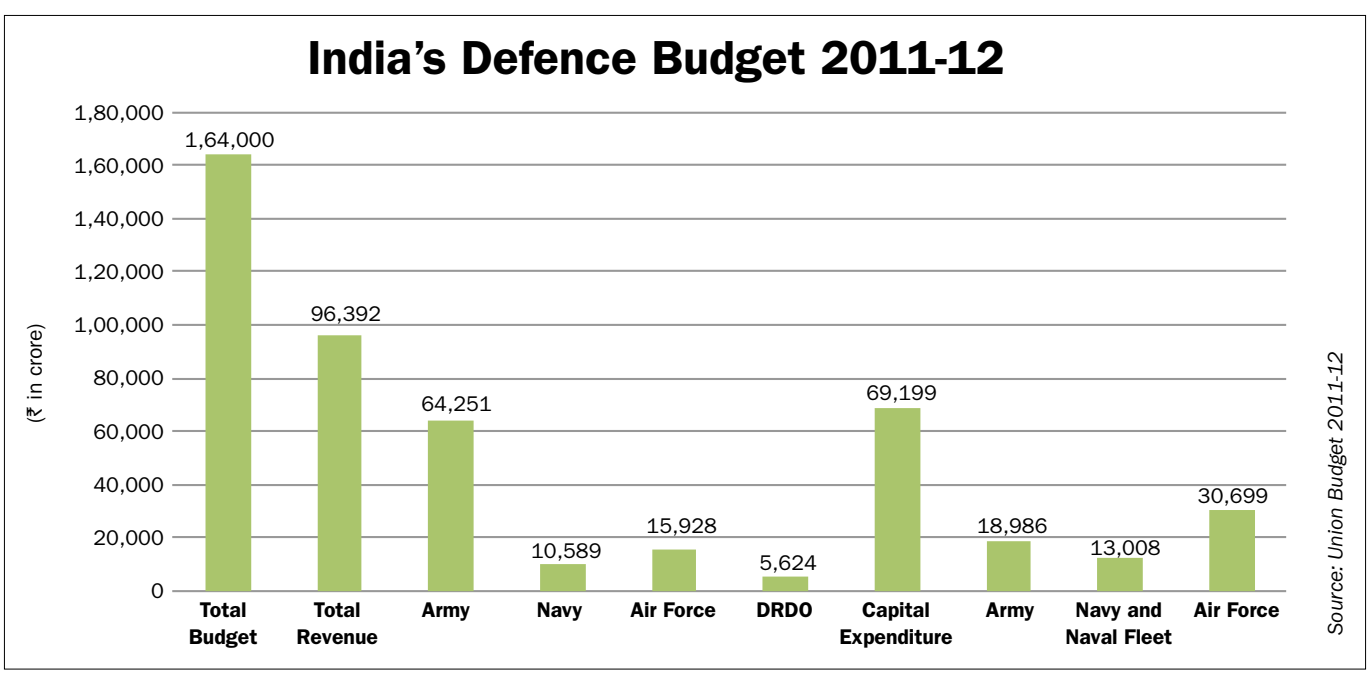
PROCUREMENT

VAGUE ASSURANCES

Even though the capital outlay on this year's defence budget shows an increase of about 11.5 per cent from last year, what is actually available for acquisition of military hardware is simply not adequate for timely modernisation of India's armed forces

FINANCE MINISTER PRANAB MUKERJEE'S budget has won many accolades like it is a politically correct budget, everybody's budget, an eye on the elections budget, etc. On the defence expenditure front, however, hopes of a departure from the mundane and staid announcements of the previous years have proved to be thoroughly misplaced. Two-liner pronouncements were a jaded repeat of the previous years—the customary 10 per cent hike (primarily to counter domestic and international inflation) and a vague assurance, that if required, more funds would be provided to meet defence needs. The fact is India's defence budget has yet again followed the recent ominous trend of straying to less than two per cent of the GDP. A similar dip was seen in the early 1960s, which resulted in India suffering an ignominious and shameful defeat at the hands of the Chinese. That was also the time when India's political leadership had refused to address the country's military vulnerabilities. India lost to the Chinese not because the Indian armed forces failed to measure up to the adversary, but owing to the refusal of the ruling establishment to acknowledge ground realities. Notwithstanding the political rhetoric, in reality, the UPA Government yet again failed to realise the ever-increasing security threats and challenges. While the old adversarial threats due to unresolved borders remain, new threats and challenges have also added to the old inventory of security woes. Terrorism in all its manifestations is a palpable threat and India also faces insurgencies generated both externally and internally. Likewise, proxy war in Jammu and Kashmir, fostered and supported in all respects by Pakistan, continues unabated.

It is a well-known fact that building military capability is a long-term exercise and therefore, defence expenditure should be linked to a long-term holistic plan, taking into account existing and emerging challenges and threats and based on trends in warfare, induction of new technologies and new methods of warfighting. When computed as a percentage of GDP, defence expenditure provides a clear indication of the investment a country is willing to make to meet its security concerns. This is a clear yardstick and a universally accepted norm. It is in this context and evaluating the threats and challenges India is likely to face, that major defence/security think tanks and analysts have recommended a hike in the defence budgets linking them to three per cent of the GDP till the necessary military capabilities are built up. Even Prime Minister Man-



mohan Singh had in the not too distant past issued a categorical assurance that if the economic growth were to reach eight per cent, defence allocations would be increased to three per cent of the GDP. This was also echoed by his Defence Minister A.K. Antony who saw no reason as to why the defence budget couldn't be increased to three per cent of the GDP if India continues to maintain a high economic growth rate. However, even after achieving the desired growth rate year after year, the ministerial promises remain firmly in the realm of mere rhetoric.

Right after the announcement of India's defence budget, China unveiled a stunning 12.7 per cent hike in its declared defence budget to $91.5 billion. While announcing the defence budget Li Zhaoxing, spokesman of the Chinese Parliament justified the increase by pointing to the levels of military spending by the US as also India. "Defence expenditure is 1.4 per cent of GDP in China," added Li, while "that ratio in India is much higher than two per cent in India." He is obviously wrong on both counts as not only India's defence budget this year works out to be a paltry 1.83 per cent of the GDP, it also a known fact that the Chinese actual figures are two to four times higher than their officially declared figures. For example, last year, the Chinese had officially released a figure of 532.115 yuan ($78 billion approximately) for defence expenditure but the actual figures are estimated to have crossed the $200 billion mark. Similarly, this year's defence budget may eventually cross the $250-300 billion mark. Then there is Pakistan, which is known to devote abnormally large percentage of its GDP on military spending. With this in view, it comes as a surprise to India's security community when both the Defence Minister and his deputy show their satisfaction with this year's allocations.

The big question is, in the name of developmental and infrastructural programmes to improve India's economic stature; can the country's leadership blatantly ignore its security concerns? Reacting to India's defence budget trends, Admiral Arun Prakash, former Chief of the Indian Navy, once remarked, "Above all, economic prosperity and national security are two sides of the same coin. Only the short-sighted will imagine that you can have one without the other."

India, with extensive land and maritime borders and a vast airspace to guard, faces a variety of threats and challenges especially from its traditional neighbouring adversaries. India has one of the largest armed forces in the world, including the third largest army, the fourth largest air force and, an expanding navy aspiring for 'blue water' capabilities. To maintain these force levels at the peak levels of combat efficiency and abreast of modern technologies and war fighting techniques, it is imperative that greater allocations are made in the budget, especially the capital outlays. All appraisals and assessments in this regard continue to point towards substantial increase in the defence budget to provide the necessary balance to maintain its march on the path to achieve economic prosperity. Air Chief Marshal S.P. Tyagi, former Chief of the Indian Air Force, put it succinctly, "Even as the country endeavours to eradicate poverty and grow financially, one must keep in mind that no nation has grown economically without military backup. In the current world order, weaklings are not allowed to prosper, that's a universally accepted truth."

> Hopes of a departure from the mundane and staid announcements of the previous years have proved to be thoroughly misplaced

Even though the capital outlay on this year's defence budget shows an increase of about 11.5 per cent from last year, what is actually available (₹55,000 crore or $12.2 billion) for acquisition of military hardware is simply not adequate for timely modernisation of India's armed forces (See table on previous page for full breakdown). The percentage increase is merely notional as it would be devoured by the annual inflation at the same or higher rates.

One of the major flaws in the system of procurement in India is the inflexibility in the procedures which invariably results in large unspent amounts from capital outlays. Former Indian Army Chief General Shankar Roychowdhury not long ago pointed out that "procedures for defence procurement and its connected expenditures still remain in the dark ages of bureaucracy. Unless that attitudinal turnaround commences in earnest, increased allocations to the defence budget will be like pouring water on desert sand."

Add to this the fact that every major defence deal in the recent past has acquired the murky hues of a 'scam', invariably stalling efforts at defence modernisation and effectively stemming defence expenditure. Notwithstanding, the Ministry of Defence claims for the year 2010-11, it is a known fact that previously, year after year, large sums of unspent money running into thousands of crores of rupees had to be surrendered out of the allotted capital funds. "We know that physical outlays don't get translated into outcomes and when you consider this aspect with a below two per cent spending of GDP, you know it is not a happy auguring," said Uday Bhaskar, former Director of New Delhi's Institute for Defence Studies and Analyses. "The armed forces have a long shopping list and every year all they have been doing is returning money as files have not moved," he added.

To better utilise unspent money and mitigate hassles of funds surrender every year, the then Finance Minister Jaswant Singh under the NDA Government had proposed and created a 'defence fund' in which the excess amounts up to a total of ₹25,000 crore could be parked to cushion the inevitable slow progress of the defence modernisation programmes. However, this very thoughtful and progressive initiative was scuttled by the UPA Government citing absence of constitutional support for such a move. There is a need to resurrect the 'defence fund' through constitutional amendment that too, sans the restrictive caps of amounts or timeframes to fulfill the modernisation needs of the armed forces. Further, annual capital outlays need to be increased to $20-25 billion, at least over the next decade or so to build up the necessary military capabilities. SP

— Air Marshal (Retd) V.K. Bhatia

Quote Unquote

INDIA HAS ALWAYS BEEN A VOTARY OF PEACE. YET, VIOLENT DISTURBANCES IN OUR IMMEDIATE AND EXTENDED NEIGHBOURHOOD POSE SECURITY CHALLENGES FOR OUR NATION AND THE REGION AS A WHOLE. OUR CURRENT DEFENCE EXPENDITURE IS CONSISTENT WITH OUR PROJECTED SECURITY REQUIREMENTS AND IS BOUND TO INCREASE OVER THE NEXT TWO DECADES.

— A.K. ANTONY, DEFENCE MINISTER

WE ARE PASSIONATE ABOUT INDIA AND WE ARE PASSIONATE ABOUT TYPHOON. THE FOUR PARTNER NATIONS IN THE EUROFIGHTER PROGRAMME WOULD FULLY EXTEND COOPERATION WITH REGARD TO TRANSFER OF TECHNOLOGY. WE UNDERSTAND THE ASPIRATION OF INDIA AND OUR OFFER IS GENUINE INDUSTRIAL COOPERATION.

— PETER LUFF, UK MINISTER FOR DEFENCE EQUIPMENT

FRENCH INDUSTRY IS READY TO CO-DEVELOP IN INDIA AND STRENGTHEN THE STRATEGIC RELATIONSHIP BETWEEN THE TWO COUNTRIES. WE WANT THE RELATIONSHIP NOT ONLY TO CONTINUE BUT ALSO TO GROW. WE HAVE THE SAME VALUES AND CAN TOGETHER FIGHT THREATS LIKE TERRORISM.

— JEROME BONNAFONT, FRENCH AMBASSADOR TO INDIA

INDIA IS A KEY MARKET FOR BOEING AND WE WILL CONTINUE TO INVEST IN THE COUNTRY FOR THE LONG-TERM. WE SEE OPPORTUNITIES IN THE AREAS OF CYBER WARFARE, HOMELAND SECURITY, UNMANNED SYSTEMS, SPACE AND SUPPORT.

— MARK KRONENBERG, VICE PRESIDENT, INTERNATIONAL BUSINESS DEVELOPMENT, BOEING DEFENSE, SPACE AND SECURITY

OUR RELATIONSHIP WITH INDIA IS BASED ON WHAT IS GOOD FOR INDIA. INDIA IS GOING TO RECEIVE THE LATEST TECHNOLOGY. INITIALLY, IT WOULD BE TECHNOLOGY COLLABORATION AND AS THE RELATIONSHIP GROWS, IT WOULD LEAD TO TECHNOLOGY EVOLUTION.

— BRUCE SCOTT, PRESIDENT, ITT DEFENSE

Mixed Outlook

The purple patches come from the Asia-Pacific and the Middle East regions while growth in North America and Europe continue to lag. Consequently, the IATA has revised its projections of net profits for 2011, up from its earlier forecast of $5.3 billion to $8.6 billion. However, the net margins remain weak at 2.7 per cent for 2010 and falling to 1.5 per cent in 2011.

By **R. Chandrakanth**

IN 2011, THE RECOVERY phase of the airline industry is expected to pause. Increase in average oil price from last year and slower global GDP rate are among the industry dampeners. Disturbances in Libya and Egypt have already pushed oil prices to over $100 (₹450 crore) a barrel.

The International Air Transport Association (IATA) forecast a downward trend of profits of $8.6 billion (₹38,700 crore) in 2011 from its earlier forecast of $9.1 billion (₹40,900 crore). The Middle East disturbances is said to increase the industry fuel bill by $10 billion (₹45,000 crore) to a total of $166 billion (₹7,47,200 crore). Compared to the levels in 2010, oil prices are now expected to be 20 per cent higher in 2011 and that fuel would represent 29 per cent of total operating costs (up from 26 per cent in 2010).

The Director General and CEO of IATA, Giovanni Bisignani forecasts that the "industry would face tougher conditions than what we are experiencing today".

The purple patches come from the Asia-Pacific and the Middle East regions while growth in North America and Europe continue to lag. Consequently, the IATA has revised its projections of net profits for 2011, up from its earlier forecast of $5.3 billion (₹24,300 crore) to $9.1 billion (₹41,700 crore).

"Despite higher profit projections, we still see the recovery pausing next year after a strong post-recession rebound. And the two-speed nature of the recovery is unchanged with European airlines continuing to underperform in other regions. The margins remain pathetic. With a 2.7 per cent net margin in 2010 shrinking to 1.5 per cent in 2011, we are nowhere near covering our cost of capital. The industry is fragile and balancing on a knife edge. Any shock could stunt the recovery, as we are seeing the results of new or increased taxation on airlines and travellers in Europe," said Bisignani.

IATA analysed that the operating environment will become more difficult because of increased fuel cost; slower GDP growth and taxation, particularly in Europe.

ASIA-PACIFIC SHOWS THE WAY

IATA pointed out that all regions would be following the global trend of reduced profitability in 2011 compared to 2010.

- **North American** carriers will see a 2010 profit of $5.1 billion (₹23,400 crore) decrease to $3.2 billion (₹14,600 crore) in 2011. The weak US economic recovery will limit demand increases to 3.7 per cent.
- **Asia-Pacific** carriers will post decreased profits of $4.6 billion (₹21,100 crore) in 2011 from $7.7 billion (₹35,300 crore) in 2010. It remains the most profitable region of the world for airlines based on strong GDP growth (outside of Japan) of 6.6 per cent, led by China. The 6.9 per cent demand growth for 2011 is above the global average, but below the expected capacity expansion of 7.8 per cent.
- **Middle East** carriers are expected to see profits shrink from $700 million (₹3,215 crore) in 2010 to $400 million (₹1,837 crore) in 2011. But the pace of demand growth will halve from 21.5 per cent in 2010 to 10.5 per cent in 2011.
- **European** carriers will be the industry laggard among the major regions with a $400 million (₹1,800 crore) profit in 2010 shrinking to $100 million (₹450 crore) in 2011.
- **Latin American** carriers will see their $1.2 billion (₹5,500 crore) profit in 2010 cut to $700 million (₹3,215 crore) in 2011. Consolidation within the region and a robust regional economy, led by Brazil, will continue to support solid and profitable growth among the region's leading carriers.
- **African** carriers will see 2010 profits of $100 million (₹450 crore) move to break-even in 2011. As with other regions, a capacity expansion of 6.4 per cent in 2011 will outstrip demand growth of 5.5 per cent.

AIRCRAFT DEMAND EXPANDS

Airbus has forecast that 26,000 new passenger and freighter aircraft would be needed up to 2029, driven primarily by replacement of aircraft for newer more eco-efficient models in mature markets, dynamic growth in emerging markets, low-cost carriers particularly in Asia and capacity growth on existing routes.

Out of the new aircraft needed, around 25,000 will be passenger aircraft valued at over $2.9 trillion. Of these additional passenger aircraft, 10,000 will replace older less

PHOTOGRAPH: WIKIPEDIA

GROWING TRAFFIC: PASSENGERS AT MUMBAI AIRPORT

eco-efficient aircraft and some 15,000 will be for growth. Taking into account today's passenger fleet of over 14,000 aircraft, the world passenger fleet will rise to some 29,000 aircraft by 2029.

In passenger traffic growth terms, emerging economies are leading the recovery. Domestic Indian traffic growth (9.2 per cent) is the fastest of any major market and the third fastest overall growth after traffic between the Middle East and South America and between North Africa and the People's Republic of China (PRC). Seven out of the top 20 fastest growth flows connect China to the rest of the world.

"Airlines in Asia-Pacific including China and India will carry one-third (33 per cent) of the passenger traffic by 2029, making it the largest region, overtaking Europe (25 per cent) and North America (20 per cent)," said Chris Emerson, Head of Product Strategy and Market Forecast, Airbus.

Nicole Piasecki, Vice President, Business Development, Boeing, has said that the aircraft production rates would be accelerated keeping up with renewed demand. Year 2011, she added, should be a "healthy order year", in turn bringing in optimism regarding potential revenue growth in 2011. However, James W. McNerney Jr, Chairman, President and Chief Executive Officer, was upbeat on the recovering economy and Boeing's 2011 prospects for growth, with passenger and airfreight demand rebounding and "new sources" for aircraft financing becoming available.

BUSINESS JET DELIVERIES HIT

For 2010, Honeywell Aerospace estimated deliveries of 675-700 new business jets, down by 16-17 per cent from 849 in 2009. Expected deliveries in 2011 will fall below 700. However, Honeywell has stated that there would be delivery of approximately 11,000 new business jets from 2010 through 2020.

BRIGHT FUTURE FOR MRO

Market intelligence report by Lucintel has projected that the global aerospace maintenance repair and overhaul (MRO) market is likely to grow at CAGR of 3.2 per cent and the aerospace composite components MRO market at 10.6 per cent. Opportunities for composites in aerospace MRO can be visualised in three segments such as primary aerostructures, secondary aerostructures and engine components.

Lucintel's report said that the use of composite materials are continuously increasing in aerostructures and other components in aircraft like Boeing 787 and Airbus 380 is expanding the MRO market. The Asia-Pacific region is expected to depict a significant growth momentum for composites in global aerospace MRO market. SP

COVER STORY

BIGGER & BETTER

Spread over 75,000 square metres, Aero India 2011 brought together 675 companies including 295 from India and 380 from 29 countries around the world

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

PHOTOGRAPH: WG CDR (RETD) R.S. CHAUHAN

AIMING HIGH:
SU-30 SOARS INTO THE SKY

HAILED AS THE PREMIER Air Show in Asia, Aero India 2011, the eighth edition of the biennial event was held at the Indian Air Force (IAF) base at Yelahanka on the northern outskirts of Bengaluru. Having come a long way from its humble beginnings in 1996, this year's extravaganza was bigger and better than those in the past. Participating in the expo spread over 75,000 square metres were 675 companies that included 295 from India and 380 from 29 countries around the world. Aero India 2009 which had witnessed participation by 592 companies, both domestic and foreign, had occupied only 45,000 square metres.

The countries that had elaborate pavilions for their aerospace companies were the US, Britain, France, Germany, Belgium, Israel, Italy and Russia. Of these, the aerospace majors of Britain, Germany, France, Russia and the US were accompanied by official delegations in their efforts at collaboration, partnership and joint ventures with the Indian aerospace industry. For the first time ever, the Chinese delegation participated in Aero India 2011. Considering China's status as a major trading partner of India, an invitation was extended to it albeit at the last minute and the Chinese delegation was led by Ambassador Zhang Yan. Pakistan and Iran were among a few of the nations that did not participate.

At the expo, both domestic and international participating aerospace companies had on display the latest in aerospace technology and a wide range of products which included military aircraft, unmanned aerial systems, airliners, general aviation aircraft and business jets. Compared to 67 in Aero India 2009, this time there were 95 aircraft on display including 44 military and 51 civil. Practically all global aerospace majors were present at the expo along with the important players from the Indian aerospace industry both from the public and private sector. Also present were a large number of small and medium enterprises associated with the indigenous aerospace industry.

INAUGURATION CEREMONY

Delivering the inaugural address at the opening ceremony, Chief Guest Defence Minister A.K. Antony reiterated the government's commitment to rapid modernisation of the armed forces. "We are open to joint ventures, public-private partnerships and licenced production under transfer of technology (ToT) for the all-round development of the aerospace industry," he said. Calling upon the global aerospace majors to partner with Indian aerospace companies, the Defence Minister said, "We have charted out a course to increase self-reliance in the defence sector by creating a strong industrial base in the country. The recently released Defence Production Policy spells out the blueprint of the roadmap that we intend to follow. We are encouraging our public and private sector industries to become active partners in this initiative." He touched upon the recent changes in policy that would help facilitate discharge of offset obligations by foreign companies.

INDIA—A LUCRATIVE MARKET

Sponsored by the Defence Exhibition Organisation of the Ministry of Defence and managed by the Confederation of Indian Industry (CII), the international Air Show this year was propelled by the business potential of billions of dollars generated in the wake of the ongoing modernisation programme for the Indian armed forces.

S. RADHAKRISHNA

WG CDR (RETD) R.S. CHAUHAN

FROM THE INDIAN STABLES: HAL'S LIGHT COMBAT HELICOPTER AND LCA TEJAS; (OPPOSITE PAGE) RECENTLY INDUCTED C-130J

The global aerospace industry was drawn to the Air Show by the combined market for defence equipment and commercial jets valued at $150 billion (₹6,75,000 crore) and growing over the next three decades. Of this, the irresistible lure is the $11 billion (₹50,000 crore) contract for 126 medium multi-role combat aircraft (MMRCA) for the Indian Air Force (IAF). According to Air Chief Marshal P.V. Naik, Chief of the Air Staff (CAS), the process of selection of the vendor was in the final stage. In spite of the mood being upbeat amongst the contenders, a degree of anxiety was quite palpable. Apart from the MMRCA contract, other major acquisition programmes include six in-flight re-fuelling aircraft, 197 utility helicopters for the Indian Army and the IAF, 22 attack helicopters and a fleet of basic turboprop trainer aircraft for the IAF.

A TREAT FOR THE PUBLIC

In conformity with the age-old practice, there were spectacular daily displays of flying by a variety of aircraft dominated, as expected, by the contenders for the MMRCA contract namely the Eurofighter Typhoon, Dassault Rafale, Saab Gripen, Boeing F/A-18 E/F and the Lockheed Martin F-16IN Super Viper. Conspicuous by its absence was the Russian MiG-35, also a contender for the MMRCA contract. Amongst the Indian aircraft participating in the daily flying display were the Indian light combat aircraft (LCA) Tejas, the Suryakiran Aerobatic Team, the Sarang helicopter display team and the HAL-built LCA. A major attraction that overwhelmed the public was the Red Bull four aircraft privately-owned aerobatic team from the Czech Republic led by the 62 year old Radoslava Máchová. The Red Bulls performed spell-binding aerobatic manoeuvres on the Zlin-50 LX piston engine aircraft.

US AEROSPACE INDUSTRY

With as many as 63 companies including all aerospace majors participating, the US aerospace industry had a dominant presence at Aero India. The business opportunity for Boeing Defense, Space & Security over the next decade is estimated to be around $31 billion (₹1,39,500 crore). After bagging high value military aircraft contracts for six C-130J Super Hercules for special operations, three Boeing business jets for VIP use and eight P-8I long range maritime patrol (LRMP) aircraft altogether worth over $4 billion (₹18,000 crore), the US aerospace industry is pushing aggressively for the $4.1 billion (₹18,450 crore) 10 C-17 Globemaster III, additional C-130J Super Hercules and P-8I LRMP aircraft, with the Boeing AH-64D Apache Longbow in the race for the $1.4 billion (₹6,300 crore) contract for 22 attack helicopters, a $1 billion (₹4,500 crore) deal in the offing for 15 heavy-lift helicopters with the CH-47F twin-rotor Chinook as a strong contender and a fleet of basic turboprop trainer aircraft for the IAF, a contract worth $900 million (₹4,050 crore) for which the Hawker Beechcraft T-6 Texan II has undergone flight evaluation in the recent past along with four other types. Boeing is also fielding the F/A-18 E/F Super Hornet for the mega-MMRCA tender. Stakes for the US aerospace industry therefore are undoubtedly high. The US delegation was led by Andrew Shapiro, Assistant Secretary of State for Political-Military Affairs. The US Commerce Secretary Locke and Ambassador Roemer were also present at the inaugural function and formally opened the US pavilion and reaffirmed the strength and durability of Indo-US strategic partnership.

BOEING

Boeing has entered into joint ventures with Indian entities such as HAL, BEL, Tata and L&T to fulfill its offset obligations. Boeing plans to partner with more companies in India to further expand its business in the rapidly growing civil and military aviation markets. In the regime of research and development, Boeing has established partnership with the Indian Institute of Science Bangalore, the National Aerospace Laboratories and several universities in India for fundamental research in materials, avionics and aerostructures. It has also commissioned its research and technology centre in Bangalore. Boeing's stated objectives in respect of India are to enhance and broaden indigenous capability, increase global competitiveness of the supply base and strengthen industrial status in the international supply chain for aerospace products. In the civil aviation segment, Dinesh Keskar, President, Boeing-India stated that Air India would receive the first of the 27 Boeing 787 Dreamliners

ANOOP KAMATH

in the last quarter of this year. Boeing estimates that driven by a steady 15 per cent annual growth in passenger traffic in the wake of a resurgent economy, the market for commercial jets in India over the next two decades would be for 1,150 aircraft valued at approximately $130 billion (₹5,85,000 crore).

LOCKHEED MARTIN

One of the leading defence contractors in the US, the company participated in Aero India 2011 brimming with confidence after having delivered the first of the six C-130J Super Hercules on order to the IAF ahead of schedule. The aircraft was on static display at the Air Show and the company is hopeful of receiving an order in the near future from the IAF for six additional C-130J Super Hercules. But the focus of Lockheed Martin has now shifted to the F-16IN Super Viper, which is one of the two single engine medium multi-role combat aircraft in the race for the MMRCA contract. "The F-16IN Super Viper is the ultimate fourth generation fighter with the latest technologies and capabilities, it can be the right choice for the IAF," a senior Lockheed Martin representative stated at a media briefing at the Aero Show. Along with the other five contenders, the F-16IN Super Viper has completed flight evaluation which included demonstration of the 130 km range Raytheon joint stand-off weapon (JSOW) AGM-154-C.

Lockheed Martin also highlighted at the expo the advances in its range of combat-proven, precision engagement and targeting systems which included the direct attack guided rocket (DAGR); PAC-3 Missile; Hellfire II; Arrowhead; Sniper Advanced Targeting Pod (ATP), etc.

Indian conglomerate Tata group entered into a joint venture with the US aerospace major Lockheed Martin Corporation to form export oriented Tata Lockheed Martin Aerostructures to manufacture aerostructures for the world's most advanced C-130 Super Hercules aircraft. Products manufactured by the JV company will form a part of Super Hercules aircraft for global customers and enhance the capability of the Indian aerospace industry and facilitate fulfillment of offset obligations. "This partnership is established as a strategic element of our global supply chain and solidifies our presence in India," stated Ralph Heath, Executive Vice President of Aeronautics, Lockheed Martin.

"The US is committed to greater bilateral commercial collaboration and developing a strategic partnership with India that strengthens our global nonproliferation efforts, and creates trade opportunities in the defence and high-technology sectors."

—Gary Locke, US Commerce Secretary

"Apart from export of products and services, BEL has identified contract manufacturing as one of the major areas to address offset obligations of vendors in the various RFPs of Ministry of Defence. Trunkey solutions' is another new area of focus for increasing exports."

—Ashwani Kumar Datt, Chairman and Managing Director, BEL

"India is important to Cessna and the expanding economy should soon support a robust business aircraft fleet and infrastructure. By 2025, I would expect India to be in the top 10 individual countries for business jet ownership outside the US."

—Trevor Esling, Vice President, International Sales, Cessna Aircraft Company

"Raytheon's primary focus is on understanding the customer and meeting their needs. We believe that our established role in the Indian market, coupled with our capabilities across critical mission areas, position us as the partner of choice for customers in India for today and the future."

—William Blair, President, Raytheon India

"The opportunities are irresistible in aerospace. Plans are afoot to make a fullfledged aerospace manufacturing facility operational soon and to effectively meet the offset obligations of the aerospace industry."

—V.RS. Natarajan, Chairman and Managing Director, BEML

"ISR systems are critical to effective homeland security and our leadership in multiple-domain ISR strongly positions Northrop Grumman to help create solutions for India's coordinated national defence structure."

—Bill Schaefer, Vice President, Business Development, Northrop Grumman Aerospace Systems

"Industry predicts a shortage of qualified pilots in the region. CAE's objective is to help airlines meet the demand for highly qualified pilots by delivering innovative simulation products and training services from the cadet level to senior captains."

—Jeff Roberts, Group President, Civil Simulation Products Training and Services, CAE

"The Defence Procurement Policy in its new incarnation is a fundamental game-changer. The offset situation is creating a flood. Industries have positioned themselves to serve these waters, but the danger is the flood could drown us. The policy could blunt our competitive edge because guaranteed business lulls one into complacency. The policy is an enabler and not an end in itself."

—Anand Mahindra, Vice Chairman and Managing Director, Mahindra and Mahindra

"We see in India, and in most of Asia, an initial appetite for mid to large aircraft due to mission requirements (longer range). This, however, does not exclude opportunities in the entry-level jet to mid light segments, where new entrepreneurs are looking at market opportunities of providing a differentiated and reliable charter ervices, with low acquisition cost, low operating cost and state-of-the-art jets."

—Jose Eduardo Costas, Vice President, Marketing and Sales, Asia Pacific – Executive Jets, Embraer

"Indian MoD's current agenda to expand the defence industrial base, encourage indigenous defence production and reduce defence imports is commendable as that will ensure India approach indigenisation faster. India is a key country for us, we want to expand our presence by showing our technologies with the capabilities of local partners."

—Giorgio Zappa, COO, Finmeccanica

NORTHROP GRUMMAN CORPORATION

In the run up to Aero India 2011, the US aerospace major confirmed that the company had responded to a request for information (RFI) from the Indian Ministry of Defence (MoD) for an airborne surveillance system for the Indian Navy offering the MQ-4C broad area maritime surveillance unmanned aircraft systems (BAMS UAS). A naval version of the Global Hawk, the MQ-4C BAMS UAS is capable of maritime surveillance, collection of enemy order of battle information, battle damage assessment, port surveillance and communication relay. It supports missions such as maritime interdiction, surface warfare and battle space management. The MQ-4C will complement surveillance operations by the Indian Navy's Boeing P-8I maritime surveillance aircraft. The US Government has already cleared the proposed sale. Northrop Grumman had on offer the MQ-8B Fire Scout UAV for the Indian Navy. Designed to accommodate a variety of sensor payloads and smaller than the Chetak helicopter, the Fire Scout can be operated from any ship capable of handling a conventional helicopter. In addition to conventional military roles, the Fire Scout has the potential to perform roles for homeland security and law enforcement. Northrop Grumman also presented the STARLite, a small lightweight wide area surveillance radar used for supporting tactical operations. This system features synthetic aperture radar and ground moving target indicator capabilities for unmanned and manned aerial vehicle applications. Also featured were Northrop Grumman's multi spectral EW simulation products used for simulating complex EW environments that cover the entire spectrum of conflict from radio frequency to infrared and the integrated battle management system (BMS), which provides the next generation of command and control and enhanced situational awareness. Northrop Grumman presented its range of capabilities in intelligence, surveillance and reconnaissance including airborne early warning and control systems for maritime reconnaissance, fire control radars and unmanned aerial vehicles. In the regime of airborne early warning and control, the company showcased the E-2D Advanced Hawkeye equipped with the multi-role electronically scanned array (MESA) radar for which an RFI has been floated by the Indian MoD. The Indian Navy may acquire four such aircraft. Northrop Grumman's contribution in the P-8I Indian Navy maritime patrol aircraft programme includes early warning self-protection and electronic support measures systems. The company displayed a model of the AN/APG-80 AESA fire control radar employed on the F-16IN Super Viper.

UK AEROSPACE INDUSTRY

Keen to enhance the strategic relationship with India, the United Kingdom fielded as many as 40 British companies at Aero India 2011 to showcase their capabilities and products in both defence and security sectors. Leading British companies such as BAE Systems and Rolls Royce were present at the Air Show along with Cobham, Hampson, Magellan, STG and Preston. Minister for Defence Equipment Support and Technology Peter Luff, led a high-level delegation to the Air Show. Also present at the show were Sir Richard Stagg, the British High Commissioner to India and Richard Paniguian, Head-UK Trade and Investment's Defence and Security Organisation.

NEETU DHULIA


S. RADHAKRISHNA

Incidentally, Cobham has been awarded contracts of over $25 million (₹112.5 crore) by Lockheed Martin for the supply of aerial re-fuelling systems and external fuel tanks for the C-130 Super Hercules aircraft.

General Dynamics UK signed a contract with HAL for the transfer of intellectual property which includes documents, training and technology to support the Avionics regime of the Hawk fleet of the IAF through its service life. General Dynamics views India as a key market and looks forward to supplying other products such as battlefield management systems, airfield security and armoured fighting vehicles. The Advanced Engineering Regional Office (AERO) in Bangalore supported participation in Aero India by UK Aerospace, Defence and Security (ADS). UK AERO has played an active role in bringing together the UK and Indian aerospace, defence and security sectors. "Since our launch, UK AERO has managed in collaboration with ADS significant success in raising awareness among UK companies of the potential and opportunities open to those engaging with the Indian aerospace and defence markets," said Ashok Saxena, Director of UK AERO. Chairman of

ADS, Ian Godden said, "India is one of the most exciting developing economies on the world stage at the moment. From the Jaguar to the Hawk and beyond, the UK defence, aerospace and security industries have enjoyed a successful relationship with India. It makes sense for UK industry to seek further collaboration with our Indian counterparts, for mutual benefit."

EUROPEAN AEROSPACE INDUSTRY

Pushing the case for the Typhoon, a strong contender for the MMRCA contract, Eurofighter GmbH put forth an attractive array of offers to India such as partnership in the production, full ToT, access to a wide array of technologies from Europe's leading aerospace and defence companies, future developments of the swing-role combat aircraft, share in the global Eurofighter programme and supplier network.

CASSIDIAN ENGINEERING CENTRE IN BENGALURU

In the pursuit of its strategic objective of a long-term partnership with India and to enlarge its industrial footprint, EADS, through its defence and security division Cassidian, has opened, the first foreign-sponsored defence-oriented Engineering Centre in India. Located in Bengaluru and manned by Indian engineers trained in Europe, this facility will create a wide range of opportunities for EADS in India.

BAE Systems showcased a naval variant of the Eurofighter Typhoon for offer to the Indian Navy in response to an RFI floated by the MoD. In a Eurofighter press conference, Defence Minister of UK Liam Fox stated that the Royal Navy was not considering the Typhoon but was instead going ahead with the F-35 joint strike fighter as its carrier borne combat aircraft. The Minister also spoke of the possibility of partnership between India and the UK for BAE Systems Type 26 frigates.

EUROCOPTER AS 550 C3 FENNEC HELICOPTER

Eurocopter, which had a number of products on offer at Aero India, is hoping to exploit opportunities generated by the Indian helicopter industry that is growing at 20 per cent annually. Eurocopter has, through a four decade partnership with HAL, consolidated its position as the leader in the Indian market for both military and civil helicopters. Leading the pack was the military-certified and combat-proven AS 550 C3 Fennec that is participating in the tender for 197 machines for the Indian armed forces and has successfully completed field trials. Rainer Farid, Vice President, Sales for South Asia, Eurocopter said, "We are very happy with Fennec's performance during the recent trials, and are confident that it is the rightful successor to the Cheetah and Chetak." Eurocopter also had on offer, the AS565 Naval Panther from the Dauphin family. Generally utilised for naval applications, the Panther is capable of a wide range of roles, including combat assault, fire support, search and rescue, anti-submarine/anti-surface warfare and MEDEVAC. For helicopter emergency medical services (HEMS), Eurocopter showcased the EC-135. Eurocopter is fielding the NH90 multi-role helicopters to replace the 16 Sea King helicopters with the Indian Navy.

S. RADHAKRISHNA

WG CDR (RETD) R.S. CHAUHAN

MESMERISING: (LEFT TO RIGHT) SCINTILLATING FLYING DISPLAY BY RED BULLS; LOCKHEED MARTIN'S F-16 IN FRONT OF OMEGA TANKER; SAAB 2000 MARITIME PATROL AIRCRAFT TAKES OFF; DASSAULT RAFALE MAKES ITS APPEARANCE IN AERO INDIA

SAAB TARGETS AIRCRAFT SALES

In response to the RFI for the medium range maritime reconnaissance (MRMR) programme, Saab of Sweden had the Saab 2000 maritime patrol aircraft (MPA) on display at Aero India 2011. The Indian Coast Guard is exploring options for surveillance aircraft under mid-tier maritime patrol (MTMP) programme, for which the Saab 340 maritime surveillance aircraft featuring a sensor suite similar to Saab 2000 aircraft, was on offer. However, as the Saab 340 is no longer in production, only refurbished aircraft would be available. At the Air Show, Saab divulged plans to set up a research and development centre in India in collaboration with HAL to develop next generation electronic warfare systems.

ISRAEL AT AERO INDIA

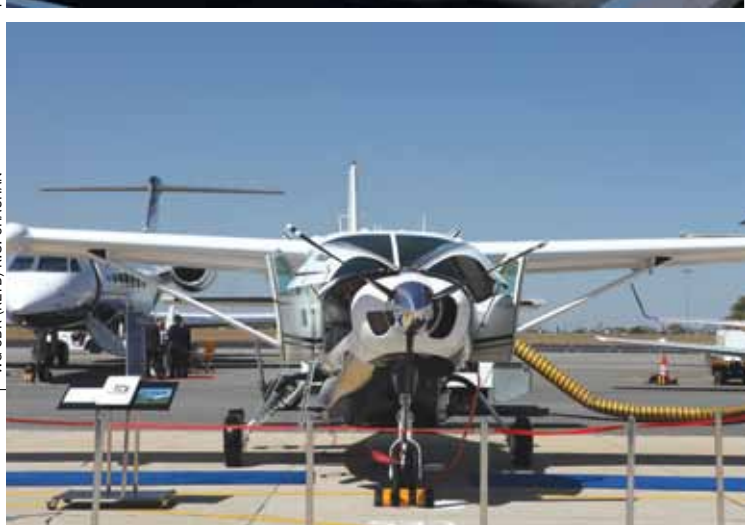
As the largest supplier of high-tech weapons and defence equipment, India is a strategic market for Israel—a fact evident in

the level of participation by the aerospace industry of this tiny nation. With JVs with Tata and Nova already in place, IAI is seeking new partnerships in the civil, government and defence sectors in India.

On display at the Israeli Pavilion were models of special mission aircraft, unmanned aerial vehicles along with ground control stations, Elta multi-mission radar, electro-optical, electronic intelligence and COMINT payloads and weapons systems. On display were the 65-kg Panther and 12-kg Mini Panther UAVs employing the revolutionary three tilting propellers driven by low noise electrical motors

ON DISPLAY:
(TOP TO BOTTOM)
EUROFIGHTER TYPHOON;
EUROCOPTER'S FENNEC;
MAHINDRA GA8 AIRVAN;
AND CESSNA'S PROPJET

PHOTOGRAPHS: ANOOP KAMATH



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ANOOP KAMATH

FLYING GVK'S FALCON 2000

He is Gelu Nitu, a commercial pilot from France, but Indians prefer to call him by his second name Nitu and so he is Nitu Gelu in India. Nitu was an instructor with FlightSafety International for 19 years and has flown almost all Falcon aircraft. And today, he takes to the air with GVK Group's business jet, the Falcon 2000.

Nitu was born in Romania and his father was an Air Force pilot who flew the MiG-19. But Nitu chose to be a commercial pilot and has flown several aircraft since 1975. He has over 12,000 hours of flying experience in Middle East, Africa, UK, India, etc and prior to joining the GVK Group, he was with the Taj Air, coaching how to fly the Falcon 2000.

Stationed in Mumbai, Nitu races towards Begumpet in Hyderabad with the Falcon 2000, as and when Chairman G.V.K. Reddy has to go on a business trip. In a chit-chat with SP's during Aero India 2011, the pilot said he has already had 1,200 hours of flying experience in the Falcon 2000 he now takes to the air. "When our Chairman is abroad, there are others in the top brass of the company who fly," says Nitu.

Besides the superb interiors, the passenger seating space in the Falcon 2000DX is aptly designed for meetings as well as entertainment and sleep. The Falcon 2000DX gives wide-cabin comfort and 3,250 range of a larger jet while still enjoying the short-runway agility and fuel economy of a much smaller plane. Powered with PW308C engine, the 2000DX can land with nearly a full fuel tank and is thus flexible enough to hop from city to city and leap across the continent without having to stop and refuel. •

and are capable of vertical takeoff and landing. A number of other systems on display included a new airborne navigation system from IAI, called TNF-Tamam Navigation Fiber Optic Gyro TNF. This is an advanced lightweight, airborne navigation and attitude heading reference system for small aircraft, helicopters and UAVs. IAI also displayed its new laser designator DART 45, a lightweight compact laser designator and rangefinder for ground, airborne and naval applications. Elta had on offer a number of radars to meet the requirements of the Indian armed forces.

It was revealed at the show that the Derby missile manufactured by Rafael Advanced Defence Systems Ltd has been selected to arm India's Tejas till such time the indigenous Astra was made available. A contract with Rafael Advanced Defence Systems is expected to be concluded in March for the Derby and delivery is expected in the second half of 2012.

RUSSIAN AEROSPACE INDUSTRY

Apart from the huge order for Su-30 MKI air dominance fighters, a large order for Mi-17 helicopters for the IAF and MiG-35 in the race for the MMRCA contract, the Russian aerospace industry has engaged the Indian aerospace industry in a number of other ways. The Indian Navy has already begun receiving the MiG-29 K for its much-awaited new aircraft carrier. HAL has joined hands with Sukhoi to develop the fifth generation fighter aircraft based on the PAK-FA T-50 that has already been flown. Intended to cater to both domestic and export markets, the entire project is estimated to be in excess of $25 billion (₹1,12,500 crore). HAL has also entered into an agreement with United Air Corporation of Russia for the joint development of a multi-role transport aircraft once again for domestic and global markets. Helicopter manufacturers from Russia had a number of products on offer through Rosoboronexport targeting the new requirements of the Indian armed forces. Russia had showcased the new Mi-28NE the export version of the 'Night Hunter' combat helicopter, which is competing against the American AH-64D Apache for the Indian tender of 22 attack helicopters. Also on offer was the Ka-226T light multi-role helicopter to compete for the Indian tender for 197 light utility helicopter. Russia is also fielding the 20-tonne capacity Mi-26T2 to compete for the Indian tender for 15 heavy lift helicopters. Antonov showcased the An-148 for which the company has firm orders for eight passenger version and 10 cargo versions with the option for 11 more.

EMBRAER IN INDIA

Embraer participated in Aero India 2011 with the largest ever display of executive jets. On static display were the Phenom 100, Phenom 300, Lineage 1000 as well as the Legacy 650, the latest jet that was certified in October last year. Aviators India and Invision are the two private companies operating the Phenom 100. The total order in India stands at 18 Phenom 100 and two Phenom 300.

INDIAN AEROSPACE INDUSTRY

Indian companies constituted 43 per cent of the total number of participants at Aero India 2011. Understandably, the domestic segment at the expo was dominated by the public sector behemoths such as Defence Research and Development Oeganisation, Hindustan Aeronautics Limited, Bharat Electronics Limited, BEML and Indian Space Research Organisation. Leading the private sector were Mahindra Aerospace, Taneja Aerospace and Aviation Ltd, Tata Aviation Services, Alpha Technologies. HAL registered another step towards self-reliance showcasing the light combat helicopter both in static and flying display as also the naval version of the Tejas. HAL also formally handed over a Cheetah helicopter to Namibian Defence Minister Major General Charles Namolah. DRDO displayed the Nishant UAV and the Rustom-1 MALE UAV that was successfully test flown in October 2010. It also had on display its aerostat radar Akashdeep which has been developed for the IAF to boost its surveillance capabilities.

GROWING IN SIZE AND STATURE

The expo in February this year was evidence enough that India has arrived on the global aerospace scene by not only offering a multi-billion dollar market for aerospace products but by also rapidly emerging as a hub-centre for aerospace technology. Besides serving as a convenient platform for networking between global and Indian aerospace industry majors, Aero India 2011 provided the opportunity for the latter to penetrate the international market. SP

ANOOP KAMATH

MAKING EVERY MISSION POSSIBLE

"Bell products never fail," said Captain S.K. Mallik, the only pilot in India to fly the Bell 429. He added, "With Bell helicopters there is no problem with maintenance. Such issues get resolved easily."

Captain Mallik (55) who has over 7,000 hours of flying experience is the Chief of Operations of Span Air Private Limited, a prominent air charter operator based in New Delhi, and FOI (H) Directorate General Civil Aviation. He had to undergo 70 hours of training in the US before flying Bell Helicopter's light twin-engine helicopter Bell 429. Soon after the Aero India show, the Captain was all set to fly members of a political party to remote environ in Assam.

Bell Helicopter officials claim that the company does not compromise when it comes to passenger comfort. And the company seems to have proved it with its light twin-engine helicopter Bell 429. The helicopter has a large cabin, spacious seats providing ample legroom and comfort that can make the trip enjoyable. It also has a large baggage area. "The helicopter can carry 550 pounds of luggage. But the stuff has to be evenly spread in the baggage area," said Mallik.

Bell 429 is equipped with two Pratt and Whitney 207D1 engines and has all the latest safety features designed to meet a wide assortment of mission requirements. The aircarft has robust structure with excellent crush strength, energy attenuating seats and self-sealing fuel cells combine to provide superior survivability; innovative flight software to minimise workloads

The aircraft has been designed keeping in mind emergency medical service. The large cabin allows full body access, optimising patient care. •

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S. RADHAKRISHNA

SNAPSHOTS

AERO INDIA 2011

PHOTOGRAPHS: ANTONY BARI JR

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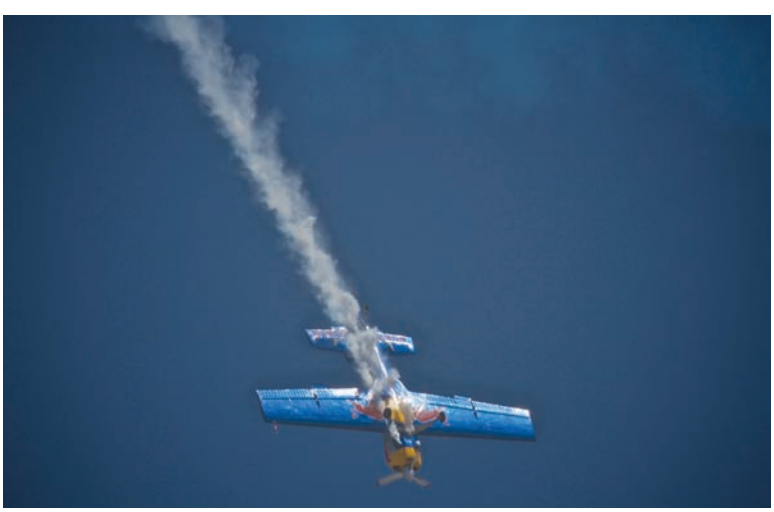


PHOTOGRAPHS: SP GUIDE PUBNS

1. DEFENCE MINISTER A.K. ANTONY AT THE INAUGURAL FUNCTION OF AERO INDIA 2011

2. AT THE INDUCTION CEREMONY OF IAF'S FIRST C-130J SUPER HERCULES AIRCRAFT, DEFENCE MINISTER HANDED OVER THE KEYS OF THE AIRCRAFT TO THE COMMANDING OFFICER OF NO.77 SQUANDRON, GROUP CAPTAIN TEJBIR SINGH

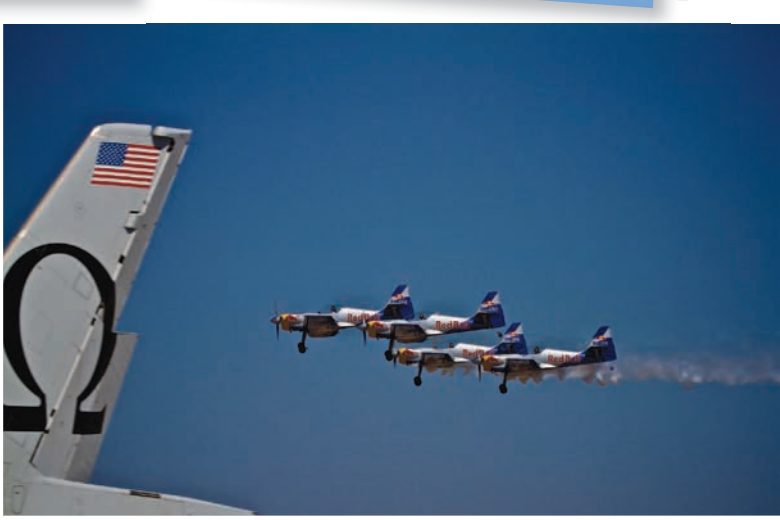
3. CHIEF OF STAFF (COS) OF USAF GENERAL NORTON A SCHWARTZHANDS OVER A MEMENTO TO THE DEFENCE MINISTER IN PRESENCE OF CHIEF OF AIR STAFF AIR CHIEF MARSHAL P.V. NAIK

4. IAF'S C-130J ON STATIC DISPLAY AT AERO INDIA 2011

5, 6 & 7. FLYING DISPLAY AT THE INAUGURAL FUNCTION

8. CZECH REPUBLIC'S AEROBATIC TEAM RED BULLS ENTHRALLS THE CROWD BY THEIR FLYING DISPLAY

PHOTOGRAPHS: WG CDR (RETD) R.S. CHAUHAN



PHOTOGRAPHS: S. RADHAKRISHNA

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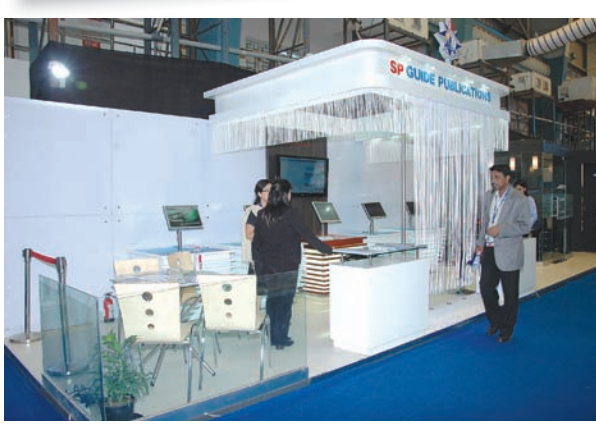

3

EUROFIGHTER

4

S. RADHAKRISHNA

1. BOLLYWOOD STAR SHAHID KAPOOR FLEW LOCKHEED MARTIN'S F-16 SUPER VIPER

2. MINISTER OF STATE FOR DEFENCE M.M. PALLAM RAJU FLIES THE GRIPEN SIMULATOR

3.GERMAN DEFENCE MINISTER KARL-THEODOR ZU GUTTENBERG (SECOND FROM LEFT) AND UK MINISTER FOR DEFENCE EQUIPMENT PETER LUFF (EXTREME RIGHT) AT THE EUROFIGHTER TYPHOON PAVILLION

4. ON THE SECOND DAY OF AERO INDIA 2011 RATAN TATA (ON THE LEFT) FLEW A F/A-18 SUPER HORNET

5. MEMBER OF THE PARLIAMENT AND INDUSTRIALIST NAVEEN JINDAL FLEW THE RAFALE FOR 40 MINUTES

6. PUBLISHER AND EDITOR-IN-CHIEF OF SP'S AVIATION JAYANT BARANWAL NEAR SAAB 2000 MARITIME PATROL AIRCRAFT

7. SP'S WAS OFFICIAL MEDIA PARTNER OF THE SHOW AND BROUGHT OUT 8 PUBLICATIONS APART FROM UNVEILING A NEW FORTNIGHTLY

8. LUXURY BUSINESS JET FALCON 7X

9. 22-YEAR-OLD SHASHANK H.R. FROM BENGALURU EMERGED AS THE GRIPEN INDIA TOP GUN IN THE MONTH LONG CONTEST ORGANISED BY SAAB FOR INDIAN COMBAT AIRCRAFT FOLLOWERS AND THOSE WITH A DREAM TO FLY A FIGHTER AIRCRAFT. HE GOT A 50 MINUTES RIDE ON THE GRIPEN FIGHTER AIRCRAFT

10. SPECTATORS WATCHING SURYAKIRAN TEAM'S FLYING DISPLAY

5

6

PHOTOGRAPHS: SP GUIDE PUBNS

7

"Taxiing" Slowly but Steadily

India's fleet will grow to 650 units by 2029. India is predicted to take 600 deliveries, representing 36 per cent of the total deliveries within the Asia-Pacific region.

By **R. Chandrakanth**

IN 2010, REGIONAL JET deliveries were considerably affected. The first quarter of 2011, however, is coming to a close on a more optimistic note. The celebratory reception of Mitsubishi Aircraft Corporation for Trans States Holdings (TSH) of the US on February 1 for having executed a definitive purchase agreement for 100 next-gen Mitsubishi Regional Jet (MRJ) is something to cheer about. The MRJ, a family of 70 to 90 seat configuration, has entered the manufacturing phase and its first flight is scheduled in 2012.

"We are the first airline outside Japan to purchase this exciting new aircraft, and we will be the first to place it into service in the US. We believe that the MRJ is a game-changing regional jet with its incredibly fuel efficient next-generation Pratt & Whitney "PurePower" geared-turbofan engines, together addressing the vital needs of the environment, as well as the critical needs of passengers and airline operators. The MRJ will reduce fuel consumption, noise and NOx emissions—this means savings on operating costs. By combining the largest cabin in the regional jet market with the innovative seat design and very quiet cabin, we will be able to offer our passengers the best comfort of any regional jet," said TSH President Richard A. Leach.

By featuring state-of-the-art aerodynamic design, noise analysis technologies and a game-changing engine, the MRJ is expected to significantly cut fuel consumption, noise and emissions, consequently improving airline competitiveness and profitability. The MRJ will have a four-abreast seat con-

PHOTOGRAPHS: BOMBARDIER, WIKIPEDIA, MRJ, GE & ANOOP KAMATH / SP GUIDE PUBNS

FLYING HIGH: (OPP PAGE) EMBRAER'S ERJ 145 HAS BEEN HIGHLY SUCCESSFUL IN THE REGIONAL JET INDUSTRY; (TOP) SPICEJET HAS ORDERED 15 BOMBARDIER Q400; MRJ ALREADY HAS AN ORDER FOR 100 NEXTGEN AIRCRAFT

figuration, large overhead bins, and feature an innovative slim seat offering heightened passenger comfort. With these features, the MRJ is going to add to airline competitiveness and profitability.

SPICEJET ORDERS BOMBARDIER

Closer home, budget carrier SpiceJet has announced that its regional services will be launched in the next couple of months, for which it has ordered 15 Bombardier Q400. The delivery plans are eight aircraft this year and the rest in 2012. The strategy is to operate on 16 non-metro routes, a market which is opening up like nowhere. Aviation analysts have projected that air traffic from non-metro airports will increase to 45 per cent from the current 30 per cent in the next 10 years. The potential is about 300 million passengers on these routes. SpiceJet has tied up with US Exim Bank for funding the regional jet aircraft plans, requiring close to $450 million (₹2,025 crore) SpiceJet has 15 aircraft on option too. And Bombardier is hoping further improvement globally though market signs are still weak. Bombardier delivered 97 commercial aircraft, compared to 121 for the previous fiscal year. The delivery guidance for 2011 is about 90 units.

"With a comprehensive portfolio of products, we believe our fundamentals are strong in the long-term for both the business and commercial aircraft markets," said Guy C. Hachey, President and Chief Operating Officer, Bombardier Aerospace. "The aviation industry is cyclical by nature and Bombardier's long history of success is attributable to our ability to face each challenge head-on, focus on the things we can control and put our plans into action," continued Hachey, "Over the past years, we have taken significant steps to strengthen our operations and continue to invest in our future programmes. By meeting the challenges of today and setting our sights on the future, we believe we are creating a loyal customer base for our products and services, and will emerge from this difficult environment a stronger and more efficient company."

Bombardier is focusing on a new 90- to -100-seat regional jet and reports are that it is contemplating a possible stretch of the 86-seat CRJ900, along with a longer variant of the 78-seat Q400 turboprop.

On Indian market trends, Trung Ngo, Vice President, Asia-Pacific Sales, Bombardier Commercial Aircraft, has said that the Indian market fared prominently in Bombardier Commercial Aircraft's market forecast. "In the next 20 years (2010-2029), we envision India is a key driver of economic growth in the Asia-Pacific region with a GDP growth rate of 6.3 per cent over the next 20 years. From a small 20- to 149-seat fleet base of 120 units, India's fleet will grow to 650 units by 2029. India is predicted to take 600 deliveries, representing 36 per cent of the total deliveries within the Asia-Pacific region."

> SpiceJet has announced that its regional services will be launched in the next couple of months, for which it has ordered 15 Bombardier Q400

SUKHOI SUPERJET IN TALKS

Enthused by such potential, Giuseppe Giordo, the Chief Executive of Alenia Aeronautica, has said that the marketing plans for India included selling Sukhoi Superjet 100. "We are talking to several operators in India and we should be able to firm up some orders this year," he said.

Recently, Sukhoi Superjet 100 found favour from Mexican low-cost carrier Interjet which has 20 on order (including options for five). Interjet has chosen the aircraft's 93-seat setup and opted for the higher-thrust version of the PowerJet SaM146 turbofans to deal with its

BACKLOG: (TOP) COMAC'S ARJ21 GET A GE ENGINE AT GE'S SHANGHAI FACILITY; (LEFT) MEXICAN LOW-COST CARRIER INTERJET HAS ORDERED 20 SUKHOI SUPERJET 100

market's hot and high operating conditions. With this order, Superjet International has a backlog of 170 firm orders. The aircraft has received type certification in Russia.

EMBRAER'S AGGRESSIVE MARKETING

Similarly, the Brazilian defence and aerospace major, Embraer has embarked upon an aggressive marketing ploy in India as it believes that the 75 to 100-seat segment will boom in the coming years. At present, Embraer commercial jets are with Paramount Airways which is yet to resume its operations, after having been grounded for various reasons. Worldwide, Embraer has a backlog of some 367 commercial jets, including 208 Embraer 190 and 195 airplanes.

In the Asia-Pacific region, Embraer has been around for three decades with about 60 turboprop and jet aircraft in service. This is besides the 75 flying with carriers in China. Embraer is putting everything behind the passenger and rightly so. The "PAX Factor", Embraer has propositioned, suggests that profits can be increased not only by cutting costs, but also by generating greater revenues with passenger-friendly equipment and a passenger-centric business model.

The E-170 with 70-80 seat configuration and a range of 2,100 nautical miles, looks and feels like a mainline aircraft. It is powered by General Electric CF34-8E engines. The E-175 is 78-88 seats aircraft with a range of 2,000 nm. With airlines discovering the untapped potential of 100-seat capacity aircraft, the E190 replaces old-generation jets and right-sizes fleets with a range of 2,400 nm. The E195 features 108-122 seat capacity and has a flying range of 2,200 nm.

The ERJ 145 family was planned from the beginning with the regional airline market in mind. The ERJ 135 (37 seats); ERJ 140 (44 seats) and ERJ 145 (55) have held their own in the regional jet industry. By the end of 2010, nearly 1,000 aircraft of the ERJ family were in service in about 39 countries, but the course of smaller seat aircraft is narrowing.

DELAYED CHINESE ENTRY

The Chinese programme of regional jet ARJ21 has suffered major delays from its original plan of entry into service in 2007. However, reports are that the ARJ21-700, a baseline model with seat capacity of 78-90 passengers, is expected to get its type certificate soon and be delivered to its first user—Chengdu Airlines by the end of this year at the earliest. COMAC also has a plan to receive the United States Federal Aviation Administration (FAA) certification for ARJ21 in 2012. SP


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Buying A JET

By **Group Captain (Retd) A.K. Sachdev**

The decision to purchase a business jet is a complex one and it is unlikely that a non-aviation business house would have adequate in-house expertise to reach the best decision

THE DIMINISHING DISPARITY BETWEEN a top-end luxury car and a small business jet is a factor of growing importance today. However, the process and criteria one applies while buying a car is quite different from those applicable to the purchase of a business jet. The apt response to the question—what criteria ought to be considered before taking the decision to purchase a business jet, is a counter-question—what do you need the aircraft for? If a prospective buyer answers that question accurately, his decision to purchase an aircraft would turn out to be the 'right' decision. Alternatively, he would join a large number of unhappy aircraft owners who are disappointed with their purchases—either because the aircraft they bought does not meet their expectations or they continue to incur losses on their aircraft for various possible reasons. According to Kapil Kaul, CEO, Centre for Asia-Pacific Aviation (CAPA), India has 912 registered civil aircraft but only 681 are estimated to be effective. Hence it is logical to surmise that the non-effective aircraft represent bad purchase decisions. To put things in the correct perspective, only four of these non-effective aircraft are business jets. Defining the need for an aircraft, however, is not as simple as it sounds since various factors are taken into consideration while describing the need. For the sake of discussion, it is presumed that piston engine and turbo-prop aircraft, along with rotorcraft, have already been ruled out of the purchase decision.

A business jet is usually, but not necessarily, a small jet and may be variedly referred to as a corporate jet, an executive jet

PHOTOGRAPHS: CESSNA, GULFSTREAM, BOMBARDIER & ANOOP KAMATH / SP GUIDE PUBNS

or a private jet (if being used entirely for private purposes). Boeing has Boeing Business Jets (BBJs) built on the Boeing 737 series and even the Boeing 747 series of airframes. However, those are used in small numbers and the generally used business jets tend to be designed with less than 20 seats in the cabin. In India, the most popular business jets have four to 10 seats. In recent years, there has been a perceptible shift in the way business jets are viewed. While they were seen as status symbols earlier much like expensive cars, their value as business enablers has now been realised. Thus, the first bundle of criteria that needs to be considered in the decision-making process would be operational in nature—what is the average length of a trip? Are travel legs short or long? How many passengers typically travel on a leg? What is the premium on time? The generally accepted categories into which business jets get shared out are heavy jets, large jets, super-mid size jets, mid-size jets, light jets and very light jets (VLJ). In general, aircraft with longer ranges tend to be bigger and thus can carry more passengers, but are more expensive to fly and require longer runway lengths. Conversely, the small aircraft can carry less passengers and travel less ranges due to their smaller onboard fuel carriage capacity. A VLJ could typically carry four passengers from New Delhi to most cities in South India but would be considered inappropriate for frequent travel to international destinations. A light jet like a Hawker could carry up to eight passengers to the Middle East but not further to Europe or Africa. If the purpose is to fly often to America, a super-mid size jet would be a more appropriate asset to acquire. It may be mentioned here that smaller the size of the aircraft, the lower the cabin height. In fact, the cabin of a small VLJ could resemble the interior of a car and offers no possibility of standing erect once inside the cabin.

> INDIA HAS 912 REGISTERED CIVIL AIRCRAFT BUT ONLY 681 ARE ESTIMATED TO BE EFFECTIVE
> **—KAPIL KAUL**
> **CEO, CENTRE FOR ASIA-PACIFIC AVIATION**

Before getting down to the number-crunching that would lead to the exact type of aircraft that would best meet one's requirement, it may be worthwhile to consider whether one already has a fleet, and if so, what is the crew availability and existing infrastructure and organisation to support a particular type of aircraft. Thus, even if business required travel to Europe, with an already existing fleet of light jets, the choice would either be to purchase a new type that would do a one-hop to a European destination or another light jet of the type already held to do a one-stop trip to Europe but at a much lower additional cost of operation due to the existing fleet and economy of scale.

Having zeroed in on the general class of aircraft one wanted to buy (seating, internal dimensions, baggage space, speed limits), the next step is a comparative study between different types of aircraft within a particular class of aircraft. The most important criteria to be considered would be the mission parameters i.e. runway length required, flight time, fuel consumed for a typical flight that is envisaged. The airport performance at different elevations and temperatures may become critical if the flights are likely to airports located at heights above 5,000 feet above mean sea level (AMSL). Other less important parameters that would influence the purchase decision could be the external dimensions, the power plant type and flat rating thrust figures, the weight figures (basic weight, maximum ramp, maximum take off, maximum landing, maximum zero fuel, maximum payload, useful load, maximum fuel, available payload with maximum fuel weights), Mach number limits, cabin pressure differential, certificated ceiling, and maximum payload range/speed/trip fuel. While each of these operational factors may not be critical to each decision, these factors are nevertheless worth including in a comparative analysis. As an illustration, one type may have a cabin pressure of 6,000 feet at its maximum cruising height, while another may have a cabin pressure of 8,000 feet. In short duration flights, it may not make a difference but in longer flights, it could make a discernible difference to the comfort level of the passengers, especially in respect of the elderly. It may also be beneficial for the analysis to include the speed/fuel figures for each aircraft under consideration for a typical flight planned (e.g. four passengers over 1,500 nautical miles). The cockpit avionics suite would be another factor for consideration in the purchase of a business jet. There are

CESSNA'S FLAGSHIP:
SUPER MID SIZE JET CITATION X

several professional companies who can be of help for a comparative analysis, but for a coarse analysis, one could refer to the annual comparison tables published by *Business & Commercial Aviation*, a journal brought out by McGraw Hill (last comparison published in May 2010 of ibid journal).

Having shortlisted a couple of types of aircraft after careful analysis of the operational factors described above, it would be a good idea to move on to the engineering and maintenance related issues. One need to consider what kind of maintenance, repair & overhaul (MRO) support is available for the types being considered. For this purpose, brochures from the original equipment manufacturers (OEM) should be read with caution and some effort made to get informal information on the after-sales experiences of previous owners. The question of whether to buy a new aircraft or a pre-owned one has been discussed later in the article, but if the latter is the case, one needs to consider the calendar time/flying time remaining for the next major inspec-

LIST OF BUSINESS JETS ON OFFER GLOBALLY

CLASS	MANUFACTURER	AIRCRAFT TYPE
Heavy Jet	Airbus	A 380
Heavy Jet	Airbus	A 318 Elite
Heavy Jet	Airbus	A 319J
Heavy Jet	Boeing	Boeing Business Jet
Heavy Jet	Embraer	Lineage 1000
Large Jet	Bombardier Aerospace	Global 5000
Large Jet	Bombardier Aerospace	Global 7000
Large Jet	Bombardier Aerospace	Global 8000
Large Jet	Bombardier Aerospace	Global Express
Large Jet	Bombardier Aerospace	Challenger 850
Large Jet	Dassault	Falcon 7X
Large Jet	Gulfstream Aerospace	G 500
Large Jet	Gulfstream Aerospace	G 550
Large Jet	Gulfstream Aerospace	G 650
Super Mid-size Jets	Bombardier Aerospace	Challenger 300
Super Mid-size Jets	Bombardier Aerospace	Challenger 605
Super Mid-size Jets	Cessna	Citation X
Super Mid-size Jets	Dassault	Falcon 900 DX
Super Mid-size Jets	Dassault	Falcon 900 EX
Super Mid-size Jets	Dassault	Falcon 2000 DX
Super Mid-size Jets	Dassault	Falcon 2000 EX
Super Mid-size Jets	Embraer	Legacy 600
Super Mid-size Jets	Gulfstream	Gulfstream G 350
Super Mid-size Jets	Gulfstream	Gulfstream G 350
Super Mid-size Jets	Hawker Beechcraft	Hawker 4000
Mid-size Jets	Bombardier Aerospace	Learjet 60 XR
Mid-size Jets	Bombardier Aerospace	Learjet 85
Mid-size Jets	Cessna	Citation Columbus
Mid-size Jets	Cessna	Citation XLS
Mid-size Jets	Cessna	Citation Sovereign
Mid-size Jets	Dassault	Falcon 50 EX
Mid-size Jets	Embraer	Legacy 450
Mid-size Jets	Embraer	Legacy 500
Mid-size Jets	Gulfstream	Gulfstream 150
Mid-size Jets	Gulfstream	Gulfstream 150
Mid-size Jets	Hawker Beechcraft	Hawker 750
Mid-size Jets	Hawker Beechcraft	Hawker 850 XP
Mid-size Jets	Hawker Beechcraft	Hawker 900 XP
Light Jets	Bombardier Aerospace	Learjet 40
Light Jets	Bombardier Aerospace	Learjet 40 XR
Light Jets	Bombardier Aerospace	Learjet 45
Light Jets	Bombardier Aerospace	Learjet 45 XR
Light Jets	Cessna	Citation CJ1
Light Jets	Cessna	Citation CJ2
Light Jets	Cessna	Citation CJ3
Light Jets	Cessna	Citation CJ4
Light Jets	Cessna	Citation Bravo
Light Jets	Cessna	Citation Encore
Light Jets	Embraer	Phenom 300
Light Jets	Grob	Grob SPn
Light Jets	Hawker Beechcraft	Beechcraft Premier I
Light Jets	Hawker Beechcraft	Hawker 40
Light Jets	Sino Swearingen	SJ30-2
Very Light Jets	Adam Aircraft Industries	Adam A700
Very Light Jets	Cessna	Citation Mustang
Very Light Jets	Cirrus Design	Cirrus Vision SF 50
Very Light Jets	Comp Air	Comp Air Jet
Very Light Jets	Diamond Aircraft Industries	D-Jet
Very Light Jets	Eclipse Aviation	Eclipse 400
Very Light Jets	Eclipse Aviation	Eclipse 500
Very Light Jets	Embraer	Phenom 100
Very Light Jets	Epic Aircraft	Epic Elite
Very Light Jets	Epic Aircraft	Epic Victory
Very Light Jets	Honda	Honda Jet
Very Light Jets	Piper	Piper Jet
Very Light Jets	Spectrum Aeronautical	Spectrum S 33 Independence

Note: This is only indicative and not an exhaustive one

tion (typically 12/24/36/48 months or 600/1200/1800/2400 hours). If, for example, one is considering an aircraft that has a month left to go for its next 48-month inspection, the cost of that inspection needs to be factored into the cost of acquisition. In the case of a new aircraft, the warranty coverage—its tenure and tenor—needs to be considered. One very important consideration in purchase of a used aircraft is its engineering history. Not only should it be checked that all the due servicing and schedules have been followed, but also due consideration should be given to the MROs used for that purpose, and the quality of records available thereof. An aircraft with a history of accident is a certain no-go. No one wants to travel in an aircraft that has been involved in an accident before. The reason is superstition at times, but mostly it is just plain instinct telling a prospective passenger that the accident has probably left the aircraft less safe than before. It is quite possible that a buyer might end up discovering he owns an aircraft with a history of accident much after its purchase. It would be a recommended practice to outsource the services of an expert for carrying out a 'pre-buy' inspection of the aircraft intended to be purchased so that its documented history and logs can be subjected to due diligence.

FAVOURITE CHOICES: (TOP TO BOTTOM) GULFSTREAM G550, BOMBARDIER'S GLOBAL 5000 AND EMBRAER'S PHENOM 300.

The next cluster of considerations—economical and financial—is applicable to nearly every purchase decision except perhaps the one where acquisition of a status symbol is the only motivation. In all other cases, there would probably be a budgetary constraint. Even if the purchasing power of the buyer is higher than the cost of one aircraft, there probably would be a budget for an individual purchase. From the economic point of view, the considerations of various operating costs (route navigation facilities charges [RNFC], terminal navigational landing charges [TNLC], landing and parking charges, insurance, handling, ground handling, hangar charges, navigational database, updating documents) are important. Generally, most of these are directly proportional to the size (all up weight) of the aircraft. In the same vein, a larger aircraft would burn up more fuel, require larger runway lengths which would be available at larger airports with higher landing/parking charges and cost more to maintain. Having considered these factors, one would reach a balance between one's operational requirements and one's budgetary constraints. At this stage, it might be profitable to address the question of whether to buy a new aircraft or a pre-owned one. The economic comparison would consider historical data of maintenance activities on a pre-owned aircraft during the last say, three or five years, to then compare it with the cost differences in real terms between a pre-owned and a new aircraft—a simple but crucial opportunity cost decision. An expert would be of use here again to make sense of the market information and to use a term sneered at by some, 'time the market' for affecting the actual purchase. This exercise is akin to playing the stock market and is not an exact science. One could make an 'informed' decision on whether to purchase now or delay, but like in the case of the stock market, one could never guess right with a 100 per cent probability.

The decision to purchase a business jet is a complex one and it is unlikely that a non-aviation business house would have adequate in-house expertise to reach the best decision. The exercise is best left to an expert company; typical services provided by such companies can be viewed at the official site of Conklin and de Deckers—one such company name picked up at random and not necessarily the best or the most recommended one.

A final word of caution for prospective buyers of a pre-owned business jet—the services of the company or agency hired for the diligence and comparative analysis should be at a flat fee, and not a percentage commission. This is to ensure that the expert company's motivation to earn a bigger commission does not lead to a higher purchase cost for you. All the best if you are planning to purchase a business jet in the near future. SP

100 and Counting

In the last five years prior to the centenary, domestic air travel has doubled. In 2010 alone, Indian carriers mounted a total of 5,25,504 flights on the domestic network, carrying 520.21 lakh passengers and making this the ninth largest civil aviation market in the world.

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

THE FIRST COMMERCIAL FLIGHT in India took to the air from an open field in Allahabad within sight of the confluence of rivers Ganges and Yamuna. The date was Saturday, February 18, 1911 and the setting—the United Provinces Exhibition. The occasion was billed as the world's first official aerial post, which is why Lieutenant Governor Sir John Hewitt and Lady Hewitt, many government officials and a large crowd were assembled. A 23-year-old Frenchman, Henri Péquet (1888-1974), took off in a British-built Humber-Sommer biplane, fitted with a 50 hp rotary Gnome engine. He carried a 30-pound mail sack containing over 6,000 letters and 40 picture postcards which bore a special postmark 'First Aerial Post, UP Exhibition, Allahabad, 1911'. The postal die showing the silhouette of a biplane flying over the mountains had been cut at the Postal Works, Aligarh, especially for the event. Péquet flew to the fortress at Naini Junction, about five miles away, where he handed over the precious sack to a lone Post Office employee for onward dispatch of the mail by surface to celebrities and common folk all over the world. He returned immediately to the exhibition, completing the round trip in just 27 minutes.

One would have expected this historic flight to trigger a flurry of civil aviation activity in the subcontinent, but nothing of the kind happened for about two decades. The First World War (1914-18) firmly shifted the focus of aerial endeavour on to the military domain. However, there were some demonstration flights and a few intrepid aviators took to the air here and there. Meanwhile, in January 1914, the world's first regular scheduled airline, the St Petersburg-Tampa Air Line began flying in Florida, USA, operating Benoist flying boats. In the UK, Imperial Airways, formed by merging four small airlines, took wing on April 1, 1924. This long-range air transport company operated till 1939 serving parts of Europe and the Empire routes to South Africa, India and the Far East. In December 1926, the first de Havilland DH-66 Hercules airliner ordered by Imperial Airways for service on overseas routes, left England to chart a new route to India via Egypt, arriving in Delhi in January 1927. In March 1929, the Short Calcutta, which was the first of Imperial Airways' flying boats, left London for Karachi, connecting India with the UK for the first time through a regular air network. Later the same year, this route was extended to Jodhpur and Delhi, thus becoming India's first regular domestic passenger flight. A temporary service from Karachi to Delhi run by the Indian State Air Service, operated sporadically between 1929 and 1931.

TATA FORGES AHEAD

Year 1929 was also the year when young J.R.D. Tata obtained his pilot's licence through the Aero Club of India and Burma and became the first Indian to get it. The first Indian woman to earn a pilot's licence was Urmila K. Parikh in 1932. In 1930, Tata Sons began chewing over a proposal to

PHOTOGRAPHS: PIB, INDIA POST & CIVIL AVIATION

1911
The first commercial flight

Postal die which was specially cut at Postal Works, Aligarh

1929
J.R.D. Tata gets pilot's licence

1932
Tata Aviation Service starts

JUBILANT MOOD: THE UNION MINISTER FOR OVERSEAS INDIAN AFFAIRS AND CIVIL AVIATION VAYALAR RAVI ADDRESSING THE CENTENARY CELEBRATIONS OF CIVIL AVIATION IN INDIA, IN NEW DELHI ON FEBRUARY 18

start an airmail service connecting Bombay, Ahmedabad and Karachi. Though J.R.D. Tata was instantly fired with enthusiasm, Dorabji Tata, then chairman of the Tatas, took some time before letting the youngster have his way. Thus Indian commercial aviation actually launched in sustained fashion on October 15, 1932, from Drigh Road near Karachi. The Imperial Airways flight carrying mail from England halted there, so the route chosen by Tata was Karachi-Ahmedabad-Bombay-Bellary-Madras. J.R.D Tata himself got airborne in a de Havilland DH 80A Puss Moth—his destination the Juhu mud flats near Bombay. From Juhu, Nevill Vintcent, a former Royal Air Force pilot and close friend of Tata, then took over for the journey to Madras, arriving on October 16. The first west bound flight left Madras the next day.

Such was the humble birth of Tata Aviation Service. It initially had just one Puss Moth and one Leopard Moth aircraft, one palm-thatched shed, one whole-time pilot assisted by Tata and Vintcent, a part-time engineer and two apprentice-mechanics. In 1933, the first full year of operation, it flew 1,60,000 miles, carried 10.71 tonnes of mail and 155 passengers. No mean achievement. Over the next few years, Tata Air Lines (it was so renamed in 1938) continued to be heavily dependent on its contract with the government for carriage of surcharged mail, including a considerable quantity of overseas mail conveyed to Karachi by Imperial Airways. It later greatly benefitted from the UK Empire Air Mail Programme which commenced in June 1937, delivering mail to any destination for just a penny and a half per ounce. Neither were there special arrangements for the few passengers, nor did they fuss about it; they were generally accommodated on the sacks of the mail. It took some years for revenues from passenger traffic to overtake those accruing from air mail; that is when proper passenger aircraft were introduced. Inspired by Tata's success, other private airlines like Indian Transcontinental Airlines and Indian National Airways commenced operations. The Indian Aircraft Act was promulgated in August 1934 and the Aircraft Rules in 1937; both are valid till today.

Although J.R.D Tata became the fourth chairman of the entire Tata Group in 1939, his Airline remained his lifelong

1948
Air-india International's first flight

1953
Air Corporations Act establishes Indian Airlines and Air India

AIR-INDIA

1960
AI enters the jet age by the induction of Boeing 707

1991
Private players enter the Indian aviation sector

2003
Capt. Gopinath pioneers the low-cost carrier concept

passion. In July 1946, it became a public limited company called Air-India. In March 1948, the Indian Government acquired a 49 per cent stake in the airline. Air-India operated its first overseas flight (Bombay to London) on June 8, 1948 and in the process it became the designated national flag carrier. Year 1948 was also the year when Prem Mathur became the country's first woman commercial pilot and started flying for Deccan Airways—the premier airline of the erstwhile Hyderabad State.

Apart from Air-India, the aviation scene after Independence was rather messy. No less than 11 private airlines were competing for traffic sufficient for only two or three. Eventually, by the Air Corporations Act of 1953, the Government of India nationalised nine airline companies. The Act established just two carriers— Indian Airlines Corporation to cater to domestic air travellers and Air-India International for international passengers. Civil helicopter services were introduced the same year.

In 1956, Durga Banerjee became the first woman pilot of Indian Airlines. Air-India International entered the jet age in 1960 when its first Boeing 707-420 was flown. In June 1962, the airline's name was again shortened to Air-India and it became the world's first all-jet carrier. The jet age dawned for Indian Airlines with the introduction of the Sud Aviation SE210 Caravelle in 1964. In 1990, Air-India, in association with Indian Airlines, airlifted 1,11,711 stranded Indian nationals from Amman to Mumbai by operating 488 flights in 59 days, prior to the First Gulf War. Vayudoot was established in 1981 to provide feeder services between smaller cities. It was merged with Indian Airlines in 1993.

J.R.D. Tata remained the chairman of Air-India for 25 years after nationalisation. It is doubtful if the airline could have achieved the commanding heights it did without his hands-on approach. He transformed it from just another carrier into one of the world's best—epitomised by its mascot the Air-India Maharaja. He was not called the 'Father of Indian Civil Aviation' for nothing.

PRIVATE ENTERPRISE TAKES OFF

The three state-owned airlines monopolised and dominated the Indian commercial aviation industry for almost 40 years. Then the 1991 economic crisis wafted the winds of liberalisation over the country and breathed fresh life into the aviation sector. Private companies were initially given permission to operate only charter and non-scheduled services. East-West Airlines was the first national private airline to fly after almost four decades. By 1995, several private airlines were operational and accounted for around 10 per cent of domestic air traffic. However, old habits die hard, and protecting the state-owned carriers remained the government's hidden agenda. The newcomers faced harsh fiscal and other restrictions which eventually resulted in the collapse of the entire private airline industry, except for Jet Airways and Sahara.

A few years passed before the next wave of private airlines emerged. In 2003, Captain G.R Gopinath set up Air Deccan and pioneered the low-cost carrier (LCC) concept in India. This was soon followed by GoAir (2004), Kingfisher Airlines (2005), SpiceJet (2005), Paramount Airways (2005), IndiGo (2006) and MDLR Airlines (2007). Subsequently, Paramount and MDLR suspended operations; hopefully they will be back. The mergers of Jet Airways and Sahara (JetLite), Kingfisher and Air Deccan (Kingfisher Red), and Air India and Indian, also took place.

By the Air Corporations Act of 1953, the Government of India nationalised nine airline companies

This last union was announced in 2007, and as part of the process a new company called the National Aviation Company of India Limited (NACIL) was established. Sadly, NACIL once again renamed Air India, is racked by financial distress and employee unrest and is a pale shadow of its former self. What have saved it from going belly-up are the regular government doles. The third edition of private enterprise finally worked—private carriers now rule the roost having garnered almost 85 per cent of domestic air traffic.

PÉQUET PEEPS AHEAD

On his short flight from Allahabad to Naini, Henri Péquet's entire concentration was probably on the job in hand-flying. His only instruments were a wristwatch and an altimeter strapped to his knee. As he crossed the Yamuna at a height of 120-150 feet and a speed of 50-60 mph, he may not have had time to muse on the fact that his largely symbolic flight marked the dawn of commercial aviation in India. Had he been able to gaze a hundred years into the future, however, he would have glimpsed a country with seven scheduled airlines operating 435 aircraft and connecting 82 operational airports with each other and the world.

The last decade has witnessed particularly rapid progress. Along with privatisation of the major metro airports, Greenfield airports were encouraged and modernisation projects were launched for 35 non-metro airports. At the same time, private airports were permitted. A domestic open skies policy was established, there was active encouragement of LCCs, and a liberal international bilateral regime was established and pursued. However, general aviation, which is still languishing, needs the same support if it is to achieve similar success.

In the last five years prior to the centenary, domestic air travel has doubled. In 2010, Indian carriers mounted a total of 5,25,504 flights on the domestic network, carrying 520.21 lakh passengers making this the ninth largest civil aviation market in the world. According to the latest figures of the International Air Transport Association (IATA) India, with a projected growth of 10.5 per cent, it should reach 690 lakh domestic passengers by 2014, making it the world's fifth largest market.

Indian carriers are now spreading their wings. Air India, Jet Airways and Kingfisher Airlines already touch many destinations abroad. In October 2010, SpiceJet also went international. IndiGo will fly international routes from August when it completes five years of domestic operations—a major regulatory requirement. SP

Unravelling the SUPER VIPER

Pulling 'g' was like shedding mental and physical cobwebs accumulated over eight years of 'life after Air Force' and proved to be highly therapeutic, to say the least

HANDS-ON: AIR MARSHAL (RETD) V.K.BHATIA IN THE COCKPIT

AN UPWARD TWIST AND a gentle forward push of the throttle and the afterburner roared into life quickly accelerating the 'Super Viper' down Runway 09 at Indian Air Force Yelahanka base near Bangalore. Pushed by an awesome 32,000 pounds of thrust of the GE F110-132A, the 'jet' leapt off the terra firma after a short take-off roll. Retracting the landing gear from the front cockpit, 'Benson Hedges', Falcon 2, in a two-ship formation handed over the controls to me for what turned out to be another highly memorable and in some ways remarkably different F-16 sortie.

It was on March 27, 1995, while leading an IAF delegation to the US, I had the first opportunity to fly an F-16 at one of the United States Air Force flying training bases. But the aircraft that I flew on that occasion was the earlier F-16B model of the Fighting Falcon. Almost 15 years later, what I flew on February 10, during the Aero India 2011 air show was an infinitely superior airplane in many aspects compared to its older sibling. According to its manufacturer Lockheed Martin, evolutionary integration of technologies of its latest F-22 Raptor and F-35 Lightening II fifth generation fighters has made the Super Viper emerge as the ultimate 'fourth generation fighter' that meets or exceeds India's medium multi-role combat aircraft (MMRCA) requirements and is absolutely the right choice for the IAF.

Earlier, I had been given a quick run of the Super Viper's capabilities in the simulator at Lockheed's main show pavilion in Hall 'E' at the exhibition grounds. The briefing and cockpit familiarisation were conducted in a highly efficient manner bringing out the unique qualities of the active electronically scanned array (AESA) radar with simultaneous multi-mode functions, the full-colour all-digital cockpit, net-centric warfare and electronic warfare capabilities. Now it was time to experience the real stuff in the air. After take-off, on instructions from Ben, I banked the aircraft in a climbing turn to the right to move into the assigned south-west sector for our manoeuvres. Even though saddled with the conformal fuel tanks (CFTs) on both sides of the fuselage, the Super Viper handles with ease during all types of manoeuvres such as hard turns, wingovers, barrel rolls, loops, etc, which I carried out with great pleasure during the initial handling of the aircraft in the sector. Pulling 'g' was like shedding mental and physical cobwebs accumulated over eight years of 'life after Air Force' and proved to be highly therapeutic, to say the least. However, as usual, such heavenly joys are short-lived and after about 10 minutes of aerobatics, we got down to the serious business of exploring operational capabilities of the 'jet'. Ben demonstrated the capabilities of the APG-80, the only AESA radar available in the international market today. This revolutionary all-weather precision targeting sensor provides outstanding situational awareness and detection, ultra-high resolution synthetic aperture radar (SAR) mapping, fully interleaved with automatic terrain following and air-to-air tracking of multiple targets. We killed a couple of 'bandits' in mock missile attacks and then engaging the terrain following mode at 100 ft agl (above ground level), enjoyed the hands-off camel ride over the hilly terrain of western Karnataka, which incidentally was dotted with windmills.

The beauty of the entire system is that the AESA can handle and display all the modes simultaneously, on individual panels or collectively on the tactical situation display (TSD) panel, providing excellent situational awareness to the pilot with the least amount of workload. The pilot can receive data-linked instructions to engage a ground target, keep a watch on friendly tracks and engage the 'hostiles' while evading/neutralising hostile ground-to-air threats with real-time information being available on the single TSD. The Super Viper has an external load capability of 8,000 kg. As far as the reach is concerned, the F-16IN can deliver in excess of 1,500 kg of ordnance on targets more than 1,700 km away and return home without refuelling. It also carries the most advanced electronic warfare system (EWS) including the aerial towed decoy system.

Simulating operational tasks in the air, it was time to head home. During the return flight, after putting the aircraft in an unusual attitude, Ben asked me to operate a switch which quickly auto-recovered the jet by bringing it into a shallow climb, wings level flight. The same could also be pre-programmed with a minimum height auto recovery to save a pilot when disabled such as due to 'g-lock', etc.

With high-speed arrival over the runway with a starboard break, quick circuit and landing, ended the most enjoyable, instructive and an unforgettable sortie in the Super Viper—a serious contender in India's MMRCA race. Back on the tarmac, I discovered that not only Benson Hedges but even the Crew Chief's first name was 'Jim'. Can there be a more unforgettable coincidence than this? SP

—Air Marshal (Retd) V.K. 'Jimmy' Bhatia

PHOTOGRAPH: LOCKHEED MARTIN

Unmanned & Unlimited

RECORD HOLDER: QINETIQ'S ZEPHYR CAN STAY ALOFT FOR ABOUT 14 DAYS. IT HAS AN ULTRA-LIGHTWEIGHT CARBON FIBRE DESIGN

PHOTOGRAPHS: QINETQ, NORTHROP GRUMMAN, AEROVIRONMENT & BOEING

The race is on to design and produce UAVs for ISR duties with ever-increasing time on station. In future, most likely, UAV endurance will extend to weeks, perhaps even months.

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

UNMANNED AERIAL VEHICLES (UAVs) are now operationally deployed or being considered for use in practically every role that manned combat aircraft are capable of. Deadly armed UAVs have been used for years against high-value ground targets in the Afghanistan-Pakistan region and other conflict zones. And it's only a question of time before an unsuspecting fighter pilot somewhere in the world finds himself locked in combat with an unmanned but lethal adversary. However, this article is about the first and most significant function of UAVs—intelligence, surveillance and reconnaissance (ISR).

The race is on to design and produce UAVs for ISR duties with ever-increasing time on station. To begin with, unmanned airborne endurance was measured in terms of hours. Now a handful of UAVs are beginning to demonstrate the ability to operate for days at a time. In future, most likely, UAV endurance will extend to weeks, perhaps even months. Why is the ability of surveillance UAVs to stay aloft for extended periods so crucial? The far higher accident rate of unmanned platforms as compared with manned aircraft is partially attributable to the high number of UAV take-offs and landings. Remaining airborne for a longer duration decreases take-offs and landings. This, in turn, sharply re-

duces accident risks and associated costs. It also means that round-the-clock target surveillance can be mounted with as little as a pair of UAVs—one remaining on patrol, while the other returns to base for refuelling and maintenance.

High-altitude long-endurance (HALE) UAVs have most of the advantages and not many of the disadvantages of orbiting satellites. Operating in the stratosphere, they fulfil the need for a surveillance capability that never needs to take time out, yet is cheaper to operate and easier to adapt and upgrade than a satellite. Satellites have inherent drawbacks. A low-earth satellite, orbiting at an altitude of 320 km or so, cannot keep a desired target in continuous view. After passing over a point, it revisits it again only after a full orbit. A satellite in geosynchronous orbit can indeed maintain over a designated point, but it needs heavy, expensive telescopes, powerful enough to pick up small objects on the surface of the earth, some 36,000 km away. A minor glitch in a critical onboard system could bring an early end to the mission and the abandonment of a costly satellite. Naturally, therefore, long-dwell stratospheric surveillance by UAVs is a capability coveted by many nations.

lightweight airframe, efficient aerodynamics and propulsion, reliable systems and autonomous operation. The aim will be to reduce the cost of an hour's surveillance to around 20 per cent of the cost of currently deployed systems like the MQ-1 Predator, its successor the MQ-9 Reaper, and the manned MC-12W Liberty ISR aircraft.

The Orion flies slowly—barely touching 90 kt as compared with 310 kt for the RQ-4B Global Hawk and 150-170 kt for the MQ-9 Reaper. Its low cruise speed improves fuel efficiency and allows use of a pair of Austro diesel engines rather than more costly and thirsty jet engines. But flying slow may decrease weather tolerance and so a compromise has to be struck. Onboard systems also need to be extremely rugged and reliable to fulfil the 120 hour on-station promise. No single point of failure is acceptable; some components are triple-redundant and others are double. The UAV also features autonomous operation—capability to take-off and land without a pilot in the loop—which means lower overall costs by reducing the number and training of crew required to operate the system.

INNOVATIVE UAVS: NORTHROP GRUMMAN PLANS TO LAUNCH THE FIRST LEMV IN NEXT FEW MONTHS; HYDROGEN-POWERED GLOBAL OBSERVER IS ADVERTISED AS A PSUEDO-SATELLITE

ORION ON TARGET

Aurora Flight Sciences is trying to revolutionise the accepted definition of long loiter time with its Orion medium-altitude long-endurance (MALE) UAV, at present in the technology demonstration phase. The Orion was unveiled on November 22, last year, in Mississippi USA, and its first flight is expected mid-year. A decade or so ago, the MQ-1 Predator had top-dog status by virtue of its maximum 30-hour capability. If Aurora's efforts bear fruit, such performance will soon seem pedestrian. The Orion is designed to fly for 120 hours (five days) at 20,000 ft, carrying a 1,000 pound multi-sensor payload. This too will mark a huge increase over the Predator's 450 pound payload. The Orion's long endurance will mean a time-on-station capability ranging from 113 hours at 550 nm range to 47 hours at a distance of 3,000 nm. Alternatively, it can deliver a total mission range of more than 9,500 nm allowing it to be located farther from its target—at a main base where fuel costs much less than when transported to a forward launch location. Its superior performance will be achieved through a combination of a

HOPES HIGH ON HYDROGEN

If Orion's five-day endurance seems impressive, that could be almost doubled by switching to hydrogen (stored as liquid but burnt as gas) as AeroVironment and Boeing are currently attempting. AeroVironment's newest unmanned HALE UAV, Global Observer, is advertised as a "pseudo-satellite". It will be able to fly for five-seven days at a time, at altitudes of 55,000-65,000 ft carrying a communications and ISR payload. The all-composite, 175-foot wingspan UAV (bigger than the B767's 156-foot wingspan) aims for a payload capacity of up to 400 pounds for the GO-1 and 1,000 pounds for the GO-2. Operating high above weather systems and above other aircraft, it can remain out of sight and out of range of most anti-aircraft missiles. By virtue of its extreme altitude, the UAV can scan a circular area on the surface of the earth up to 600 miles in diameter, which works out to more than 2,80,000 square miles of coverage, almost

like a satellite. And yet, it will do the work of a satellite for just tens of millions of dollars, against hundreds of millions or even a billion dollars for an advanced surveillance satellite. Quite unlike a satellite, it can be up on duty within a matter of hours. It also has the ability to quickly reposition, if required. The Global Observer goes beyond mere surveillance—in addition to its onboard cameras it can provide cell phone, TV and broadband Internet for the same area, by virtue of its sophisticated communications equipment. It is also useful for maritime patrol, storm tracking and weather applications.

HYDROGEN-POWERED: BOEING'S PHANTOM EYE IS HYDROGEN-POWERED DEMONSTRATOR UAV

On January 11, the Global Observer completed its first hydrogen-powered flight, staying airborne for four hours at up to 5,000 ft. Its innovative propulsion system uses liquid hydrogen and fuel cells to drive eight small rotary engines set along the wings. The engines drive a generator that powers four propellers and charges the storage batteries. Liquid hydrogen is expensive and hard to store and can be dangerous to handle because its temperature is extremely low. Hydrogen atoms are also tiny, so leaks are a big problem. Still, hydrogen offers three times the energy density of conventional fuel and affords a marked improvement in endurance. It is also a clean source of power, leaving water as the only by-product of combustion.

Boeing is on a similar hydrogen quest, attempting to break the record for long-endurance flight by a high-altitude UAV. It unveiled its Phantom Eye hydrogen-powered demonstrator UAV last July. The demonstrator, intended to evaluate the Phantom Eye's technical proficiency, has a 150-foot wingspan. It is smaller by 40 per cent compared with the planned full-scale version which will have a 250-foot wingspan. The propeller-driven demonstrator has a pair of 150-hp, 2.3 litre four-cylinder engines. Boeing says it will be able to cruise at about 150 kt and carry a payload of up to 450 pounds, remaining airborne for four days. The UAV is scheduled for first flight early this year. Boeing's future objective is a production Phantom Eye with endurance of 10 days, which will enable it to remain on patrol for four days at 10,000 nm range, or six days at 6,000 nm distance. The full-scale Phantom Eye, which will carry 2,000 pounds payload, is intended for both military and commercial use.

REMAINING UP THERE FOREVER

Any stored fuel must ultimately run out. So is it time to switch to an unlimited source of energy, the sun, for practically perpetual flight? QinetiQ thinks it is. Zephyr, its solar-powered UAV, holds the current endurance record for a UAV flight, officially certified by the Fédération Aéronautique Internationale (FAI). Getting airborne on July 9, 2010, Zephyr stayed aloft 336 h 22 min (14 days and 22 min), reaching a record altitude of 70,741.5 ft in the process. In comparison, the previous official record for unmanned flight, held by the RQ-4A Global Hawk, stood at just 30 hrs 24 min.

The record-breaking Zephyr has an ultra-lightweight carbon-fibre design, around 50 per cent larger than its previous prototype. It weighs 53 kg and has a 22.5 m wingspan. Its wing area has been increased by means of a wider chord. Winglets have been fitted to provide extra lift and a new T-tail configuration has been adopted to reduce drag. The wing houses rechargeable lithium-sulphur batteries, charged by wing-mounted solar arrays. The UAV also has a new power management system, which permits individual batteries to be switched off to conserve energy.

With some enhancement there's no good reason why a solar-powered UAV cannot remain airborne practically forever, recharging its cells by day and using the stored energy to continue flying each night. Its endurance will be limited only by its tolerance of the harsh conditions of the stratosphere and by its ability to avoid critical system failures. The main hitch, however, is payload. Current solar-powered craft just concentrate on remaining airborne—which they do rather well—and cannot carry much equipment beyond their own airframe, engine and storage batteries. That could change, in due course, ushering in an era of low-cost, perpetual aerial surveillance.

Lastly, remotely piloted airships are also being investigated for persistent ISR. A hybrid airship, being built by Northrop Grumman, is designed as a surveillance and reconnaissance platform under the US Army's long-endurance multi-intelligence vehicle (LEMV) technology demonstration programme. The airship will be more than 300 feet long and 70 feet tall, and capable of staying aloft for over three weeks at a time. Northrop Grumman hopes to launch the first LEMV airship sometime this summer and it is scheduled to be demonstrated in Afghanistan 18 months after June 2010. Airships, however, are large and ponderous and rather more difficult to deploy, switch targets and retrieve than UAVs. They may also be more vulnerable to weather and enemy action. As always, any military force would like to possess a mix of capabilities so that it can employ the best-suited resource for a specific need. SP

THE SURPRISE JAPANESE ATTACK on Pearl Harbour on December 7, 1941, catapulted an unprepared USA into World War II. Most military pilots soon departed for the warfront leaving behind a severe shortage for tasks such as ferrying squadrons of aircraft from factories to training bases, providing target practice, testing new planes and training. Hardly any men were available, but what about the thousands of skilled women pilots?

Renowned fliers Jacqueline Cochran and Nancy Harkness Love separately proposed that women's wings be established specially to ferry aircraft. After months of resistance, their endeavours finally bore fruit. Beginning September 1942, the two independently started to train small groups of women to fill the gaps left by the missing men. On August 5, 1943, their efforts were united to create the Women Airforce Service Pilots (WASP). About 25,000 women from across the USA applied, but only 1,830 were accepted and just 1,074 completed training and became WASP (not WASPs, because WASP itself is plural). Walt Disney's lovable female gremlin Fifinella became their official emblem.

The initial trainees needed a pilot's licence and 500 hours of flying time, but those who joined averaged more than 1,000 hours. They had to pay their own passage to the training base in Sweetwater, Texas. It was the only all-female military flying base in history and the girls called it Cochran's Convent. They received no gunnery training and very little formation flying and aerobatics, but went through the manoeuvres necessary to be able to recover from unusual attitudes. The percentage suspended during training compared favourably with the elimination rates for men. The first class graduated on December 17, 1943. Each month another batch began, 18 in all. After training, WASP fliers were stationed at 120 bases across the US. Eventually so many were available that Cochran announced that they would accept any function (she called them "dishwashing jobs") that might release additional men for combat duty. They undertook thousands of operational flights from aircraft factories to ports of embarkation and training bases, towing targets for live anti-aircraft artillery practice and simulated strafing missions, besides transporting cargo. They began by successfully handling the light planes, thus proving their skill and stamina. They were gradually permitted to fly bigger, faster, and heavier aircraft. Eventually WASP came to fly every aircraft in the military inventory. Between September 1942 and December 1944, the WASP delivered 12,650 aircraft of 77 different types.

WOMEN AIRFORCE SERVICE PILOTS 1942-1944

The WASP proved that a military plane cannot really distinguish between male and female; only between good and bad pilots

In truth they were not mere dishwashing jobs. A few women were selected to test rocket-propelled planes, to fly jet-propelled planes, and to work with radar-controlled targets. The WASP also proved useful to redeem reputations. The B-29 Superfortress, for example, was considered to be a dangerous aircraft, prone to engine fire. Colonel Paul Tibbets, who piloted the B-29 that dropped the atomic bomb on Hiroshima, sent two WASP to show the men that the heavy bomber was "safe enough for a woman to fly". Similarly, the B-36 Marauder had snuffed out so many lives that it was called the "Flying Coffin" while the P-39 Airacobra was nicknamed the "Widow Maker". WASP graduates were again dispatched to demonstrate that the planes were indeed safe, if handled properly.

Target-towing duty was the most dangerous WASP mission. Often the tow aircraft returned with its body riddled with bullet holes and there were some fatal accidents as well. In all, 38 WASP lost their lives in service. However, because they were not considered to be in the military, but under Civil Service rules, a dead WASP was sent home at family expense without traditional military honours. The family were not even permitted to drape the US flag over the coffin.

It was always assumed that the WASP would someday become part of the military; instead it was deactivated in December 1944. At the time, there were 916 women pilots on duty, but though they had proved themselves beyond doubt (and some volunteered to continue flying without pay) no place could be found for them except back in their kitchens. WASP records were classified and sealed. It wasn't until 1977 that the US Congress granted veteran's status to those who had served as WASP. Later, they were also issued official honourable discharges and applicable military medals.

Nowadays, it is generally accepted that given half a chance, women can indeed fly combat aircraft. The WASP proved that a military plane cannot really distinguish between male and female; only between good and bad pilots. Yet, listen to WASP Cornelia Fort: "Any girl who has flown at all grows used to the prejudice of most men pilots who will trot out any number of reasons why women can't possibly be good pilots... The only way to show the disbelievers, the snickering hangar pilots, is to show them." Show them women pilots—an inspiration for all women on International Women's Day?. SP

—Group Captain (Retd) Joseph Noronha, Goa

MILITARY

Asia-Pacific

Emiraje awarded contract for UAE ECCS

The UAE Armed Forces has awarded a $550 million contract to Emiraje Systems LLC for the United Arab Emirates Command and Control System (ECCS). ECCS is a major command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) programme, which will federate, integrate, coordinate and maximise the combined efficiency of the UAE armed forces assets. As prime contractor of ECCS, Emiraje Systems LLC carries out in Abu Dhabi all system design and system integration activities, as well as the development of critical components.

Embraer unveils new EMB 145 AEW&C Platform

Embraer has presented the first of three EMB 145 airborne early warning and control (AEW&C) platforms to representatives of the Indian Government at a ceremony held at its headquarters in São José dos Campos, Brazil.Based on the proven Embraer ERJ 145 regional jet, the aircraft features an in-flight refuelling system, satellite communication (SATCOM) capability, a significant increase in electrical and cooling capacities, and a comprehensive set of aerodynamic and structural changes. These improvements will allow the installation of the advanced electronic systems currently being developed by India's Defence Research & Development Organisation under Centre for Airborne Systems' (CABS) coordination.

Americas

Boeing EA-18G Growlers deployed by US Navy

Boeing on February 17 announced that EA-18G Growler airborne electronic attack aircraft have been deployed for the first time by the US Navy. The EA-18G is the only air combat platform that delivers full-spectrum airborne electronic attack (AEA) capability along with the targeting and self-defence capabilities derived from the Navy's frontline fighter, the F/A-18E/F Block II Super Hornet. A derivative of the two-seat F/A-18F Block II, the EA-18G's highly flexible design enables warfighters to operate either from the deck of an aircraft carrier or from land-based airfields. It is replacing the Navy's current AEA platform, the EA-6B Prowler, which has been in service since 1971. The EA-18G joined the Navy's aircraft fleet in 2008, when it was introduced to fleet training squadron VAQ-129.

Boeing receives USAF contract to build next-gen refuelling tanker

Boeing has received a contract from the US Air Force to build the next-generation aerial refuelling tanker aircraft that will replace 179 of the service's 400 KC-135 tankers. The contract calls for Boeing to design, develop, manufacture and deliver 18 initial combat-ready tankers by 2017. "We are honoured to be given the opportunity to build the Air Force's next tanker and provide a vital capability to the men and women of our armed forces," said Jim McNerney, Chairman, President and CEO, Boeing. In selecting the Boeing NewGen tanker after a lengthy and rigorous proposal process, the Air Force has chosen an American-built, multi-mission tanker that is based on the proven Boeing 767 commercial airplane and meets all requirements at the lowest risk for the warfighter and the best value for taxpayers.

First Navy pilot to fly carrier variant of F-35 Lightning II

Lt Commander Eric "Magic" Buus became the first United States Navy pilot to fly the

RAYTHEON INDIA'S NEW LIAISON OFFICE

Making a strong statement of "long haul" commitment to India, Raytheon Company has expanded its Raytheon International India liaison office, the next step being setting up a manufacturing facility as and when the defence and homeland security business finds the scale.

Reinforcing the "expanding partnership" with India, Senior Vice President of Business Development and CEO Raytheon International Thomas M. Culligan; Raytheon Asia President, Walter Doran and Raytheon India President William L. Blair announced at the opening of the office at Radisson Commercial Plaza in New Delhi, that it will "support the company's efforts to deepen its relationships across India". "For more than 60 years, Raytheon has collaborated with the Indian Government and has been a valued partner across civil aviation, air traffic management, satellite navigation and defence," said Blair. "As we look towards the future, our new office will enable Raytheon to further support the requirements of our customers and suppliers in India." The "sweet spot" or the "DNA of Raytheon" is defence, said Doran and reiterated that the company would offer the best of equipment to India. •

QuickRoundUp

AFGHAN AIR FORCE

• The Afghan Air Force (AAF) received an addition to its forces with the arrival of the 10th C-27A Spartan at the Afghan Air Force Base in Kabul, marking the half-way point in the AAF's C-27 fleet as it continues to build up to 20. Not only valuable for Afghanistan's burgeoning cargo capabilities, the addition of another C-27 provides a greater training platform for the AAF as it gains a greater proficiency in the aircraft.

AGUSTAWESTLAND

• AgustaWestland North America has introduced its AW139M military helicopter for the US military market which has been customised for the military version of the multi-role, off-the-shelf AW139 medium-twin helicopter. It has been integrated with proven US military technology for the US Air Force's common vertical lift support programme.

AIRBUS

• Airbus Military has performed an initial series of air-to-air refuelling trials of the A400M airlifter using a Vickers VC10 tanker of the UK Royal Air Force (RAF) operating from Toulouse. A400M development aircraft Grizzly 1 executed a series of dry contacts with the VC10's fuselage-mounted hose drum unit. The RAF is one of the launch customers for the A400M.

ARIANESPACE

• Arianespace began a landmark year of launch activity with an "exceptional" Ariane 5 mission that orbited the second European automated transfer vehicle (ATV) for servicing of the International Space Station. Ariane 5 vehicle carried its heaviest payload ever, lofting a total mass of 20,050 kg, which included 19,700 kg for the ATV, plus associated integration hardware.

ASTRIUM SERVICES

• Astrium Services has been awarded a contract by the Canadian Department of National Defence (DND) to deliver the air patrol airborne satcom terminal to support Canada's Radar and Imaging for the Land/Littoral Environment Technology Demonstration Project. The terminal, which will be delivered and supported by Astrium

APPOINTMENTS

GULFSTREAM
Gulfstream Aerospace recently appointed Arrow Aircraft Sales and Charters Private Limited, a professional business aviation service provider headed by Samir Gupta as Chairman with Rohit Kapur and S.P. Singh as the Managing and Executive Directors, respectively. The company will work closely with Gulfstream's Jason Akovenko, Regional Vice President, Asia-Pacific, and Roger Sperry, Regional Senior Vice President, International Sales, who will continue to oversee sales in the country.

EADS
Jean-Pierre Talamoni has been nominated Director of International Development within the Strategy and Marketing Organisation of the EADS Group with effect from January 1, 2011. In this post, he will be in charge of supporting and promoting the international development of the EADS and its strategy in the respective region/country to all local stakeholders, including key customers, to ensure that EADS is perceived in the respective country as speaking with "one voice" while coordinating marketing and sales actions locally.

AIR INDIA
Air India has appointed S. Chandrakumar as the Chief Operating Officer of Air India Express, the low-cost international subsidiary of the government carrier.

SELEX GALILEO
Selex Galileo has announced the appointment of Allan Cook to the post of company Chairman. Allan Cook will maintain his current position at WS Atkins plc, one of the world's leading engineering and design consultancies, where he held the role of Chairman from February 2010.

CFM
Jean-Paul Ebanga has assumed the role of President and Chief Executive Officer of CFM International. Ebanga replaces Eric Bachelet, who had served as CFM President and CEO since September 2005. Bachelet has accepted the position of Safran Executive Vice President of Research and Technology.

Lockheed Martin F-35C Lightning II. The F-35C will operate from the US Navy's large aircraft carriers by way of catapult launch and arrested landing. The United Kingdom's Royal Navy and Royal Air Force also will employ the F-35C. "The in-air handling qualities of the F-35C are excellent. I immediately felt right at home in the aircraft," said Lt Commander Buus. He added, "The Navy should be excited about having an aircraft that will be able to launch from our carriers with enough internal fuel and weapons to project power where we need to, and will have the stealth characteristics to go in and out of harm's way unseen. This will be a great leap in technology for naval aviation."

F-35 stealth fighter inaugural flight
The first production model of the Lockheed Martin F-35 Lightning II made its inaugural flight on February 25 in preparation for delivery to the US Air Force this spring. The jet will head to Edwards Air Force Base, California to support developmental testing shortly after the Air Force takes delivery. During the flight, the conventional takeoff and landing (CTOL) F-35A variant, known as AF-6, underwent basic flight manouvring and engine tests. The F-35A CTOL variant—designed to meet US Air Force requirements—is also the primary export version of the Lightning II. The Air Forces of Italy, the Netherlands, Turkey, Canada, Australia, Denmark, Norway and Israel will employ the F-35A. Deliveries of the F-35B short take-off/vertical landing variant to the US Marine Corps also begin this year, while deliveries of the F-35C carrier variant to the US Navy start in 2012. Seventeen F-35s have entered testing since December 2006, and have logged more than 650 flights and ground tests.

New deployable ATC system programme

Electronic Systems Centre officials intend to call for proposals within the next few months for development and production of a new deployable ATC system. Referred to as the Deployable Radar Approach Control (D-RAPCON), the system could be used at forward operating locations, however basic, for warfighting needs or contingency response. The system could also provide rapid back up for failed military or even civil fixed-base systems, said Diane McElligott, a programme manager for the Aerospace Management Systems Division.

Adjustments put F-35 on track
The F-35 programme's Director has stated that the Defense Department's joint strike fighter programme is on track to field the F-35 Lightning II in fiscal 2016. While addressing the National Aeronautics Association, Vice Admiral David J. Venlet said that although changes made to the programme in January extended flight testing and slowed development by about a year at an additional cost of $4.6 billion, the programme has made progress over the past year. The right plan is in place to ensure the programme is efficient in terms of cost-savings and production, he added,

QuickRoundUp

Services' Secure Satcom Systems, will enable DND to evaluate the technical feasibility and operational capability of an airborne intelligence, surveillance and reconnaissance platform.

ATK

• ATK has announced that it has received a contract from the King Abdullah II Design and Development Bureau (KADDB) of the Kingdom of Jordan to modify two of the country's CASA-235 transport aircraft into highly-capable and cost-effective special mission aircraft, according to the combined modification designs of both KADDB and ATK. Subject to the US government export licensing approval, the modified aircraft are expected to be delivered by the late spring of 2013.

BAE SYSTEMS

• Underpinning the growing importance of support and services to its business portfolio, BAE Systems has announced a new £8.3million (about $6.16 million) contract to continue support of Hawk jet trainers at the NATO Flying Training programme based in Canada (NFTC).The contract with prime contractor Bombardier ensures the timely delivery of both scheduled and unscheduled servicing and technical support services, including responding to queries from the NFTC programme.

BELL HELICOPTER

• Bell Helicopter has announced the first delivery of a Bell 429 helicopter to Strong Aviation in Kuwait City. The helicopter will be utilised for VIP missions in the area. The Bell 429 was chosen for its impressive performance capabilities, especially in the extreme climate of the Middle East.

BOEING

• Boeing has announced that Chile's LAN Airlines has ordered three additional 767-300ER airplanes valued at $493 million at today's list prices. This order brings the total number of 767s ordered from LAN to 33.

IRKUT

• Russian airframer Irkut has signed a state contract with the government to carry out the next stage of research and design work on the pro-

SHOW CALENDAR

8–10 March
ASIAN AEROSPACE 2011
Asia World-Expo, Hong Kong
www.asianaerospace.com

8–10 March
INTER AIRPORT INDIA 2011
Bombay Exhibition Centre
Goregaon East, Mumbai, India
www.interairportindia.com

8–10 March
ATC GLOBAL 2011
Amsterdam RAI Exhibition & Congress Centre, Amsterdam, The Netherlands
www.atcevents.com

16–18 March
MRO INDIA 2011
Bombay Exhibition Centre, Mumbai, India
www.mroindia.com

21–23 March
AIR SURVEILLANCE AND RECONNAISSANCE 2011
America Square Conference Centre, London, UK
www.asarcevent.com

21–24 March
NBAA 38TH ANNUAL INTERNATIONAL OPERATORS CONFERENCE
Sheraton San Diego Hotel, San Diego, CA, USA
www.nbaa.org

5–7 April
AIRCRAFT INTERIORS EXPO HAMBURG
Hamburg Messe, Hamburg, Germany
www.aircraftinteriorsexpo.com

12–14 April
MRO AMERICAS 2011
Miami Beach Convention Center, Miami, FL, USA
www.aviationweek.com/events/current/mro/index.htm

13–15 April
SHANGHAI INTERNATIONAL BUSINESS AVIATION SHOW
Shanghai Hongqiao International Airport Business Aviation Center, Shanghai, China
www.shanghaiairshow.com

14 April
BUSINESS AVIATION REGIONAL FORUM
Business Jet Center, Dallas Love Field Airport, USA
www.nbaa.org/events/forums

noting that the programme has undergone an intense technical review under his watch. The latest restructuring, he said, was realistic, achievable and based on deep assessments of all aspects of the programme.

Venlet said he has instituted more testing, increasing the number of hours and flights that test pilots fly, having recently increased the mandated number of test flights through fiscal 2016 from 5,800 to 7,700. He's confident, he said, that the additional $4.6 billion will hold up, as development and testing concludes in 2016.

Europe

Eurofighter naval version makes debut at Aero India

At Aero India 2011, Eurofighter and partner company BAE Systems unveiled for the first time more details about the studies carried out for the initial definition of the navalised version of the Typhoon. These studies have included the assessment of required design changes, piloted simulations to refine the aircraft's handling qualities and discussions with key suppliers.

The studies indicate that these changes are feasible, and would lead to the development of a world-beating, carrier-based fighter aircraft. The most important element of the navalised Typhoon is that its exceptional thrust-to-weight ratio allows the aircraft to take off from a carrier without using a catapult but with a simple and much cheaper ski-jump. Detailed simulations have shown that the aircraft will be able to take off and land in this way with a full weapon and fuel load— providing a truly potent and flexible naval aviation capability.

Thales AESA RBE2 radar validated on Rafale

Thales has announced that the production model AESA RBE2 radar with active electronically scanned array antenna has been validated on the Rafale omnirole combat aircraft. Following a comprehensive programme of flight tests conducted between September and December 2010 with the AESA RBE2 on the Rafale, Dassault Aviation confirmed that all aspects of the radar's performance comply with the technical specifications of the 'roadmap' contract, awarded by the French defence procurement agency (DGA).

CIVIL AVIATION

Asia-Pacific

Honeywell's support to Jet Airways and JetLite
Jet Airways and its subsidiary, JetLite, have selected Honeywell to provide comprehensive global maintenance support for auxiliary power units (APUs) fitted on their fleets of Boeing B737s and Airbus A330 aircraft. Seeking to improve reliability and significantly reduce operating costs through a fleet modernisation programme, SriLankan Airlines has selected Honeywell to provide maintenance services on its Airbus A320s equipped with Honeywell's131-9A APU.

Piaggio Aero enters Australian market

Italian business aviation manufacturer, Piaggio Aero announced at Avalon 2011,

QuickRoundUp

posed MS-21 twinjet. Under the pact, Irkut is to receive Rb24 billion ($820 million) from the state budget for the work, which is to be completed by December 2012.

KOREA

• Korea's Air Force mainstay KF-16 fighter jets will have their performance enhanced by installing and dropping GBU-31 joint direct attack munition (JDAM) precision-guided weapon. JDAM is a precision-guided bomb guided by an integrated inertial guidance system coupled to a GPS that can disable North Korea's long-range artilleries and other strategic targets at the same time.

LOCKHEED MARTIN

• Lockheed Martin has received a $726.6 million contract modification from the US Air Force for sustainment of the F-22 Raptor fleet. This modification is for the 2011 follow-on agile sustainment for the raptor (FASTeR) sustainment contract, which was awarded initially in 2008, with an option for 2009 that was exercised.

MBDA

• At the IDEX 2011 exhibition, Abu Dhabi, MBDA has showcased an addition to its air defence range by presenting for the first time a new combination of systems to coordinate the firing of Mistral and VL MICA missiles. Improved Missile Control Post is the first element of this set up. It integrates, within a shelter mounted on an all-terrain vehicle, a command and control unit and latest generation 3D radar capable of detecting and identifying aerial targets at ranges of 80 km.

PRATT & WHITNEY

• Pratt & Whitney has successfully completed initial ground testing on its first PurePower PW1000G series engine, the PW1524G engine for the Bombardier CSeries aircraft. The engine completed nearly 200 hours of ground tests at the company's West Palm Beach.

ROLLS-ROYCE

• Rolls-Royce has secured two major support contracts, worth a total of $246 million, to cover engines powering C-130 military transport aircraft.

the Australian International Air Show its entry into the important Australian aviation market. The company said that it would begin sales of its world-renowned P180 Avanti II aircraft in the country with first deliveries expected during 2011. The P180 Avanti II brings a completely new aircraft to Australia—one that uses 40 per cent less fuel and has the lowest carbon footprint in its class by far, while providing class leading performance and cabin comfort. The P180 Avanti II is truly eco-friendly, efficient and economical, making it an ideal aircraft for Australia.

CAE and AAI helicopter pilot training programme

The Airports Authority of India (AAI) and CAE have agreed that a helicopter ab initio pilot training programme will be launched later this year at the CAE Global Academy, Gondia. The programme will lead to a commercial helicopter pilot licence (CHPL) and within three years is expected to graduate approximately 100 new helicopter pilots annually. CAE Global Academy, Gondia is the newest and most modern flight school in India, opened two years ago to train aspiring airline pilots. Also known as the National Flying Training Institute Private Limited (NFTI), the school is a joint venture of AAI and CAE.

INDUSTRY

Asia-Pacific

HAL and GE sign contract for Hawk components

GE Aviation and India's premium public sector aerospace company Hindustan Aeronautics Limited (HAL) have signed a 30-year contract that covers licence to carry out repairs and overhaul of various avionics, instruments and hydraulic products for the Hawk Mk132 aircraft, an advanced jet trainer operated by the Indian Air Force. This licence will provide in-house repair and overhaul capabilities to HAL for GE Aviation products and reduce turn-around-time for the repairs. HAL will build its maintenance, repair and overhaul capabilities at its Bangalore and Korwa facilities in India.

Samtel Thales Avionics JV incorporated

On February 9, during the Aero India 2011 air show Samtel Display Systems Ltd and Thales Avionics SA announced the official incorporation of their new Joint Venture company, Samtel Thales Avionics Ltd. Puneet Kaura, Executive Director, Samtel Display Systems said, "Incorporation of Samtel Thales Avionics is an important step in our strategy to cater to the existing and future opportunities in India."

Americas

Embraer grew the most in the aviation market in 2010

According to data released on February 22 by the General Aviation Manufacturers Association (GAMA), Embraer was the company that stood out in the executive aviation market in 2010. The company delivered 145 executive jets during the year, an increase of 23 aircraft over 2009, which was the highest, in absolute terms, among all manufacturers. Embraer's 2010 market share reached 19 per cent, or almost one in every five executive jets delivered, world wide, was produced by Embraer. The entry level Phenom 100 was the world's most delivered executive jet, with 100 units delivered during the year. The Phenom 300, with 26 delivered, was at the top of the list in the light jet category, an important achievement for a product in its first year in the market. The Legacy family, which includes the brand-new Legacy 650, in the large category, made 11 deliveries. The ultra-large Lineage 1000, which is the biggest executive jet made by Embraer, and the corporate versions based on the commercial E-jets platform, totalled eight deliveries. All of these decisively contributed to making Embraer the company that showed the greatest growth in the world's executive aviation market.

Bombardier Aerospace delivers 244 aircraft

On February 17 Bombardier Aerospace announced that it had delivered 244 aircraft for the fiscal year ending January 31, 2011, compared to 302 aircraft deliveries in the previous fiscal year 2009/10 (year ending January 31, 2010). It received 201 aircraft orders, net of cancellations, compared to 11 orders, net of cancellations, for the previous fiscal year. The fourth quarter was especially strong for business aircraft, with 74 net aircraft orders. Bombardier Aerospace had a solid performance despite the continued impact of the economic environment on the aviation industry and the slower than anticipated recovery from the global financial crisis.

SPACE

Americas

Boeing-built light squared space-based network

Boeing has announced on February 14 that it has completed the post-launch testing and on-orbit handover of the first LightSquared satellite and space-based network (SBN). The satellite system has been accepted by LightSquared and is ready to begin service. The LightSquared SBN will combine satellite and terrestrial technologies to enable high-capacity data use for standard cell phones, PDAs and other wireless devices. •

QuickRoundUp

Under a $203 million MissionCare contract modification, Rolls-Royce will provide the US Air Force with comprehensive propulsion system services for its fleet of C-130J aircraft. Rolls-Royce has also signed a one-year contract extension, valued at over $43 million, for the support of the UK's C-130 military transport fleet.

SCHIEBEL

• Following a contract awarded in July 2010, Schiebel has delivered two Camcopter S-100 Unmanned Air Systems to the King Abdullah Design and Development Bureau of Jordan which will be primarily used for surveillance, intelligence and reconnaissance missions.

SELEX GALILEO

• Selex Galileo's new generation SEER radar warning receiver was recently tested with the Czech Republic Air Force. Results show that SEER had demonstrated extremely high sensitivity and accuracy compared to previous generation systems, performing as promised and fulfilling the expectations of the Air Force. The SEER RWR helps aircraft detect and evade threats including missiles and enemy fighters and improves their survivability.

SIKORSKY

• Sikorsky Aerospace Services has announced the signing of a letter of intent with Alpha Star Aviation Services to engage in discussions to form a joint venture dedicated to providing comprehensive military and commercial aviation support and maintenance services in the Kingdom of Saudi Arabia. Alpha Star Aviation Services is an aerospace services provider based in Riyadh, Saudi Arabia.

SKYMARK AIRLINES

• Skymark Airlines, Japan's third largest and fast growing airline, has signed a contract for four A380s with Airbus, firming up a memorandum of understanding announced in November 2010. "We are pleased to welcome Skymark as our newest and first Japanese A380 customer," said Tom Enders, Airbus President and CEO. Total firm orders so far for the A380 stand at 244 from 19 customers worldwide and 43 aircraft have been delivered to five customers.

CRISIS of Confidence

PHOTOGRAPH: SP GUIDE PUBNS

The financial position of Air India is untenable with the possibility of further deterioration and the government is not amenable to advice from the former COO which is not only sound but if accepted, would do the ailing carrier a lot of good

JUST WHEN THE TIDE appeared to be turning for Air India, the airline is once again in the news but this time for all the wrong reasons. Air India's flight schedules could be seriously disrupted as the Indian Commercial Pilots Association, which represents pilots of Indian, the erstwhile domestic segment of the combined entity Indian, has served a notice to the airline management to strike work beginning March 9, 2011. The slew of complaints include failure on the part of the management to fulfil commitments made in the past, inept handling of industrial relations by the senior levels in management, failure to take the pilots into confidence about the airline's turnaround plan, lack of progress in the merger initiated three years ago, disparity in salaries and working conditions of pilots of the erstwhile Indian and Air India, substantial difference in emoluments and perks between Indian and expatriate pilots smacking of racial discrimination, portraying fake shortage of senior commanders to continue the services of expatriate pilots resulting in lack of career progression amongst Indian pilots, frequent delay in payment of salaries, violation of a memorandum of settlement signed in November 2009, non-implementation of the recommendations of the Sixth Pay Commission and issuing flight operation circulars without approval from the Directorate General of Civil Aviation.

There appears to be multidimensional crises of confidence afflicting Air India. The independent Directors appointed on the board last year to help craft a turnaround strategy for the airline, in their first meeting recently with the new Civil Aviation Minister Vayalar Ravi, have conveyed their reservations about the way the airline was being run and that there had been no improvement in the quality of its management over the last one year. The management displayed little concern in respect of critical aspects such as discipline and on-time performance. The senior executives ought to be held accountable for lack of action. On the other hand, the Ministry of Civil Aviation (MOCA) is of the view that as the top management is incapable of infusing the required level of confidence amongst the airline staff, chances of success of the turnaround strategy were somewhat remote and hence it would not be possible to sustain financial support to the airline for long. The Ministry of Finance on its part is neither happy with the airline's turnaround plan nor convinced of proper utilisation of funds infused in the airline so far. In a meeting to discuss allocation of additional ₹2,000 crore for the airline, Finance Minister Pranab Mukherjee made his displeasure known to the Civil Aviation Minister. Anand Mahindra, an independent Director has reportedly submitted his resignation citing compulsions of business ethics related to conflict of interest as the ostensible reason. But perhaps the most embarrassing development has been the resignation of Captain Gustav Baldauf, the COO, on February 28. Baldauf quit as the COO when he was served a show cause notice by the MOCA that was somewhat riled by his public utterances wherein he cited difficulties experienced in the work environment on account of unwarranted political interference in the running of the airline. He alleged that "the government played too prominent a role in routine operations". Under the contract, Air India would have to shell out ₹4 crore to Baldauf as part salary for the residual period of contract, further aggravating its own financial difficulties.

Although the airline posted operating profits in the last quarter of 2010, its overall financial situation is extremely precarious. It had a debt burden of over ₹40,000 crore on an equity base of ₹145 crore before the infusion of ₹2,000 crore by way of equity during the period 2009 to 2011. The airline has an annual interest payment burden of ₹1,800 crore and cumulative losses in excess of ₹15,000 crore. Unfortunately, the four-year turnaround plan of the airline does not appear to be taking off as over the last one year, the airline has fallen short in performance and with continually slipping market share, it is expected to lose over ₹7,000 crore by March 2011. MOCA has recommended infusion of ₹10,000 crore against an assessed requirement of ₹17,500 crore for the airline to survive. Meanwhile, IndiGo has overtaken Air India pushing the national carrier into the fourth slot.

In the prevailing situation, it is abundantly clear that the management is incapable of hard decisions to redeem the situation. The financial position of the airline is untenable with the possibility of further deterioration and the government is not amenable to advice from the former COO which is not only sound but if accepted, would do the ailing carrier a lot of good. Given the total mess Air India is in, there appears to be no alternative to privatisation if it is to survive. SP

— Air Marshal (Retd) B.K. Pandey

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