

# VAYU

VI/2012

## *Aerospace & Defence Review*



*Interview with CNS  
Tale of two Warships  
Sea Harriers in  
Falklands  
Lords of the Ocean  
Quest for MRMR  
French Navy Today*

**CFM**



The Shtil-1 air defence system aboard INS Teg, showing a 9M317 missile on its launcher (photo by Angad Singh)

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## Aerospace & Defence Review

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### Also :

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### Regular features :

Commentary, Outlook, Viewpoint, Aviation & Defence in India, World Aviation & Defence News, Vayu 25 years back, Tale Spin.

## Unending wait for aircraft carrier

The recently concluded Indo-Russian Inter-Governmental Commission on Military Technical Cooperation, co-chaired by Defence Minister A.K. Antony and Russian Defence Minister Anatoly Serdyukov, was held against the backdrop of yet another delay in the delivery of the Russian aircraft carrier *Admiral Gorshkov* (rechristened INS *Vikramaditya*). Ever since India signed an agreement eight years ago in 2004 for the purchase of this 44,500-tonne aircraft carrier, the delivery schedule has been marked by slippages.

The delivery has now been pushed ahead by a year to December 2013. With the ageing INS *Viraat* soon heading for a phase-out and the construction of an indigenously designed aircraft carrier at least another six years away, the delay in the induction of the Russian aircraft carrier has meant that India will have to wait for some more time to fulfil its ambition to have two battle carrier groups. Disappointing as it is, the fact remains that bilateral defence relations otherwise remain on a firm footing. India has contracted to buy an additional 42 Sukhoi Su-30MKI fighters to boost this fighter fleet to 272, an additional 59 Mi-17 V5 helicopters to raise this fleet to 139 and missiles for the P-5 submarines. In addition to remaining a major source of arms supplies, defence relations with Russia have expanded to include significant collaboration on high-end weapon systems – the BrahMos supersonic cruise missile and the fifth generation fighter aircraft (T-50) being two significant examples. Having jointly developed the army and naval variants of the BrahMos, the two sides have now decided to build the air force variant of this deadly missile.

The special relationship is reflected in other ways as well. Russia has leased India a nuclear-powered submarine and steadfastly continues to desist from selling defence hardware to Pakistan. Yet the fact remains that Russia is not the same as the Soviet Union and India needs Russia so long as it is unable to build a strong military-industrial base to become sufficiently self-reliant. To its credit, India has diversified its source of weapons to both Israel and the United States. The delay in the induction of the aircraft carrier only underlines the need for India to step up its efforts to achieve self-reliance in key defence technologies.

*From The Tribune*

## Darkness of 1962

It is not an overstatement to say that the shock, and even humiliation, of 1962, is still very raw. Understandably so. Fifty years ago to the week, Chinese invaders compelled Indian troops to give up the fight and then gained control of the local administration before unilaterally withdrawing north of the MacMahon Line.

Dealing with the raw memory of being found defenceless involves revisiting the circumstances and events of that episode. Officialdom has never quite mustered the confidence to do so, and a symbol of that failure to address that war fully in the public domain remains the refusal to make the Henderson Brooks report public. Commissioned by General J.N. Chaudhuri after he took

over as chief of the army after the 1962 debacle, the report was to examine the conduct of military operations leading up from the outbreak of hostilities till China's unilateral ceasefire of November 20. The report, prepared by Lt General Henderson Brooks and Brigadier P.S. Bhagat, was submitted in April 1963, and thence forwarded on to the defence ministry. And there it has presumably remained, with the Centre failing — refusing — to declassify it. In the absence of a detailed reading of the report, the public domain has been flooded with speculation about where the authors have situated India's key failing — its spare equipment and weapon stores, the quality of military planning, the dynamic between the military and political leadership or even the type of resistance offered on the ground before abandoning key posts. However, the declassification by the American authorities recently of letters written by Prime Minister Nehru to President Kennedy, reprinted first in this newspaper, is ample documentation of how grave the situation appeared in those hours leading up to China's surprise withdrawal on November 20. It does our democracy no good to disallow scholars from reading official accounts of that very difficult month in Indian history.

To be fair to the establishment, it cannot be easy to publicly undertake an evaluation, because the Chinese threat never vanished. Indeed, in the past few years Beijing has periodically amplified its claims on Arunachal Pradesh. Yet, New Delhi will not be able to alter the public tendency to see the issue as being framed by the 1962 War if it does not allow a more informed scrutiny of that time. The fiftieth anniversary and India's national interest demand it.

*From The Indian Express*

## In Free Fall

Kingfisher Airlines (KFA) is down but whether its out or not depends on how expeditiously it produces a credible revival plan. The Directorate General of Civil Aviation is justified in suspending its licence owing to misgivings about passenger safety, deepened by a crisis created by KFAs nonpayment of salaries to staff. Thought a non-performing asset by many lenders, surely debt-strapped KFA should've been made to account for itself much earlier. Today, its lenders worry they'll protect only a small part of their exposure if KFA sinks. KFA employees are also uncertain about their future.

Civil aviation authorities have contributed to creating this mess. KFA was given wide latitude despite defaulting on payments to staff, vendors and taxmen. Nothing illustrates this better than the controversy sometime ago over the removal of a safety-conscious DGCA head who made a case for grounding the airline. However, the lessons to be drawn don't concern a single company's fate. A larger malaise afflicts Indian aviation, signalled by the alarming 12.4% drop in passenger numbers for domestic airlines during September 2012, compared to last year. The industry still lacks a level playing field. Nor were investments attracted at the right time for its expansion and infrastructural upgrade.

Despite the nod to FDI from foreign carriers, they won't rush to a sector that's been ailing for a while. Investors are equally put off by the privileged status of Air India, a public sector

**SIKORSKY**

white elephant surviving on taxpayer-funded bailouts. Add to this industry-unfriendly policymaking. Key to popularising air travel, low-cost flights can't but be hit by the Airports Authority of India's inclination to levy landing and parking charges on aircraft with less than 80 seats. Steep airport charges have escalated owing to user development fees (UDF) slapped on travellers, who think twice about flying as a result. Thanks to UDF, Delhi's one of the world's costliest airports. Nor has allowing jet fuel import helped. So the faster ATF is granted declared goods status so it attracts a uniform 4% duty by way of state levies the better.

The civil aviation minister talks of the need for low-cost airports, boosted capacity-building and greater regional and international connectivity to turn India into a global aviation hub. If he means business, the government will make the right policy changes to help improve domestic carriers' finances and enthuse investors. It must also stop coddling Air India. Greater competition in aviation will ensure airlines with vision, good management practices and genuine concern for passengers survive. That's how it should be.

*From The Times of India*

## (British) Army reforms

Over the past two years Britain's armed forces have endured significant cuts as the government seeks to reduce the national deficit and bring Ministry of Defence spending into balance. No section of the military has had to adjust more than the army. The regular army is to be cut by 20 per cent over the next eight years to 82,000 personnel, its lowest level since the Napoleonic wars. Meanwhile, the government last week published a green paper setting out plans to raise the army reserve from 18,000 to 30,000 – making reservists a far larger proportion of UK land forces.

As the MoD presses ahead with this, two questions must be asked. First, does the greater reliance on reservists mean capability is being cut? Some military experts say it does, and that this policy is another sign of Britain's decline as a warrior nation. But criticism can be overdone. Until now, many of the UK's allies with a proud combat record – including the US, Canada and Australia – have had a far higher reliance on reservists than Britain. Moreover, a modern army has much to benefit from making use of reservists who have up-to-date skills in medicine, logistics and IT that cannot be generated within a national defence ministry.

Second, can the army persuade British industry to generate this near doubling of reservists? This is a big ask. Until now, reservists have been called up in small numbers, filling sudden gaps in the following careful negotiation with employers. This situation will change. Under its plans, the army will want to call up entire units of reserves to support field operations, possibly at short notice. Employers will have to surrender staff for up to one year in five, ensuring reservists are trained to a much higher standard.

Business is right to be wary of this. Large companies can cope with the additional burden but smaller ones will find government policy much more demanding. All will want the MoD to spell out what its new policy will mean in terms of compensation and tax breaks for affected employers.

That said, British business should take an enthusiastic view of what Philip Hammond, defence secretary, and army chiefs are trying to achieve. Business leaders should recognise that army reforms are part of an attempt to bring UK public expenditure under control and make the country more competitive. They should also take heed of the way many US entrepreneurs recognise their patriotic obligations and make the sacrifices that are needed to sustain an effective reserve force.

*From Financial Times (UK)*

## A drone in your life

Two Iranian fighter aircraft fired on a US Predator drone over the Persian Gulf. Political party-cum-militant group Hezbollah sends a drone over Israel. A Khan is basing a political career on denouncing drone attacks on Pakistan. All of this highlights that drones, also called unmanned aerial vehicles, are ubiquitous in the international system and that the problems regarding their use are multiplying. Those who argue drones should be put back into the box are wasting their breath. A recent study calculated that 35,000 drones would be in operation over the next decade. While the US's use of drones in the Afghan-Pakistan war theatre receives the most attention, the primary future of drones is in the civilian sphere. Drones are now being used by police to monitor traffic, by coast guards to watch coastlines and engineers to inspect dams and tall buildings for safety purposes.

Equally false is the idea that militaries will not deploy drones in ever-increasing numbers. As Barack Obama realised, drones are inexpensive, they keep soldiers out of harm's way and are far more accurate than any existing form of distant warfare. Though estimates vary, studies put civilian casualties at 20% to 30%. This is low given the nature of the war and compared to traditional aerial bombing or strafing. By any standard of just war, drones are morally sound. They are proportionate. Unlike normal bombing or even a special force raid, where fire is often indiscriminate, drones create far less collateral damage. In fact, it can be said they have created a new standard in this area. They have minimal consequences. Drones do not leave radiation or level buildings. Their pilots can sit and operate them thousands of miles away from the battlefield. As Hezbollah has shown, drones will not be a monopoly of the US and Israel — countries which at present make two-thirds of the world's drones — for long. India is also assembling a fleet.

Nonetheless, drones are revolutionary in many ways. Automatic targeting is just a few steps away, a capacity that would take direct human control out of the loop. Which is why they need rules. At present, drones are treated as small helicopters or airplanes. But they are much more than that — the next generation will be carried in backpacks and follow individual soldiers. It is unclear who would be legally responsible for a non-guided drone. The Persian Gulf incident raised the question of rules of engagement between men and machine. The list goes on. It is a debate that needs to be taken up more seriously and one that India should not remain passive about.

Drones are here to stay.

*From Hindustan Times*

**SAAB**

## Defence cooperation . . . .

## . . . . for strategic outreach

*INS Ranvijay at Ex Malabar 2012 sails past US Navy Aircraft Carrier.*

**W**ith its growing economy and gradually increasing military power, India is looking increasingly outwards to safeguard wider national interests, particularly its sea lanes of communication. Since the 1998 nuclear tests at Pokhran, India has entered into strategic partnerships with most major powers, including the United States, and is becoming increasingly conscious that it must fulfil its responsibilities as an emerging Asian power.

Unlike in the past when it remained steadfastly non-aligned, in today's rapidly globalising world India cannot afford to 'go it alone' any longer - even if it still shuns military alliances. The bilateral strategic partnerships that India is engaged in building with France, Japan, Russia, the United Kingdom and the US, among others, hinge around varying levels of defence cooperation. While small-scale tactical-level exercises have been held by the armies and the air forces, the navies have consistently raised the bar and have been conducting large-scale manoeuvres.

Large naval exercises are not new to the Indian Ocean region and the Indian Navy has always participated in them with relish. From 1949 up to the 1965 war, the Indian Navy joined other Commonwealth navies, including Australia, Britain, and Pakistan,

to participate regularly in exercises called Joint Exercises Trincomalee. Then the Royal Navy pulled out of the Indian Ocean and the US Sixth and Seventh Fleets sailed in to fill the vacuum. As Indo-US relations were estranged, especially after tough sanctions were imposed on India consequent to the Pokhran-I nuclear test in May 1974, the Indian Navy became isolated in the region. The first joint exercises with the US Navy, part of the *Malabar* series, were held in 1994 when Indo-US defence cooperation was revived.

The knee-jerk reactions that followed the Pokhran-II nuclear explosions in May 1998 soon gave way to a more rational international appraisal of India's emergence as a Southern Asian military power and many navies began to call on India's ports. The Indian Navy soon began to exercise with the navies of Britain, France, Indonesia, Oman, Russia, Thailand, Singapore and the US. In addition to these bilateral exercises in the Indian Ocean, the Indian Navy availed the opportunity of port calls to Australia, China, Japan and New Zealand to carry out limited exercises in their waters.

From bilateral exercises to multilateral ones, which reduce sailing time and costs and multiply operational benefits, was but a short step. Till then the largest ever multinational exercise in the Indian Ocean, *Malabar 07*

was conducted in the Bay of Bengal by the navies of Australia, Japan, India, Singapore and the US in the first week of September 2007. Over two dozen destroyers, corvettes, submarines and three aircraft carriers (USS Nimitz, USS Kitty Hawk and INS Viraat) and a large number of shore-based aircraft participated in the week-long exercise. Since then these exercises have been conducted regularly.

### New Great Game in Asia

The *Malabar* exercises are conducted to understand and learn from each other's tactics, techniques and procedures, augment levels of interoperability and show presence for enhancing maritime security in the Indian Ocean region. The declared aims of these naval exercises are to practice joint patrolling of international sea lanes; anti-piracy measures; procedures for disaster relief; and, casualty evacuation. There is clearly an underlying message in these annual exercises that has not gone unnoticed in the intended quarters. Much like the 'Great Game' played out in Central Asia in the late 19th and early 20th centuries, the major Asian powers and the US are jostling for advantage to maintain the balance of power in Asia.

India is a reluctant newcomer to this new Great Game. Several pointers mark the power

**NEXTER**

play in force. China, Russia and the Central Asian Republics have come together to form the *Shanghai Cooperation Organisation* (SCO) to guard their own interests and balance ASEAN and APEC. China is assiduously engaged in pursuing a “string of pearls” doctrine that is clearly aimed at the strategic encirclement of India and has been flexing its military muscle in the South China Sea. China has created client states around India that are dependent on China for their major arms purchases (Bangladesh, Myanmar, Sri Lanka and Pakistan). By making inroads into Nepal and building ports at Gwadar (Pakistan), Hambantota (Sri Lanka) and in Myanmar, China is not only jockeying to safeguard the sea lanes over which its oil and gas flow but also attempting to confine India to the backwaters of the Bay of Bengal and the Arabian Sea.

Former Japanese Prime Minister Shinzo Abe had suggested a “quadrilateral” meeting between Australia, Japan, India and the US some months ago. This move raised China’s suspicions and the recent multilateral exercise have fuelled these further. China formally queried the Japanese about the underlying motives as it became apprehensive that the four democracies were likely to gang up against it. Chinese scholars and analysts dubbed this loose group of democracies as an Asian NATO in the making. The quadrilateral is unlikely to become a cooperative military venture as India does not join military alliances and prefers to maintain its strategic autonomy. Also, the Chinese, Indian and Russian foreign ministers have met four times in the last three years though both China and India gave a lukewarm response to a former Russian PM Yevgeny Primakov’s proposal for a strategic triangle between the three of them.

### Strategic Outreach

In keeping with its growing power and responsibilities, India has been steadily enhancing its expeditionary and military intervention capabilities. These growing capabilities have been amply demonstrated in recent times. During the 1991 Gulf War, India had airlifted 150,000 civilian workers who had been forced to leave Iraq, from the airfield at Amman, Jordan, over a period of 30 days. This was the largest airlift since the Berlin airlift at the end of World War II. During the South East Asian tsunami in 2004, the Indian armed forces were in the forefront of rescue and relief operations. Over 70 Indian Navy ships had set sail with rescue teams and relief material in less than 72 hours of the disaster even though the

Indian people on the eastern seaboard had themselves suffered horrendously. Indian naval ships on a goodwill visit to European countries during the Lebanon war in 2006 lifted and brought back 5,000 Indian civilian refugees.

India is set to join the world’s major powers in terms of its ability to undertake out of area contingency operations. With the arrival of INS Jalashwa, the erstwhile USS Trenton, India’s strategic sea-lift capability has been upgraded to lifting one infantry battalion at a time. India is considering the acquisition of more such ships. The SU-30 MKI long-range fighter-bombers with air-to-air refuelling capability that India acquired from Russia, the C-130J Special Forces transport aircraft from the US and the AWACS and maritime surveillance capabilities that India intends to build over the next five to 10 years, will give India considerable strategic outreach. However, India has consistently favoured military interventions only under a UN umbrella. Though that position is unlikely to change

opposed to deeper relations with the US. Their position is guided by apprehensions that India will become a subaltern power and will be forced to compromise its strategic autonomy. The opposition of the Left Parties flows mainly from a pathological hatred of the US as an “imperial” power rather than from genuine national security concerns and they are completely outnumbered. The right wing Bhartiya Janata Party (BJP), initiated the ongoing defence and security relationship with the US but is now ambivalent about supporting it.

### India hedges its bets

As it faces complex strategic scenarios and is located in an increasingly unstable neighbourhood, it is in India’s interest to encourage a cooperative model of regional security and to work with all friendly countries towards that end. At the same time, India finds it pragmatic to hedge its bets just in case “worst case” scenarios begin to unfold and threaten its economic development or territorial integrity. The



Indian Air Force C-130Js : symbolic of increasing relationship with the U.S.

quickly, India may join future coalitions of the willing when its vital national interests are threatened and need to be defended.

As a key player in Asia and a large democracy with which India has commonality of interests, the US is emerging as India’s leading strategic partner. Though there is a broad national consensus on the contours of the emerging relationship with the US, particularly enhanced defence cooperation and civil nuclear energy cooperation, some of the opposition parties are not convinced that the government has adopted the right approach. India’s communist parties, which were supporting the government till the 2009 elections to Parliament, are steadfastly

*Malabar* series of naval exercises are part of an initiative to engage with the littoral navies to enhance maritime cooperation for security and stability in the Indian Ocean region. The increasing emphasis on maritime cooperation is part of India’s continuing efforts to discharge its growing obligations and responsibilities as a regional power. There is a clear attempt on India’s part to cooperate with all the major Asian powers to maintain peace and stability in the southern Asian and northern Indian Ocean regions, but without unduly favouring any one of them.

**Brig. Gurmeet Kanwal**  
Former Director, CLAWS

**DASSAULT**



## Flight Safety in Jeopardy ?

The summary sacking of EK Bharat Bhushan, then director general civil aviation, whose extension had only recently been accorded by the cabinet committee on appointments and who, by all accounts, was making every effort to set the Directorate General Civil Aviation house in some order, raises disturbing questions about a regulatory authority primarily responsible for aviation safety and the professional conduct of civil aviation in the country.

To the travelling public this has revived memories of Air India Express Flight 812 overshooting the runway at Mangalore on 22 May 2010 and extinguishing 158 precious lives making it the third worst air disaster in India. This was followed barely four days later by another aircraft of Air India Express *en route* to Pune from Dubai reportedly encountering an uncontrolled rapid descent from cruising altitude while the captain had left the cockpit for the restroom. The young pilot later told the DGCA that he “got into a panic situation” and the DGCA report itself lamely concluded that “the incident occurred due to inadvertent handling of the control column in fully automated mode by the copilot, which got compounded as he was not trained to recover the aircraft in automated mode”. What, one wondered,

were co-pilots trained to do if they could not even pull out of a simple dive ?

The answer to this question naturally followed in March of last year when 14 pilots had to be grounded after it came to light that a non-existent pilot training school in Rajasthan was doling out fake documents based on which pilots had obtained flying licences! At the time some eight touts were also arrested, and since touts work in a two-way environment, at least nine middle and senior-level staffers in the DGCA were also put under the scanner. And if this were not disconcerting enough, it emerged that a DGCA director of air safety, RS Passi, was stripped of his responsibilities for influencing an airline to employ his daughter who had failed her flying test. So much for the culture of safety within the walls of the national aviation safety promoter and regulator !

At the time, Bhushan had stated that commercial pilots licences of around 10,000 pilots and airline transport pilots licences of 4,000 pilots would also be screened along with a third-party audit of 40 flying schools. It is no secret that many flying schools are owned by influential people with the right contacts, and commerce, not professional flight training, is their first priority. Now that we know that Bhushan was not welcome in his efforts at cleaning up the internal

mess, one wonders whether these efforts were also stunted, leading to the inevitable question: how many more ill-trained pilots are occupying cockpits in Indian skies?

From reports it would appear that the day before he was sacked, Bhushan had prepared a note regarding the large amounts that Kingfisher Airlines owed to its creditors and employees. The note was to be a warning to KFA to remedy this state of affairs, failing which its operations would be suspended. This was in keeping with a DGCA policy of financial surveillance of all airlines to keep an eye on any unfavourable trends like significant layoffs, delays in meeting payrolls, inadequate maintenance of aircraft, shortage of supplies and spare parts and curtailment of flights, and to determine if they had in place remedial systems.

The logic of such guidelines is impeccable as in this business every activity, howsoever remote it may appear to be, is ultimately linked to the end product of safe flight. Whilst credit for introducing this policy must go to the then head of DGCA, Syed Nasim Ahmad Zaidi, who was later secretary, civil aviation, one fails to understand why subsequent actions of the ministry were in contravention of this spirit. To begin with, the existence of the note that reportedly

caused Bhushan's axing was denied by Prashant Sukul, a joint secretary in the ministry of civil aviation who had taken over temporary charge from Bhushan and who has since handed it over to a new DGCA. In response, Bhushan had brought to Sukul's notice that the removal of such a note which contained observations of two other officers and his own ruling suggested wrongdoing of a very serious nature and needed investigating.

We have the word of an erstwhile head of DGCA, who had gained a reputation for cleaning up the system and, no doubt, was removed for this sin, against that of a stand-in DGCA and present joint secretary in the ministry of civil aviation, who would have been party to the former's unceremonious sacking. No bets on where the truth lies, but if the ministry is genuinely concerned about the health of civil aviation and wants to convey this message to the aviation community and the weary Indian air traveller, it owes it to them to share what was the fire that necessitated Bhushan's instant dismissal and what happened to the note that he left behind? Silence continues to be construed as the sway of vested interests over the independent working of the safety regulator, fuelled perhaps by crony capitalism in its naked avatar, with the lives of unsuspecting and innocent passengers as pawns.

Instead, a canard was then spread that it is not the DGCA's remit to call on private airlines to pay salaries and dues, which are not linked to safety. The ministry went as far as to state that "there are no regulatory frameworks anywhere in the world allowing cancellation of the licence of airlines merely for failing to pay salaries to the staff". Whilst this statement may technically be correct, it is grossly misleading and a half-truth, and certainly in contradiction to the policy of financial surveillance of airlines that is currently in force within DGCA.

Considering that it was the then civil aviation secretary who had introduced the system of financial surveillance in the DGCA in the first place, it is hard to believe that he personally endorsed the statement issued by his own ministry. The case only gets curiously when one reads reports that the only other airline having difficulty in passing through DGCA's financial surveillance was Air India under the control of the civil aviation



ministry and headed by yet another civil servant. Did the mandarins in the ministry feel that once Bhushan targeted the Kingfisher Airlines, the next could well be Air India or was it some extraneous influence that intervened to get Bhushan unceremoniously sacked?

If by now the potential air traveller is running scared, he has every reason to do so, because the entire civil aviation scene is ridden with issues of conflict of interest and cronyism. We have heads of the DGCA who are erstwhile civil servants in the civil aviation ministry and vice versa. The ministry controls both the regulator DGCA and Air India, and yet the regulator is expected to audit Air India impartially as it does other private operators. In a sector that is highly competitive and technologically driven, we continue to appoint civil servants as heads of Air India, in spite of the fact that the Air India of Tata's pedigree and performance has been run aground by them. Even as the DGCA is the overall safety regulator, it alone investigates accidents and for obvious reasons will not ever find fault with itself.

The co-founder of one of the Indian carriers, which, reportedly and without fanfare, is one of the few running profitably, was constrained to publicly lament, "Our principle issue was why the government is tinkering with policies for a select few in the industry." This certainly is a question that the entire corporate world should be asking, because one does not know where selectivity will strike next.

The director general of the International Air Transport Association recently warned of India's aviation being faced with a multi-faceted crisis, adding that the global aviation community was concerned over

the situation in India. Since the IATA is a global trade organisation representing some 240 airlines (including Air India) and accords safety as its number one priority, this observation cannot be viewed lightly. And if all this was not bad enough, it has just been reported that the International Civil Aviation Organisation is going to do a safety audit of the DGCA to examine if it is effective enough to ensure safe flying in and over India. No prize for guessing what the findings will be !

It needs no test pilot (although the writer admits to being one) to conclude that the turmoil within the civil aviation sector owes primarily to archaic organisational and manning models that are practised by Rajiv Gandhi Bhawan to deal with a sector that is not only one of the most dynamic in the world but also one involving significant technological sophistication and business innovation. To those wishing to extricate Indian civil aviation from what is the equivalent of the dark ages, it is suggested that a report on a national aeronautics policy submitted to the government by the Aeronautical Society of India in 2004 (another admission, this writer was one of the vice-presidents of the society at the time) needs to be dusted and resurrected. In essence this recognises aviation as one of the most significant technological influences of modern time and accordingly defines organisational and management models such that it empowers the nation. Until enlightenment dawns in favour of change, the hapless air traveller is condemned to venture into Indian skies on a wing and a prayer.

*Air Marshal Brijesh D. Jayal*

## Navy Chief outlines Perspective Plan 2012-27

In his Navy Day press conference, Admiral DK Joshi Chief of Naval Staff has outlined various initiatives to shape the Indian Navy “in the realm of Policy and Plans”. These include the *Maritime Capabilities Perspective Plan 2012-27*, the *XII Plan document* and the *XII Infrastructure Plan document*. A fourth document, the *Maritime Infrastructure Perspective Plan*, is under compilation.

The CNS confirmed that over the next five years, the IN would induct ships and submarines at an average rate 5-6 per year amongst which are guided-missile destroyers of the *Kolkata-Class* (P-15A), plus P-15Bs, which are advanced version of the *Kolkata-Class* as also the P-75 (Scorpene) submarines, in addition to P-28 ASW Corvettes, Survey Vessels, OPVs and Fast Interceptor Craft.

As for Naval Aviation, the scheduled induction of Boeing P-8I LRMP aircraft from 2013 would enhance maritime domain awareness in the IOR and the



Admiral DK Joshi, CNS during the press conference on 3 December 2012



Indian Navy MiG-29KUB, the type operational conversion trainer with INAS 303.

Navy’s area of interest. In his exclusive interview with *Vayu* (see this Issue) the CNS stated that Naval Aviation is poised for significant growth in the near future with planned induction also of the MiG-29K, LCA Navy, Hawk AJT, MRMR aircraft, Naval Utility Helicopters (NUH), Multi-Role Helicopter (MRH), UAVs as also modernisation of the Sea King and Kamov helicopter fleet.

## Slew of decisions for IAF

During his press conference on eve of Air Force Day, Air Chief Marshal NAK Browne confirmed a number of decisions taken by the Government of India which concerned IAF modernisation and expansion. These include the decision on procurement of 22 Boeing AH-64 Apache attack helicopters and induction of more Sukhoi Su-30MKI air dominance fighters. The IAF also plan to order two Mirage 2000 trainers in direct replacement of the two aircraft lost earlier the year.



Dassault Mirage 2000Hs of the IAF at their home base

The CAS also referred to imminent decisions on the next batch of mid-air refueling aircraft (the Airbus A330 MRTT is leading contender) and re-engining of the Jaguar Strike fighter fleet (single tender basis favouring the Honeywell F.125). Importantly the CAS indicated that the formal contract for the M-MRCA (Dassault Rafale) should be finalised by end of the financial year (31 March 2013).



Dassault Rafale at the Aero India 2011 Air Show

## IRKUT

### Stinger Missiles for India

As prelude to the acquisition of Boeing Apache helicopters by the Indian Air Force, the US Government is offering 245 Stinger missiles and 56 launchers to India as part of the weapons package. The Stinger complements advanced performance of the Apache in providing critical air-to-air defence capability. Air Chief Marshal NAK Browne has confirmed that the Apache contract is in its final phase, and negotiations are ongoing.

### Maiden flight of Jaguar DARIN III

Maiden flight of the first Jaguar strike fighter modified to DARIN III standards (JM 255) took place on 28 November, 2012 at HAL's Airport Bangalore. The DARIN III Jaguar will incorporate an Elta radar in the nose as standard. The other changes include data system requirement capture, specification preparation, software, hardware, electrical, mechanical design and development as carried out by HAL at its Mission & Combat System Research & Design Centre (MCSRDC). Aircraft modifications were done by HAL's Overhaul Division.



Jaguar DARIN III taking-off at HAL Airport, Bangalore on 28, November 2012.

The upgrade incorporates new state-of-the-art avionics architecture including Mission Computer (MC), Engine and Flight Instrument System (EFIS), Solid State Digital Video Recording System (SSDVRS), Solid State Flight Data Recorder (SSFDR) and additional functions in inertial global positioning system (INGPS), autopilot, radar and RWR. The upgrade covers modern navigation, EW and weapon delivery system with INGPS using primary and reversionary modes, state-of-the-art, man-machine interface (near glass cockpit) with two smart multifunction display and head-up display.

### Escalation in costs of HAL-built Su-30s MKIs

The 42 additional Sukhoi Su-30MKIs to be built for the IAF by HAL are likely to cost virtually twice as much as paid for the first batches ordered in 2000. Each Su-30MKI will now cost around Rs.350 crore (\$70 million). The aircraft has been produced under licence by Hindustan Aeronautics Limited for the past decade and the current situation is largely owing to HAL being unable to increase indigenous content of the fighters, which has



caused price escalation. The irony is that each aircraft would cost Rs 60 to Rs 70 crore less were they to be procured directly from Russia. According to Air Chief Marshal NAK Browne, a further four Su-30MKI squadrons are being raised and the IAF will round off the total with this Type to 13 squadrons by 2018.

### PDP for MTA signed

On 12 October 2012, the preliminary design phase (PDP) contract was signed between Hindustan Aeronautics and Russia's United Aircraft Corporation, the Joint Venture to be known as the MTA Ltd. This is a follow-on of the general contract signed in May 2012. "With this, HAL and UAC-TA will start the preliminary design work immediately at Moscow. The HAL design team consisting of 30 designers will be positioned at UAC-TA", said RK Tyagi HAL Chairman.

An Inter-Governmental agreement was initially signed between India and Russia in November 2007, "to design, develop and produce the multi-role transport aircraft of the 15-20 tonne class". A requirement of 100 aircraft for the Russian Air Force, 45 aircraft for the IAF and 60 for other countries has been projected.

The preliminary design phase contract will be followed by the detail design phase (DDP) Contract. The aircraft will be designed for cargo and troop transportation, para-dropping troops, airdrop of supplies, including 'low altitude parachute extraction system'.



The follow-on contract of Multirole Transport Aircraft (MTA) project being signed by T. Suvarnaraju of HAL (extreme right), S. Velmozhkin of UAC-TA in the presence of R.K. Tyagi, Chairman of HAL (standing, third from the left). N.C. Agarwal, CEO, MTAL is seen in the centre.

## AVI OIL

## 'Admiral Gorshkov' delivery not till late 2013

The delivery of former Soviet Navy aircraft carrier 'Admiral Gorshkov', which is to be commissioned as INS *Vikramaditya* has been further delayed after malfunction of the ship's main power plant and the boiler. This was officially stated by Russian Defence Minister Anatony Serdyukov during his visit to India for the India-Russia Inter-Governmental Commission on Military Technical Cooperation (IR-IGMTC). Although the Indian Government have expressed "serious concern" for the further delays, there is no move to invoke any penalty clause in the contract because "technical teams were still going back and forth".



The Indian and Russian Defence Ministers.

Serdyukov said, "We have given a revised time table, sea trials shall resume in April next year. We believe the transfer (of the ship) will take place in the fourth quarter of 2013." At present the ship is back in the shipyard at Severodvinsk, an inspection is being carried out and the reason for the malfunction was being examined. "We will work a detail schedule for elimination of the malfunction", the Russian Defence Minister said. Further "the aircraft carrier had already sailed for over 11,000 nautical miles".

In mid-November 2012, the Russian Authorities stated that "the negotiations with the Indian side are practically over. The *Vikramaditya* aircraft carrier will be handed over to the customer in the middle of 2013 after the insulation of boilers has been replaced," Sergei Forafanov, vice-president of the United Shipbuilding Corporation, said after participating in a ceremony at Kaliningrad for commissioning of INS *Tarkash*, the second of the three stealth frigates, into the Indian Navy.

The carrier was to be handed over to the Indian Navy in December 2012. But the insulation of the aircraft carrier's boilers failed during sea trials. "It was not designers' mistake. The insulation materials were used on request by the Indian side. The partner had not taken into account the factor of vibration and the hull's deformation while the ship is on the move," Forafanov said, adding that the boilers would be covered with a different sort of insulation." The *Vikramaditya* will be fully restored and handed over to India next year," .

## Defence Ministry to monitor delayed indigenous aircraft carrier project

Numerous slippages and deadline extensions have resulted in the MOD's decision to give an impetus to the ambitious project to build an indigenous aircraft carrier, "by closely monitoring the progress on the construction of the 40,000 tonne indigenous aircraft carrier". The construction of IAC-1, originally scheduled to be ready by 2014, is running three years behind schedule and the MOD is to approach the CCS to release additional funds for the Cochin Shipyard to complete the project.

Planned to cost Rs 3,261 crore, the price has escalated, though the MOD has not given details about the revised estimate while Cochin Shipyard has been asked to furnish the revised schedule. Teething troubles including availability of quality steel from Russia and problems in the arrival of the gear box have been more or less resolved. Defence Secretary Shashikant Sharma will lead an empowered committee to monitor the progress of the project but according to new schedule, the aircraft carrier will not be ready before 2017.

## HAL at Kasaragod

Defence Minister AK Antony inaugurated Hindustan Aeronautics Ltd's new Strategic Electronics Factory at Kasaragod (Kerala) on 17 November 2012 with Chief Minister of Kerala Oommen Chandy, inaugurating the production facilities at the same function. Mr. Antony said that the Unit had already begun production and the Kasaragod facility will "cater to the upgrade needs of fighters such as Su-30s and Jaguars".

## Disinvestment in HAL

The UPA government plans disinvestment in Hindustan Aeronautics Ltd (HAL), the country's sole aircraft and helicopter manufacturer. The Cabinet Committee on Economic Affairs (CCEA) has considered a proposal to offload 10 per cent of the government's share in HAL, hoping to generate Rs 3,000 crore from the sale of HAL shares. The stake sale via an initial public offer will provide 5 per cent discount to retail investors and company employees.

There are some eight companies on the sell-off list for the current financial year, including Hindustan Copper, SAIL, BHEL, Oil India, MMTC and NMDC and HAL's entry has added to the list with the aim of meeting the Rs 30,000 crore divestment target as well as the revised fiscal deficit projection of 5.3 per cent of the GDP.

## Mini UAVs for infantry units

In an effort to augment reconnaissance capability of frontline infantry units, the Indian Army plans to equip more than 350 battalions with three mini UAVs each to help in offensive and defensive operations. These UAVs are portable and have electronic sensors that aid the situational awareness of soldiers by relaying real-time images.

The Indian Army is looking to induct mini UAVs with an operating range of eight to 10 km and a flight endurance of about three hours. The Army plans to buy more than 1,000 mini UAVs, for around Rs. 150 crore. This project is part of the 80-odd modernisation schemes and is likely to be implemented within the 12th Plan (2012-2017) period.

## Army to get 'all attack helicopters'

In a major policy decision taken just after Air Force Day, the Ministry of Defence has informed the COAS that “in principle”, all future attack helicopters procured will “given to the Indian Army”. According to reliable sources in New Delhi, the decision was made after consultation at the highest level, including those with National Security Advisor Shiv Shankar Menon. While the brief note does not clarify as to ownership of the 22 new Boeing Apache helicopters, an IAF spokesperson went on record to state that these would be inducted into the IAF.



*The Indian Army at present has four squadrons with the HAL Dhruv ALH for high altitude operations and is inducting the weaponised WSI version ('Rudra').*

The CAS had earlier opposed the Army's demand to have their own attack and medium lift helicopters, contending that the country could not afford to have these “little air forces”, but the Defence Minister is said to have “very sympathetic view” on the Army's demand to get its own force of attack helicopters. The MoD has clarified that the medium lift helicopters (Mi-17s) will continue to be operated by the IAF but the Army will review prioritisation of the tasks and their deployment.

The Army has maintained that induction and control of the tactical and attack helicopters is an “inescapable necessity” as the infrastructure particularly along the high mountain frontiers with China is far from satisfactory and that such assets are needed to reduce time for deployment. The Army plans to establish a Mountain Strike Corps for the north east for greater offensive and fire power purposes.

## Army Commanders' Conference at New Delhi

The bi-annual Army Commanders' Conference was held at New Delhi in mid-October 2012 and culminated into a Combined Commanders' Conference, with closing address by the Prime Minister. The four-day conference was chaired by the Chief of the Army Staff and attended by all Army Commanders, Principal Staff Officers, Directors General and Heads of Arms and Services.

In his opening address, the COAS General Bikram Singh highlighted the need for maintaining “extremely high levels of operational preparedness at all times”. While complimenting the



Commands on their efforts, he reiterated the need for complete vigilance towards constitutional obligations and assigned roles. He emphasised on the need for defence preparedness and modernisation of the armed forces, including several emerging technologies and operational changes in the immediate future. The COAS also stressed on the need to uphold the core values of the Army and concentrate on management of units to ensure group cohesion and high levels of motivation and morale.

## Boeing CH-47F Chinook selected by India

According to Defence Ministry sources in New Delhi, the Boeing CH-47F Chinook has been selected to meet the Indian Air Force requirement for heavy lift helicopters, the initial contract being for 15 numbers. According to them, “the Chinook proposal was lower both in terms of initial direct acquisition cost as well as life cycle costs. The contract negotiation committee will shortly finalise the details”. The programme is estimated at \$ 1 billion.

The Chinook was in direct competition to meet the IAF's requirement with the MIL Mi-26TZ heavy lift helicopter, an earlier version of which presently serves in small numbers with the IAF's No.126 Helicopter Flight.



*RAF Chinook in Afghanistan operations*

### IAF-RSAF joint military training at Kalaikunda

The eighth Indo-Singapore Joint Military Training (JMT) between Indian Air Force (IAF) and Republic of Singapore Air Force (RSAF), held annually at Air Force Station, Kalaikunda in West Bengal, concluded on 30 November, after six weeks.



*RSAF F-16D Block 50+ fighter aircraft during training sortie at the just-concluded IAF-RSAF JMT at Kalaikunda airbase, West Bengal*

IAF Su-30MKI and MiG-27 aircraft participated alongside RSAF F-16D Block 52+ Fighting Falcons during the day-night joint exercises. The RSAF detachment comprised 30 officers and 87 personnel. Among the senior dignitaries who visited Kalaikunda during the exercise included RSAF Chief of Air Force (CAF), Major General Ng Chee Meng and Air Officer Commanding-in-Chief, Eastern Air Command, Air Marshal S Varthaman (now retired).



*Against a rare backdrop of six fighter variants : IAF Hawk AJT in centre foreground, (L to R) MiG-27, Mirage 2000, Su-30 MKI, an RSAF F-16D and an IAF MiG-21 FL, with IAF and RSAF personnel at Kalaikunda airbase*

### US Navy presence in Andaman Sea

Even as the US Government is applying its new strategy of “re-balancing” forces towards the Asia-Pacific, two US Navy aircraft carriers, USS *George Washington* and USS *John C Stennis* have carried out anti-submarine and surface warfare exercises in the Andaman Sea near the A & N Islands. Although India is cognizant of the ongoing combat manoeuvres by the US Navy in the region, MoD sources said the two carriers with their accompanying aircraft, helicopters and warships are in “international waters” leading to the Malacca Strait. “It’s nothing unusual and of no concern to us”.

### JASDF Chief visits IAF

General Haruhiko Kataoka, Chief of Staff of the Japan Air Self Defence Force made a three day visit to India from 19-21 November 2012. The General called on the CAS, Air Chief Marshal NAK Browne, also interacted with Senior Air Officers at Air Headquarters and visited Western Air Command, Paratroopers Training School at Agra and the Aircraft and Systems Testing Establishment (ASTE) at Bangalore. “The visit is of special significance in the context of improving military cooperation between the two countries”.



*Air Chief Marshal NAK Browne presenting memento to General Haruhiko Kataoka, Chief of Staff, Japan Air Self Defence Force during his three day visit to India on 19 November 2012.*

### Indo-Indonesian defence talks

India’s Defence Minister A.K. Antony and his Indonesian counterpart, Purnomo Yusgiantoro have recently met in Jakarta to discuss joint training, and possible co-production and sales of military equipment. “The two countries will develop a roadmap on co-production of defence equipment and weapons”, besides discussing joint patrols of Indian and Indonesian warships in the Strait of Malacca. The sale of BrahMos supersonic cruise missiles to Indonesia was also discussed. India’s engagement with regional countries is part of its “Look East” policy as it monitors China expand influence in the Indian Ocean. China has a military base on the Coco Islands, Myanmar.

### “BrahMos is Indian Navy’s primary weapon”

The supersonic cruise missile BrahMos is becoming the primary offensive weapon for the Indian Navy. Trials of the BrahMos continue, with the Navy successfully test-firing the missile, from various warships, the latest being from the INS *Teg* - the Navy’s latest induction from Russia - off the coast of Goa on 7 October 2012 (*see story in this issue*).

Two other warships - INS *Tarkash* and INS *Trikand*, both *Talwar*-class frigates as the INS *Teg* - will also be armed with the missile in vertical launch mode. “The Navy has also got a number of indigenous ships being built. Project 15 Alpha (INS *Chennai*) has already been inducted to be followed by 15B and 17A destroyers with stealth features, which are under induction.



Brahmos firing by INS Rajput

Latest upgrades to the Indo-Russian BrahMos cruise missile make this a sub-strategic “super weapon” capable of launch from land, sea, sub-sea and air platforms. The *Izvestia* daily quoted a defence industry source as saying that the BrahMos missile, test fired from the Russian-built frigate INS *Teg*, had a new satellite guidance system borrowed from Russia’s long-range cruise missile X-555 and its latest version, X-101. The new guidance technology, which uses Global Navigation Satellite System (Glonass) has been added to the BrahMos’ Doppler-inertial guidance system to increase its range and precision.

“The integration of the X-555 and BrahMos navigation systems has produced a “super missile” with sub-strategic capability beyond its tactical range. Fired from land, air and sea platforms, it can hit targets at ranges of 300 to 500 kilometres and is also capable of carrying a nuclear warhead,” continued the Russian official.

“The IAF now plans to integrate the BrahMos with Sukhoi 30MKI long-range fighters and flight tests of a modified Su-30MKI will start by end of 2012 with firing tests to be conducted in 2013”, said Alexander Dergachev, deputy head of the NPO Mashinostroenie, which developed the Yakhont supersonic missile, prototype of the BrahMos.

### AAD missile testfired

On 23 November 2012, an Interceptor Missile AAD was launched from Wheeler’s Island, Odisha, which successfully destroyed an incoming ballistic missile at an altitude of 15 km. The target missile, a modified version of the Prithvi, simulating an enemy tactical ballistic missile, was launched from Launch Complex III at Chandipur. Long Range Radar and MFC Radar detected the missile from its launch and tracked it through the entire trajectory, monitored by the guidance computer. Subsequently the AAD Missile was launched at an appropriate time to intercept and destroy the TBM.

Noteworthy was “impeccable performance” of the Ring Laser Gyro based Navigation System and Fibre Optic Gyro-based INS, onboard computers, guidance systems, actuation Systems and the critical RF Seekers used for the terminal phase. The AAD Missile system, initially guided by Inertial Navigation system was continuously updated of the target position by radar through data links. The Radio Frequency (RF) seeker tracked the Missile & Onboard computer guided the Missile towards the Target Missile. The Radio Proximity Fuse (RPF) exploded the warhead thereby destroying the target missile.

The special feature of intercepting multiple targets with multiple interceptors was successfully demonstrated: an electronic target with a range of 1500 km was launched and the radars picked up the target missile, tracked the target missile subsequently and launched an electronic interceptor missile. All four missiles were tracked by radars and the guidance and launch computers operated in full operational mode for handling multiple targets with multiple interceptors. Four missiles were airborne concurrently and both interceptions took place near simultaneously. “The perfect synchronisation of radar systems, communication networks, launch computers, target update systems and state of the art avionics have been completely proven in this mission,” according to the DRDO spokesperson.



## Raytheon Mk.54 torpedos for Indian Navy

Raytheon is the US Navy's sole production supplier for Mk.54 lightweight torpedo hardware and has been awarded a \$45.3 million contract to provide the torpedo hardware, test equipment, spares and related engineering and repair services for the US fleet inventory. It will also support foreign military sales to the Royal Australian Navy and the Indian Navy. The Mk.54 is the Navy's next-generation anti-submarine warfare (ASW) weapon



deployed from surface ships, helicopters and fixed-wing aircraft to detect and attack underwater targets. The Mk.54 is designed for both deep water and littoral environments, making it "the only lightweight torpedo capable of striking any underwater target in the world's oceans, regardless of water depth". The Mk.54 has been recently launched successfully from a P-8A Poseidon aircraft by the US Navy, the torpedo adding critical capability to these long-range ASW, intelligence, surveillance and reconnaissance aircraft.

## First indigenous Catamaran

FOC-in-C Western Naval Command, Vice Admiral Shekhar Sinha commissioned the *INS Makar*, this being a Catamaran Hydrographic Survey Vessel and first of its kind to be inducted in the Indian Navy. The vessel is indigenously built by Alcock



Ashdown Gujarat Ltd. *INS Makar* also marks a new chapter in the annals of hydrography in the country, primary role of the ship being to undertake hydrographic surveys, required for production of nautical charts and publications aimed at improving navigational safety at sea. She is equipped with an array of modern surveying equipment and also undertakes limited oceanographic surveys towards providing marine environmental data.

## Dhanush test fired

The *Dhanush* 350 km range surface-to-surface ballistic missile, was successfully launched on 5 October 2012 from a naval ship off the coast of Balasore by the Strategic Forces Command. The *Dhanush* being developed by DRDO, is a short-range (350 km range) strategic ballistic missile, designed for launch from naval ships.

## Affiliation of Naval frigates and Cavalry Regiments

On 5 October 2012 an affiliation ceremony was held at Vishakhapatnam onboard the frigates *INS Shivalik* and *Satpura*, with two of the most decorated regiments of the Indian Army. While *INS Shivalik* and *INS Satpura* represented the Navy, the Army was symbolised by the Scinde Horse and the 7th Cavalry. Lieutenant General AK Singh, GOC-in-C, Southern Army Command, Colonel of the Regiment, and Vice Admiral Anil Chopra, FOC-in-C, Eastern Naval Command attended the event.



Commanders-in-Chief with COs of *INS Shivalik* and 7th Cavalry

Commencing with inspection of the combined Army-Navy Ceremonial Guard onboard the two ships, with T-72 tanks and horse-mounted lancers of the two Regiments lined up on the jetty, the Ships were formally affiliated to the Regiments with the reading, signing and exchange of the 'Affiliation Charter' by the Commanding Officers of *INS Satpura* and *INS Shivalik*, with Commandants of the Scinde Horse and 7th Cavalry.

## INS *Tarkash* commissioned

**I**NS *Tarkash*, the second of the three stealth Frigates constructed at Yantar Shipyard, Kaliningrad Russia, was commissioned and inducted into the Indian Navy by Vice Admiral Shekhar Sinha FOC-in-C, Western Naval Command on 9 November 2012 at Kaliningrad in Russia. Also present were the Indian Ambassador to Russia with senior officials of the Russian Government, Indian and Russian Navies, Federal Service for Military Technical Cooperation, Rosoboronexport, United Shipbuilding Corporation, Yantar Shipyard and Russian Industry representatives.



Induction of this second in the series of the multi role stealth frigates with advanced combat suite and an optimal blend of Russian and Indian cutting edge technologies, bolsters the Indian Navy's role as "a key facilitator in promoting peace and stability in the Indian Ocean Region". A formidable array of weapons and sensors onboard the ship include the supersonic Brahmos missile system, advanced Surface to Air missiles upgraded 100mm medium range gun, optically controlled 30 mm Close-in Weapon System, torpedoes, rocket launchers and advanced Electronic Warfare/Communication suite.

## Commissioning of H-189

**O**n 21 November, Indian Coast Guard Ship H-189, third in the series of twelve Air Cushion Vehicles (ACVs) designed and built by Griffon Hoverworks Limited (GHL) and commissioned at Mumbai by Vice Admiral Shekhar Sinha, FOC-in-C, Western Naval Command and witnessed by Inspector General SPS Basara, Commander Coast Guard Region (West), DIG BS Yadav, Commander Coast Guard Region (North-West) and other dignitaries from Central and State Government

The Air Cushion Vehicle with 31 tonnes displacement can achieve a maximum speed of 45 knots and is capable of undertaking multifarious tasks such as surveillance, interdiction, search and rescue and rendering assistance to small boats/craft in distress at sea. With the commissioning



of H-189, the force level of ICG has gone up to 77 ships and boats and with the planned inductions the force level would be doubling by 2018.

## Northrop Grumman Navigation Systems for Coast Guard Vessels

**N**orthrop Grumman Corporation is to supply advanced shipboard navigation systems for 20 fast patrol vessels of the Indian Coast Guard, the fast patrol vessels to be built at Kochi Shipyard. Under the contract, awarded through the company's Indian partner Marine Electricals Ltd., Northrop Grumman's Sperry Marine business unit will provide a navigation package including VisionMaster™ Total Watch™ multifunction displays, electronic chart display and information system (ECDIS), autopilot, magnetic compass and the new NAVIGAT 3000™ fibre optic gyrocompass. The contract also includes spares, factory testing and engineering support services. The first shipset delivery is expected in late 2012. Deliveries will continue into 2015.

## Saab and Pipavav in defence deal

**S**aab and Pipavav Offshore and Defence Engineering Ltd are in a joint deal for investment in the company worth MSEK 250. The investment is in shares which will be issued through a directed share issue, which is dependent on approval from an extraordinary General Meeting held by Pipavav in the fourth quarter 2012. After the investment, Saab will hold approximately 3.5 per cent of the capital and votes in Pipavav. On 24 August, a Memorandum of Understanding (MoU) had been signed concerning a strategic investment in the Indian company Pipavav. At the same time, both companies signed a Technical Partnership Agreement (TPA), a continuation of ongoing co-operation between the companies and covering details about the format for continued relationships and relevant projects. The two companies earlier jointly formed the Combat System Engineering group, which analyses naval combat system design and architecture. The companies are also exploring next generation combat management systems for the Indian Navy and Coast Guard.

## Saab's Skeldar UAV System

As part of the Sweden India Nobel Memorial Week 2012, which was marked in main cities of India, Saab India Technologies showcased their Unmanned Aerial Vehicle (UAV) System, Skeldar, which is a new generation, fully autonomous and mobile short-to-medium range VTOL UAS. Suitable for a wide range of sensor applications in performing missions such as reconnaissance, surveillance and identification, the Skeldar can hover for hours while providing real-time information to a control station or to a remote video terminal.



A full-scale mock-up of the Skeldar UAV on display at the Swedish Trade Commission at New Delhi

The Skeldar system consists of two air vehicles and a mobile UAS Control Station and based on operational and technical requirements, the system may be integrated into a wide variety of segments and system environments utilising a common control concept and user interface in the context of command, control and payload management.

## Saab JV with QuEST Global Manufacturing

Saab has established a joint venture to manufacture and supply assemblies for the commercial aerostructures market together with Indian partner QuEST Global Manufacturing, in which Saab holds 26% ownership. "The partnership with QuEST Global enables Saab to leverage QuEST Global's manufacturing strengths and high knowledge in machining, helping Saab remain competitive in a global market".

The new company will be located in Belgaum (Karnataka) where QuEST Global has developed a fully operational Special Economic Zone and where QuEST Global Manufacturing's operations are located. Facilities for the joint venture will be built during 2013, initially with 50 employees, that number estimated to grow to about 400 in the coming years.

## Niklas Nieminen is Managing Director Saab India

Saab has announced appointment of Niklas Nieminen as Managing Director of Saab India Technologies Pvt Ltd from 1 November 2012.

Niklas will be working closely with Lars-Olof Lindgren, Head of Market Area, India. According to Lars-Olof Lindgren, "India has been identified to be one of Saab's most important markets and we are looking at Niklas with his considerable experience in Saab to enable us to respond quickly and effectively to the diverse market opportunities here. Niklas brings to the team here important domain knowledge, experience across product lines and a strong understanding of Saab values. I am sure Saab India will grow rapidly under his leadership."

After his service as a technical officer in the Swedish Air Force, Niklas worked with the Missile Division of Bofors before joining Saab Avionics in 1998. Over the past 14 years he has held a number of crucial positions in Saab. For the past four years Niklas has been head of Strategy and Programme Management at Saab's business unit Training and Simulation.

## Inderjit Sial is President & Managing Director of Textron India

Inderjit Sial has been appointed as the President & Managing Director of Textron India Private Limited, succeeding NR Mohanty. At Textron, Inderjit will be responsible for advancing the company's globalisation strategy in the region and with supporting Textron's business units with their growth, business development, engineering and sourcing initiatives. He is also responsible for managing Textron's overall relationship with the Indian Government and Indian Defence Services.



## TCE partners Dassault

Dassault Systemes and Tata Consulting Engineers Ltd (TCE) have formed a strategic partnership to leverage core capabilities "to deliver solutions in key sectors such as energy, process, utilities and construction where TCE is already established. TCE will leverage Dassault Systemes' 3DEXPERIENCE industry solutions to bring business value to customers. The partners will also set up a dedicated centre of excellence for delivering 3DEXPERIENCE solutions in key industry segments".

"The synergy will help transform our service delivery model, for customer satisfaction through value creation, taking us further up in the international engineering consulting business," said J. P. Haran, Managing Director, TCE. "In the current economic environment, where quantum improvement in productivity has become the key to competitiveness, this value creation partnership certainly deserves special importance," said Chandan Chowdhury, Managing Director, India, Dassault Systemes.

### India's e-defence to get a major boost

The Government of India plans to establish an autonomous institution - Institute of Cyber Security Professionals of India - along the lines of the Institute of Chartered Accounts of India (ICAI) and make "cyber security audits" mandatory for companies by amending the Companies Act. In order to combat cyber attacks a new initiative is being undertaken to train 500,000 'cyber warriors' in the next five years. This joint government-private sector plan will bolster India's cyber security capabilities. "Efforts to draw a strategic plan for India, being overseen by National Security Advisor (NSA) Shivshankar Menon, needs to be expedited as India is way behind the research and planning undertaken by some western and Asian nations".

Cyber warfare has emerged a top threat to national security with India's systems subjected to a large number of highly specialised cyber attacks. Majority of such attacks India emanate from countries like the US, China, Russia, a few east European countries and Iran. Chinese hackers have targeted a large number of institutions, even stealing data from schools run by the armed forces.

### Downswing in domestic air travel

Domestic flights are at downswing owing to escalating fares and "prohibitive airport user charges": the current year has recorded a much reduced number of people flying domestically. The January-September 2012 period saw 438.4 lakh people flying within the country, which is 0.9 per cent less than last year's figure of 442.2 lakh in the same period. October had a 12.4 per cent fall in domestic flyers with the figure at 40.2 lakh as against 45.9 lakh in the same month last year.

However, despite reduction in passengers, there are predictions of "better times financially". Kingfisher Airlines going out of the 'system' has also been quoted as one of the reasons that have brought some respite for rest of the airline industry.

On the market share charts, IndiGo has retained the first place, followed closely by the Jet Group. Air India (domestic) regained the third spot by displacing SpiceJet, a direct result of its concerted efforts in marketing. Kingfisher, which was flying till end September, had the smallest share, only 3.5 per cent.

### FDI to boost Air Kerala status

Air Kerala, a state-promoted airline project, has attracted the attention of foreign carriers to start flying operations between the Arabian Gulf countries and this southern Indian state. Air Kerala, with an initial equity base of Rs 200 crore, will be 26 per cent state-owned with non-resident Keralites and business groups holding the remaining shares valued at Rs 10,000 per share. The Kerala government is being helped by Ernst & Young with a feasibility report on the airline project. India's decision to allow foreign airlines to take 49 per cent ownership in domestic carriers is also opening up possibilities for Air Kerala, which will "offer competitive fares to the state's population of more than 2.5 million in the oil-rich Gulf".

### Air India's head office shifting to New Delhi

Air India's head office is likely to move from Mumbai to Delhi "to meet the evolving needs and concerns of the airline". The iconic building at Nariman Point, Mumbai, will be replaced by New Delhi's Airlines House, which was head office of the erstwhile Indian Airlines. Pecuniary interests of the airline are likely behind this decision as the Mumbai building is being rented out to generate funds.



The Aviation Ministry took this decision also because the merged airline (with IA) has maximum flights using Delhi's Terminal 3, the other reason being the Rs 30,000-crore government bailout, which will require the airline to meet certain milestones over the next eight years.

### Government guarantees for Air India

Debt-laden Air India has been given a lifeline with the finance ministry offering an unconditional guarantee for the national carrier's Rs 7,400 crore bond issue. This guarantee will enable the airline to issue non-convertible debentures and repay the short-term working capital facility availed from 19 banks. The airline was forced to postpone its bond programme since the finance ministry had issued a conditional guarantee specifying that the government would take over Air India's liabilities but if the airline met certain milestones.

The bonds will have a tenure of 19 years and will have a spread of up to 70 basis points above government securities with a comparable maturity. While AI will be able to save on the interest cost by retiring this debt, banks will reduce exposure to AI after the said short term loan is paid. According to a spokesman, the airline's restructuring programme is on track in terms of meeting on-time performance and passenger load factor benchmarks. This unconditional guarantee has reduced concerns over the long-term viability of the restructuring plan.

## Kingfisher Airlines crises

Within a month of cancelling as many as 60 flights per day from its schedule of 340 flights daily, Kingfisher Airlines has admitted that some of its aircraft are being taken back by AerCap Aviation, the major global aircraft leasing company based in the Netherlands.



In addition to leasing from AerCap, Kingfisher Airlines has leasing agreements with AWAS, ACG and Fly Leasing. While around 12 aircraft are owned by Kingfisher Airlines, the rest are under an operational lease, which the company is trying to convert to a financial lease. As part of this, Kingfisher Airline is hoping to get back around \$200 million paid as deposit and redeploy them towards debt settlements, which is at Rs 7,500 crore on an average rate of 18 per cent. Kingfisher Airlines is also examining sale and lease back option of the 12 aircraft it owns and settle incremental debt.

Kingfisher are also carrying out reconfiguration of their airliners to accommodate more economy class seats and this initiative will require up to 3 aircraft to be out of service over the next three months.

## APPOINTMENTS

### Vice Admiral SPS Cheema is C-in-C Strategic Forces Command

Vice Admiral SPS Cheema has taken over as C-in-C of Strategic Forces Command on 1 November 2012, after his tenure as Chief of Integrated Defence Staff to the Chairman, Chiefs of Staff Committee (CISC). Commissioned into the Indian Navy on 1 January 1977, he is a graduate of National Defence



Academy (NDA), Khadakwasala, the Defence Services Staff College (DSSC), Wellington and the College of Naval Warfare (CNW), Mumbai. A specialist in Missile and Gunnery, who has spent majority of his time on afloat appointments, the Vice Admiral was the commissioning Commanding Officer of Missile boat INS *Nishank*, Mauritian Coast Guard OPV *Vigilant* the stealth frigate INS *Trishul*, INS *Khanjar* and the aircraft carrier INS *Viraat*.

### Air Marshal Ravi Kant Sharma appointed AOC-in-C, Eastern Air Command

Air Marshal Ravi Kant Sharma took over command of the Shillong-based Eastern Air Command on 1 December 2012. He was formerly Deputy Chief of the Air Staff (DCAS) at Air Headquarters in New Delhi. The Air Marshal was commissioned into the fighter stream of the IAF in June 1975, is a Qualified Flying Instructor, an Experimental Test pilot and has flown around 3300 hrs, on several different types of aircraft including the Tejas LCA, where he also was Director National Flight Test Centre (NFTC).

A graduate of the Defence Services Staff College (DSSC), Wellington, the Air Marshal has commanded Test Pilot School and Prototype Test Squadron at Aircraft System Testing Establishment (ASTE), Bangalore and a premier airbase in the South-Western Sector. He has been Assistant Chief of the Integrated Defence Staff (Financial Planning) at HQ IDS, and Assistant Chief of the Air Staff (Plans).



### Air Marshal S Sukumar is the new Deputy Chief of Air Staff

Air Marshal S Sukumar has taken over as Deputy Chief of Air Staff at Air Headquarters in New Delhi on 1 December 2012. He was earlier ACAS (Personnel Officers). Commissioned in the Flying Branch on 29 December 1976, he is a qualified flying instructor and an experimental test pilot. He has flown over 4000 hrs on 25 types of aircraft, including all types of MiG aircraft in the IAF inventory i.e. the MiG-21, MiG-23, MiG-25, MiG-27, MiG-29. Also the Jaguar, Mirage 2000, Su-30, An-32, Avro 748, Kiran, Mk.I, Mk.II, HT-2 and HPT-32. Uniquely he has flown the F-16, F-18 and the Alpha Jet during flight test evaluation.



The Air Marshal has held various command and staff appointments which include as Principal Director Air Staff Requirements.

## Rear Admiral BK Verma is COS, Eastern Naval Command

**R**ear Admiral Bimal Kumar Verma, AVSM took over as Chief of Staff, Eastern Naval Command from Vice Admiral Sunil Lanba, AVSM on 29 October 2012. Commissioned in the Indian Navy on 1



January 1980, with post-specialisation in Communication and Electronic Warfare, he has held a variety of appointments ashore and afloat. Amongst his important ashore appointments, the Flag Officer has been Principal Director Naval Operations at Integrated Headquarters, Ministry of Defence (Navy), Naval Attaché in Tehran, Iran and Captain Sea Training at Visakhapatnam, INTEG and has also served with the Signal Intelligence Organisation.

Rear Admiral Verma's afloat appointments include commissioning crew of INS *Viraat*, Signal Communication

Officer of INS *Ganga* and Fleet Communication Officer of the Western Fleet. He has also been the commanding Officer of IN Ships *Shardul*, *Magar*, *Ranjit* and *Mysore*.

## Mr. S. Subrahmanyam is new Managing Director HAL (MiG Complex)

**M**r. S. Subrahmanyam has taken over as Managing Director of HAL's MiG Complex at Nasik, prior to which he was Chief of Projects at HAL's Helicopter Division (Bangalore). A graduate in mechanical engineering, Subrahmanyam is also a post-graduate in aircraft production from IIT, Chennai.



Mr. Subrahmanyam joined HAL as Management Trainee in July 1980 and has worked in different capacities at the Helicopter Complex, MiG Complex, Bangalore Complex and Corporate Planning.



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The wake of the future

# “Perfect Example” : Sikorsky’s collaboration with Tatas



*The S-92 with a first India-built cabin is currently flying in Brazil*



*S-92 cabin being manufactured at Hyderabad*

**S**ikorsky Aircraft Corporation, in the effort to increase its global footprint, collaborated with the Tata Group in India in late 2009 to set up aviation manufacturing facilities in Hyderabad, “thereby giving a boost to the aviation industry of India.” Sikorsky in collaboration with TASL has set up a cabin-assembling facility in Hyderabad, which is now in full swing and has already delivered 23 cabins so far.

“The first Indian-built cabin has been fully integrated into a Sikorsky S-92 helicopter and currently flying for a customer in Brazil,” said AVM (Retd) Arvind Walia, Regional Executive India & South Asia. The TASL facility is currently producing two cabins per month and is expected to expand to three cabins per month in 2013.

Sikorsky also has set up a JV with the Tata Group, called TARA (or STAR,) which would manufacture more than 4,000 detailed components and sub-assemblies for the S-92 helicopter. Ground breaking ceremony was held in February 2011, and the facility has already started manufacturing parts, within a record 15 months since its inception. Both the facilities employ close to 500 employees and are spread over 200,000 square feet of covered area, and would be expanding to take on the add-ons in near future. “This collaboration is a big milestone indeed for the Indian Aviation industry and a perfect example of Indo-US Corporate partnership.”

# “Operating Across the Full Spectrum”

**VAYU** Interview with

**Admiral DK Joshi**  
**PVSM AVSM YSM NM**  
**VSM ADC,**  
**Chief of Naval Staff**



**VAYU** : The Maritime Capabilities Perspective Plan 2012-27 has been published as have the XII plan documents. Please comment on the Indian Navy’s progress in consonance with the conceived vision and plan.

**CNS**: The present force levels of the Indian Navy are being further augmented for undertaking tasks mandated to the Indian Navy. We are acquiring ships, submarines and aircraft in accordance with our Maritime Capability Perspective Plan (MCPP), which aims to build the force structure

necessary to respond to disparate requirements. The MCPP has been suitably enmeshed into the Long Term Integrated Perspective Plan (LTIPP) of the Armed Forces that was approved by the DAC on 2 April 2012.

The Indian Navy (IN) is continuously evolving to meet the emerging challenges to our maritime interests from various quarters. With a well laid out long-term plan, the IN has been able to keep pace with the developing security situation in the region. Today, the Indian Navy operates a balanced force comprising an aircraft carrier, multi-role destroyers and frigates, fleet tankers, amphibious ships and a multitude of other aviation and sub-surface combatants, capable of a wide spectrum of operations in the Indian Ocean Region and beyond.

Perspective planning by its very nature is based on assured long term funding and credible sources of supply. There is also a need to enhance the capacity and expertise of our defence industry to reduce our dependence on foreign sources of supply in the medium to long term.

**VAYU** : With the induction of INS Chakra earlier this year, the Indian Navy is rightly proud of belonging to the group of six nations operating nuclear submarines. Following this, the indigenous N-submarine ‘INS Arihant’ is also to shortly join service. Kindly review for our readers the overall plans to augment the Navy’s nuclear submarine fleet.

**CNS**: India’s vast and diverse maritime interests and the security concerns in the Indian Ocean Region (IOR) mandate us to take all measures to ‘build’ a strong and capable Navy. While our SSN, INS Chakra, would contribute towards maintaining a strong stabilising and credible presence in the IOR, INS Arihant, which is an SSBN, would provide us with the option of sea based strategic deterrence. The maritime security dynamics in the IOR and our extended neighbourhood would dictate our overall plans to augment the Navy’s nuclear submarine fleet.

**VAYU**: Unfortunately, delays in induction of the INS Vikramaditya will have impacted on the Navy’s plans for extended air power at sea. Escalation over the years in price of this carrier apart, the repeated procrastination in its delivery has raised doubts about the final quality and lethality of this platform for the MIG-29ks already procured by the Navy. Kindly comment on how such a situation could be redressed.

**CNS**: There have been some unforeseen delays in induction of the Vikramaditya. Nevertheless, the capability gap would be filled by keeping INS Viraat operational till the induction of INS Vikramaditya.

The ship has undergone extensive sea trials and has spent more than 100 days at sea. During the trials, the ship clocked a distance of almost 12,000 miles and more



Admiral DK Joshi, the CNS at Air Force Day parade on 8 October 2012.



INS Trishul.

than 500 sorties (involving four types of aircraft and three types of helicopters) were flown towards proving the ship's Aviation Facilities Complex (AFC) and its onboard equipment/ system. The ship's main propulsion and auxiliary equipment were tested under sea going conditions and their performance barring a few equipment, was observed to be good. This bears testimony to the fact that efforts have not been lacking towards ensuring a quality product. However, defects that have emerged during the course of sea trials would need time for rectification. The Russian side has reiterated its commitment towards delivery of a good quality ship which would serve the Indian Navy for 40 years and beyond.

**VAYU:** As widely reported by the media, the Chinese Navy has already acquired its first aircraft carrier. How does this concern the Indian Navy in terms of operational readiness to face a potential adversary in maritime environment in the Asia-Pacific Region?

**CNS:** An aircraft carrier is able to contribute to fleet operations only after it transcends from being just a "platform" to a fleet "capability". This transformation of an asset into capability is a long drawn process that demands investment of time and effort. The IN has undergone this process for over five decades now.

Acquisition of platforms/capabilities is an outcome of the necessity to safeguard national interests. Navies across the world are enhancing capabilities depending upon the challenges they expect to face. Since the security challenges are only bound to increase in times to come, the IN's acquisition plan is continuously evolving to meet new challenges. These acquisitions are not directed towards any specific country.

**VAYU:** Aviation assets of the Indian Navy are being modernised and augmented in consonance with long-term planning. Your comments please, considering the parallel modernisation aspirations of the Indian Air Force and overlapping of acquisitions and roles.

**CNS:** In line with the long term modernisation plan of the Navy, naval aviation is poised for significant growth in the near future with the planned induction/



The CNS at his Navy Day media conference.

IAI

"A smart Navy to meet new challenges"



operationalisation of aircraft such as MiG-29Ks, LCA (Navy), Advanced Jet Trainer (AJT), P-8I Long Range Maritime Reconnaissance Anti-submarine Warfare aircraft, Medium Range Maritime Reconnaissance (MRMR), Naval Utility Helicopter (NUH), Multi-Role helicopter (MRH), UAVs as also the modernisation of Sea King and Kamov helicopters. We must understand that the roles of the Services are well defined and unique and that there is no overlapping. The role of naval aviation is a natural subset of the role of the Indian Navy and is therefore distinct. Acquisition plans of individual services are thus drawn out to meet the distinct roles obviating overlaps. Government approvals for acquisitions are

thus accorded based only on the separate and distinct requirements of individual services.

**VAYU:** Amphibious aircraft could be usefully employed for maritime patrol, search & rescue as also for apprehending suspicious craft including fishing trawlers. Are there any plans to induct such aircraft types by the Navy in the near future?

**CNS:** The Indian Navy is pursuing a case for procurement of amphibious aircraft in the near future. In fact the procurement process has been kick started and we have received a few responses to the RFI which was hosted on the MoD website last year.

The INS Viraat.



**VAYU:** Is delivery of the first six Scorpene-class submarines on schedule for 2015? What steps can be taken to ensure that the force level of the Navy does not suffer owing to any delay in acquisition of all the six submarines?

**CNS:** As per the revised CCS approval, the commissioning date for the first Scorpene submarine is June 2015. There were delays due to the impasse in the procurement of certain construction related material. However, this has been overcome and actions are being taken to meet the scheduled delivery timelines.

The required force levels of our submarines and the strategies of their operations in the future are in accordance with the overall naval plans in countering the threats posed by our potential military adversaries in operations close to coast as well in distant waters. The Indian Navy presently operates fourteen conventional submarines with scheduled accretion of additional submarines under various projects commencing 2015. As mentioned earlier, INS *Chakra* has added further teeth to undersea capability.

The delays in induction will to some extent impinge on our submarine force levels, but the present numbers are adequate to address any situation in view of the recent modernisation and upgradation of most of our submarines in terms of their weapon-sensor suites as well as their crew-support systems.

**VAYU:** The Indian Navy has carried out several exercises with 'friendly' navies in recent years. Which other major exercises are planned in the near future? Also is there any change in orientation to derive maximum advantage in terms of operational preparedness and new tactics in maritime warfare? Please elaborate.

**CNS:** The Indian Navy conducts bilateral exercises with several navies on a regular basis. Exercises with these navies have evolved in content over a period of time and are conducted professionally, optimally utilizing the available time at sea. The thrust is on imbibing technology, best practices and updating of Standard Operating Procedures. In addition, PASSEX (passage exercises) are conducted with visiting ships of friendly navies and during our ships visit to foreign ports on 'Over-Seas Deployments' (OSDs). The schedule of these exercises

# ELETTRONICA

is revised every time so that the exercises remain relevant to the prevalent maritime environment and perceived challenges. We have accrued immense benefits in the past and the exercises are oriented in a manner that continues to benefit the participating navies.

**VAYU:** Acquisition of next generation equipment and weapon systems is invariably required by all major navies of the 21st century. Are there any weapon systems the Indian Navy has not placed on its priority list so far, but would like to induct expeditiously?

**CNS:** The IN has a well charted induction plan for weapon systems and equipment which flows from the Maritime Capability Perspective Plan (MCPP). Considering global technological advancements, the IN is progressing the induction of next generation weapons and sensors, which would ensure that we have platforms and equipment commensurate with our requirements. The induction of weapon systems and equipment is an ongoing process and all factors including the technology available are taken into consideration whilst finalizing our requirements. Several future technologies are being considered for induction. These are contained in our Technology and Perspective Capability Roadmap. This roll on plan is regularly reviewed and updated as required



The guided missile destroyer, 'INS Delhi'.

**VAYU :** The Indian Navy has been combating piracy in the Arabian Sea for some time: what long-term approach is being taken to combat this universal scourge?

**CNS:** Piracy has shown a decline in the recent times, primarily due to the military efforts put in by the world navies and Best Management Practices (BMP), including deployment of armed guards onboard merchant ships. However, it would not be correct to conclude that

piracy is on its way out, as it is also related to the internal situation in Somalia. The Indian Navy has deployed ships for anti-piracy operations in the Gulf of Aden since October 2008. Ships have also been deployed for EEZ surveillance and anti-piracy patrols off the island nations of Mauritius, Seychelles and Maldives on the request of their respective governments. Considering the large quantum of Indian trade through the Gulf of Aden (imports valued USD 50 Billion and exports valued



Fire power : I.N. warship launches rockets during exercise.

## AGUSTAWESTLAND



MiG-29KUB of INAS 303.

USD 60 Billion), we need to continue deployments for anti-piracy in the Gulf of Aden as well as in the Arabian Sea. In order to support anti-piracy deployments, we carry out operational turn round (OTR) of the deployed ships in the ports of Oman, Djibouti and Red Sea. To operationally de-conflict the anti-piracy efforts of other navies, we share relevant information with the ships deployed in the Gulf of Aden, through the forum of Shared Awareness and De-confliction (SHADE) meeting and Contact Group on Piracy off the Coast of Somalia (CGPCS). Piracy will need a solution to be found on land through international efforts. Action at sea is aimed

at containing the problem till a lasting solution is found on land.

**VAYU:** Coastal security efforts need further coordination with other Indian organisations: Please brief our readers on the steps already taken and plans for the near future.

CNS: Since Nov 2008, several initiatives have been taken by the Government to strengthen security of the coastal areas against the threat of non-state actors from the maritime domain. One of the most significant achievements of the last few years has been the integration of all maritime stakeholders, including

the several State and Central agencies into the coastal security construct. The capability of the coastal security construct to tackle emerging threats is regularly tested through coastal security exercises. The results are encouraging as good coordination, synergy and understanding between all agencies has been developed thereby permitting the optimum utilisation of resources and security structures of all the stakeholders. Real time information flow between all stake holders has resulted in prompt response by sea-going agencies to any emerging situation. The coastal and fishing communities have been trained as 'eyes and ears' of the security agencies through regular coastal security awareness campaigns. A number of surveillance initiatives such as coastal radar network and Automatic Identification System (AIS) chains have been operationalised. It is intended to continue the efforts towards integrating and exercising all stakeholders along with early conclusion of various technological projects such as transponders on all fishing vessels, biometric identity cards for fishermen etc, to ensure seamless security of our coastline. The tasks are huge and the challenges are many, but all of us involved in the maritime domain are working steadfastly to strengthen coastal security.

**VAYU :** The indigenous warship building programme is 'healthy' with over 40 warships currently under construction. What is the requirement for induction of these on an annual basis over the next two 5-year plans?

CNS: The IN has wholeheartedly supported indigenisation programmes, in consonance with our overall national vision of sustained growth and self-reliance. It is a matter of significant achievement that the modernisation programme of the Navy is focused towards indigenous warship construction and is largely driven by Indian shipyards and industry including private shipyards. Consequently, we are one of the very few countries in the world with the capability to produce a wide variety of warships, ranging from an Aircraft Carrier to Fast Attack Craft. Our preferred choice of inducting ships and submarines has been through the indigenous route, and of the 44 ships and submarines presently on order, 42 are from Indian shipyards. Our acquisition programme is continuing



The 'Admiral Gorshkov', which has yet to become the INS Vikramaditya.

**MBDA**

apace, and over the next few years, we expect to induct a wide variety of ships, submarines and aviation assets.

As India continues with its efforts towards development and realising regional power status, there is a growing acceptance of the fact that the maritime domain will be the prime facilitator of our economic growth. The role and responsibility of the Indian Navy to protect our maritime interests are likely to grow with the requirement to safeguard our expanding economic interests, as also the responsibilities associated with being a mature and responsible regional maritime power. Therefore, to be able to fulfil the variety of operations ranging from constabulary to full-fledged blue water operations and concurrently protect our maritime interests, the Indian Navy needs to evolve into a versatile and potent force at a fast pace. Presently, on an average, the Navy is inducting 5 to 6 new ships and de-inducting 3 to 4 ships per year. This pace of induction is likely to continue in the next two five-year plan periods.

**VAYU: Is infrastructural development keeping pace with expansion of the fleet and aviation assets? What new facilities are planned, including additional Naval Air Stations?**

**CNS:** As stated earlier, Naval aviation is poised for significant growth in the coming years. The induction of new platforms will necessitate corresponding increase in aviation infrastructure. Accordingly, additional Naval Air Stations

and Naval Air Enclaves are being set up at several locations along our coastline and island territories.

The IN is also focusing on the infrastructure augmentation at the existing air stations to cater for the infrastructure requirements for the planned inductions.

**VAYU: The Naval Academy at Ezhimala is to shortly graduate its first course. What enhancement of its capacity is planned over the next 10 years?**

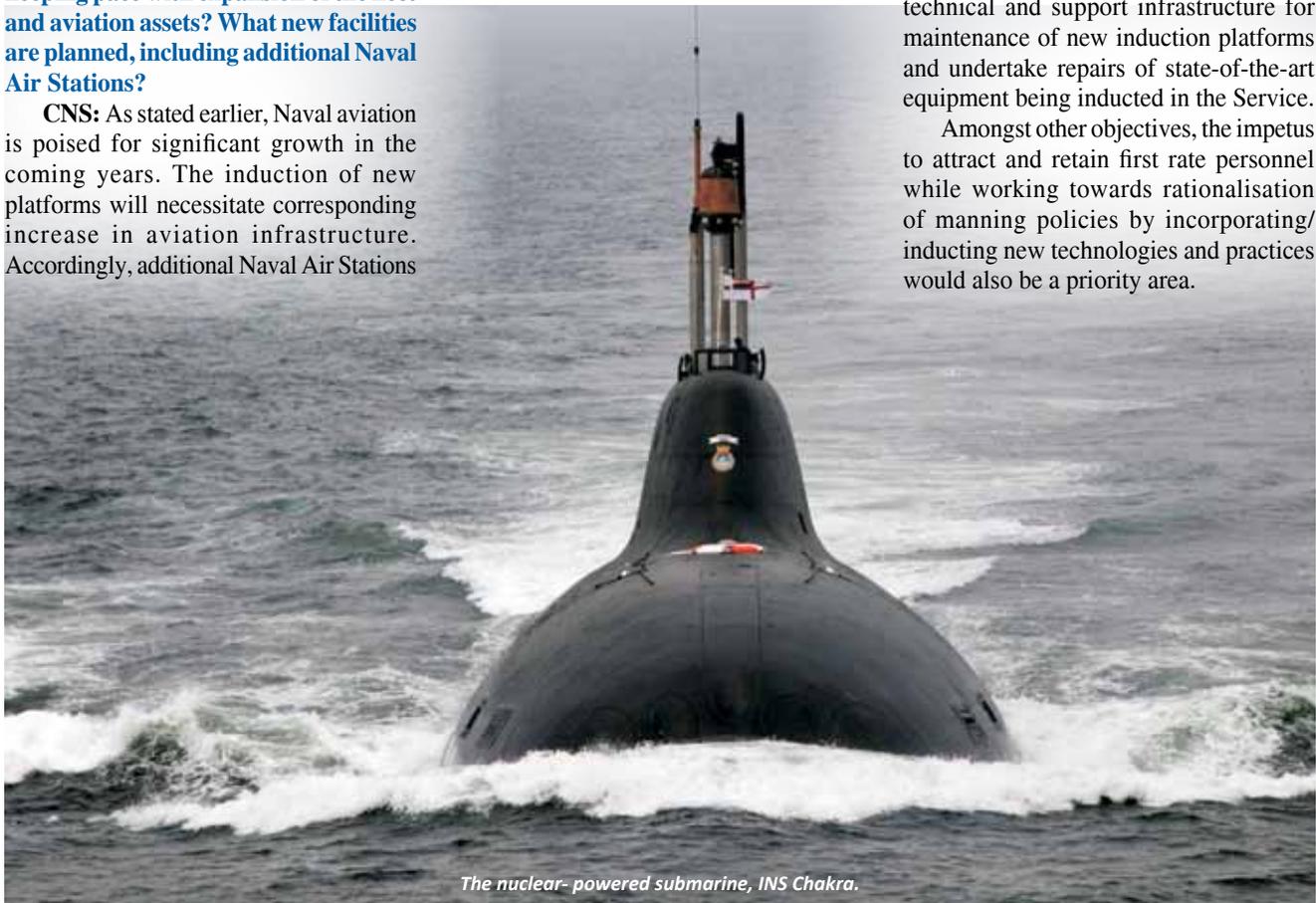
**CNS:** The INA presently has a training capacity of 600 trainees which will be enhanced to 750 by December 2012. Further, the Govt. has approved the enhancement of the training capacity at the INA from 750 to 1200 trainees in the second phase of infrastructure development. The civil works of Phase II are likely to commence in 2013. The IN is also considering the expansion of the INA under Phase III to cater to a peak training load of over 2000 trainees.

**VAYU: Kindly enumerate your 'vision' for the Indian Navy at the end of the second decade of this century.**

**CNS:** We are committed to creating and sustaining a combat ready, technology enabled and networked force, capable of safeguarding our maritime interests and projecting combat power in our areas of interest. Consequently, we seek to evolve relevant doctrines and conceptual frameworks, in order to acquire war fighting capabilities to operate across the full spectrum of conflict in support of our national interest. While coastal security and combat readiness remains our primary focus areas, we are also committed to ensuring security and stability in the Indian Ocean Region and in providing support to our maritime neighbours, when requested. Our operational endeavours shall be underpinned by continuous upgradation of our human skills and a constant willingness to transform in order to adapt to change in the environment around us.

Our focus will remain on induction of platforms to achieve a balanced 'force mix' for Roles, Missions and Objectives in our primary area of interest, and facilitate Out-of-Area Operations. Significant attention is already being paid to augment and build technical and support infrastructure for maintenance of new induction platforms and undertake repairs of state-of-the-art equipment being inducted in the Service.

Amongst other objectives, the impetus to attract and retain first rate personnel while working towards rationalisation of manning policies by incorporating/inducting new technologies and practices would also be a priority area.



*The nuclear-powered submarine, INS Chakra.*

DCNS

# A Tale Of Two



Former Chief of Naval Staff, Admiral Arun Prakash, reviews the near-simultaneous induction of Soviet-origin aircraft carriers by India and China.

*The Admiral Gorshkov, with MiG-29 KUB embarked*

Two warships, both of Soviet provenance, have recently been the focus of world-wide attention, for different reasons. Former Soviet aircraft-carrying cruiser, the 44,500 ton *Admiral Flota Sovietskogo Soyuza Sergei Gorshkov*, accepted as a gift by India and handed over to the Sevmash shipyard in Severdovinsk for repair and modernization, missed yet one more delivery deadline when it suffered machinery problems during trials in the Barents Sea in early September 2012. A week later, another Soviet-era aircraft-carrying cruiser, the 67,500 ton *Varyag*, purchased from the Ukraine and modernised by a shipyard in Dalian, was ceremonially christened the *Liaoning* and accepted into service by the Peoples Liberation Army (Navy) - albeit without any aircraft.

This fascinating tale, not just of two significant warships and two ambitious navies vying for influence, but also of three

nations and their different approaches to vital issues impinging on security and international-relations, deserves to be laid bare here.

## The Soviet 'Aviation Cruisers'

The post-war Soviet Navy considered aircraft carriers as expensive instruments of "capitalist imperial aggression", and tactically as vulnerable sitting-ducks for their submarines and strategic bombers armed with anti-ship missiles. However, with the passing of first generation Soviet ideologues, this prejudice was breached by the launch, first of the anti-submarine warfare (ASW) helicopter carriers of the *Moskva* class in 1968, and then, starting in 1973, of four 'heavy aviation cruisers' of the *Kiev* class. Designed by the Nevskoye Bureau of St Petersburg, these 44,500 ton ships were the largest ever built by the Nikolayev (South) shipyard in the Ukraine for the Soviet Navy, and took Western observers by surprise.

The designation 'aviation cruiser' arose from the fact that unlike Western carriers, the *Kiev* class, or Project 1143, ships were designed with an angled-deck which ran only 2/3rd the vessel's length, while the fore-deck ahead of the island superstructure (offset to starboard as in western carriers) was taken up with heavy missile armament, including the 550 km range *Bazalt* surface-to-surface nuclear-tipped missile. Equipped with the Yakolev Yak-38 (*Forger*) fighter and Kamov Ka-28 helicopters, the intended mission of these ships was to operate for fleet air-defence, shipping strike and ASW.

Unlike the British Sea Harrier which could perform a short take-off and land vertically (STOVL), they Soviet Yak-38 could take-off and land only in the vertical mode (VTOL) and, therefore, had limited range and endurance - even the *Bazalt* missile had a much longer reach ! Since their armament was a mix

# Warships



The Liaoning on sea trials.

of missiles and aircraft, and they were restricted to operations within range of the land-based Soviet Naval Aviation, the 'aviation cruiser' classification was quite appropriate for these ships.

While the *Kievs* did represent a radical departure from the dogmatic anti-carrier stance of Soviet naval strategists, but equipped with the short-legged and subsonic *Forger*, they were no match for any of the US Navy attack carriers. By the mid-1980s it became obvious to the Soviets that their VTOL technology, and the Yak-38 family of shipborne aircraft, had severe limitations and there was need to switch tracks.

Ruling out the steam-catapult route, the Soviets chose to adopt a British innovation, the ski-jump, and took up the challenge of adapting shore-based fighters for shipboard operations. By end-1989, they had succeeded and a new class of carriers, led by the 67, 500 ton *Tiblisi* (later

re-named *Kuznetsov*) was seen carrying out deck trials with conventional (non-VTOL) aircraft in the Black Sea. This ship blazed a new trail in aviation by operating modified versions of high performance aircraft, like the Sukhoi Su-27, MiG-29 and Sukhoi Su-25, from a carrier deck without the help of a steam-catapult. A new term was added to the maritime lexicon: STOBAR, standing for 'short take-off but arrested landing'.

These exciting developments in the *Morskaya Aviatsia* (Soviet naval aviation) unfortunately happened to coincide with the historic collapse of the USSR, and all new projects were abruptly halted. By the early-1990s the first three of the *Kiev* class were decommissioned. Of these, the *Novorossiysk* was scrapped and *Kiev* and *Minsk* were sold to China. The fourth ship, *Baku*, was placed in reserve fleet and re-named *Admiral Gorshkov*. The *Kuznetsov* joined the

Russian Navy, but the construction of a sister ship, the *Varyag* was abandoned, half-way through.

It is understood that in 1988 Russia had also commenced work on a nuclear-powered carrier named *Ulyanovsk*. Equipped with a ski-jump and two steam catapults, this 75,000 ton ship would have been in the 'super-carrier' category, but work was halted in 1991 for lack of funds, and the vessel was scrapped.

## The Gorshkov/Vikramaditya : an Indian Approach

The first Russian offer to sell the *Gorshkov* to India came in 1994-95, following which three expert naval teams, and a fourth one, led by the Defence Secretary, visited Russia to examine the ship, especially since she was reported to have suffered a fire in the boiler room.

The reports were at pains to point out the deterioration in material condition of

the 15-year old ship and the magnitude of the work that would be required, not just to restore it to operational status but also to convert it from a VTOL 'aviation-cruiser' to a conventional aircraft-carrier. Serious apprehensions were also expressed about ability of the Russians to support the ship over its 30-40 year lifespan and the capacity of the IN dockyards to sustain such a complex behemoth. With doubts of this nature being raised by Naval HQ, the MoD, understandably, cast the case into limbo for 5 years.

There were a number of factors that had an important bearing on the internal discussions that went on for nearly half a decade regarding the *Gorshkov*. Firstly, the MoD had dithered over sanction of the indigenous aircraft carrier project for so long, that with the impending demise of the INS *Viraat*, the future of India's naval aviation was beginning to look bleak. Secondly, there was intense political pressure from Moscow for India to acquire the *Gorshkov*, which resulted in frequent prodding of MoD by the PMO. And finally came the irresistible sweetener : the ship was offered to India as a "gift". The unstated condition

was that its lucrative work-package should be assigned to the Sevmasb submarine-building shipyard in Severdovinsk, then idle and in dire financial straits for want of any orders.

Eventually, matters were taken out of hands of the MoD and NHQ by the signing of a high-level Indo-Russian Inter-Governmental Agreement (IGA) which pledged that India would acquire a package consisting, *inter alia*, of the *Gorshkov* as well as two nuclear submarines (on lease) within a stipulated period. Dropping all discussion regarding the merits of the acquisition, South Block constituted a price negotiation committee (PNC) and began preparing for a dialogue with the Russians. A parallel exercise was launched for the selection of a suitable aircraft.

The major items of work involved in the role-change of *Gorshkov*, after removal of missile launchers and associated equipment, were the creation of a flight-deck/runway running the full length of the ship, terminating in a ski-jump for take-off ; plus the installation of a hydraulic arrester-gear for landing. Operation of the 4th generation MiG-29K from the ship called for the addition of many facilities and electronic aids for surveillance and control. In addition the ship, idle for two decades and in poor material state, required extensive repair, replacement and modernisation of all equipment on board, including the engines.

Since the *Gorshkov* had been lying in the Sevmasb shipyard for many months, the Indian side assumed that the work-package proposed by the shipyard was the result of an extensive survey of the ship and therefore, comprehensive, authentic and pertinent. The tortuous Indo-Russian negotiations lasted for over eleven months, and each item of the work-package was discussed before coming to a mutual agreement and signing of the contract in January 2004. The repaired and modernized *Gorshkov* was to be delivered to the Indian Navy in 2008 at a cost of US \$ 974. Separately, a contract for



Admiral Gorshkov lets off its steam !



Russian test pilots with MiG-29KUB during deck trials on the 'Admiral Gorshkov'.



the development, production and delivery of 16 MiG-29K fighters for the ship was also signed.

However, within a few months of the work starting, ominous messages started emanating from Russia about “under-estimation of work” and anticipation of delay in completion. This led to another set of negotiations in which India agreed to the Russian demand for a 250% increase in negotiated cost and a slippage of 4 years in delivery of the ship. It is noteworthy that by the time the re-negotiation commenced, India had already paid 25%-30% of the cost of refit.

In hindsight, only two possible reasons can be conjectured for this unprecedented turn of events. Either the Russians had been utterly casual and unprofessional in grossly under-estimating the extent of work as well as the time duration. Or they had adopted an unethical approach and enticed the Indian side by negotiating a contract that appeared “reasonable”, and then reneged on it once India had sunk enough money in the project. There do not seem to be any other plausible explanations for this breach of a solemn contract under-written by two governments.

However, the worst was yet to come. During its September 2012 sea trials, the ship, scheduled to be commissioned as the INS

*Vikramaditya* on Navy Day 2012, suffered a major failure of the refractory lining in her boilers, whose replacement will lead to a further delay of one year.

But let us see how the Chinese handled their carrier project.

### Varyag/Liaoning : the Chinese Style

Having purchased the hulk of the Australian carrier *Melbourne* in 1985, China went on to acquire two former Soviet carriers, *Minsk* and *Kiev* a few years later. The Chinese have proved themselves, masters at reverse-engineering and analysts saw these acquisitions as part of a master-plan to closely study and undertake the indigenous construction of an aircraft-carrier. Such theories were bolstered by the fact that the Chinese bought blueprints as well as consultancy from M/S Bazan of Spain and the Nevskoye Design Bureau for aircraft-carrier design. The Chinese, however, had different ideas.

In 2000 the 20 year old, 67,500 ton *Varyag* was purchased from Ukraine, ostensibly by a private Chinese company, for conversion to a casino in Macau. The ship had an eventful passage to China, under tow, around the Cape of



MiG-29Ks on the 'Admiral Gorshkov'

Good Hope to reach Dalian after an epic 18 month voyage. On arrival in Dalian she was appropriated by the PLA Navy and placed in the hands of a shipyard.

Varyag happened to be the fourth aircraft-carrier hull to have been acquired by China, and its fate remained shrouded in secrecy and speculation for quite some time, till satellite imagery revealed in 2004 that she was receiving serious attention from a naval shipyard, both at an alongside berth and in dry-dock. However, it was not till 2008-09 when the fitment of major equipment, as well as radars, guns and rocket launchers convinced observers that a repaired and modernized *Varyag* would be the PLAN's first aircraft carrier.

After nearly a decade of dockyard work, which included major changes in the hull, superstructure and flight-deck, and the installation of new propulsion machinery as well as weapons systems and sensors, the ship sailed for her first sea-trials in August 2011. Since then she has sailed on a dozen occasions for various trials, and clocked over 100 days at sea. An important point to note is that she has been fitted out with an arrestor gear, which means that she is notionally ready, in all respects, to operate aircraft. [As events in late November 2012 clearly proved].

On 24 September 2012, the former *Varyag* was officially commissioned as the *Liaoning*, and handed over to the PLAN, displaying pennant number 16 on her bows. She is, reportedly, under the command of 43-year old Senior Captain Zhang Zheng.

### The Liaoning's Air-Wing

There can be little doubt that the *Liaoning*, after extensive sea-trials and acceptance into service, is now a serviceable and seaworthy vessel, but one must be quite clear that both the ship and the PLAN have a long way to go before she becomes an operational STOBAR carrier. The first major issue relates to the availability of a suitable combat aircraft in sufficient numbers.

In this context, China had reportedly engaged in extended negotiations with Russia for purchase of up to fifty Sukhoi Su-33 (carrier versions of the Su-27) fighter aircraft. The negotiations apparently did not lead to a satisfactory conclusion because of Russian apprehensions about China's propensity for reverse-engineering and their disregard of intellectual property rights. Not to be put down, the Chinese are said to have acquired a Ukrainian

version of the Sukhoi-33 and used it to undertake a reverse-engineering project that has produced the Shenyang J-15, or *Flying Shark*, carrier-borne fighter.

The first J-15 prototype is believed to have performed its maiden flight in mid-2009, and images clearly show the same basic airframe design as the Sukhoi Su-33, with a Russian AL-31 engine. Given that normal development time for a prototype aircraft to complete its full trials programme and obtain operational clearances, it could be anywhere from 3 to 5 years before the J-15 enters production and squadron service. In order to fully exploit the J-15, the PLAN will need to acquire a shipborne helicopter for airborne early-warning (AEW). One of the few AEW helicopters in the market today, is the Russian Kamov Ka-31, and China will need a substantial number.

It is, therefore, obvious that the PLA Navy has some years to go before it can position a full air-wing on board and claim to have an operational carrier at sea. Till then the *Liaoning* will remain a trials-cum-training ship. Once the J-15 enters squadron service, PLA Navy pilots, as well as aviation support crew can then commence the training process to operate from the carrier's deck. Only when all of



The Liaoning at a Chinese port.

them are proficient will the *Liaoning* count as an operational aircraft carrier.

The PLAN is known to have created a full-scale mock-up of the Liaoning's flight-deck, ski-jump and superstructure at the Wuhan Naval Research facility. Two full-size dummy fighters and a helicopter were also seen on the deck. But this facility could only have facilitated checking of dimensional and ergonomic compatibility of aircraft with ship, and validating deck markings. For training of PLAN pilots to take-off and land from the Liaoning, they would need to use the comprehensive test-cum-training facility created by the Soviet Navy at Saki near Sevastopol in the Ukraine, which has a ski-jump, arrester gear and a full set of optical and electronic aids required for landing on board.

### The Different Approaches

Comparisons have, inevitably, been drawn between the manner in which two emerging powers, India and China, have managed such projects with remarkable similarities : acquisition of a de-commissioned Soviet-era aviation ship, its repair and modernisation and induction into service. The two contrasting approaches reflect on many national

attributes and characteristics, and it is useful to reflect on some of them.

The departing British had envisaged that independent India's navy would be structured around one or more carrier task forces, and it was from the Royal Navy that we inherited our first two aircraft carriers and learnt the esoteric art of carrier aviation. For the past half-century or more, the aircraft-carrier has remained the centre-piece of IN doctrine and strategy, this concept has received support, in principle, from the national security establishment. In China's case, as the blue-water ambitions and operational reach of the PLAN grew, so did its sense of vulnerability while deploying surface forces on the high seas without an umbrella of integral air power. The carrier has also been considered a major status symbol, as evident from Defence Minister Liang Guanglie's 2009 statement stressing that China was the only "big nation" that did not have aircraft carriers and that such a situation "could not be allowed to prevail forever".

The programme for acquisition of an aircraft carrier for the PLAN was, in all likelihood, conceived and monitored at the highest levels of China's government, and has been marked by

a series of difficult decisions with far reaching implications. The concept of refurbishing a de-commissioned Russian ship and restoring it to service in China as a preliminary to indigenous serial production, appears to have carried the least risk, and was, therefore, sound. In India's case, the navy's long-standing proposal for indigenously constructing an 'air defence ship' lay un-actioned in MoD files for a decade before it was overtaken by the *Gorshkov* offer. It received approval after signing of the *Gorshkov* contract, but the project has been languishing in Cochin Shipyard, ever since, for want of political interest and impetus.

China's vibrant shipbuilding industry, its sound defence technological and industrial base (DTIB) and the national penchant for reverse-engineering gave them enough confidence to embark on the challenging task of undertaking refurbishment of a large and complex ship. It also speaks highly of their technological and management skills that they succeeded. In India's case, there was no shipyard which could have contemplated a task of this magnitude or complexity. The decision to let a Russian yard undertake the task was, thus, a Hobson's choice, but the Indian MoD was not permitted the



*Trials of the J-15 'Flying Shark' from the Liaoning are indicative of the rapidity with which the PLAN are moving in this specialised area of aircraft carrier operation.*

freedom of selecting the most competent Russian shipyard to execute the job at a competitive price.

Finally, India's inability to either build its own carrier or to refurbish the *Gorshkov* in-country, is as much a reflection on the lack of vision and resolve in the national security establishment, as on the failure of our DTIB (consisting of the DRDO and defence PSUs) to rise to the occasion, after 65 years of independence.

### **Russia's Role ?**

Let us note that when these two ships, with potent air-wings, are deployed by their respective navies, a new maritime balance will emerge in the Indo-Pacific region. The role played by Russia in the creation of this equation, was possibly underpinned by considerations of *realpolitik*, and is worth examining.

A major factor in Russia's attitude towards China and India is the degree of dependence of each country on it for weapon platforms and systems. While the Chinese pushed through a determined reverse-engineering drive which freed it

from external dependency in the early-1980s, India's abject failure in defence indigenisation has made it the world's largest importer of arms. A majority of India's weapon imports are from Russia and we will remain dependent on this country for the foreseeable future. Aware of this dependency, Russia would not be above wooing China as a buyer while taking India for granted as a captive market.

Notwithstanding their technological competence, it is most unlikely that the Chinese could have successfully undertaken repair and refurbishment of *Varyag's* complex systems, especially the propulsion machinery, without substantial help from the Russian ship designers and builders. The ship was, reportedly, acquired without the hydraulic arrestor gear required for aircraft operations, but obviously, somewhere down the line, the Russians agreed to supply this vital piece of equipment, as well as the optical and electronic devices for aircraft recovery. Similarly, there must be hundreds of systems, on board, of Soviet/Russian

origin for which the Chinese would have sought and obtained Russian spare parts and support.

Coming to aircraft : despite the ostensible denial of the Sukhoi Su-33 by the Russians, the rapidity with which the Chinese have replicated it, in the form of the J-15 *Flying Shark*, could be an indication of Russian help. In any case, the engine for this aircraft is the Russian supplied Saturn AL-31.

In case of the *Gorshkov/Vikramaditya* imbroglio, it is now evident that Russia's insistence on assigning the refit to the Sevmas shipyard was a serious error. This shipyard, dedicated exclusively to nuclear submarine construction, was obviously out of its depth, taking on the refurbishment of an aircraft-carrier built in a Ukrainian shipyard. Much of the gross "miscalculation" by Sevmas in the context of work-package and time-frame is a manifestation of inefficiency, mismanagement and endemic corruption that afflicts the Russian military industry. The latest failure of boiler refractory, during sea trials, points to a poor



workmanship in a highly specialised area. The Russian government has, however, backed the shipyard to the hilt rejecting, feeble Indian pleas for imposing penalties or liquidated damages.

As far as the Chinese project is concerned, the most crucial piece of Russian assistance will be the availability of the training facility at Saki, where PLAN pilots will learn skills of STOBAR

operations. If reports that this facility is being made available to the PLAN are true, then the presence of Russian instructors can be taken for granted. In this context, there are disturbing reports that the Saki facility, earlier promised by the Russians for training *Vikramaditya*'s pilots, has now been denied to India. More than a setback, this constitutes yet another breach of faith, but the IN should soon be commissioning its own training facility in Goa.

### Realpolitik at Sea

Both the *Liaoning* and *Vikramaditya* will be observed with great interest, by maritime professionals, when they put out to sea as operational aircraft-carriers. The PLAN, with the bigger ship and, perhaps, a more potent combat aircraft, but with no background of carrier operations, will be stepping out very tentatively. The IN, on the other hand, with experienced naval aircrew and half a century of carrier operations behind it, will deploy its carrier with confidence and panache.

However, it must be borne in mind that both ships were designed and built by the Russians who had little experience of shipborne aviation. Both ships will throw up many design flaws with operational implications, requiring innovative solutions and assistance from designers and builders. Russia will, therefore, have a continuing role to play during the service life of both ships. How it plays that role and which way the “cookie crumbles” will be a function of politics and diplomacy.



Jump-launch of the J-15 from the *Liaoning*'s skiramp.

# The Gorshkov Saga –



**A**dmiral Gorshkov had a short and uneventful career with her original customer. Originally commissioned as *Baku* for the Soviet Navy, she was the last of the Kiev class of “heavy aircraft carrying cruisers.” *Baku* was equipped with twelve P-500 *Bazalt* cruise missiles in addition to an air wing of 12 Yak-38 ‘Forger’ VSTOL combat aircraft and 12-16 helicopters (Kamov Ka-25/27/31). The angled flight deck extended around two-thirds the length of the ship, and was designed exclusively for VTOL operations, being devoid of a ski-jump or catapults. She was different in many aspects from the preceding ships of the Kiev class, being used to trial some of the technologies that would be used on the larger *Kuznetsov*-class aircraft carrier.

After dissolution of the Soviet Union, the *Baku* was renamed *Admiral Gorshkov* in 1991, and continued to serve in the Northern Fleet. A boiler room explosion

in 1994 necessitated a year of repairs, she returned to service in 1995. The following year, Gorshkov was decommissioned and offered for sale. India was immediately interested in the purchase, and after protracted negotiations, agreed to buy the ship in January 2004. Under terms of the initial agreement, the ship would be free, but the refit, upgrade and modification would cost around \$800 million, with an additional \$1 billion to be spent on the aircraft and weapons systems. The aircraft carrier was to be named *INS Vikramaditya* in Indian service.

Modifications to the *Admiral Gorshkov*, to be undertaken at the Sevmas shipyard in Arkhangelsk, include the removal of the P-500 cruise missile launchers and the four 3K95 *Kinzhal* surface-to-air missile launchers fitted on the bow, to make room for a 14.3° bow ski-jump. Two restraining stands would also be fitted, allowing combat aircraft to reach full power before

making a ski jump-assisted short takeoff. The 20-ton capacity aircraft elevator beside the ship’s island superstructure remains unchanged, but the aft lift will be enlarged and its capacity increased to 30 tons. Three arresting cables would be fitted on the aft part of the angled deck. Navigation and carrier-landing aids would be refitted to support fixed-wing STOBAR (Short Take-Off But Arrested Recovery) operations.

The eight boilers have been converted to take diesel fuel instead of furnace fuel oil and modern oil-water separators as well as a sewage treatment plant are being incorporated to meet international standards. She is also being fitted with six new Italian-made Wärtsilä 1.5 MW diesel generators, a Global Marine communications system, Sperry Bridgmaster navigation radar, a new telephone exchange, new data link and an IFF Mk XI system. Living condition are

# Better Late Than Never?



being improved with new water-producing plants as well as York International refrigeration and air conditioning. A new galley is being installed together with improved domestic services and accommodation for 10 female officers.

In the four years following initial agreement, construction delays and cost escalations strained the deal until a stalemate was reached in 2008, with Russia stating that due to the severely deteriorated condition of the ship, the final delivery cost would be in the region of \$3 billion. Following months of high-level talks, in March 2009, the final delivery price was agreed upon at \$2.3 billion, nearly three times higher than that of the original contract. Since then, work continued apace, and the aircraft carrier looked on track for a late-2012 delivery date.

In June 2010, a MiG-29K prototype was tested for use aboard the *Vikramaditya*, this type being the primary fixed wing

fighter to be operated off the carrier by the Indian Navy. The first of these aircraft had already been delivered to India in 2009, with a total of 45 to be operated by the Navy in the coming years.

Dock trials began in March 2011. The focus of these trials was on the main power generation units and the radio-electronic armament systems, manufactured in India. Additionally, Indian Navy personnel began training on *INS Vikramaditya* in April 2011. A year later, in April 2012, it was announced that all internal systems were functioning, and the ship was entirely self-contained. Measurement of the ship's magnetic field and centre of gravity were performed before sea trials were undertaken.

The ship sailed out for its crucial pre-delivery trials from Severodvinsk in June 2012, with projected handover on 4 December 2012, celebrated as "Navy Day" in India.

However, it was during these final set of trials lasting 120 days that the programme was struck its most recent and widely-publicised blow. During full-steam testing in September, seven of the ship's eight boilers failed and had to be shut down. Initially, the Russian contractors blamed the failure on India's insistence to replace the engines' asbestos insulation with firebrick. Asbestos is a known carcinogen, and India had sought to replace the material based on health and safety concerns.

Following this latest incident, the delivery date of the *Vikramaditya* has been pushed back by a year, to the fourth quarter of 2013. However, despite the boiler issue gaining the most publicity, most of the other systems that were to be tested during the sea trials, including the crucial aviation-related elements such as the ski jump, arrestor wires and aircraft guidance systems, performed flawlessly.



*Iconic photograph of the legendary Admiral Sergei Gorshkov of the then Soviet Navy inspecting Indian Naval Guard of Honour at Bombay.*

Despite talks of a cash penalty amounting to approximately \$115 million (5 percent of the ship's cost), such action remains unlikely in light of the multitude of past and present naval acquisition programmes that have also faced delays and cost escalations, but escaped without consequences. For now, with one last hurdle to clear, it looks like the Navy has no other choice but to wait another year and accept the INS *Vikramaditya* in the winter of 2013.

*Angad Singh*

**[All pictures of the carrier Admiral Gorshkov from the net.]**



*The Gorshkov under transformation.*



## INS 'Vikramaditya':

# The Morphed Aircraft Carrier

Admiral Sergei Gorshkov in his tenure of twenty-seven years as legendary Commander-in-Chief of the Soviet Navy, transformed it into a true 'Blue-Water Navy', from what was essentially a near-shore force. He was an outstanding visionary, effectively reflected in his voluminous literary publication 'Sea Power of the State'. So it may be no coincidence that a modified *Kiev*-Class warship initially bearing his name is destined to dominate the strategically

38 'Forger' aircraft (chiefly to gain aircraft carrier based aviation experience) in addition to Kamov Ka-25 'Hormone' Anti-Submarine Warfare (ASW) helicopter squadrons. The forward part resembled a cruiser with P-500 Bazalt (SS-N-12 'Sandbox') Anti-Ship Cruise Missile (ASCM) launchers presenting a unique cruiser/carrier configuration. In Soviet Navy service the *Kiev*-class was employed in support of Soviet submarines in their respective 'bastions' against NATO

cruise missile firing submarines and Tupolev Tu-22M 'Backfire' bombers armed with anti-ship missiles.

The 45,400-ton 'Admiral Gorshkov' Navy service near the end of the Cold War. The heavily modified Krechet Class ship designed by St. Petersburg's Nevskoye Design Bureau, led by Vassily Anikeev was initially called the 'Baku' and was used as a test bed for radar and electronic systems eventually to be fitted on the first Russian super carrier 'Admiral



*The carrier seen in Russia (Photo: Oleg Kuleshov)*

vital Indian Ocean albeit under Indian naval colours as Indian Navy (IN) remains second in capabilities only to the major naval presence of United States in the Persian Gulf and Indian Ocean region.

An ingenious Russian product of the Cold War, the *Kiev*-class aircraft-carrying cruiser (TAKR in Russian acronym) was developed from the *Moskva*-class helicopter carrying guided missile cruisers (CGH), with a more conventional flight deck arrangement, adopted to enable the carrier to operate fixed-wing Vertical Take Off and Landing (VTOL) Yakovlev Yak-

(North Atlantic Treaty Organisation) threats. These included defensive postures to protect the SSBN (Submarine, Ballistic missile armed, Nuclear powered) holding areas or 'bastions' from hostile submarine incursions in the Barents Sea and Sea of Okhotsk, and offensive missions to sweep aside NATO barrier ASW forces in key areas such as the GIUK (Greenland, Iceland, United Kingdom) gap. Thus to contest the entire North Sea and Norwegian Sea area, as far as west as Iceland, the *Kiev*-Class (that included '*Kiev*', '*Minsk*' and '*Novorossiysk*') were supported by

Kuznetsov'. Pristine systems included 'Sky Watch' 3-Dimensional Planer radar, and "Cake Stand" aircraft control (TACAN) radar along with a formidable SAM armament. The ship suffered a boiler room explosion in early nineties; necessary repairs were conducted and the ship was later offered for sale to Indian Navy (IN).

Projected to be the first IN operated aircraft carrier with a formidable Anti-Air Warfare (AAW) capability, prior to delivery to IN, the helicopter/VTOL carrier has been extensively refurbished



arresting gears are fitted on the aft part of the angled deck. Navigation and carrier-landing aids will support fixed-wing Short Take-Off But Arrested Recovery (STOBAR) operations including the LAK optical-landing system. As apparent, the ship is slated have a decent multi-tier air defence capability provided by Russian MiG-29K fighters, and SAMs (although not officially declared, Indo-Israeli Barak-8 remain the logical weapon) and appropriate Close In Weapon Systems (CIWS). Shipborne Airborne Early Warning (AEW) capability will be provided by Kamov Ka-31 helicopters.

The INS *Vikramaditya* will provide the vital integrated air support in terms of both Fleet area air defence and “on-station” ASW screening, by deploying

that case may be too late to react. MiG-29Ks will additionally deny the operation of enemy LRMP aircraft in the vicinity of own vital submarine operations, while assisting Indian LRMP platforms in their operational role by establishing local air superiority beyond land based air cover. INS *Vikramaditya* also may establish an air defence fighter and SAM cover over Arabian Sea to destroy enemy airborne strike platforms in defence of vital nuclear and oil installations on the Western coast. Ironically while the relative height and size of the “island” is likely to cause severe turbulence issues during flight operations yet they do provide specific spaces for future installation of active phased array radars to conduct extensive aerial operations.

On the downside, the absence of futuristic steam catapults or advanced electromagnetic aircraft launch-and-recovery systems alike Electro-Magnetic Aircraft Launch System (EMALS) (like those being developed in United States by Kaman Electromagnetics, alongside an internal-combustion catapult system fuelled by JP-5 jet fuel) have ruled out fixed-wing AEW&C platforms alike the United States E-2D ‘Advanced Hawkeye’ operating from the INS *Vikramaditya*. Fixed-wing AEW&C platforms have superior coverage of airspace and more importantly have the ability to guide and control shipborne fighters towards their targets, an attribute the AEW helicopter platforms lack. Fortunately India’s strategic geographic position also enables her to influence naval operations with land based LRMP platforms like the P-8I Poseidon to provide extended ASW coverage and AEW&C platforms for optimal situational awareness, although an integral AEW&C asset is always welcome.

Propulsion is one area that had repeatedly proven problematic to INS *Vikramaditya* (even the present boilers are behaving notoriously) and this *Vayu* observer can only wish that the warship in her lengthy refurbishment incorporated the Bhabha Atomic Research Centre (BARC) developed nuclear Pressurised Water Reactors (PWR) thus reducing dependence on fleet replenishes and be so able to move and manoeuvre more freely.

*Sayan Majumdar*

to a more conventional aircraft-carrier configuration by deleting the ASCM and SAM installations on the foredeck to make way for a 14.3-degree bow ski-jump. Two restraining stands allows MiG-29K air superiority fighters to reach full power before making a ski-ramp-assisted short take-off although constrained deck space enables launch of only one aircraft at a time. While the 20-ton capacity elevator beside the ship’s island superstructure remains unchanged, the aft lift is enlarged and its lift capacity increased to 30-tons. Three

a mixture of air defence fighter and ASW helicopter squadrons. The air defence fighters will be instrumental in intercepting and destroying enemy strike and Long Range Maritime Patrol (LRMP) platforms at great distances before they can close in for ASW operations or conduct Anti Surface unit Warfare (ASuW) with accurate anti-ship missiles like Harpoon and Exocet. This necessity is more acute if the enemy airborne platforms are to be guided to their targets by an Airborne Early Warning & Control (AEW&C) System aircraft as land based air cover in

# VTOL+VIFF = VICTORY



RN Sea Harrier, with Sidewinder missiles and extra fuel tanks coming in for vertical landing.

## Sea Harriers, HMS Hermes and the Falklands

*First hand account by Cdr Tony Ogilvy of the role of Sea Harriers in the Battle of the South Atlantic, 1982*

At the time Argentinian forces were invading the Falklands, I was assigned to 899 Headquarters and Training Squadron at Royal Naval Air Station Yeovilton, having just commenced a refresher course on the Sea Harrier, in preparation for taking over command of 801 Squadron from Lieutenant Commander Nigel Ward. Once the decision was taken to send the task force, all three Sea Harrier Squadrons at Yeovilton put a rapid mobilisation plan into operation, prior to embarking in their ships at the beginning of April 1982. This plan even included recalling pilots on exchange tours from Australia and the United States.

801 Squadron joined HMS *Invincible*, 800 Squadron went to HMS *Hermes* and 899 Squadron was split between the two ships to augment the two frontline squadrons. I embarked in HMS *Hermes*, alongside in Portsmouth, and we sailed south on April 5 when all storing had been completed. The passage to Ascension Island was spent in working up both the air group and ship's company, with regular action and emergency station drills in preparation for the forthcoming operation.

One of the earliest changes was to repaint the Sea Harriers in a colour scheme more appropriate to the South Atlantic. The original top side colour of dark sea grey was retained and the underside painted the same shade. Wartime roundels, i.e. without the white circle, and a small aircraft serial number, were retained for



identification purposes. The new colour scheme was most effective at low level over land or water : the aircraft virtually disappeared.

At Ascension Island we had our first taste of things to come : a sonar contact, and the fleet went to action stations for real. From then on *Hermes* remained in a high state of readiness and watertight integrity and drills were practised with increasing regularity as we headed south.

From the start the primary role of both carriers was fleet air defence. But *Hermes* with her large and varied magazine — 1,000 lb bombs, cluster bombs, etc. — was also tasked with a number of attack options. These were against ship and land targets and, as the Squadron air warfare instructor, I was involved in a fair amount of planning en route to the total exclusion zone. Combat air patrols were carried out on an escalating scale, with increasing numbers of missions each day as the task force came closer to the Falklands. It was a Sea Harrier from 801 Squadron in HMS *Invincible* that made the first interception of the Argentine Air Force Boeing 707 reconnaissance aircraft on 25 April. No aggressive action was taken in this first encounter as the rules of engagement were still very limiting.

CAPs were being flown at between 60 and 80 miles from the task force and, during the approach to the total exclusion zone, a good deal of night flying was taking place. We had no accurate knowledge of what we would be facing inside the zone and were preparing for everything. So, until we could quantify the threat, our exercises covered a wide range of tactical possibilities: new attack modes like loft delivery were tried for the first time and live weapons were dropped to check arming and release circuits.

In late April and early May, well south of Ascension Island, plans for the air attack on Port Stanley airfield were being finalised. I was responsible for working out the attack profile and, with a team to assist, produced the basic plan.

In view of the intelligence reports of anti-aircraft artillery defences on and around the airfield, I decided on two complementary attack profiles using a total of nine aircraft. Four Sea Harriers would go in first to neutralise the AAA, closely followed by the remaining five which would concentrate on dropping

ordnance on to Stanley airfield. It needed really accurate timing to be effective and to minimise the risk of attrition.

Using the aircraft's self-contained navigation, heading and attitude reference system (NAVHARS), the formation of nine Sea Harriers flew direct to a waypoint north-west of the island and from there the first four, led by myself, dog-legged over the sea to run in for the fire suppression attack. The other five Sea Harriers, led by the commanding officer, flew a co-ordinated navigational leg before turning in for their attack run approaching over the land.

This was the first time ever we had operationally used the loft or toss bombing technique in the Sea Harrier. It involves an approach at 100 feet flying about 520 knots to a pull-up point 3 miles or so short of the target, from where the bombs are lobbed, like in an underarm cricket-ball delivery.

The initial formation carried variously fused 1,000 lb high-explosive bombs designed to destroy AAA and radar defences and hamper repair work. Once the ordnance had been released, we went through the normal escape manoeuvre and cleared out. The loft-bombing system proved very successful, and those in the second wave on their run-in could see the airburst weapons exploding in the planned area. On pull-up, my radar warning receiver gave a locked radar alarm which reinforced our suspicions that there was an anti-aircraft missile system on the airfield. I completed a sharp escape manoeuvre and the warning cleared.

The other five Sea Harriers in the meantime attacked from the north and the north-west, aiming to produce maximum disruption to both surface and support areas. Four of the Sea Harriers were carrying cluster bombs while the fifth was armed with three 1,000 lb high-explosive bombs. They flew in at very low level, jinking hard until just before weapon release.

Apart from the runway itself, the pilots in the second wave were briefed to attack anything of value, which included hangars and buildings, oil and fuel dumps as well as parked aircraft, of which there were quite a few, including some Pucaras.

An RAF Vulcan had attacked the airfield only a few hours before us and that meant the defences were on top line. As it

was, only one Harrier was hit (in the tail) and this turned out to be minor damage, repairable in a short time once back on board. The attack was a success, all the bombs were released on target and caused a considerable amount of damage.

Later that day the first Argentine air attacks were mounted, using Mirage IIIs. Two of them were detected approaching at high level and two Sea Harriers were launched from HMS *Hermes* to intercept. As they closed the targets, one Mirage fired an air-to-air guided missile which failed to hit, the targeted Sea Harrier evading the missile's flight path. The second Sea Harrier locked on to one Mirage and fired a Sidewinder at long range. It hit and the Mirage exploded. Meanwhile the second Mirage turned tail at long range and was not engaged.

Following the first interception using Sea Harriers, we continued our programme of land attacks and photo-reconnaissance over the Falklands — Pebble Island, Fox Bay, Port Stanley, Goose Green, etc. The Admiral and his staff needed as much tactical information and detailed reconnaissance data as possible and I think he was pleased by the results of these reconnaissance sorties. Certainly subsequent land operations proved the value of this work, which in later weeks was shared with the RAF Harriers of No. 1 Squadron.

While continuing our operations over Argentinian strong points we had our first casualty, Lieutenant Nick Taylor RN, whilst attacking installations at Goose Green. The sortie itself was successful, but of course it was tinged with great sorrow. In the back of our minds we had all expected this might happen but it came as a jolt all the same. I think it was much worse for the families at home. They would hear news reports of a Harrier pilot being shot down or involved in an accident, and all they could do was to sit and wait.

It was confirmed that there was a continuing requirement to bomb installations at Port Stanley airfield, for which both carriers devised medium-level bombing techniques. These attacks kept the airfield defenders on permanent alert as well as achieving an unquantifiable amount of damage. The raids continued on a daily basis and later attacks were made, using the loft mode by day and night aimed at the runway itself.



*Sea Harriers ready to launch from the HMS Hermes.*

Later in May, additional Sea Harriers of 809 Squadron and some RAF Harrier GR3s of No. 1 (F) Squadron arrived via *Atlantic Conveyor* and were split between the two carriers, making a grand total at one stage of 22 Harriers on board HMS *Hermes*. Those plus the resident helicopter and fixed-wing squadrons made for very full carriers.

The RAF Harriers did a fine job in ground attack and reconnaissance missions, and their arrival released more Sea Harriers for air defence duties, which were becoming increasingly heavy. The San Carlos landing marked the beginning of the main air attacks by the Argentine Air Force.

The Sea Harriers in both carriers were now committed to CAP duties, and operations were stepped up to provide patrols in support of the San Carlos beach-head. After leaving their respective carriers, the Sea Harriers usually came under the tactical control of the screening ships, usually Type 42 destroyers, occasionally Type 22 frigates, but much of the intercept work was autonomous, with the Sea Harriers on CAP picking up the raids as they came in at low level.

The air defence ships in the San Carlos area did a marvellous job and HMS *Brilliant* in particular deserves a special mention. Whilst under heavy attack herself, the first lieutenant, using the ship's radar, directed Sea Harrier patrols on to raids approaching to attack at very low level. Anything I can say would never do justice to the bravery and dedication

shown by those ships and their crews in the Sound.

Every day, throughout the Argentine raids, we were running a programme in *Hermes* that often required up to ten Sea Harriers at any one time. All this, with aircraft on alert throughout the night, was a tremendous task for the pilots involved, particularly the night team. They, at the height of the air battle would spend up to 10 hours in 24 in the cockpit, either flying or at alert.

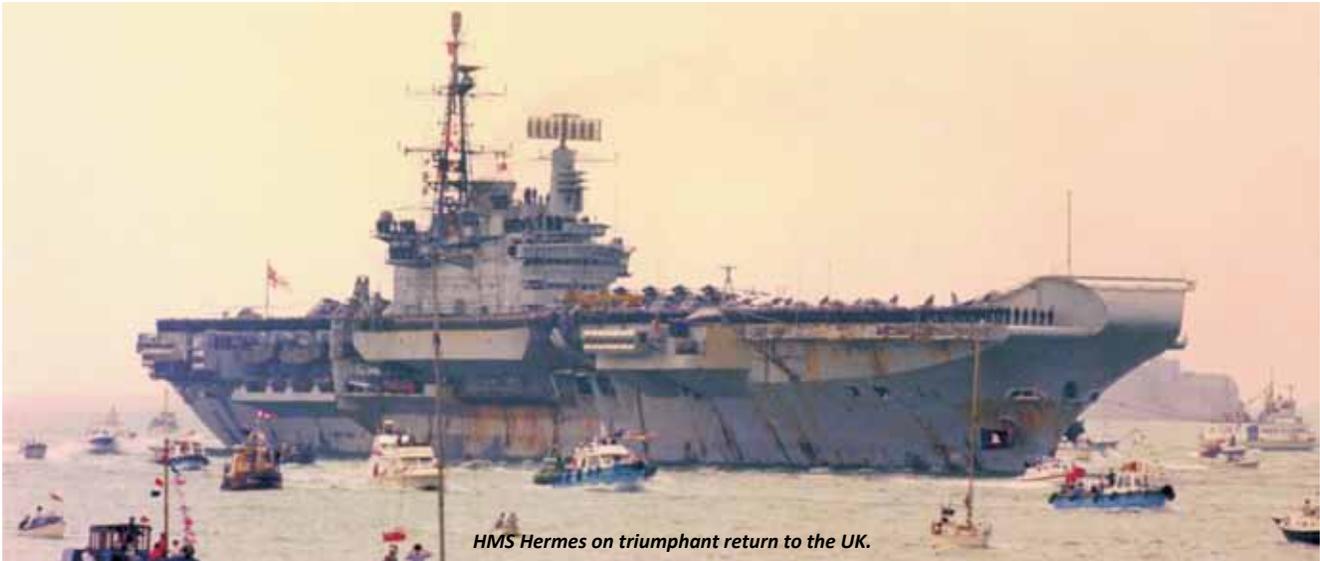
By now the great strength of the Sea Harrier was becoming apparent. Under operational conditions, the aircraft and systems held up beyond anyone's expectations. Of the 16 or so Sea Harriers on board, at least 10 were serviceable at any onetime. The Pegasus engine, also, more than proved its worth. During the time that I was embarked, not one Sea Harrier needed an engine change. But I think, most important of all, the

aircraft worked so well in all roles. Every Sidewinder missile launched correctly; not once did the Aden guns fail; and all bombs separated properly fused and they all functioned. The avionics held up well, with few spares needed, and even with a very occasional degraded weapon aiming system, missiles and bombs still hit their targets. The F95 reconnaissance camera did not let us down and the aircraft showed that it can take battle damage.

As for its primary role as a fighter, the 23+ Argentine aircraft shot down — mostly Mirages and A4s — with no Sea Harrier lost in air combat says it all. The Falklands crisis has demonstrated the full extent of the Sea Harrier's capability in all its roles. It is a tough and reliable combat aircraft and, teamed with the Sidewinder AIM-9L, won the air battle hands down. It is surely no exaggeration to say that without the Sea Harrier there could have been no task force.



*Sea King comes into land on HMS Hermes.*



*HMS Hermes on triumphant return to the UK.*

At one period in the deployment, HMS *Hermes* was flying 40 Harrier sorties a day, at times in appalling weather — less than 200 feet cloud base and well under half a mile visibility, in sea states that only the South Atlantic can provide. Harrier recoveries (the decelerating transition to a hover with subsequent vertical landing) came in to the deck from all angles: over the bows, up the wake and over the stern, from port or from starboard: with touchdowns amidships, on the afterdeck and just behind the bow ski-jump. Because of the ever-constant threat of hostile submarines, the Admiral preferred to steam the task force at 15 knots or so, and it would have been tactically very unsound to turn the carrier into the wind

for every launch and recovery as would have been necessary with a fiat-top operating conventional naval jets.

Taking a general overall view of the Falklands operation as far as the Sea Harriers were concerned, we in the Fleet Air Arm were more than satisfied with its achievements and with the operational results. The new fixed wing RN squadrons more than justified their existence ; surely now there can be no doubt anywhere of what the Sea Harrier is capable of accomplishing. Once again so often in the past, the RN has pioneered new techniques in naval aviation and proved them to a watching world.

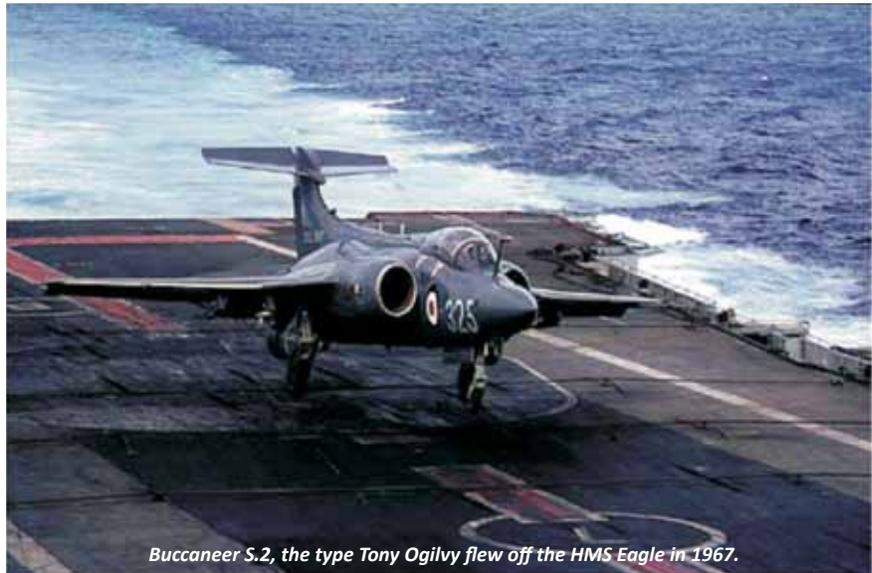
Lieutenant Commander Antony Ogilvy AFC RN contracted a severe sinous infection which grounded him. He

remained onboard HMS *Hermes*, flagship of the Falklands Task Force as part of the planning team for air defence and attack operations, in liaison with ship and staff officers. As the Air Warfare Instructor he worked on the planning of many of the air to ground attacks that took place. He took command of 801 Squadron from Sharkey Ward in the Falklands and remained as CO until 1984.

*Tony Ogilvy joined the RN Fleet Air Arm in 1964, and spent 12 years on the Buccaneer, flying 2000 hours from HMS Ark Royal and HMS Eagle. He was an AWI. In his 20 years of naval aviation flying, Tony had a total of 3200 flying hours and was member of the RN Hunter Aerobatic team whilst at RNAS Brawdy.*



*Cdr. Tony Ogilvy when commanding 801 Squadron on board HMS Hermes.*



*Buccaneer S.2, the type Tony Ogilvy flew off the HMS Eagle in 1967.*

# The Sea Gripen Programme

**T**ony Ogilvy is now General Manager, Aeronautics and Head of Sea Gripen Centre with Saab in the UK and has briefed the Indian Navy on the programme.

*The Sea Gripen can be considered as an ideal Indian Naval carrier-based fighter, and a perfect fit in terms of timing. Saab intends to work in partnership with the Indian authorities to demonstrate fully the major advantages that Sea Gripen can bring to the new carrier fleet, and security of the nation, for the next 40 years.*

*Design work on the maritime version of Gripen has been conducted for a number of years, but became a formal programme in 2009 to meet the IN Request for Information issued in December of that year. In September 2011 Saab opened its new offices in London, which included the Sea Gripen Design Centre as an integral part, recruited a team of UK specialist engineers to staff the centre, linked to engineers in Linköping on real/time secure IT to complete the design work.*

*With a catapult launch Sea Gripen will be able to operate to its maximum takeoff weight of 16.5 tonnes, which will provide navies with Gripen E/F performance and capability from a carrier base. Without catapult assistance, Saab are working on further methods to increase takeoff payload and anticipate that Sea Gripen will offer a very capable payload performance from a 200 metre deck run, and 14 degree ramp exit. The use of a holdback mechanism will greatly improve launch weight, and it is understood that*



Artist's depiction of the Sea Gripen with its array of weapons.

*The Sea Gripen offers a full multi-role capability in all roles, day and night. It can be considered the perfect work-horse for the carrier environment, with low supportability and high availability offering the marine command maximum levels of fire power over protracted operational periods afloat and ashore. The Sea Gripen will fully complement capabilities of the LCA Navy being developed by the Aeronautical Development Agency.*

*By doing so, Saab has tapped into the enormous pool of maritime jet and carrier based operational knowledge resident in the UK, to form a highly focused combined Swedish/UK team to deliver the production plans.*

*The design phase was completed in August 2012, and the next step, with a customer, will be the production of test vehicle(s) for proof of concept and deck launch & recovery work.*

*the INS is considering this system for its first STOBAR carrier.*

*The simplicity of the Gripen maintenance on demand system, and minimum requirement for first line spares, will enable a non-traditional and highly advantageous new approach to support for embarked operations. The ability of Gripen to maintain a very high tempo of multi-role sorties will offer the command at sea a unique and powerful net-centric fighter.*

# THE SILVER CARRIER



INAS 300 Sea Harrier takes off from skiramp of the INS Viraat.

## 25 Years of INS Viraat with the Indian Navy

On 12 May 1987, HMS *Hermes* was transformed into becoming the INS *Viraat* under the command of Captain (later Vice Admiral) Vinod Pasricha. Commissioned in November 1959 as the Royal Navy's HMS *Hermes*, the new avatar came about after it completed 28 years under the Union Jack and after earning glory in the Falklands Campaign of 1982.

The commissioning signal from Naval Headquarters stated: "Your commissioning today marks an important milestone in the development of our Navy's blue water capability. May your operational prowess match your gigantic name and good fortune attend on you wherever you may sail. I wish all officers and men a happy, challenging and rewarding commission."

Message from the crew of the *Hermes* read: "Bringing forward HMS *Hermes* for hand over to the Indian Navy and commissioning as INS *Viraat*... It is with a mixture of sadness, pride and confidence that we today hand over this magnificent ship to the Indian Navy; sadness in that

we with our happy memories witness her passing from the Royal Navy, pride in the capabilities noting that she will be in good hands and confident that she will prove equal and worthy of all the

aspirations the Indian Navy have for her as *Viraat*. The Captain, officers and ship's company of HMS *Hermes* congratulate the Captain, officers and ship's company on the majesty of INS *Viraat* and may good



INS Viraat on the high seas.

fortune attend all who sail in her quest to control the sea and be all powerful.”

These words have proved prophetic as INS *Viraat* has been maintained and run successfully by the professional men of the Indian Navy now already for 25 years, making *Hermes-Viraat* one of the longest serving aircraft carriers in the history of naval operations anywhere in the world. This is also great testimony of the Indian Navy’s capability in maintaining and operating ships so as to extract the most from them.

On the occasion of *Hermes-Viraat* completing 50 years in service in 2009, then-Chief of Naval Staff Admiral Nirmal Verma, who commanded *Viraat* from November 1996 to December 1997, said: “The fact that a warship designed in the 1940s and built in the 1950s could evolve and adjust to the technological and strategic imperatives of the post-war years, the Cold War, and continues to have utility in the 21st century is testimony to the men and women who built her and also those who have contributed to transforming her over the years. The ship has truly stood up to its motto – ‘Any Mission, Any Time, Any Where.’”

### Gems of the *Viraat*

- ⚓ When commissioned in 1987, *Viraat*’s envisaged life was 10 years.
- ⚓ Its last major modernisation and life enhancement refit was in 2008-09, enabling a life extension of a few more years, until the arrival of INS *Vikramaditya*.
- ⚓ INS *Viraat* was the flagship of the Western Fleet during Operation *Parakram*. With its full strength of Sea Harriers embarked, it was central to the Western Fleet deployment for over six months. She was at sea with Captain (now Admiral and CNS) DK Joshi as Commanding Officer and Rear Admiral (later Vice Admiral) JS Bedi as the Fleet Commander.
- ⚓ INS *Viraat* is currently commanded by Capt. Ajendra Bahadur Singh, 18<sup>th</sup> Commander of the ship.
- ⚓ The *Viraat* has seen 18 Commanding Officers, of which four have gone on to become Chiefs of Naval Staff: Admiral Madhvendra Singh, Admiral Arun Prakash, Admiral Nirmal Verma, and Admiral DK Joshi. Vice Admiral SPS Cheema is now C-in-C, Strategic Forces Command.



With Sea Harrier and Sea Kings embarked, fine view of INS *Viraat* and its angled deck.

### INS *Viraat* : list of commanding officers

S NO.	NAME	FROM	TO
1	CAPTAIN VINOD PASRICHA NM	12 May 1987	15 Dec 1988
2.	CAPTAIN MADHAVENDRA SINGH	15 Dec 1988	30 Aug 1990
3.	CAPTAIN ARUN PRAKASH VRC NM	30 Aug 1990	26 Dec 1991
4.	CAPTAIN MADANJIT SINGH	26 Dec 1991	21 Mar 1993
5.	CAPTAIN YASHWANT PRASAD	21 Mar 1993	28 Sep 1994
5.	CAPTAIN JAGJEET SINGH BEDI VSM	28 Sep 1994	13 Oct 1995
6.	CAPTAIN VIJAY SHANKAR	20 Oct 1995	08 Nov 1996
7.	CAPTAIN NIRMAL KUMAR VERMA	08 Nov 1996	13 Dec 1997
8.	CAPTAIN SK DAMLE NM VSM	13 Dec 1997	15 JUN 2000
9.	CAPTAIN RF CONTRACTOR	16 Jun 2000	18 Dec 2001
10.	CAPTAIN DK JOSHI NM VSM	18 Dec 2001	07 Jan 2003
11.	CAPTAIN ANIL K CHOPRA	07 Jan 2003	06 Jan 2004
12.	CAPTAIN PRADEEP CHAUHAN	06 Jan 2004	31 May 2005
13.	CAPTAIN SPS CHEEMA NM	31 May 2005	15 May 2006
14.	CAPTAIN GIRISH LUTHRA	15 May 2006	11 Aug 2007
15.	CAPTAIN AR KARVE	11 Aug 2007	27 Dec 2008
16.	CAPTAIN ANIL KUMAR CHAWLA	27 Dec 2008	06 Aug 2010
17.	CAPTAIN HARI KUMAR	06 Aug 2010	15 Nov 2011
18.	CAPTAIN AJENDRA BAHADUR SINGH	15 Nov 2011	till date

- ★ The ship has done over 40,000 hours of steaming and traversed over 500,000 nautical miles across the proverbial seven seas. Additionally, the ship has undertaken over 20,000 hours of flying from its deck.

### The Role of Cochin Shipyard Limited (CSL)

All major refits of INS *Viraat* have been undertaken by Cochin Shipyard Limited (CSL). The extension of the ship’s life far beyond initial expectations stands as testimony to the high levels of workmanship and dedication of the staff at CSL.



On sail before the Falklands War

## Glorious Innings of the HMS Hermes

**H**M*S Hermes* (R12) was last of the *Centaur*-class aircraft carriers and is the longest serving frontline warship. *HMS Hermes* was launched in 1957 after a protracted construction period to incorporate all the newest innovations to carriers at sea. Even at the time of her launch, she was hardly the biggest carrier at sea, and classified as a 'Light Fleet Carrier,' meaning her role was to support the main fleet in big naval operations.

*HMS Hermes* spent much of her career in the Far East as part of Britain's Far East Fleet protecting Commonwealth nations such as Singapore and Hong Kong. The vessel embarked an air wing primarily consisting of Sea Vixen and Supermarine Scimitar F.1 fighters and attack aircraft. In 1962, she acquired a limited nuclear strike capability in the form of Scimitar T.53 two-seat nuclear strike aircraft.

The *Hermes* was originally scheduled to undergo a major rebuild to allow her to operate Phantom FG.1s (McDonnell Douglas F-4) but this plan was shelved owing to cost considerations. This meant that *Hermes* was operating near-obsolete aircraft until the arrival of the Supermarine Scimitar FAW.4 and Blackburn Buccaneer S.2s, which were supported Gannet AEW aircraft and Sea Vixen EF.3 electronic warfare aircraft.

During the Falklands crisis in 1982, *Hermes* was in the UK finishing a refit, and was immediately assigned to the task force sent to retake the islands. The vessel holds the distinction of being the first to launch a combat mission over the islands when a Sea Vixen EF.3 flew in advance of a strike package by Avro Vulcans to destroy enemy radars. During the course of the mission, the Sea Vixen chanced upon an Argentine transport aircraft trying to land on the Islands and shot it down, thus making *Hermes* the first carrier to have one of its aircraft score a kill.

*HMS Hermes* was sold to the Indian Navy in 1987, and re-commissioned as the *INS Viraat*. Glorious Innings indeed!



HMS Hermes in 1982

### Vital Statistics

#### HMS Hermes

Type: Carrier  
Class: Centaur  
Pennant Number : R.12

#### History:

Keel laid: June 21, 1944  
Launched: February 16, 1953  
and finished by going into service:  
November 25, 1959  
Shipyard: Vickers-Armstrong at  
Barrow-in-Furness  
1984 included in the backup  
May 20, 1987 sold to India

#### Dimensions, displacement, and crew:

Length: 208.8 m  
Width: 27.4 m  
Draft: 8.7 m  
Displacement: 23,900 tons / 28,700 tonnes max  
Crew: 2100

#### Propulsion

2 Parson turbines  
Power: 76,000 hp (57 MW)  
Speed: 28 knots  
Range: 6500 miles at a speed of 14 knots

#### Air Components (with the Indian Navy)

BAe Sea Harrier FRS Mk.51  
Sea King Mk.42B / C  
Ka-31 AEW  
Chetak

# Lords of the Ocean



## The Indian Navy's new Boeing P-8Is

An unprecedented event is taking place even as this is written. Navies of the United States and India will, virtually simultaneously, be inducting what is arguably the world's most advanced and effective long range maritime reconnaissance and anti-submarine warfare aircraft in the shape of the Boeing P-8 Poseidon.

*Poseidon was one of the twelve Olympian deities of the pantheon in Greek mythology, whose main domain is the ocean, and regarded as the 'God of the Sea'. In Indian mythology, Varuna is the 'God of the Sky and Oceans' and therefore these divine entities are related in the celestial sense.*

Meanwhile, back on earth, the Indian Navy's Air Squadron 312 (*Albatross*) will operate the P-8I from its designated air station, INAS *Rajali* at Arakkonam in Tamil Nadu while the US Navy's Squadron VP-16 is the first with the P-8 in that service and operating from Whidbey Island in the Puget Sound area of Washington. By the time, INAS 312 gets its first P-8I, the USN's VP-16 will

have some half dozen P-8As in service. In all, the US Navy has 117 P-8As on order while the Indian Navy has confirmed orders for eight P-8Is with another four as option but the total requirement reportedly is for 24 such aircraft – not surprisingly considering the IN's responsibilities. During Vayu's visit to the P-8 check out hanger in Boeing Field, the second IN aircraft (IN 321) stood virtually nose to nose facing USN 433 in the hanger.

### India's Maritime Frontiers

Apart from sharing land frontiers with six nations, India has a long seaboard in what can become a volatile corner of the world. Equally significant, the nearby Indian Ocean sea lanes are perhaps among the most strategic in the world. Thus, geography and geopolitics have combined to confer significant domestic and regional responsibilities onto the Indian Navy.

The Indian Peninsula has 7,000 kilometres of coastline, along which comes a 300 km maritime economic exploitation zone. Not surprisingly therefore, that the Government of India is seeking modern

maritime patrol aircraft which will serve the nation's unique security requirements over considerable time into for seeable future.

The Indian Navy presently has a diminishing fleet of Ilyushin Il-38 'Sea Dragons' and Tupolev Tu-142M 'Bear Foxtrots' which will, over the next years, be supplanted by the Boeing P-8I, designed specially to counter not only the threat posted by hostile submarines in littoral and deep-water operations, but as a true multi-mission aircraft, it also has the ability to counter surface and overland threats.

The genesis of the programme goes back some years to April 2006 when Boeing submitted its P-8I proposal to the Indian Navy. In December that very year, it was notified that the P-8I had been down selected to the flight demonstration phase of the competition. In July 2007 Boeing hosted a delegation from the Indian Navy in Seattle, Washington State for flight evaluation of the aircraft and its systems.

Boeing also believed that it was "the perfect time for India to become involved

## General Characteristics of the Boeing P-8I (based on the 737-800 fuselage) :

Length:	39.47 metres
Wing Span:	37.64 metres
Height:	12.83 metres
Maximum Takeoff Gross Weight:	85,820 kilograms
Speed:	490 knots (789 km/h)
Range:	1,200+ nautical miles, with 4 hours on station (2,222 kilometers)
Ceiling:	12,496 meters
Crew:	9
Power Plant	Two CFM56-7 engines providing 27,300 pounds thrust each

### Within P-8I, space for sensors systems weapons



in the P-8 programme”. Richard Buck of Boeing stated that “our engineering and development programme is structured so that other configurations like the India-unique P-8I can be produced at minimal additional cost. This is due in part to the U.S. Navy’s requirement that the P-8 be able to integrate new technologies quickly and affordably.”

“Not only is the timing right, but when you take into account the range of the P-8I, it is clear that this aircraft is the right size for the Indian Navy’s mission. India’s

extensive coastline and the region’s densely populated shipping lanes make the P-8I’s self-deployment range of 1,200 nautical miles and four hours on-station capability extremely attractive. Factor in an optional aerial refueling capability and the P-8I is the ‘ultimate vehicle’ for achieving maritime domain awareness. Boeing offered the Indian Navy an optional Universal Air Refuelling Receptacle Shipway Installation (UARRSI) system which can accommodate an air refueling boom like those used on the KC-135 and KC-10”.

In addition to its impressive range, the P-8I can get to its area of operations really fast. Powered by the world’s most reliable high-bypass turbofan engine, the CFM56-7, the P-8I has a cruise speed of 445 knots and a patrol speed of 230 knots. The two engines provide a combined 54,000 pounds of thrust.

The comprehensive suite of sensors and weapons provides the P-8I with formidable strike power. In addition to the Raytheon modified AN/APY-10 multi mode radar mounted in the nose, which

has aerial scan, interleaved with weather and surface search capabilities, there is an additional aft looking radar, specific to the IN's requirement being the Telephonics AN/APS-143Cv3 OceanEye radar, integrated by Boeing and functioning akin to a "rear view mirror".

There are 11 'hard points', for weapons carriage, two under each wing for Mk.82 depth bombs or anti-ship missiles (Harpoon) plus five Mk.54 torpedoes (manufactured by Raytheon) inside the weapons bay. There are two hard points at front for SAR equipment or additional depth bombs.

As for the airframe itself, the Boeing 737, which has been the best-selling commercial jet in history promised "unsurpassed reliability, maintainability and supportability which were critical factors that contributed to Boeing

selecting the combination of the 737-800 airframe and the CFM56-7 engine as the basis for the P-8". The CFM56-7 has logged more than 70 million flight hours while maintaining an industry-leading .002 per cent in-flight shut down rate. "We know that reliability and availability are critical concerns for the Indian Navy. Everything else is irrelevant if the flight crew cannot depend on the aircraft to be mission ready when needed. For that reason we have also incorporated proven, mature sensor and display technologies into the P-8I."

By leveraging existing Boeing 737 support systems in India (and worldwide), the P-8 programme will logically reduce total ownership costs for the lifecycle of the aircraft. "In fact, we have already discussed with the Indian Navy some innovative approaches

to maintaining and supporting the P-8I. Optional full contractor logistic support is a novel and cost effective concept that leverages the worldwide Boeing support system to provide a P-8I logistics systems covering all spares and spares distribution. Such an approach would free the Indian Navy from maintaining a large and costly inventory of spare parts and would substantially reduce its investment in support and infrastructure." stated Buck.

"By taking advantage of the advanced training systems already being used in the commercial world, we can ultimately extend the life of the aircraft. Full fidelity simulators and web-based training for flight crews translates into fewer flight hours in the aircraft for training purposes and that means more hours for mission execution."



Nose to nose : Indian Navy P-8Is at Seattle, in the Puget Sound area.

# Exotic plumage for the Albatross.

Boeing's P-8I for the INAS 312 'Albatross' is the third aircraft type to be operated by this Indian Naval Air Squadron. Initially formed with Lockheed L.1049G Super Constellations with which the Albatrosses got airborne in November 1976, these graceful and essentially civil airliners were supplanted in March 1988 by Tupolev Tu-142Ms.

The third aircraft type with INAS 312 will be the Boeing P-8I, the first of which will be delivered in 2013 and the remaining seven by 2015. There is an option for four additional P-8I aircraft was included in the original contract (while the inventory could well be doubled over the next decade).



*'Albatross' adorns Super Constellation.....*



*.....now, on Tupolev Tu-142M.....*



*.....and soon, the P-8I Poseidon.*

## Building the Boeing P-8I



Boeing is using a first-in-industry production process and its existing Next-Generation 737 production system to efficiently design and build the P-8I for India as well as the P-8A Poseidon for the U.S. Navy. Both aircraft share the same 737 assembly line.

The P-8's 737-800 fuselage is built in Wichita, Kansas, and then sent to Boeing's final assembly facility in Renton, Washington from where all aircraft structural features unique to the P-8I are incorporated in sequence during fabrication and assembly. Aircraft quality and performance acceptance flight testing takes place at Renton Field and final installation and checkout of the mission system and special flight test instrumentation is conducted at the historic Boeing Field.

In 2010, Boeing's team began to receive the first indigenous deliveries, started testing software, completed the programmes final design review and in December began fabricating the first plane's fuselage. The milestones allowed Boeing to successfully transition from designing to building of the Indian Navy's new long-range maritime reconnaissance and anti-submarine aircraft.

In August 2011, Boeing completed final assembly of the first P-8I aircraft and began fabrication of the second. The P-8I made its first flight on 28 September, 2011 and began the official flight test programme on 7 July, 2012 the Indian Navy's second P-8I aircraft made its first flight on 12 July, 2012.

# The P-8 Training System



Objective of the P-8 training system is to provide combat-ready air, mission and maintenance crews in support of all platform missions, with a combination of equipment, software, courseware, personnel and logistics support.

Boeing's P-8 training system has been designed to provide comprehensive, realistic aircrew training at a fraction of the cost of actual in flight aircraft training. The training comprises two main systems: the Operational Flight Trainer (OFT) and Weapons Tactics Trainer (WTT) which together constitute the P-8 Weapon Systems Trainer. The two devices are electronically coupled, creating fully integrated flight and mission crew training.

The OFT is a full-motion, full-visual trainer for the flight deck crew that uses equipment identical to the actual aircraft. The OFT is an ICAO 9625 (Level D) simulator that provides high resolution 220 x 60 degree, out-the-window field of view, 3D modeling of surface cues and weather conditions. 6 of freedom electric motion system, digital electric primary and secondary flight controls and

a mix of avionics and simulations for high fidelity operation. Audio cueing system replicates flight deck sounds and an Instructor Operator Station (IOS) supports "over-the-shoulder" training in forward position and "crew resource management" training in aft position, able to invoke hundreds of system faults.

The WTT is an innovative, fully integrated mission crew trainer that leverages Boeing's actual aircraft mission crew equipment and consoles. The WTT also uses drop-in mission

and acoustic Operational Flight Programmes (OFP), incorporates range-dependent, physics-based sonobuoy and ocean acoustics modeling and provides realistic weapons deployment and post launch behavior in all environment.

The WTT includes all mission crew workstations, search stores panel, rotary launcher auxiliary panel, and secondary power distribution system Boeing's full range of P-8 training capabilities extends beyond simulated trainers and includes a full suite of classroom-based training, essentially the Flight Management Computer System Desktop Trainer which allows pilots to build proficiency in flight and route management ; Mission Operator Part Task Trainer can be used for individual or sub-team learning, practice and refresher training and the Tactical Open Mission Software Desktop Trainer which allows mission operators to gain and maintain proficiency in a classroom setting.

The P-8 training system is presently used by the US Navy, the first device delivered to Naval Air Station Jacksonville, Fla. in 2011 and seven additional systems, plus attendant courseware, are to be delivered by 2014. The system is also intended for use by the Indian Navy.



# The Project 75 and Project 75-I



The INS Sindhuvijay, a Kilo-Class submarine seen in Russia (photo: Aame.in)

## India's Quest for Nuclear Triad

India has been recognised as a nuclear power by the world community, as it now possesses tested nuclear warheads which are under the command of India's civilian leadership. The delivery vehicles for the warheads are under command of the Indian Armed Forces. In its pursuit of a capable and effective nuclear triad, India has land and air based systems in place but still needs to develop the third leg, based on submarines to complete the nuclear triad. In the absence of this capability, India's stated official policy seeking minimum credible deterrence cannot be considered as really operational.

The need to have a credible submarine force is recognised by the defence establishment as the existing inventory has been depleting at a very fast rate.

By 2015 India will be left with only half of its current submarine fleet of fifteen submarines. The current inventory consists of ten *Kilo*-Class diesel-electric powered submarines, four HDW diesel-electric and one *Akula*-Class nuclear (SSN) submarine. Currently, INS *Arihant* (SSBN) is undergoing sea trials. It has been estimated that the required number of submarines for a minimum credible deterrence against China and Pakistan is around eighteen. It is important to highlight that by 2015 India would have only seven to eight submarines as against the needed eighteen. Such reduced numbers have serious security implications to overcome which the Cabinet Committee on Security (CCS) and Defence Acquisition Council (DAC) sanctioned two projects, the P75

and P75I to augment India's depleting stock of submarines.

A 30-year submarine building plan proposed by the defence establishment was approved by the Cabinet Committee on Security (CCS) in July 1999. It envisaged the manufacture of 24 vessels, all of them in India, the first twelve with transfer of technology from foreign collaborators and the next twelve indigenously. The \$ 4.5 billion Project 75 envisaged the building of six French *Scorpene*-Class submarines in the time frame 2012-2017. At this juncture, the project is already three years behind schedule and with huge cost overruns. The first completed *Scorpene* was scheduled to be delivered by 2012 but because of inordinate delays and teething problems, the date has been postponed to

2015. This situation is a cause for serious concern as both China and Pakistan are beefing up their underwater combat capabilities at a rapid pace. The gap is likely to widen in the future if the current state of affairs is not remedied.

Project 75I (India) was supposed to be the successor to Project 75. Project 75I warranted the manufacturing of six next generation stealth submarines by 2020 at an estimated cost of \$ 11 billion. The basic parameters of importance are the Air Independent Propulsion System (AIP) to increase endurance and stealth capability, land attack capability and vertically launched missiles feature to accommodate the BrahMos supersonic missile. The progress report of Project 75I is however abysmal with officials in the

billion. Although there has been a lot of coverage regarding the MMRCA deal, the Navy's quest for a fighting and credible submarine force has been languishing for a long time.

India needs to fast track its submarine programme. The various stakeholders need to act in a coherent, planned and decisive manner to provide India with the capabilities to deter its adversaries and gain the deserved prestige in the global arena. The Government of India on its part must ensure timely issuance of RFPs and the corresponding selection and approval procedures. There has to be appropriate political intervention to enforce the strict guidelines all the way to the very basic of decision making pyramid. Once the vendor selection process is completed,

an integral part of any future submarine project as this will help in timely deliveries and best of business practices.

There has to be greater emphasis on indigenous development of shipyard and dock infrastructure along with the focus on supporting industries. Private players such as L&T, ABG Shipyard and Pipavav Shipyard have invested substantially in the infrastructure and should be considered in future proposals. The Ministry of Defence examined the Krishnamurthy Committee report and concluded that "no private sector shipyard individually has the capability to build a submarine." Such discriminatory behavior will only hurt India's national interests in the long term. The public sector units of Mazagon Dock Limited (MDL) and Hindustan Shipyard



*An example of the Akula Class submarine*

MoD stating that the Request for Proposal (RFP) for global tender can be floated "only after 2012." This delay impacts the Navy's modernisation plans and the Navy now will be unable to possess its submarines from Project 75I before 2022. The combined costs of P75 and P75I is around \$ 15 billion which is much greater than the touted 'mother of all defence deals'; the procurement of 126 Medium Multi Role Combat Aircraft for some \$ 10

in-country production must start at the earliest. Simultaneously an independent agency needs to look into matters of accountability, transparency and most importantly to monitor the progress of the project. Also in both the projects (P75 and P75I), Private Indian players have been left out in favour of DPSUs and foreign vendors with the exception of INS *Arihant*. The expertise of private Indian Defence Companies needs to form

Limited (HSL) are already under tight budget and time constraints to deliver pending orders of the P75. Private players can be considered in limited capacity to fulfill the P75I deadlines rather than depending on foreign vendors for all relevant needs.

Recently, in a report to the Parliamentary Standing Committee on Defence, the recently retired Mazagon Dock Ltd Chairman Vice Admiral H.S.



*Shishumar-class (Type 209) HDW submarine*

Malhi remarked, “My request as CMD would be that if repeat orders are placed, we will be able to retain the expertise because it takes a long time to build up expertise on submarine construction. We have already suffered in the past when there was a gap between the SSK and Scorpene.” The statement is indicative of the urgent need to retain in-house expertise by application of repeat orders and reducing dependence on foreign vendors. The transfer of HSL to MoD is another example of how the various stakeholders can collaborate to provide timely deliveries in an accountable and transparent manner. The end user, i.e. the Indian Navy, is most concerned about the timely availability of submarines. Therefore, it would be the appropriate body, through the official channels of MoD, to take over some of the critical dockyards, to ascertain that there are no budget and time overruns.

Transfer of Technology (ToT) is another widely debated issue as foreign governments are not as forthcoming as Indian policy makers want them to. The focus of India’s investments should be on absorption of ToT and indigenous development of submarine systems. Significantly, Defence Research and Development Organisation (DRDO) is also developing an AIP system at its Naval Materials Research Laboratory at Ambarnath, near Mumbai. This is based on fuel cell technology, as is the AIP developed by Siemens, fitted in German HDW submarines. There is need for the project to be monitored on a very tight schedule and preference should be given to DRDO’s AIP– if it is completed on time, incorporating the qualitative and functional parameters mentioned in the RFP for P75I.

Submarines are, in fact, the ultimate deterrent. Despite advances in sonar

technology over the decades, detecting, tracking and targeting submarines remains extremely difficult, particularly in the Indian Ocean where salinity of the seas and the presence of thermal zones of variable water temperature, make submarine detection extremely difficult. The value of submarines as strategic assets is indispensable. P75 and P75I are critical in the country’s endeavor to complete the nuclear triad and protect its areas of national interest particularly the Indian Ocean Region (IOR). The completion of these projects is essential to fulfill the Indian Navy’s ambition to become a true blue water Navy and to enhance its ability to project power in consonance with India’s increasing economic and geostrategic power.

***Raveen Janu***

*(Associate Fellow with CLAWS)*

# IN DEFENCE OF THE SEAS



**Richard Gardner examines the multiple-choice decisions faced by operators seeking to upgrade their maritime patrol aircraft (MPA) fleets.**

*Indian Navy HAL-Do228, which equips three squadrons in maritime patrol and information warfare tasks.*

Such is the nature of modern air warfare and technological progress that concepts and solutions can easily go full-circle. When the Russian Navy de-commissioned much of its vast fleet of submarines Western procurement priorities switched towards global mobility and out-of area operations. The threat to global trade routes from nuclear submarines seemed to be a thing of the past, but within two decades,

as can defence priorities and funding streams. Newer generation aircraft can appear on the market while platform and system evolution is underway, and this might seriously challenge the need for



*Lockheed P-3C Orion of the US Navy seen at Singapore (Richard Gardner photo)*



submarine fleets are growing again, with underwater operations on the increase in the Gulf region, the Indian Ocean, the South China Sea and the Pacific. These swings in perceived military threats can have a major impact on forward aircraft fleet planning, especially in the specialist area of Maritime Patrol Aircraft (MPAs), which tend to have very long operational lives, and consequently are subject to periodic refurbishment and upgrading. While an MPA airframe might spend 30-40 years in service, during such a lengthy timescale, engines, sensors, communications, avionics and weapons systems are likely to change very significantly, offering ever more capability and improved performance. However, operational requirements can change in a much shorter timescale,

expensive update programmes. Balances have to be struck and many questions need to be asked along the way, such as whether other solutions might deliver more efficiently and at less cost, or if another upgrade will represent better value than an all-new replacement when the latter's additional training and maintenance costs are considered. Another factor might be

whether it is time to change direction and look for more innovative alternatives, such as a mix of satellites, unmanned aircraft and smaller manned patrol aircraft. Trying to foresee the best way forward in maritime air operations is no easy task, though retaining future flexibility has become a key element in the evaluation and study of long-term MPA needs. There is certainly no lack of alternative platforms and systems on offer.

The availability of lightweight, compact, high resolution surveillance radars enables MPA platforms to identify and track multiple sea targets in all types of weather conditions. As well as traditional visual confirmation of these surface targets, using hand-held and fixed cameras, electro-optical sensors can provide detailed video images, including night infra red images which can be checked with onboard computer databases, or streamed through real-time downlinks to a maritime headquarters on land or aboard a warship. The requirements for maritime patrol extend from protecting overwater trade routes and vital shipping lanes to monitoring



*Global Hawk is used by the US in a maritime as well as overland surveillance role and can be regarded as an alternative to a long-range MPA with ultra long endurance. (Richard Gardner photo)*

out into open ocean from their original hunting grounds in the coastal waters off Somalia, the Horn of Africa, West Africa and among the islands of Indonesia, and now attack ships much further into the Indian Ocean, including to the East of the Seychelles. This presents a huge problem for the limited number of warships patrolling this vast area of Ocean. The

This remains the main US Navy MPA platform and is also used by almost all major Western operators of long-range maritime fleets, and over the years has been upgraded with new radars, glass cockpits, digital mission systems and electro-optical sensors in fuselage mountings, including turrets which can swing to give 360° below aircraft coverage. Such systems are particularly useful at night spotting small boats with their infra-red cameras. The Australian, New Zealand and Canadian armed forces are operators of P-3Cs and Japan produced large numbers under licence. Australia has recently taken back into service modernised AP-3Cs fitted with enhanced mission systems, avionics and cockpits, and Canada is also running its own P-3Cs through a similar extensive upgrade programme.

The US government has a large P-3C fleet of surplus aircraft in storage and from this stockpile aircraft are released and supplied to overseas customers, with refurbished airframes and more modern systems and equipment. These include P-3Cs for the Pakistan Navy. In Europe, surplus P-3Cs from the Netherlands have been refurbished and sold to new operators, while Italy has upgraded its own Orions. EADS has established a P-3C refurbishing line. The operation of turboprop MPAs is a cheaper option than using pure jets, and is well suited for coastal patrols and territorial economic zone protection, but for longer-range oceanic “blue water” patrols, aircraft with pure-jet engines offer faster transit speeds to and from patrol zones, quicker



*RAF Beechcraft King Air 350 ER fitted with Raytheon surveillance radar and other EW sensors is widely used for multi-role surveillance, reconnaissance and electronic warfare. (photo: Raytheon)*

movements by submarines and surface ships, and checking out national energy infrastructure such as off-shore oil and gas rigs. In the 21st Century with thousands of commercial ships providing essential world trade links, the ships carrying containers and minerals have attracted hostile attention from a new generation of pirates. They have moved

use of helicopters and UAVs extends the reach of the warships, but there is now more effort to allocate long range patrol aircraft to lookout for pirates and to identify them before they seize their chosen shipping targets.

Still one of the most widely used maritime patrol aircraft in the world is the four-engined Lockheed P-3C Orion.



*The Airbus Military C-295 MP Pursuader MPA has a Magnetic Anomaly Detector (MAD) 'stinger' in the tail to assist in anti-submarine warfare. (Richard Gardner photo)*

battlespace management role, integrating target data and distributing it widely to ships and other aircraft. Australia is committed to ordering P-8As for service later this decade, while the Indian Navy has already seen the first two examples of its initial order for eight P-8I aircraft airborne in the USA, to be fitted with some Indian-developed equipment, including a secure communications system, IFF transponder and interrogator, satcom system and data links. In addition Indian companies, including HAL, are building structural components and fittings for the aircraft. A further four to eight more P-8Is may be purchased later. CAE is supplying an advanced integrated Magnetic Anomaly Detector for the IN's P-8Is. The P-8 Poseidon is currently the most advanced MPA aircraft available and in service will give India a far-ranging oceanic anti-submarine air platform, with the ability to carry a wide variety of anti-ship and anti-aircraft missiles, homing torpedoes, depth-charges and search-and-rescue equipment, so that it can fulfill peacetime humanitarian tasks as well as offering a powerful maritime and overland multi-mission operational capability.

reaction times and a quieter and more comfortable cabin environment for crews on extended missions.

The US Navy has of late taken delivery of early production models of the Boeing P-8A Poseidon MPA patrol aircraft and established the first training squadron which is working up instructors who will establish a stream of crews for the full fleet of 117 aircraft to replace all the remaining USN P-3C Orions. The P-8A has an advanced mission system and although it is based on the civilian Boeing 737-800 airframe, the new MR aircraft has been

fitted with such military features as air-to-air refueling capability, external weapons pylons, a mid fuselage internal weapons bay, turret-mounted IR/EO surveillance sensors, new air-to-surface radar and a defensive aids system. The fuselage offers a large working cabin space for tactical display consoles and for operators to work and rest in comfort. The twin CFM-56 engines give an extended endurance on station, allowing patrols of typically up to 8 hours. Advanced sensors can detect submarines on or below the surface, and the P-8A will also be able to act in the area

France still maintains a number of squadrons with Atlantique twin-engine MPAs. These have been in service for over 40 years and are long due for replacement,



*The C-295 has a comprehensive ASW mission system and associated crew stations fitted in the cabin. Rear access is through the door as seen, but the system can be removed completely for maintenance or replacement if required through the large rear ramp door. (Richard Gardner photo)*

**ELBIT**



Indian Navy Ilyushin Il-38 Sea Dragon (photo: Max Bryansky)

though there is no firm proposal in hand at present. Germany and Italy have also operated Atlantiques but their replacements will be smaller, but more capable aircraft, such as the maritime version of the ATR-72 500, the Surveyor MPA, fitted with a comprehensive Thales AMASCOS surveillance mission system (already

transport or the Persuader MPA versions are on offer based on the standard aircraft. These can carry lightweight air-to-sea radars, weapons pylons for torpedoes, depth charges, rockets and missiles, jamming pods, large cabin windows for visual searches, and also rescue equipment such as inflatable life-rafts, emergency

Maritime Reconnaissance (MRMR) platforms which are highly adaptable for a wide range of patrol activities. The concept of layered defences is particularly appropriate when it comes to considering how best to deal with submarines operating far out in oceans or even shallower waters. MRMR platforms are very cost-effective when used in conjunction with longer range MPAs as they can exploit their operational flexibility, switching from inshore ASW missions to more general coastal and territorial surveillance. Despite advances in detection technology, it remains a fact that deep-diving nuclear submarines are still extremely difficult to counter in open oceans. Detecting them successfully requires not only long-range air patrols and ASW-equipped surface warships, and



Boeing P-8I in Indian Navy colours (photo: Rick Schlamp)

chosen by Turkey Indonesia, Japan and Malaysia). Selex also supplies an advanced X-band Seaspray 7000E active phased array radar which can offer high resolution surveillance, moving target indication (MTI) and interfaces with the weapons system for use in conjunction with anti-surface missiles. The ATR 72 600 MP aircraft ordered by the Italian Air Force feature a stretched fuselage fitted with the Selex Airborne Tactical Observation and Surveillance System (ATOS).

Airbus Military is also marketing a proposed a multi-role version of the C-295, which would combine the IAI-Elta-developed 360° early warning radar, carried above the fuselage, with a downward-looking radar to offer maritime and overland surveillance. In the meantime,

stores and powerful searchlights, as well as flares. Inside the cabin, the crews have a mission system including large display screens, which can handle multi-tasking operations, and which can be shared with other crew stations on the aircraft. Thus radar information can be shared with video images overlaid onto reconfigurable displays, allowing rapid decision making and changing information to be incorporated into the tactical picture as it develops. An important factor is that the number of specialist crews required to operate all the onboard systems is also reducing as mission systems become more capable.

Today's light transports, regional turboprops and business jets provide efficient and affordable Medium Range

attack submarines, but also secure space satellites or command and control aircraft for communicating with the submarines. Networks of sea-bed sensors can be used to track submarine movements in critical "choke points" on the ocean bed where they are known to pass by. Quite clearly, very few navies can afford the enormous cost of providing all such defences against ocean-going submarines, but in areas such as the Arabian Gulf, and around the Indian Ocean and Mediterranean where waters are shallower, there are many options available to minimise exposure to submarines.

India has an envious layered MR capability, which will be enormously enhanced when the P-8I and selected MRMR join the inventory. Presently

**BOEING**

the Indian Navy operates the upgraded Ilyushin Il-38 Sea Dragon, which was the Russian equivalent to the P-3C Orion, and it is expected to remain in service until 2020, by which time the P-8Is will be in full service. For extra long endurance maritime surveillance over vast Indian Ocean distances, India's eight Tupolev Tu-142s have provided an impressive capability, fitted with modern (Elta-supplied) multi-mode search radars, but are also destined to be replaced by P-8Is by 2016.

To meet future MRMR requirements SAAB is offering a specialised long endurance MPA version of its SAAB 2000 twin turboprop platform, fitted with a comprehensive range of onboard sensors including AESA radar, an electronic warfare suite and advanced communications. Direct competitor to the ATR-72 MP, C-295 and SAAB 2000 is the Bombardier Q400MPA. This aircraft is based on the Canadian company's spacious, quiet and high speed Q400 twin turboprop airframe, but fitted with an Elta M-2022 maritime surveillance radar system and a comprehensive electro-optical and electronic warfare suite, within an integrated mission system. Bombardier has previously supplied the smaller Dash 8 Q300 to several coastguard services, including Australia, where Cobham provides the Coastwatch fleet of MP aircraft that cover the entire Australian coastline. For inshore coastal surveillance, or medium endurance over deeper waters, the ATR-42 MP offers a modern maritime surveillance and tracking capability, as does the Airbus Military CN-235, which has been chosen by many operators, including the US and South Korean Coast Guards.

A lightweight search radar, mounted in the lower nose, or beneath the cabin, provides 360° surface coverage and turret-mounted IR and electro-optical sensors allow a single cabin operator to monitor surface movements using high-resolution display systems. Fully integrated mission systems from companies including L3, Thales, Selex and Raytheon provide maximum flexibility in operating small and medium size platforms. The aircraft can be as large as an ATR or as compact as a Diamond WA42 Twin Star or B-N Islander/Defender.

India has a large number of Dornier 228 twin turboprop short-range coastal patrol aircraft built by HAL. The 228



*Saab is working on the Saab 2000 MPA aircraft based on its civil airliner version (photo: Saab)*



*ATR-42 MP Surveyor (photo: Alenia)*



continues in production in India and is again securing new orders. Similarly, the Britten-Norman Islander/Defender light twin-engine transports remain in production in the UK and, fitted with search radar and electro-optical and IR sensors, are widely used for coastal patrol, fishery protection and anti-smuggling missions all over the world.

One of the most popular light twin engined platforms for multi-mission surveillance is the Beechcraft King Air, which is used extensively by US and British air forces. L3 has developed a very comprehensive suite of onboard sensors and a mission system that provides a highly cost effective package at relatively low cost.

A recent development in the MPA field is the conversion of tactical transport aircraft, such as the C-130, into effective MPA platforms by the addition of customised sensors and easily installable cabin mission stations. The key to this becoming a practical solution is the widespread availability of surplus C-130 (and similar) airframes and the arrival of very compact digital mission systems linked to lightweight solid-state high resolution, surveillance radars and electro-optical devices, including turrets. Lockheed Martin, Raytheon, Northrop Grumman, Marshall Aerospace and HISS all have similar solutions for this application.

There are many sensor options available for mounting on the ubiquitous C-130 Hercules, but an innovative new technology called SABIR (Special Airborne Mission Installation & Response System) has been developed by Canadian company Highland Integrated Surveillance Systems and comprises a self-contained bolt on/bolt off application, which needs no hardware modifications to the aircraft. The complete system unit, which causes no interference with cargo operations, is tucked into the fuselage side, in place of an aft paratroop door, and comprises a collapsible workstation, operator chair, equipment racks, an observer door plug, with retract frame and built-in sonar tube launcher, and an articulated strut with sensor mounting. Many operators, including the US Coast Guard, use the C-130 in the maritime patrol role, fitted with a search radar, but these new “bolt-on” options open up new opportunities to widen the use of the extremely versatile C-130.



*ATR-72MP (photo: Alenia)*



*Bombardier Q400 MPA (photo: Bombardier)*

# The Quest for MRMRs & New Helicopters



*Airbus Military C-295MPA/ASW*

## Expanding Indian Naval Aviation

The requirement for maritime air surveillance by the Indian Navy is assuming ever greater need. Apart from the Arabian Sea and Bay of Bengal, to keep under aerial surveillance are several strategic chokepoints, Straits of Malacca in the east and the Hormuz Straits in the west and, an entirely new scenario, anti-piracy operations off the coast of eastern Africa.

At an international summit, many such concerns were voiced and at a subsequent high level meeting in the United States attended by representatives from Australia, Singapore, Malaysia, Indonesia, Japan and others, India was asked to assume a major policing role against sea piracy in the region. Protection of friendly shipping from piracy and guarding against intrusion by anti-national elements, as became evident during the Mumbai attacks of 2008, are some of the key concerns of the Indian Coast Guard and Navy. Then, China's growing presence and establishment of the so-called 'String of Pearls' encompassing the Bay of Bengal, Indian Ocean and Arabian Sea, is another area of worry for India that can only be assuaged through constant vigil.

It is an undeniable fact that India needs to augment its presence in its area of interest through intense maritime patrolling. The most expeditious and effective manner of doing so is with airborne surveillance. While the Coast Guard is charged with patrolling as well as intervening in coastal areas, more so during peace, the Navy has to train, equip and be ever prepared to go to war should the need arise.

This article reviews the options available to the Indian Navy and Indian Coast Guard for reinforcing its medium range aviation capabilities. Three years back, in 2009, the Indian Ministry of Defence (MoD) issued a request for proposal for six medium range maritime reconnaissance (MRMR) aircraft for the Indian Navy, as a first step in augmenting its capabilities. The MRMR requirement does not require for the aircraft to necessarily have anti-submarine capabilities but the aircraft should be capable of anti-surface vessel operations,

even being equipped with some form of anti-ship missiles.

In addition, the Indian Coast Guard's requires six to nine aircraft of 'medium' category but with no offensive equipment. The RFI issued in 2010 announced a diverse range of missions including search and rescue, environmental monitoring, pollution control and medical evacuation.



*A US Navy Lockheed Martin MH-60R (photo: Andy Walker)*



*An Australian Navy Sikorsky S-70B (photo: Chad Thomas)*

## The Contenders

**Boeing : P-8I Lite:** Boeing are likely to offer a modified version of the P-8I Poseidon which is a serious contender owing to the commonality in support and maintenance. An expanded order would save on support costs but the platform itself is probably of a far higher price.

**IAI with Dassault Falcon or Bombardier Q400:** Other contenders for the requirement are being promoted by IAI Elta with both the maritime patrol version of Dassault's triple-engined Falcon 900. The IAI has another option for India which is its Elta modified Bombardier Q 400 turboprop.

**ATR-42/72:** EADS subsidiary ATR and Alenia Aeronautica have modified this passenger turboprop for the maritime role: the ATR-72 ASW has been ordered by Turkey and Italy to fulfil their requirements, equipped with pylons for weapons plus the Magnetic Anomaly Detector. The smaller ATR-42 Surveyor has already been ordered by Italy, Nigeria and Libya, it has also attracted the attention of Pakistan's Navy.

**Saab 2000 MPA:** Saab joined the competition in 2011 with its offer of the Saab 2000 MPA turboprop along with

the firm's phased array maritime radar and RBS-15 anti-ship missiles. Like other MRMR competitors, the aircraft is a modified business/regional transport aircraft. The smaller **Saab 340 MPA** has recently been revealed.

**Airbus Military CN-235/C295 ASW:** The CN-235 MP Persuader is in service with the US Coast Guard and has been ordered by South Korea. The larger C-295 has been ordered by Chile, employing the same sensors as the CN-235 Persuader with under-wing stations to carry weapons.

Along similar lines, Brazil's Embraer has modified its **ERJ-145** regional jets into surveillance platforms, while Antonov's **An-74 MP** is a variant of the tactical transport aircraft, distinctly recognised by the twin turbofan engines mounted over wings.

## Modernising the Helicopter Fleet

Similar to the fixed winged requirements, the Indian Navy seeks to augment and modernise its helicopter fleet. The Government of India has issued RFIs for 16 multi-role helicopters (MRH) to replace the Navy of early model Sea King helicopters. It is learnt that this requirement may

maritime surveillance, commando assault, search and rescue, medical evacuation and logistic support missions from naval vessels. The RFP was issued in 2009 and among contenders are the Sikorsky S-70B Seahawk, European NH Industries NH 90, and the Lockheed Martin MH-60R.

The Indian Navy has reportedly carried out trials of NH-90NFH and Sikorsky S-70B. Despite two rounds of tendering/retendering and flight trials, the programme seems to be delayed even though the requirements are of an urgent nature.

The NH-90NFH has been developed by NH Industries to meet NATO's requirements. The twin engined, four blade main rotor design incorporates innovative features, has a carbon fibre fuselage with twin doors and rear ramp, composite rotor blades, modular avionic system integrated within a full glass cockpit, fly-by-wire control system with four axis auto pilot and advanced mission flight aids specific mission and role fit equipment, on-board monitoring and diagnostic system.

The Sikorsky S-70B Seahawk has been developed from the US Army's UH60A Black Hawk, and entered service with the US Navy thereafter. 230 Seahawk



An Italian Navy NH90 NFH (photo: Lukas Gerber)

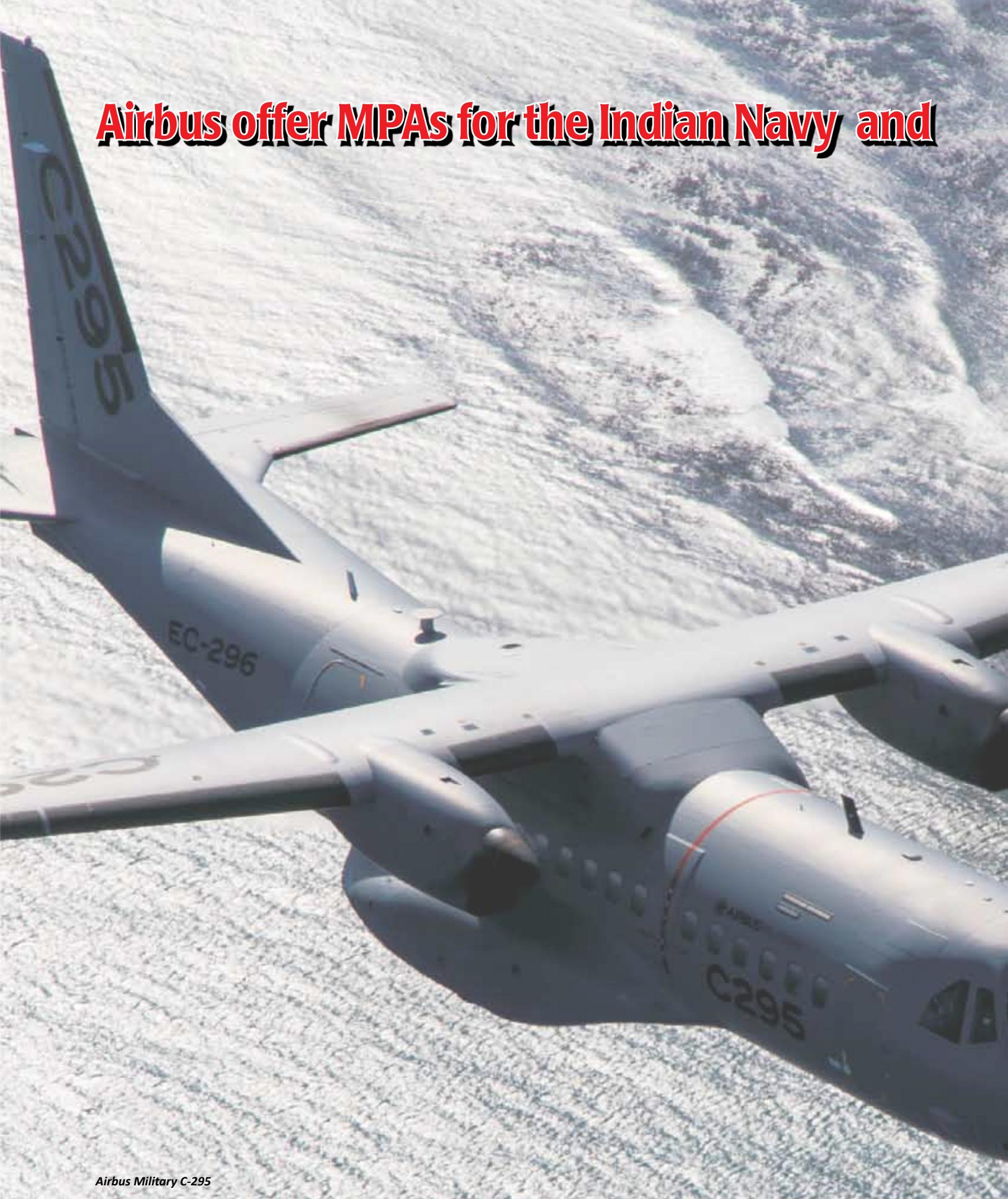
substantially increase to over 90 such helicopters which will make this a major procurement. These helicopters, which would be equipped with in-flight refuelling capabilities, would be required for anti-submarine and surface-warfare and as their primary function, and will be armed with anti-ship missiles and light weight torpedoes for anti-ship and anti-submarine warfare.

The MRH would have a secondary mission capability for

helicopters are in service in the USN, with the designations SH-60B, SH-60R, SH-60R, SH-60F and HH-60H. Its role include all-weather surveillance, search and rescue, missile targeting, anti-surface and anti-submarine warfare and strike warfare.

In 2011 it was reported that a proposal by the US Navy to sell its MH-60 'Romeo' helicopters against the requirement through the FMS route was not accepted by the Indian Government, but recent reports suggest Lockheed Martin helicopter may be back in the competition.

# Airbus offer MPAs for the Indian Navy and



*Airbus Military C-295*

# Coast Guard



According to Airbus Military, its C295 and CN235 are currently the market leaders in the maritime patrol and coastguard roles, and continue to be developed for future application. Additionally the anti-submarine warfare version of the C295 is in service as the only new ASW turboprop type to be developed in the last 30 years. Between them the two types have a 43% market share in the ISR sector, and undertake a wide range of missions including conventional maritime patrol, anti-submarine warfare (ASW), fishery protection, maritime pollution control, counter-piracy, search and rescue, smuggling prevention, and control of illegal immigration.

The MPA role is a demanding one and the C295 and CN235 are well adapted for it: the C295 has an endurance of up to 11 hours, good low-level flying characteristics with up to 3g manoeuvrability and a cruise speed optimised for persistent surveillance and wide area coverage. Crew benefit from wide field-of-view bubble windows and safe low-speed flying characteristics.

The C295 is normally equipped with Airbus Military's proprietary Fully Integrated Tactical System (FITS), providing up to four operators with an advanced interface with the sensors to ensure maximum operational effectiveness. This state-of-the-art mission system "ensures that crews can maximise the potential of the information collected by the aircraft's sensors and rapidly take effective action as appropriate. The fact that the mission system and aircraft are provided by the same company is an important contributor to the C295's cost-effectiveness and low-risk."

The system processes data from sensors including the: radar, electro-optic/infrared, acoustics, MAD, automatic identification system, IFF, communications and electronic intelligence. Communications include satcoms, HF/VHF/UHF, and Link 11 and Link 16 datalinks. In the ASW role it features sonobuoy and armament inventory management with launch pattern control.

Armed with Mk46 torpedoes, the C295 has been in service, since 2010. A major technological development has the potential to enhance up the C295's offensive capabilities in the maritime patrol role. Trials of the MBDA Marte anti-ship missile which began earlier in 2012, continue and have promising results. First missile-carriage flights took place in the summer and the next stage will be missile-release tests.

The FITS is also being updated. At its development laboratory at Getafe outside Madrid, Airbus Military is developing the next generation of the system which is "already the most modern" on any aircraft in the medium-sized MPA/ASW class. A host of improvements under trial will bring benefits including greater processing power particularly for high-resolution image capture and video recording; updated netcentric functionalities such as wideband datalink, video streaming, and use of remote ground consoles and databases; and a revamped human-machine interface capitalising on the latest touchscreen display technology.

More than 110 C295s have been delivered to 15 operators of which five have placed repeat orders, and more than 85 are in service, having accumulated more than 110,000 flight hours. Of those, nearly 50 aircraft are equipped with FITS. Its operating costs are remarkably low – around half that of some competing types – contributing to the lowest life-cycle costs in its class.

The smaller CN235 is suited for coastguard missions and was selected by the US Coast Guard which currently has 12 aircraft in service, designated the HC-144A Ocean Sentry. More than 270 CN235s are in service with some 40 operators and the type has accumulated over one million flight hours. It too is normally equipped with the FITS, with a smaller number of workstations as it requires fewer crew-members, but retaining a powerful battery of sensors and also boasting an endurance of 11 hours.

## VAYU Interview with

**Mr. Khalil Rahman,  
Country Head, India,  
Atlas Elektronik.**



**VAYU : On Atlas Elektronik's association with India : is there any specific Indian Navy programme the company is currently working on?**

**KR:** Atlas has a long-standing association with India. Our products have been used by the Indian Navy since the mid-1980s on the German built Type 209 submarines. We have provided equipment such as combat systems, torpedoes and the sonar systems onto the *Shishumar* class submarines, which were designed by HDW.

As the Indian Navy seeks to extend the life of both its German and Russian submarines, Atlas Elektronik is participating in the upgrade programmes.

Atlas is involved in upgrading the complete suite of equipment on the German submarines. We have already upgraded two of the boats. For the Russian built Kilo-class we're bidding for the towed array sonar.

Atlas Elektronik believes there is a large potential in the Indian market

and in view of the Indian Navy's fleet expansion plans, the company is looking to develop its long-term footprint in India. As for submarines, one of the important programmes that Atlas is looking at is the Navy's requirement for another eighteen conventional submarines, the first six of which is called Project 75 (India). We will be bidding with our shareholder HDW for the Project 75 (India).

Our aim is not only to deliver German-built products to the Indian Navy but to build a coalition of partners in India that will include both the public and private sector, the shipyards and indeed organisations like DRDO to help the Indian industry develop localised solutions or solutions that are adapted to the needs of the Indian market.

**VAYU : What other projects and interests in India?**

**KH:** India has a very ambitious programme of shipbuilding, both surface ships and submarines. We are interested in all programmes where our technology

has an application. Among many projects, one important project that we feel will be of interest to India are torpedoes. Atlas owns the IP on everything from the tip of the torpedo to the casket. We are in fact the only European manufacturer that has the complete range of unique technologies, which we are willing to share with India, and are talking to various partners including the DRDO.

We believe that a market and an economy of the size of India needs to develop its indigenous industry and will do it. We are looking at developing partnerships here in order to allow India to develop an indigenous torpedo that integrates aspects of our technology. We view the torpedo defence system as big potential. And we are talking both directly to the Navy and to various partners.



Torpedo SeaHake mod4 ER (Extended Range)



Besides, an RFI (Request for Information) was issued last year for shallow water ASW craft, a small craft that is also tendering to a number of Indian shipyards. We expect the tender shortly. So we are talking directly to the Navy, to the shipyards and to industry partners about how best to integrate our technologies onto these platforms.

**VAYU : Your future plans in India? We heard the company is planning to open a subsidiary in India soon**

**KR:** Yes that's right! Our plan is to create a 100% Atlas subsidiary in India, as this will help us in establishing a long-term footprint both commercial and technical in the country. This is on going and should be operational within the next few months. We also are in the process

of negotiating or having discussions on MOUs and partnerships with key industry players. We have already some on-going partnerships. An example is the portable diver detection sonar- we are partnered with Larsen & Toubro.

**VAYU : Can you elaborate on partnership between Atlas Elektronik and DCNS for torpedoes?**

**KR:** The JV is still not formed, but is being discussed. The discussions have been widely reported in the European press. If such a JV comes to pass it will change the European torpedo industry fundamentally.

**VAYU : Atlas participated in recently concluded Euronaval 2012. What were the key highlights for Atlas at the show?**

**KR:** Atlas Elektronik showcased its wide spectrum of products, innovations and capabilities at Euronaval 2012. The key highlights were the SeaSpider and SeaHake torpedo as a model along with a model of the UUV SeaOtter on display. Atlas also showcased its "Low Frequency Active Towed Array Sonar" for surface ships ACTAS and a Mine Countermeasure Container model. Besides, we exhibited our 'Expanded Flank Array Sonar'(EFAS), which ideally complements the submarine sonar sensor suit.

The ATLAS subsidiary Atlas Elektronik UK showcased its expertise like Cerberus mod2 whereas Hagenuk Marinekommunikation (HMK), which is also an ATLAS subsidiary, displayed the communications systems Seicam 5000 and Seicam 5066.



## **VAYU** Interview with

### Stephen Greene, Vice President (Communications), Textron Systems Corporation



**VAYU:** Which are the areas of interest for Textron which concern the Indian Navy's modernisation plans?

**SG:** Two areas of interest for Textron related to the Indian Navy modernisation plans are its mine countermeasures and anti-submarine warfare objectives. Our Common Unmanned Surface Vessel (CUSV) offers a demonstrated capability to conduct unmanned mine-hunting and mine-neutralisation operations. During the recent 'Trident Warrior 2012' U.S. Navy Fleet Experiment our CUSV team executed multiple real-time, mine warfare detect-to-engage scenarios, during which two CUSVs controlled by one operator from a single control station detected and prosecuted "exercise" mines in a minefield laid by the U.S. Navy. CUSV delivers a faster, more efficient, more effective and, most importantly, a much safer way of conducting the difficult task of mine countermeasure operations. The ability

to execute the mine warfare detect-to-engage sequence from unmanned vessels reduces risk and lessens the requirement for men in the minefield. As a multi-mission, multi-payload vessel with a reconfigurable payload bay, users can quickly deploy nearly any payload to satisfy additional mission requirements including anti-submarine and anti-surface warfare, communications relay, launch and recovery for unmanned aircraft, and Intelligence, Surveillance and Reconnaissance (ISR).

**VAYU:** How can the CUSV help boost the Indian coastal security and are there any discussions going on with the Indian Navy for these?

**SG:** Using a combination of sensors, our Common Unmanned Surface Vessels (CUSV) can provide 24/7 situational awareness of India's ports, harbours, and shipping lanes, as well as be programmed

to intercept potential threats and issue warnings. The Navy would benefit from CUSV's combat-proven maritime command and control system, based on AAI Unmanned Aircraft Systems' One System architecture.

**VAYU:** How can the Motor Lifeboat (MLB) and NAIAD Rigid Hull Inflatable Boat (RHIB) enhance capabilities of the Indian Navy and Coast Guard?

**SG:** Both of these proven craft are well equipped to support India's Navy and Coast Guard. Our Rigid Hull Inflatable Boat (RHIB) features a hull concept designed by Naiad Inflatables Ltd. of New Zealand, along with aluminum construction



The A CUSV at sea.

and lightweight drive train for superior performance in the harshest of conditions. The durable RHIB could be used by India for a variety of coastal, harbour and inland waterway missions such as high-speed pursuits, search and rescue, routine search and seizure operations, and low-speed harbor patrol. And our innovative Motor Lifeboat (MLB) delivers outstanding performance in a wide variety of maritime roles, including search and rescue, border patrol, law enforcement and natural disaster relief operations.

**VAYU** : What is the progress after the Indian Navy's request for price and availability data on the LCAC via the Foreign Military Sales (FMS) process?



*An LCAC with vehicles embarked.*



*An AAI Shadow M2 in flight.*

**SG**: We suggest you ask the Indian Navy for a response to this question.

**VAYU** : Given the intense competition in India, how do you plan to project Textron as a better option? What key strengths and unique technologies does Textron bring to India?

**SG**: Textron is able to offer India a broad base of proven defence capabilities spanning the land, sea, air and cyber domains. These include manned and unmanned aircraft, as well as manned and

unmanned maritime vessels; unmanned command and control technologies; tactical wheeled vehicles; smart air and ground weapons systems; unattended sensor systems; and a comprehensive offering of multi-source intelligence, geospatial analysis and custom intelligence solutions. In addition, operators, maintainers and logisticians are deployed worldwide to provide operation and field service support, repairs and upgrades, supply chain

management and other critical services for asset availability and affordability. Together, these Textron capabilities create an unmistakable advantage for India's defence and homeland security requirements.

Textron also looks forward to expanding bi-lateral industrial relationships with private Indian industry as well as selected government public service units in support of the national defence requirements of India.

# ADVANCED TECHNOLOGY AMPHIBIOUS AIRCRAFT



## Roles and Missions for Modern Navies



ShinMaywa US-2

Even whilst an Ilyushin IL-38 and Lockheed P-3 Orion circled overhead airdropping rescue facilities, 42 submariners of a nuclear-powered submarine perished in the Norwegian Sea on 7 April 1989. The rescue aircraft, circling overhead, were powerless as they watched freezing submariners perish literally before their eyes since the rescue ships had not reached the location. Just one capable amphibious aircraft would have averted the tragedy! This is a lesson of history that India can learn from that sad experience of the Russians.

Similarly incidents of civilian disasters at sea are unfortunately numerous. 1,502 people perished when the *Titanic* sank on 15 April 1912. More recently in December 2010, an asylum seeker boat sank killing 48 people off the Christmas Islands; 200 lives were lost in December 2011, when a ship sank off Java in rough seas; in June 2012, despite adequate warning and with four Indonesian and Australian warships, four merchant ships and five Australian government aircraft (but no seaplanes) joining the search in only 2 metre swells, 90 people were still missing; and in the Comoros islands more than 30 people have been lost recently following boat capsizes at sea. Just one capable amphibious aircraft would have averted the tragedy.

In India, M.V. *Wisdom* and M.V. *Patitran* went aground near Mumbai within a few months of each other, having gone past the coastal surveillance envelope undetected. Both ships were suspected to have drifted after their crew abandoned them. Such derelicts are not only hazardous upon beaching but also are a menace at sea. Amphibian aircraft could have rapidly conveyed a team to take charge of the vessel before it ran aground. Helicopters and ships were unequal to the task.

*Article 98 of the United Nations Convention on the Laws of the Sea (UNCLOS)* requires that “Every coastal State shall promote the establishment, operation and maintenance of an adequate and effective search and rescue service.” Advanced technology amphibious aircraft, which can operate in rough sea conditions, can easily avert such loss and tragedy.

Beginning its debut on 28 March 1911 when the *Hydravion* took-off from water at Martinique, seaplanes had by end of World War I completed transcontinental flights and in some instances even been refueled by ships and submarines at sea. Post 1918, amphibious aircraft made their appearance. After World War II, amphibians lost their place though limited civil and commercial applications continued.

Recent technological advances have now catapulted amphibious aircraft into becoming veritable force multipliers for

maritime operations. These aircraft can provide mainland-inter island support without need of a runway, monitoring, servicing and protection of offshore assets, surveillance of the EEZ and high seas; surveillance, reconnaissance and intelligence gathering, oceanic Search and Rescue (SAR) and casualty evacuation (CASEVAC). Further they can provide long range fleet logistic and maintenance support, long range Visit, Board, Search and Seizure (VBSS) operations, control derelicts, provide humanitarian assistance and disaster relief operations and counter small arms and drugs trafficking, human migration, poaching and toxic cargo dumping at sea etc. Unlike helicopters and aircraft, amphibious aircraft can land at the location and enforce the will or the law of the country and thus really are a platform of choice for benign and constabulary missions of navies.

These aircraft combine the capabilities of rapid surveillance and prompt response, whether for relief or arrest, in a single platform. Of particular significance is that as per UNCLOS, military aircraft are “entitled to seize (Article 107)” and enjoy “right of visit (Article 110)”, and the “right of hot pursuit (Article 111)”. Amphibious aircraft can be very useful in conducting anti-piracy missions and efficient, effective and economic constabulary operations for fishery protection, prevention of toxic

dumping at sea, illegal human migration and smuggling of weapons and drugs. Once the deterrence value of amphibious aircraft is clearly established, by conducting successful operations that brings culprits to book, the international waters will be far more safer and secure.

In a world increasingly challenged by natural disasters such as floods, tsunamis and cyclones, amphibian aircraft can provide rapid relief to a devastated population. Requiring neither runway nor other airfield facilities, modern amphibians can safely land within a few meters from the coast and relief material and teams can be ferried ashore through integral boats requiring little or no logistic support from shore. Amphibians can also be used as airborne firefighters carrying several tons of sea water to douse fires ashore or on oil rigs. Amphibians can also support remote communities in distant islands or remote land frontiers with proximity of deep lakes and rivers with logistics and medical support.

Of particular relevance to the Indian Navy, and in fact all navies that operate long range maritime patrol aircraft (LRMR) or AWACS aircraft or shore based maritime interdiction aircraft, is an amphibious aircraft that can conduct near all-weather high speed rescue operation for the crew of a ditched aircraft either in accident or battle. The aircraft is more easily replaceable than its highly trained aircrew! Similarly, the rescue of a crew of distressed ship or submarine is faster with amphibious aircraft than using ships or even helicopters.

For mission effectiveness the main parameters of performance evaluation would be ability in rough sea operations, the range, payload, STOL capabilities, shallow water operations and beaching possibility. Of these, rough sea operations are paramount for India. According to a study, 96 percent of all waves likely to be encountered are below 3 m in height. Amphibians must therefore, by design, have full operational capability to undertake maritime missions in wave heights of 3m as a norm so as to be available for missions all year except for a few weeks. Range must be adequate to conduct missions upto the Malacca Straits on the eastern seaboard and the Gulf of Aden on the western side. For disaster relief operations, the amphibian should have a capacity for onboard first aid, sick bay for at least ten patients and commensurate rescue gear. STOL features and shallow water operations would permit landing in busy waterways, possible riverine/high altitude lake operations as well as in open oceans. Low stalling speed would enable better observation of the target area to search for casualties swept away in cyclones or tsunamis. Payload would vary with the mission but should be sufficient to carry rescue personnel together with disaster relief material. In addition, amphibious aircraft should also be able to land on rivers and lakes in distant parts of the country or on short runways to support the local population.

For India, aspiring to regional power status, its Navy must not only be able to address vital security needs of the country but must be able to contribute in benign and constabulary operations in its area of interest and influence for the regional good. From a maritime perspective this power status contributes to burden sharing towards protection of global public goods and the oceanic commons to achieve firstly, freedom of navigation and safety at sea; secondly, promote regional stability through an open and participative security architecture; thirdly, proactively alleviate suffering during disasters in the littorals of friendly nations.

Development of such capabilities and induction of the appropriate enabling systems signal a firm regional commitment towards maintaining regional stability and maritime security and safety but is also an affirmation of delivering on the natural responsibilities that come with great power status. Whilst ships, submarines and aircraft

## Amphibious Aircraft types also include these:



*Russian Beriev Be-200*



*Canadian Bombardier CL-415*



*German Dornier CD-2 SeaStar*

are all able in some way or the other to fulfill the above missions, each of these platforms are also limited by some capability gap or the other. Modern amphibious aircraft make possible a range of options not achievable by any one platform. Their unique multi-modal design permit airborne, seaborne and land operations in a single platform.



## Japan's Fleet Review: JMSDF 2012

A naval review of JMSDF was conducted on 14 October 2012 at Sagami Bay off Tokyo, the event akin to the 'Family day at Sea' conducted annually by the Indian Navy. In addition to the naval personnel, families and civilians are embarked on the ships with various exercises carried out at sea, involving ships, aircraft and the submarines to showcase the capabilities of JMSDF to the Japanese people.

This year's review involved participation of 48 ships of different class, 45 aircraft and helicopters and 3 submarines of the JMSDF. The day-long event also saw participation of missile frigates from the USA and Australia and an LPD of the Republic of Singapore Navy. About 8000 personnel of JMSDF participated in the review.

Presently, the JMSDF is the only maritime force that operates the unique US-2 amphibious aircraft. Two US-1A and three US-2 amphibious aircraft demonstrated their capability of landing in restricted waters, flying at extremely low speeds by skimming the surface and landing barely a few meters from the ships to demonstrate their ability to carry out effective long range SAR and Fleet support. The amphibian aircraft's capability to carry out very short distance landing and take-off from sea along with its ability to carry a sizeable payload of personnel (30 personnel) and stores was demonstrated to the participating navies and visitors.

*(photos: JMSDF)*



# DEG TEG FATEH !

**Vayu sails aboard the INS TEG**



*Watching the sunrise from the forecastle of INS Teg.*

In October, the Indian Navy's Western Command invited *Vayu* to sail aboard IN warships for a 'Media Day at Sea.' So on 22 October, at 5 am, we boarded *INS Teg*, India's newest guided missile frigate of the *Talwar*-class (a major rework of the Russian *Krivak-III*-class design) at the Naval Dockyard, Mumbai.

Three other ships sailed that day: *INS Trishul*, also of the *Talwar* class, *INS Betwa*, a *Brahmaputra*-class missile frigate, and *INS Aditya*, a fleet replenishment tanker.

We departed at dawn marking the beginning of a long but enlightening day as guests of the Indian Navy.

The programme included demonstration of a number of typical peacetime operations: merchant vessel escort missions, assaulting a captured vessel with MARCOS (marine commandos), replenishment at sea, defensive reaction to fast attack craft and even on-board calisthenics.

*Vayu* was also given a comprehensive tour of the ship's facilities, including the engine room, bridge and operations room (CIC).



*Indian Navy Marine Commandos underway in a rigid-hulled inflatable boat (RHIB).*

When we returned to harbour (after 12 hours at sea), we observed a number of docked warships and submarines from gargantuan *Delhi*-class destroyers, to the aircraft carrier *INS Viraat*, to *Brahmaputra* and *Talwar*-class frigates and *Kilo*-class and *Shishumar*-class submarines.

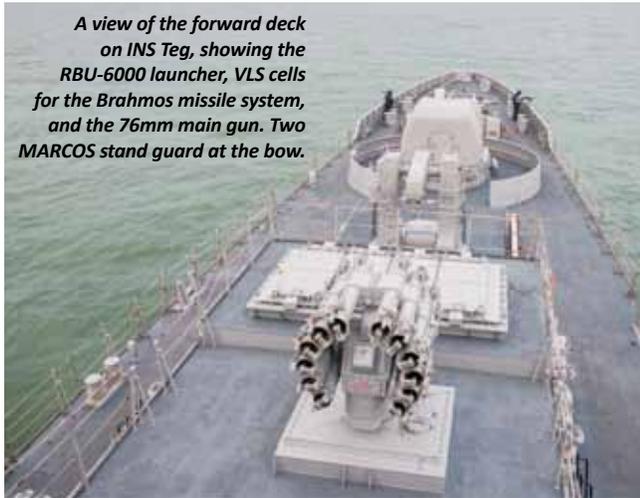
A whirlwind trip, to be sure, but certainly a great day with the I.N.!

*Angad Singh*



*INS Betwa (F39) is the second ship of the Brahmaputra class of guided missile frigates.*

# Images of the Indian Navy



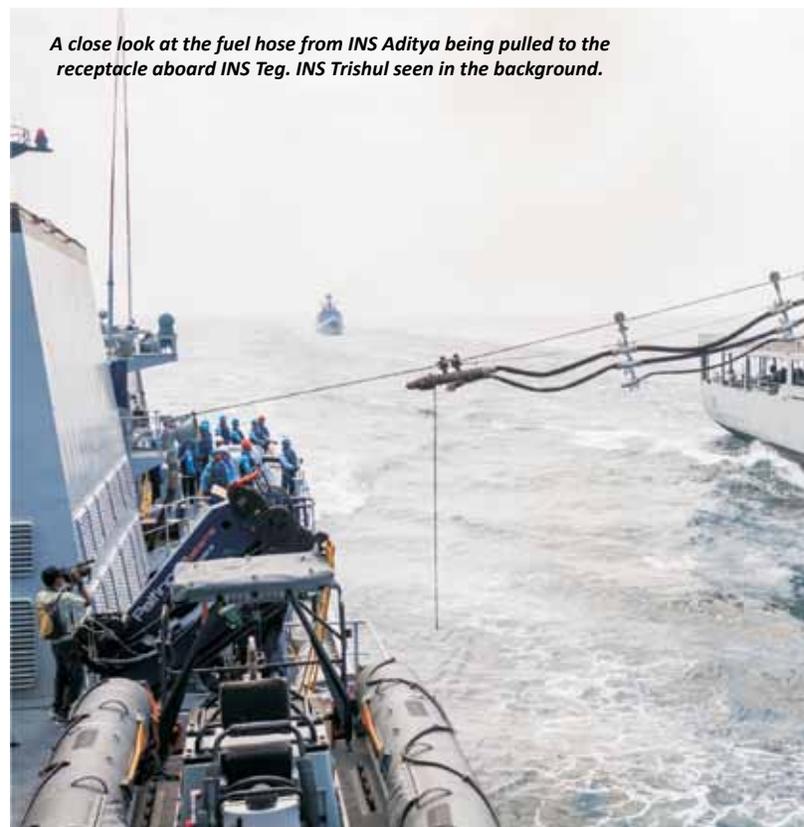
*A view of the forward deck on INS Teg, showing the RBU-6000 launcher, VLS cells for the Brahmos missile system, and the 76mm main gun. Two MARCOS stand guard at the bow.*



*INS Betwa conducting replenishment at sea (RAS) from tanker INS Aditya.*



*INS Teg is equipped with a pair of AK-630 gatling guns as its close-in weapon system (CIWS).*



*A close look at the fuel hose from INS Aditya being pulled to the receptacle aboard INS Teg. INS Trishul seen in the background.*



*A Westland Sea King Mk.42C helicopter on overhead pass over the INS Teg.*

# in the Arabian Sea



*MARCOS from INS Teg approaching stern of the ship.*



*The Shtil-1 air defence system aboard INS Teg, showing a 9M317 missile on its launcher (see Cover)*



*HAL Chetak approaches the helicopter deck of INS Trishul.*



*INS Trishul and INS Betwa executing turns in opposite directions to join formation behind INS Teg.*



*HAL Chetak, serial number IN483, being flown for aerial filming.*

*All photos by Angad Singh*

## Second Chinese FGFA flies

While the Chengdu J-20 fifth generation fighter has received much world attention, a second, parallel Chinese ‘stealth’ aircraft programme has quietly been underway, unnoticed until recently. In September 2012, photographs of a sub-scale model of such an aircraft appeared on the Internet. Bearing the Shenyang Aircraft Corporation (SAC) logo and the designation ‘F-60’ on a vertical stabiliser, the design strongly resembled the Lockheed Martin F-35 JSF. This had twin engines, non-stealthy exhaust nozzles and an intake configuration, all but identical to the forward-swept cowls and DSI (Diverter-less Supersonic Inlet) protrusions as on the F-35. Such images suggested that the aircraft was likely to have low radar cross-section, internal weapons carriage and other stealthy features.



There are enough allegations of cyber-espionage, thus while the “borrowed” design cues are not necessarily surprising, it was assumed the leaked images represented an early mock-up, especially given the fact that the J-20 programme appears to be proceeding well. All speculation on this second stealth programme were cleared on 15 September, when new images of the aircraft being towed out at the SAC airfield in Northeast China began to spread. Also of note are the twin nose wheels, which lend more credence to the hypothesis that this aircraft will also serve on Chinese Navy carrier decks (most naval aircraft are equipped with twin nose wheels). Following the circulation of these images, the aircraft is being referred to as the J-31, in reference to the serial number on the nose: ‘31001’.



The J-31’s apparently small size would limit its endurance and capabilities, but this aircraft would certainly be a cost effective complement to the J-20 and an ideal replacement for the bulk of the PLAAF’s J-7s and Q-5s.

However, it is clear that China has chosen to emulate the US decision to develop two types of advanced combat aircraft simultaneously. Chengdu Aircraft Corporation’s J-20, unveiled last year, and now well into advanced flight testing (see *Vayu II/2012*), fills the role of a heavy stealth fighter whose configuration suggests a role optimised for interception and strike missions. The J-31 would fill the light-medium weight category, similar in role to the multi-mission F-35 Joint Strike Fighter. The presence of twin engines, while highlighting Chinese industry’s inability to produce turbofans in the 120 kN (dry) thrust class, also hints at a possible naval role for the new fighter, with the redundancy of two engines preferred for naval aviation.

## PAF JF-17s at China Air Show

In an indication of their combat operational status, three JF-17 *Thunders* of the Pakistan Air Force’s No.26 Squadron (‘Black Spiders’) took part at the recent Zhuhai Air Show in China. The *Thunders* flew more than 3000 nautical miles (5500 kilometers), north from Kamra and then eastwards across the Tibetan plateau, skirting the Himalayas en-route to Zhuhai. While at Zhuhai, two JF-17s were on static display, while the third carried out flight demonstrations through the period of the Show, held from 13 to 18 November.



It is learnt that a third JF-17 squadron is to be formed by the PAF in the immediate future while a fourth also equipped with JF-17s will follow by late 2013.

In contrast the Indian *Tejas* LCA is likely to receive its formal Initial Operational Clearance (IOC) only by late 2013, or some 30 years after the programme was conceived.



## Rafale equipped with Thales AESA radar

The DGA (French defence procurement agency) has officially taken delivery of Rafale C137, the first production Rafale equipped with the Thales RBE2 AESA radar, at Dassault Aviation's Mérignac establishment near Bordeaux. The RBE2 AESA brings the Rafale a number of key operational benefits including extended range capabilities supporting low-observable target detection and full use of new weapon systems such as the meteor air-to-air missile, higher reliability for reduced maintenance and lower through-life support costs and greater waveform agility for SAR (Synthetic Aperture Radar) imaging and improved resistance to jamming.



## F-35Bs in first aerial refueling

On 2 October 2012, a US Marine Corps F-35B short take-off vertical landing (STOVL) version of the Joint Strike Fighter, carried out the type's first aerial refuelling. The two F-35Bs mid-air refuelled from a Lockheed Martin KC-130 Hercules tanker over the Gulf of Mexico using the probe and drogue aerial refuelling system. The aircraft were at 15,000ft and flying at about 250 knots.



The F-35Bs were from Marine Fighter Attack Training Squadron 501 (VMFAT-501) at Eglin, Florida while the KC-130J was from Marine Aerial Refueller Transport Squadron 252 at Marine Corps Air Station Cherry Point, North Carolina.

## Gripen NG trials in Switzerland

The Saab Gripen NG, which is flight demonstrator of the models E/F, took part at the Swiss Air Force's annual flight demonstration at the Axalp-Ebenfluh shooting range. The Swiss Government had officially declared their type selection of Gripen as the F-5 replacement in November 2011.



The Gripen NG test aircraft was flown by a Swiss pilot in the front and a Saab test pilot in the back seat. The next generation Gripen will have a dramatically enhanced performance with advanced capabilities, including new software and hardware (primarily the new AESA radar).

## Airbus Military A400M simulates refuelling

Simulated air-to-air refuelling (AAR) of the new generation A400M airlifter has recently been done with a C-160 Transall tanker of the French Air Force. The two aircraft conducted 20 "dry contacts", which was representative of a normal refuelling operation. It is expected that "wet contacts" will take place in the first quarter of 2013. The A400M has now successfully performed refuelling contacts with a VC10 of the Royal Air Force, the C-160, and an Airbus Military A330 MRTT new generation tanker/transport.



## Gripens offered to Croatia

According to official Swedish sources, the Croatian Air Force have been offered eight Saab JAS39C/D Gripens to begin re-equipment of this air arm as its obsolescent MiG-21s are phased out. "These Gripens can be operational within one year of the contract being finalised", according to the source.

Meanwhile, in the industrial programme for technology transfer in the area of aerostructures for the Gripen NG, a new phase has been entered with completion of design of the rear fuselage and start of production. This has been done by Akaer, the selected Brazilian company participating in this new-generation combat aircraft.

## Successful deployment of Iron Dome

During the recent Israeli-Palestinian conflict that erupted in November 2012, the 'Iron Dome' system successfully intercepted incoming rockets fired from Gaza. In the first four days of operations, the 'Iron Dome' system had shot down some 250 incoming rockets.

Produced by Rafael Advanced Defence Systems, 'Iron Dome' has been operational since 2011. Currently five 'Iron Dome' batteries are deployed in Israel, most in the south near Gaza. A fifth battery was deployed outside Tel Aviv recently, two months ahead of schedule and hours later, it shot down a rocket headed toward Tel Aviv. The system is part of what Israel calls its "multilayer missile defence", meant to protect against short-range rockets. The IDF says its new 'David's Sling' system, being developed by Rafael to intercept medium-range missiles, and will be activated by 2014.



Missiles in canisters; missiles are manufactured by Rafael Advanced Defense Systems



The IAI Elta multi-mission radar

## Boeing delivers RAAF's 6th C-17

Boeing delivered the sixth Royal Australian Air Force C-17 Globemaster III at the company's final assembly facility in Long Beach on 1 November 2012. The aircraft will be assigned to No.36 Squadron at RAAF Base Amberley near Brisbane. The Australian Government announced its intent to buy a sixth airlifter during 2011's arrival ceremony for the RAAF's fifth C-17, the contract was completed on 6 June and Boeing delivered the aircraft less than five months later.



## Maritime Ka-62s for Russian Navy

The Russian Navy will acquire maritime version of the Kamov Ka-62 light utility helicopter by 2014, with specifications to be drawn up by the end of 2012. The service needs a new type to operate from its 2,500 tonne Project 20380-class frigates, as its Ka-27 co-axial ant-submarine warfare (ASW) helicopters are "too large".



This is Kamov's first conventional main and tail rotor layout, the first production example of the 6 tonne Ka-62 utility transport due to fly in 2013. To be integrated are an acoustics suite, dipping sonar and lightweight torpedos and the navalised version will have folding main rotor blades and a folding tail. Russia's Northern Fleet has also commenced deck-landing and ASW trials with Kamov's modified Ka-27M, with modern electronics equipment and a new 360° search radar, which can simultaneously track numerous targets.

## Iraq orders 28 L-159s

The Iraqi Air Force will acquire 28 Aero Vodochody L-159 trainers from the Czech Republic, as announced by Czech defence minister Alexandr Vondra on 12 October, following a visit to Aero Vodochody's Odolena Voda production site by a delegation of Iraqi officials, led by Prime Minister Nouri al-Maliki.



The contract is likely to be signed for 24 new-build trainers plus four examples to be drawn from the Czech air force's surplus stocks. It is anticipated that the deal will be worth \$1 billion. Aero Vodochody built 72 L-159s for the Czech air force, which subsequently placed 48 into long-term storage.

## The USAF T-X requirement

The US Air Force has released outline 'Key Performance Parameters' for the T-X jet trainer, to replace the present Northrop T-38C Talon. The USAF is asking for a "pretty robust set of capabilities". Upto 350 T-X aircraft are likely to be acquired to fulfill the USAF's future undergraduate pilot training and lead-in to basic fighter flying. Also to be integrated into the system will be simulators, networked weapon systems and operational flight trainers and unit training devices. "Lifecycle costs should not exceed \$35.3 billion over a two decade window".



Northrop T-38 Talons

One of the key requirements is that the T-X should assume the 'F-22 bridge course' (eight sorties in a two-seat F-16, doing night aerial refuelling and ensuring pilots can pull 9Gs while operating the radar and other systems) before new pilots head to the Raptor B-course. Lockheed Martin, BAE Systems, Alenia Aermacchi and Boeing are expected to bid, after a formal request for proposals is issued "next fall".

Alenia Aermacchi will reportedly offer a T-100 system based on its M-346, while BAE Systems is promoting its Hawk and Lockheed Martin the T-50, designed in tandem with Korea Aerospace Industries. Boeing will most likely offer a 'clean-sheet design'.

The USAF's draft performance "wish list" includes requirement for an aircraft to deliver an operational availability rate of not less than 64.7%. Platforms must be able to sustain 6.5 g for at least 15 sec, while not using more than a 15° nose-low attitude at 80% fuel weight between an altitude of 10,000ft(3,050m) and 20,000ft. Other features include ability to attain a minimum of 7.5g and an onset rate of 3g/sec.

## Swiss evaluation of UAV types

The Swiss government has completed in-country flight evaluations of two Israeli unmanned air vehicle types, with the decision on its medium-altitude, long-endurance (MALE) surveillance requirement expected to be made during 2014. Israel Aerospace Industries' Heron 1 was tested from mid-September, followed by flights with Elbit Systems' Hermes 900 in early October, both air vehicles demonstrated in a variety of flight envelopes. The process involved personnel from the Swiss Air Force and Armasuisse defence procurement agency.



The test flights were performed from Emmen over central Switzerland and the Jura region. The Swiss armed forces intend to acquire two systems of the selected type to replace their current RUAG Ranger UAVs, 16 of which were in air force service till 2011.

A brief comparison between the two types indicates that each has a maximum take-off weight of about 1.2tonnes. The Hermes 900 and Heron 1 UAVs have an endurance of 36 and 45 hours respectively, which compares with the 275kg (605lb) Ranger's approximate maximum of four hours.

## First Yak-130 combat trainers delivered

The first batch of six Yak-130 combat trainers have been delivered to the Russian Air Force. On 5 October 2012, pilots from the Borisoglebsk training centre ferried the first three aircraft from Irkutsk aviation plant (branch of JSC IRKUT Corporation) to the airfield in Borisoglebsk city.



Delivery of 55 Yak-130 combat trainers to the Russian Air Force by 2015 is under the contract signed on 7 December 2011 between the Russian Ministry of Defence and the IRKUT Corporation. Anatoly Serdyukov, Minister of Defence, stated that “equipping the Air Force with Yak-130 aircraft will allow achievement of the desired level of pilot’s training to handle new generation combat fighters, which are to be mass procured by the Military”.

## Upgrade for Taiwanese F-16s

Lockheed Martin has been awarded a contract worth \$1.85 billion to initiate the upgrade of 145 Block 20 F-16A/B aircraft for the Republic of China (RoC) Air Force. This retrofit programme will include the addition of an Active Electronically Scanned Array (AESA) radar, embedded global positioning, as well as upgrades to the electronic warfare and other avionics



systems of Taiwan’s F-16s. Lockheed Martin has upgraded more than 1,000 existing F-16s, both for the US Air Force and international customers. These new upgrade programmes will be based on the F-16V configuration announced by Lockheed Martin earlier this year.

## Additional HC-130Js for US Coast Guard

Lockheed Martin received a \$218 million contract for three additional HC-130Js for the US Coast Guard, which will increase their fleet from six to nine. The contract also includes funding for two mission suites, which are critical in supporting



US Coast Guard search and rescue operations. The new aircraft are scheduled for delivery in early 2015. The HC-130J’s special mission suite comprises a two mission system operator station located behind the pilot and co-pilot, a belly-mounted 360-degree long range search radar, nose-mounted forward looking infrared radar and an advanced mission communications suite. The missionised HC-130J is designed to deliver enhanced search, detection and tracking capabilities.

## AW139s for Royal Thai Army

The Royal Thai Army has ordered two AW139 twin-engine helicopters to be delivered in 2014 to perform transport and utility missions. The contract also includes a comprehensive maintenance and training package. The Royal Thai Army adds to a growing number of military customers that have ordered or are operating the AW139 for a wide range of roles including VVIP and government transport, utility, search and rescue, emergency medical service and homeland security. The armed forces of Ireland, Qatar, UAE, Italy and Egypt are amongst those operating the AW139 currently.



## Eurofighter Typhoon Phase 1 Enhancement

The Phase 1 Enhancements (P1Eb) flight testing programme of the Eurofighter Typhoon has begun with completion and delivery to operators scheduled by end 2013. This First Batch of Enhancements Contract introduces a host of important improvements to Eurofighter Typhoon capabilities.



Improvements include full Air-to-Surface integration on Eurofighter Typhoon (including Laser Designator Pod), full smart bomb integration, modern secure Identification Friend or Foe (IFF), improved Radios and Direct Voice Input, Air-to-Surface Helmet Mounted Sight System, improved Air-to-Air capabilities including digital integration of Short Range Air-to-Air Missiles and updated MIDS datalink functionalities for enhanced interoperability with Coalition Forces. Future enhancements importantly include the AESA radar and METEOR missile.

## Maiden flight of Su-30SM

Developed by JSC Sukhoi Design Bureau, the first Su-30SM made its maiden flight on 21 September at Irkutsk. The Su-30SM has been designed to meet the requirements of the Russian Air Force, incorporating new radar system, radio and recognition system, ejection seats and a number of support systems. Weaponry configuration is also new. This contract for 30 Su-30SMs for delivery by 2015 was signed between the Russian Ministry of Defence and JSC IRKUT Corporation in March 2012.



## Airbus Military C295s for Indonesia

The Indonesian Air Force has taken delivery of two Airbus Military C295 transport aircraft ordered in February 2012, first of nine to be delivered to the Indonesian Ministry of Defence under the terms of a contract signed by Airbus Military and PT Dirgantara Indonesia (PT DI). Delivery of the ninth and last aircraft ordered is scheduled for summer 2014.

## Raytheon contracted for SM-3 missiles

The Missile Defence Agency have awarded Raytheon a \$230 million contract for 14 Standard Missile-3 Block IA missiles and five SM-3 Block IB missiles. The SM-3 Block IA missiles will bolster the US Navy's inventory that is deployed around the world aboard US and also Japanese Navy ships. Designed to neutralise short- to intermediate-range ballistic missile threats in space, Raytheon's SM-3 Block IB includes an enhanced two-colour infrared seeker for better target discrimination.



## Type Certification for Sikorsky S-76D

The Federal Aviation Administration (FAA) has approved Type Certificate for the S-76D helicopter on 12 October 2012, this being the latest in the family of versatile S-76 helicopters manufactured by Sikorsky, with more than 800 S-76 helicopters delivered to the global fleet since 1979, augmenting everyday the increasing 6 million-plus flight hours.



The S-76D helicopter's standard equipment features include its all-composite, flaw-tolerant main rotor blades; an advanced THALES integrated avionics system and autopilot; health and usage monitoring system, active vibration control and Pratt & Whitney Canada PW210S engines. Rotor Ice Protection System for all-weather capability will be available as an option.

## Sikorsky Black Hawk helicopter enhancement

The US Army's Aviation Applied Technology Directorate (AATD) have awarded Sikorsky Aircraft Corp. the Combat Tempered Platform Demonstration (CTPD) contract. This programme will build upon and improve the Black Hawk platform's already high operational durability and survivability by developing and integrating a suite of advanced new technologies and establishing their benefits before transitioning them to the platform and eventual use by the nation's soldiers.



This project builds upon previous work by 'Sikorsky Innovations', the technology development organisation for Sikorsky Aircraft, by incorporating key technologies including a zero-vibration system, adaptive flight control laws, advanced fire management, durable main rotor, full-spectrum crashworthiness, and damage tolerant airframe.

## First production Airbus Military A400M aircraft

The initial three production A400M new generation airlifters are seen together in this image of the Airbus Military final assembly line (FAL) at Seville, Spain. The photo shows MSN7 (furthest from the camera, and first to be delivered to a customer in France) awaiting imminent installation of its engines, alongside MSN9 (centre, and the first aircraft for Turkey) and MSN8 (closest, and also for France) undergoing Ground System Tests.



## AHRS for Israel's M-346

Northrop Grumman has been selected by Alenia Aermacchi to provide the Attitude Heading Reference System (AHRS) for the Israeli M-346 advanced trainer aircraft. Northrop Grumman Italia will provide the LISA-200 AHRS for the fighter trainer under a new contract that builds on its five-year experience as a supplier for the M-346 programme. Based on accurate and reliable fibre-optic gyro technology, the LISA-200 AHRS incorporates advanced features such as a high-speed data refresh rate and output to fulfill the stringent requirements of a fly-by-wire quadruple-redundant control system.



## SELEX Galileo's support contracts

SELEX Galileo has been awarded new contracts relating mainly to the company's Grifo radar and the Falco Unmanned Aerial System (UAS). The Grifo is one of SELEX Galileo's most successful products and has sold more than 450 units worldwide while the Falco is the only UAS entirely developed, equipped and manufactured in Europe and is now in service with four international customers.



## Tigers for Afghanistan

Eurocopter's Tiger support programme has further advanced following delivery of the first four helicopters to be upgraded for deployment to Afghanistan. This equips the German Army with a complete batch of ASGARD helicopters, a vital prerequisite for the Tiger to be deployed in theatre by the end of the year. The Afghanistan Stabilisation German Army Rapid Deployment (ASGARD) programme was initiated by Eurocopter and the Federal Ministry of Defence at the end of 2011 and includes a sand filter, additional defence weaponry, a mission data recorder and enhanced communications equipment for multinational missions.



## US Navy's draft RFP for VXX Presidential helicopter

The US Navy's Naval Air Systems Command has released a draft request for proposal (RFP) for the VXX Presidential helicopter programme, to replace the US President's aging fleet of VH-3D and VH-60N transport helicopters. According to the draft document, "industry input is being sought prior to the release of the formal RFP, which is anticipated in the mid FY 2013 timeframe." The VXX programme was originally won by the AgustaWestland-Lockheed Martin team with the AW101-based VH-71 Kestrel in 2005, but a deteriorating financial climate led to the formal cancellation of the planned acquisition of 23 helicopters in 2009.



In 2010, a decision was taken to restart the contest, following which Sikorsky and Lockheed Martin announced their collaboration on the Sikorsky S-92, designated the VH-92. Boeing and Bell are also likely to participate in the revived competition, with previous winner AgustaWestland now teaming up with Northrop Grumman to offer the AW101. The US Navy wants proposals for existing, in-production helicopters for the eventual tender, with modifications intended to be minimal. The draft RFP states that the programme intends to focus on "integration of mature subsystems on a mature platform."

## Saab receives order for data links

Saab has received an order for data links worth approximately SEK 119 million. "Saab has delivered robust data link solutions for more than 25 years and offers data links in a wide range of applications," stated Micael Johansson, head of Saab's business area Electronic Defence Systems. Saab's data links supports frequency bands from VHF and upwards. Tailored solutions are provided for both ground based and airborne systems including radar integrated data links and light weight terminals. Deliveries will be made from the business area Electronic Defence Systems in Gothenburg during 2014-2018.

## Debut of the nEUROn

On 1 December, the nEUROn, which is Europe's unmanned combat air vehicle (UCAV) stealth technology demonstrator made its maiden flight. The nEUROn programme was launched in 2005 and involves France, Italy, Sweden, Spain, Greece and Switzerland. With Dassault Aviation as prime contractor, the programme was designed to merge the skills and know-how of Alenia Aermacchi (Italy), Saab (Sweden), EADS-CASA (Spain), HAI (Greece), RUAG (Switzerland) and Thales (France). With a length of 10 metres, a wingspan of 12.5 metres and an empty weight of 5 tons, the aircraft is powered by a Rolls-Royce Turbomeca Adour engine. The nEUROn will continue testing in France until 2014, and then be sent to Vidsel in Sweden for a series of operational trials and then go to the Perdadesfogu range (Italy) for further tests, including firing and stealth measurements.



## CAPES to select AESA

The US Air Force's Lockheed Martin F-16 radar modernisation programme has been changed, with the company now to assume greater responsibility. Under the USAF's previous strategy, the US government would have supplied Central Avionics Profound Extension Suite (CAPES) prime integrator Lockheed with an AESA radar as government furnished equipment. Lockheed has made preliminary evaluation of early



versions of the candidate Northrop Grumman Scalable Agile Beam Radar and Raytheon Advanced Combat Radar in its systems integration laboratories, and both systems have been flown on the F-16. Both radars meet the USAF's requirements. The USAF requires 24 upgraded F-16s be declared operational in the fourth quarter of 2018, with the selected contractor to need two to three years to fully develop an AESA array, which will form the centerpiece of the CAPES upgrade. It will also integrate new centre cockpit displays, enhanced electronic warfare systems and datalinks with upto 300 of the USAF's F-16s.

## Apache re-designated, production increased

The US Army has redesignated the Boeing AH-64D Block III Apache as the AH-64E, even as the upgraded attack helicopter has entered into full rate production following a successful operational test phase. The Block III has undergone a major boost in capabilities to justify the change in redesignation, according to Boeing's Ray Handy, marketing manager and a pilot for the AH-64.

The E-model's rotor blades are made of composites, while the airfoil is differently shaped. The entire drive system has been completely revamped, with the engines and transmission considerably upgraded. Introduction of the D-model in the 1990s added a large amount of weight to the aircraft over the years. The E-model is similar in performance to the much lighter



A-model helicopter. The Block III's avionics have also been greatly improved, the most significant modification being that the system has moved to an open-architecture design. Moreover, improvements have also occurred in flight controls and flight management systems as also mission capabilities.

## Alaska Airlines expands CFM-powered Boeing 737 fleet

Alaska Airlines will purchase CFM engines to power 50 new Boeing 737 aircraft, which includes firm orders for 13 Boeing Next-Generation 737-900ER aircraft powered by CFM56-7B engines, in addition to 20 737 MAX 8 and 17 737 MAX 9 aircraft powered by the advanced LEAP-1B engines. Alaska Airlines is a long-time CFM customer and actually launched the CFM56-7B powerplant on the Boeing Next-Generation 737-900 aircraft variant in 1997.

## Lufthansa Technik, CFM International in Joint Cooperation Agreement

Lufthansa Technik AG and CFM International have signed a new cooperation agreement for the support of CFM56 engines. Under the terms of the agreement, CFM and Lufthansa Technik will jointly develop component repairs, overhaul technology and other technical support for their respective maintenance, repair and overhaul operations. CFM will supply OEM replacement parts, component repairs, and repair technology to Lufthansa Technik.

## CASSIDIAN's SmartRadar

Cassidian has developed an airborne ground surveillance radar that, through use of the newest ultra-high-resolution radar technology, can monitor wide areas with stationary targets while at the same time detecting and tracking moving targets at greater distances.



One version of Cassidian's SmartRadar is integrated into a pod equipped with an autonomous cooling system, making possible immediate adaptation to various mission aircraft. The high performance of the radar is largely due to state-of-the-art AESA technology which uses a large number of transmitter and receiver (T/R) modules in the antenna. These modules, which are made from special HF-capable materials, are developed and manufactured by Cassidian in its own facility, the "Microwave Factory".

## Dassault introduces the Falcon 2000LXS

Dassault Falcon has launched the Falcon 2000LXS, which offers improved airport performance, payload and cabin comfort compared with the Falcon 2000LX, which it will replace in 2014. The 4,000 nm Falcon 2000LXS will allow operators to access more airports because of new full-length inboard slats enabling the



aircraft category-leading airport performance and balanced field length. With full fuel, the Falcon 2000LXS will have a payload of 2,190 pounds; a maximum takeoff weight (MTOW) of 42,800 lbs with a balanced field length of 4,675 feet, "which is over 1,000 feet better than some aircraft in its category". At M.80, the Falcon 2000LXS will have a range of 4,000 nm, climb directly to 41,000 feet in 19 minutes, reach a mid-cruise altitude of 45,000 feet and have a certified ceiling of 47,000 feet.

## Saab's Head-Up display (HUD) System for US Army Aviation

Saab has received orders for its HUD-system following flight evaluations by the US Army Aviation with the system installed on a Blackhawk helicopter. Saab secured the order in cooperation with BAE Systems Inc. for the US Army Night Vision and Electronic Sensors Directorate (NVESD) requirement. The customer will perform further flight tests using the system on the Blackhawk as well as other helicopter platforms. The objective is to increase safety while flying at low levels and during take-off and landing in degraded visual environments (DVE). Saab's HUD (RIGS) is an advanced, light-weight integrated head up display, which improves safety during all phases of flight. The new HUD system is designed to be compatible with a wide range of helicopters and small aircraft.

## Ka-226 production site relocated

Series production of the Kamov Ka-226 co-axial light twin helicopter will be relocated from the Kumertau Aircraft Production Enterprise (KumAPP) based at Kumertau, Bashkortostan, to the Ulan-Ude Aviation Plant (U-UAP) at Ulan-Ude in the Republic of Buryatia. The Ka-226 is currently being built for the Russian Air Force's Army Aviation and helicopter units of the Ministry of Interior. It is expected that "significant orders" will be placed soon by the Federal Security Service, which is currently evaluating the Ka-226K, a shipborne border patrol version. Another potential customer is the Russian Ministry of Emergency Situations. The Ka-226 is currently competing (with Eurocopter's Fennec) for the 197-unit requirement of the Indian Army and Air Force.

## KONGSBERG awarded next phase CROWS contract

KONGSBERG has been awarded a new agreement by the US Army for production, system support and technical engineering support of the M153 CROWS Remote Weapon Stations (RWS), up to \$970 million and extends over a 5 year period. M153 CROWS is the primary remote weapon station being used by US forces and KONGSBERG, working under the previous CROWS contract, has delivered over ten thousand M153 CROWS units to the US military to date.

### LINK order ATR 72-600s

ATR and Japan's new regional carrier LINK have launched the very first ATRs in Japan, one of the last Asian countries where ATR aircraft had not entered service. LINK will start operations in 2013 with the introduction into its fleet of three leased ATR 72-600s. The aircraft will be delivered starting in late 2013.

### AW119Kx Single Engine Helicopter

AgustaWestland have launched the AW119Kx, latest evolution of the single engine helicopter, which features the Garmin G1000H glass integrated flight deck system and the very latest avionics, including synthetic vision, moving map, highway in the sky and obstacle/terrain avoidance systems, to improve situational awareness and increase safety. Certification of the AW119Kx is scheduled in the first quarter of 2013.



The AW119Kx is provided with state-of-the-art integrated avionics bringing this model to a new digital era while keeping the outstanding performance, cabin space and payload characteristics of the rugged AW119Ke.

### S-92s for Bond Aviation

Bond Aviation has taken delivery of the first two of 16 Sikorsky S-92 heavy, twin-engined helicopters to be used for offshore transportation and search-and-rescue missions operated by Bond's sister company Norsk Helikopterservice. There are more than 150 S-92s in service since 2004. Helicopter transport companies serving the offshore oil and gas industry operate approximately 66% of the fleet, with companies accounting for 90% of the fleet's total flight hours, which are on a pace to reach 500,000 hours in early 2013.



### Afriqiyah Airways to acquire additional A350 XWBs

TransAsia Airways of Taiwan has placed a firm order with Airbus for another six A321neo aircraft, the new aircraft part of the airline's fleet expansion, which will allow it to develop new routes to regional destinations. The aircraft will be powered by Pratt and Whitney PW1100G engines. The latest contract takes TransAsia Airways' total orders for Airbus single aisle aircraft to 29, of which 11 have already been delivered. The carrier's single aisle backlog now comprises 12 A321neo and six Sharklet-equipped A321ceo. In addition, the airline also has two widebody A330-300s on order.



### Spring expands CFM56-5B fleet

China's Spring Airlines have ordered CFM56-5B engines to power two new Airbus A320 aircraft. The engine order is valued at \$40 million at list price and the airline is scheduled to take delivery of the first aircraft in January 2014 and the second aircraft in July 2014. The two new A320 aircraft of Spring Airlines will be powered by the CFM56-5B Performance Improvement Package engine. The PIP improvements, which provide a 0.5% improvement in fuel burn, include hardware changes to the core, including new high-pressure turbine blade, as well as manufacturing changes to the fan and compressor blades and vanes to improve performance retention. The engine also features fewer parts to help lower maintenance costs.

## Qatar Airways' Boeing 787 with Recaro seats

On 13 November 2012, a Qatar Airways Boeing 787 Dreamliner flew from Seattle to Doha on its maiden journey, its economy-class fitted with specially designed seats from Recaro Aircraft Seating of Germany. Qatar Airways has ordered several thousand Recaro Comfort Line 3620 seats for the airline's B787 and A350 fleets. The ultra-thin backrest offers "outstanding comfort", and other features include flexible materials in the headrest and backrest as well as the latest IFE system integration. As the launch customer, Qatar first introduced the CL3620 in their single-aisle fleet in 2009.

## Aeroflot's 100th Airbus A330

The Russian national carrier Aeroflot has taken delivery of another A330-300, the 100th Airbus aircraft to enter service with the airline. Powered by Rolls-Royce Trent 700 engines, Aeroflot's A330-300 features a two-class cabin layout seating 296 passengers (28 in business and 268 in economy class). Aeroflot plan to deploy the airliner on numerous routes on its medium and long-haul network. Aeroflot was the first airline in Russia to operate the A310, with an entry into service in 1992, as well as the first to operate the A320 Family (in 2003) and the A330 Family (in 2008). Currently the airline operates a fleet of 79 A320 Family aircraft and with today's delivery 21 A330 Family aircraft.



## Air Asia's first A320 with new sharklets

Malaysia's Air Asia will be the first airline to operate an Airbus A320 with new fuel-saving sharklets on the end of its wings. This was announced at ILA 2012 by John Leahy, Chief Operating Officer Customers of Airbus, and Zaman Ahmad, Head of Customer Experience and Technology of Air Asia Group, in front of an aircraft equipped to test this new technology. 3,398 orders

have been taken for the new A320, 1,459 of which are for the latest version with new engines. Owing to high demand, monthly production will be increased from 40 to 42 aircraft by the end of the year.



## Additional A380s and A350 XWBs for Singapore Airlines

Singapore Airlines will procure 25 more widebody aircraft from Airbus, comprising five double-deck A380s and 20 A350-900s. The aircraft will be operated on the carrier's long range and regional services, offering maximum comfort and efficiency for high density and medium capacity routes. The



latest A380 order will be the third to be placed by the airline, bringing the total number of A380s ordered by SIA to 24. The airline, which was the launch operator for the A380, now has 19 aircraft in service, flying to 10 destinations in Europe, the US and the Asia-Pacific region from its Singapore base. In the mid-size category, the new A350 XWB order will see the airline double its backlog for the all-new aircraft to 40. The A350-900s will be used by the airline on both medium and long haul routes, and powered by Rolls Royce Trent engines.

## Philippine Airlines order 10 more A330s

Philippine Airlines has placed a firm order with Airbus for an additional 10 A330-300 widebody aircraft. The latest purchase agreement follows a major order from the airline in August for 44 single aisle A321s and 10 A330s under the carrier's fleet modernisation programme. For its latest order the airline has selected the 240 tonne high gross weight version of the A330, offering extra range capability. This will enable the airline to operate the aircraft non-stop from Manila to any destination in the Asia-Pacific region, as well as to the Middle East and as far as Honolulu in Hawaii.

## Bell Helicopter activity in Europe

Bell Helicopter, a Textron Inc. company continues to increase its sales and customer support activities in Europe, delivering seven aircraft and signing nine contracts within the last three months, as well as launching Bell 407GX and Bell 429 flight demonstration tours, and gaining EASA approval for a new customer support facility. Deliveries included three Bell 429s to Switzerland, Romania and Czech Republic as well as four 407GXs to Belgium, Denmark, Iceland and Germany. The 429 delivered to Switzerland was the first with EMS interior to be operated in Europe by one of the leading providers of air medical services, Air Zermatt.

## Turkish Airlines order 15 Airbus A330s

Turkish Airlines has placed an order for 15 A330-300s, their seventh order for the A330 family of aircraft and their twentieth Airbus order overall. The aircraft will be operated on medium and long haul routes from the Turkish Airlines hub in Istanbul. Turkish Airlines placed their first order with Airbus in 1984, and now operate 101 Airbus aircraft including 17 A330 Family aircraft.



## First CRJ1000 NextGen Aircraft for Garuda Indonesia

Bombardier Aerospace has delivered the first of six CRJ1000 NextGen regional jets ordered by PT Garuda Indonesia (Persero) Tbk, the aircraft's launch customer in the Asia-Pacific region. The Indonesian flag carrier also intends to operate 12 additional CRJ1000 NextGen aircraft through a third-party lease agreement and holds options on 18 more aircraft of the same type.



## Elbit's Battle Management Systems

Elbit Systems has contracted with the Australian Defence Force (ADF) for supply of Battle Management Systems (BMS) for the Royal Australian Navy's landing craft. The systems are to be integrated into landing craft installed on board the *Canberra*-Class Amphibious ships (LHD). The watercraft will enable transport of troops and equipment from the LHDs to the shore including where there are no fixed port facilities and will allow communication and connectivity with Infantry Forces in joint operations. Elbit Systems has been supplying its BMS to the Australian Army under the defence network-centric "Land 75/125" Programme, one of the largest BMS programmes in the world.

## Elbit/IAI partnership for Advanced Flight Training

The TOR-Advanced Flight Training (TOR), partnership between Elbit and Israel Aerospace Industries is established to perform the Israeli Air Forces' future trainer programme in a contract of approximately \$603 million. Elbit Systems will provide services and systems as a subcontractor to TOR. In the establishment phase of the Project, Elbit Systems will establish an enhanced logistic support and maintenance infrastructure for the new trainer as well as an advanced ground training array.

## BAE's multiple 155-mm LRLAP

BAE Systems have completed a series of successful gun fire tests of the 155-mm Long Range Land Attack Projectiles (LRLAP) as part of ongoing testing at White Sands Missile Range in New Mexico. The LRLAP is effective against a variety of targets in multiple mission areas and designed to provide expeditionary



forces with an affordable, ship-launched alternative to currently used missiles. The LRLAP is guided by a GPS and Inertial Measurement Unit, allowing for a high degree of accuracy. This, in turn, assists expeditionary forces in reducing costs by requiring fewer rounds to achieve desired effects on targets. In addition, its accuracy minimises the potential for collateral damage.

## ATLAS North America SeaFox

The SeaFox mine neutralisation system, developed by ATLAS North America (ATLAS NA), a subsidiary of the German-based ATLASELEKTRONIK GmbH has effectively participated in *Trident Warrior 2012* US Navy Fleet Experiment. Textron/AAI used its Fleet Class Common Unmanned Surface Vessel (CUSV) with a L-3 Klein 5000 V2 Side Scan Sonar to investigate a suspected minefield. When detecting a mine-like object, its coordinates were fed into the SeaFox to further prosecute the potential target. A second CUSV then remotely deployed the SeaFox for examining and identifying the exercise-mines, followed by a simulated mine-neutralisation. The SeaFox



is a one-shot mine disposal vehicle, used for semi-autonomous disposal of naval mines and other ordnance found at sea.

### IAI's ALPHA for Israeli Navy

Israel Aerospace Industries (IAI) has won a contract to supply the Israel Navy with ALPHA (Advanced Lightweight Phased Array Radar) radar systems for the Navy's Sa'ar 4.5-class missile ships. The ALPHA radar has been developed and produced by ELTA Systems and is a key component of the ship's weapon system and able to perform a variety of missions simultaneously



such as multiple target tracking and identification, and defence munitions guidance. It provides 360-degree defence against a wide variety of airborne platforms and munitions.

### ALHD 'Canberra' at Australia

The ALHD *Canberra* arrived at Australia after two months of navigation. The loading operation on board the heavy sea lift ship *Blue Marlin* commenced on 4 August in La Coruña (Northwestern Spain), a very specialised operation in which engineers of Navantia, BAES and Dockwise participated. The departure from La Coruña was on 17 August and supported by Navantia during the trip. Construction of the ship began in Spain in 2008, with the hull launched by Navantia in 2011, which has built one unit for the Spanish Navy, 'Juan Carlos I', was contracted to build 2 units for the Royal Australian Navy and is being evaluated by the navies of Turkey and India.



### Raytheon's new Phalanx Block 1B for UK

Raytheon have been contracted to deliver five Phalanx Block 1B Close-In Weapon Systems to the UK Ministry of Defence starting in 2013. Installation and in-service support will be provided by Babcock Marine. Phalanx is a rapid-fire, computer-controlled radar and 20 mm gun system that automatically acquires, tracks and destroys enemy threats that have penetrated all other ship defence systems. More than 890 systems have been built and deployed in the navies of 25 nations.



### 12 Navantia LCMs for Australian Navy

Navantia have 'cut steel' for the first LCM-1E high speed landing craft, of a series of 12 for the Royal Australian Navy, to be operating on board the ALHD *Canberra* and ALHD *Adelaide*. These units are identical to the LCM-1E high speed landing crafts built by Navantia and in service with the Spanish Navy since 2007. Each LCM-1E weighs 110 tonnes, the first four arriving in 2014, when the first of the new ALHDs becomes operational.

### Textron's USV in Naval Mine Countermeasure Operations

Textron Systems Advanced Systems' Fleet-class Common Unmanned Surface Vessels (CUSV) successfully demonstrated the ability to conduct collaborative unmanned mine-hunting and mine-neutralisation operations during the *Trident Warrior 2012* US Navy Fleet Experiment. CUSV is a multi-mission and multi-payload capable Unmanned Surface Vessel featuring commercial off-the-shelf modular open architecture, a reconfigurable payload bay, and high tow force capability. Its maritime command and control system is based upon AAI Unmanned Aircraft Systems' combat-proven One System architecture. "CUSV users have the freedom to quickly deploy any payload necessary to satisfy mission requirements including towing, mine countermeasures, anti-submarine and anti-surface warfare, communications relay, launch and recovery for unmanned aircraft, underwater systems, and intelligence, surveillance and reconnaissance".

## Brazilian EC725s with advanced management systems



Cassidian will work alongside Brazilian systems specialist ATECH, to equip the new EC725 helicopters of the Brazilian Navy with an advanced mission management system. As part of the procurement of 50 EC725 helicopters by the Brazilian armed forces, Eurocopter and its Brazilian subsidiary Helibras signed a contract with ATECH and Cassidian to develop and manufacture the Tactical Data Management System (TDMS) for 8 navy helicopters, to be concluded by 2017.

## 5th P-8A Poseidon for US Navy



On 2 November 2012, Boeing delivered the fifth production P-8A Poseidon aircraft to the US Navy, one of 24 low-rate initial production (LRIP) maritime patrol aircraft that Boeing is building for the Navy as part of contracts awarded

in 2011 and 2012. "This is our final P-8A delivery of the year; we'll ramp up to 12 deliveries, including P-8I aircraft for India, in 2013," said Chuck Dabundo, Boeing vice president and P-8 programme manager. "Our in-line production approach, which draws on processes developed on the company's commercial and military programmes, has been key to our ability to increase production rates while reducing costs." The next three Poseidon aircraft are undergoing mission systems installation and checkout in Seattle, and two more are in final assembly in Renton, Washington. Boeing will deliver its sixth production P-8A to the Navy in early 2013.

## Seven AW139 Helicopters for Swedish Maritime Administration

The Swedish Maritime Administration have ordered seven AW139 intermediate twin helicopters. The aircraft will be equipped for Search and Rescue (SAR) operations with the first helicopter scheduled to be delivered in the spring of 2013 and the final one in 2014.



## Israel Aerospace Industries launches Fast Patrol Boat

Israel Aerospace Industries (IAI) have unveiled its *Mini Dvora*, a multi mission fast patrol boat for Home Land Security (HLS) and Exclusive Economic Zone (EEZ) security missions. *Mini Dvora*, a member of the *Super Dvora* fast boat family, has evolved from Ramta Division's extensive experience and maritime legacy. Located in Beer Sheva, Ramta has, for over four decades, developed and manufactured most of Israel's Navy security boats as well as for other customers around the world.

The boat's unique structure allows it to perform missions in shallow waters near the coast as well as in deep waters.



The Mini Dvora mock-up

## MBDA KFK demonstrator successfully tested

The KFK missile held its first firing demonstration on 19 September 2012 at the military training centre in Baumholder, Germany, with two successful unguided firings of the missile travelling the planned distance in each case. Under the project supervision of MBDA Germany, MBDA with the support of various government offices has been financing a Technology Demonstration Programme with its own resources for around one year. The missile concept was developed by building on the mission experience of the German *Bundeswehr* and more generally on the lessons learned from recent conflicts. Ongoing military missions have revealed the particular need for a compact, light-weight, low-cost, precision multipurpose weapon that can be transported and operated by a single operator.



## Thales avionics package for Atlantic Airways

Atlantic Airways has selected the package of Thales Avionics equipment and cockpit technologies for installation on its Airbus A319. The selected equipment consists of Alternate Supplier Furnished Equipment (SFE) and Buyer Furnished Equipment (BFE) for which FLI chose Thales against other vendors. Under the terms of this selection, Thales has equipped Atlantic Airways aircraft with the new generation dual Flight Management System (FMS), the new Digital Head Up Displays System (D-HUDS) installed in Captain side, the latest integrated ACSS surveillance suite including TCAS, TAWS and Transponder functions, Low-Range Radio-Altimeters (LRRA), Pitot Probes and Angle Of Attack sensors, and Kannad's Emergency Locator Transmitters (ELT).

## L-3 WESCAM launches the MX-RSTA



L-3 WESCAM have introduced its MX-RSTA electro-optical/infrared (EO/IR) imaging system. The MX-RSTA (Reconnaissance, Surveillance and Target Acquisition) system is designed for ground vehicle missions, where it can be configured as a Commander Independent Viewer, a Primary Gunner Sighting System, or as a mast-mounted vehicle reconnaissance and

surveillance system. Available after two years of development, the modular MX-RSTA combines the latest stabilisation technology with a common system gimbal and interchangeable sensor/laser payloads. This approach enables scalable system solutions, providing the flexibility of altering sensor payloads based on changing programme requirements, scope and budget constraints.

## ITT Exelis EW systems for Omani F-16s

ITT Exelis has been awarded a \$23.6 million Foreign Military Sales (FMS) contract to provide the Royal Air Force of Oman with electronic warfare defensive systems. The RAFO will procure 12 airborne integrated defensive electronic warfare suites, as well as spares and support equipment. The Advanced Integrated Defensive Electronic Warfare System, or AIDEWS, is an integrated digital radar warning receiver and advanced jamming countermeasures system, which provides pilots with situational awareness and protection against radar-based threats, including modern surface-to-air and air-to-air weapon systems.

## Hawk achieves 5,000 flying hours

The first Royal Air Force Hawk TMk2 has completed 5,000 flying hours. The Hawk aircraft ZK024 was flown as part of a formation by Wing Commander Kevin Marsh, Officer Commanding IV Squadron. BAE Systems jointly with subcontractor Babcock's maintains the Hawk TMk1 and TMk2 aircraft fleets based at RAF Valley, Anglesey. The BAE Systems Advanced Jet Trainer Hawk TMk2 has been in service with the RAF since July 2009. Almost 1000 Hawk aircraft have been sold or are on order, training fast jet pilots in more than 20 other nations.



## Eurocopter's Puma Mk2 for UK

The upgrade of UK Ministry of Defence Puma aircraft got a major boost when Eurocopter handed over its first Puma Mk2 aircraft to MoD. This upgrade will significantly enhance the aircraft's performance, mission capability and safety. The first modified aircraft will fly from Oxford into QinetiQ's Boscombe Down facility where it will support trials. Enhancements for the Puma Mk2 include major performance and safety improvements with the use of new Makila 1A1 turboshaft engines; the integration of a full glass cockpit incorporating modern avionics and a flight management system; the implementation of a digital automatic flight control system; as well as the incorporation of a secure communications suite, new defensive aids and ballistic protection for crew and passengers.



# Air Shows – the German way !

## Highlights of ILA 2012

The German Air & Space Show, popularly known as ‘ILA’, has remained on the world’s aerospace show calendar for decades, initially

Even though this was an international Air Show, with Poland as partner country (just as India was at ILA 2008), the overwhelming presence of Germany’s

Armed Forces (*Bundeswehr*) made this the largest exhibitor at the ILA using the Berlin Show not only to showcase their capabilities, but perhaps to attract



*The Eurofighter Typhoon is reequipping Luftwaffe’s combat squadrons, with 180 aircraft initially ordered. The Typhoon formally entered service with the Luftwaffe’s JG 73 and JG 74 where it replaced the F-4F and former East German Air Force MiG-29s.*

taking place at Hanover, being dovetailed with the much larger *Messe* but since the past two decades, at its new site at the erstwhile East Berlin international Airport at Schönefeld. Over the past 20 years, the approach to and area itself of the Show has been much improved and expanded and today the site can play host to some 300 aircraft on static display as also providing virtually exclusive airspace for flying displays.

With construction of the Berlin ExpoCenter Airport now complete, ILA 2012 was held for the first time at the southwest portion of the future Capital Airport BER. As per Mr Dietmar Schrick, CEO of German Aerospace Industries Association (BDLI), “the complex is characterised by efficient infrastructure and modern halls : ILA is a user friendly trade show for both exhibitors and visitors, and optimally equipped for the future.”



*The Eurojet EJ-200 turbofan powers the Eurofighter Typhoon and is being evaluated by several countries for new generation fighters.*

qualified applicants for voluntary service in the military.

The Luftwaffe pulled out all stops and had virtually every aircraft type on static display, including the Eurofighter Typhoon, and Panavia Tornado (the latter sporting insignia of JG 74 'Molders', made famous by the German fighter ace). Ironically, there were other Tornados on display, those of the Royal Air Force's

Nos. 31 and 617 Squadrons. Here was champagne time indeed for the aviation history enthusiast as the former were 'First in Indian Skies' and the latter, the famous 'Dam Busters' Squadron. How the world has changed : antagonists of the 20th century are now inseparable allies ! How far to go for countries in the Indian subcontinent to learn this lesson from European history ?

## Official inauguration and trade visitors

The German Chancellor Dr. Angela Merkel and the Deputy Minister President and Minister of Economics of the Republic of Poland, Waldemar Pawlak, opened ILA 2012 on 11 September 2012. Exhibitor numbers were the highest in the ILA's 100 year history, with 1,243 exhibitors from 46 countries providing an outstanding display of high-tech products from most countries of the aerospace world. At the last ILA (2010), some 230,000 trade visitors and those of the public were recorded as attending and in 2012 there were certainly many more.

Over 280 aircraft were at the ILA 2012, both on static display and in the air. These included the world's two largest airliners, an Airbus A380 and a Boeing 747-8, as well as a Beluga from Airbus, the world's most voluminous transport aircraft. An Airbus Military A400M heavy military transporter, was at Schönefeld while new types on public display for the first time included a Eurocopter Hybrid Demonstrator X3 and a solar-powered Elektra One Solar. The national formation aerobatics teams of Turkey and Poland put on flying displays for the first time at ILA, but the cynosure of all eyes were the vintage Messerschmitt Me-262 jet fighter and Me-109, the latter vying for being the Second World War's most proliferate



*Luftwaffe Tornado with smart weapons on display during ILA 2012.*



*Also flying Tornados is the Royal Air Force's No.617 Squadron, the 'Dam Busters', the squadron patch saying it all ! Now an allied force but in 1944, 617's Lancaster bombers had breached Germany's Möhne and Edersee dams, causing catastrophic damage.*



*Lufthansa's first Boeing 747-8 (D-ABYA) shortly after the German Chancellor Angela Merkel and Lufthansa Chief Executive Christoph Franz and Minister President of Brandenburg Matthias Platzeck christened the airliner as 'Brandenburg'.*



*Beautifully restored is this example of the Messerschmitt Me-109 of World War II fame.*

fighter type even though popular history has put the Spitfire on that pedestal.

New concepts at ILA 2012 included many more unmanned aircraft systems (UAS) and eco-efficient flight, which attracted much interest. The UAS section exhibited a wide range of products, ranging from small unmanned systems to large unmanned aircraft for use both in civil and military environment. The industrial innovations and research

projects on display included aircraft seats, cabin concepts of the future, increasingly efficient low-emission engines, new materials and alternative aviation fuels, all of which underlined the industry's ability to develop environmentally friendly aircraft technology that protects the climate.

Under the heading of 'Space for Earth', the Space Pavilion focused on the benefits and innovative capabilities

of the aerospace industry. The International Suppliers Centre (ISC), Europe's marketplace for the supply industry, and the ILA CareerCentre, Europe's largest aerospace job exchange, registered significant growth. The ILA HeliCentre and Airfield, where the General Aviation section was located, provided trade visitors with an overview of the latest aircraft and industry products.



*Providing 'superior comfort to the passenger while also allowing more living space, thanks to its lean backrest' were RECARO's new model CL 3510, on display during ILA 2012. During her opening tour German Chancellor Dr Angela Merkel visited the RECARO stand and in fact, rested on the seats.*



*At the RUAG Chalet, Peter Klouk with image of the Dornier 228NG next generation light transport aircraft which has been built under licence by HAL at its Kanpur Division for over 25 years. 'Green aircraft' from HAL are imported by RUAG for completion to the new NG standards for worldwide sales.*

## The Indian presence

As briefly reported in *Vayu* Issue V/2012 there were three categories of Indian visitors to the Berlin Air Show. The DRDO had an enormous display of products, albeit in model form, which attracted genuine interest if not curiosity.

The officious delegation from the Department of Defence Production with HAL Directors in tow went from Chalet to Chalet and it is understood that the officials were given detailed presentations on several high technology programmes and opportunities for joint ventures. These included, but were not confined

to, the export of Indian-designed and built aircraft and systems including the Tejas Light Combat Aircraft and Dhruv Advanced Light Helicopter. Whether these opportunities can, or will, be exploited remains to be seen.

The private industry put up a brave front with some 20 companies clustered at the International Supply Centre, representing a spectrum of products and services in the aerospace sector ranging from engineering and design support services to the manufacture of high precision aerospace components and assemblies. According to the coordinator George Cheriyan, "The companies were exploring opportunities for partnerships, joint ventures and technical tie ups to address the needs of India's rapidly growing aerospace market".

Companies participating in the Indian Business Delegation at ILA 2012 included Tata Advanced Materials, TAL Manufacturing Solutions, Rangsons Electronics, Aeromatrix, Kemrock, Fairtech, CADES Digitech, Amado Tools, Rapid Global Business Solutions, Systems Aids, Accord Software & Systems, Metallic Bellows, Sessa Tools, MKU, EIS, Hitech precision Aerospace, Axis Aerospace, and NR Exports.



Tri-colours in the Berlin breeze, mark the DRDO Chalet at ILA 2012



Model of the Lakshya pilotless target aircraft (PTA) developed by the Aeronautical Development Establishment (ADE) with consultancy from the erstwhile Dornier Systems GmbH.



BDLI official inaugurating the 'Indian Seminar' at ILA 2012.

# THE FRENCH NAVY TODAY

## Plans & New Equipment

*The French naval base at Toulon. Seen is the Tonnerre (L9014), an amphibious assault helicopter carrier of the French Navy. She is the eighth vessel to bear the name and the second ship in the Mistral class amphibious assault ships.*

Every two years, in the run up to the *Euronaval 2012* naval exhibition in Paris, select international media get to visit the French Navy for briefings on their plans and whatever is relevant ! This year around 30 of us converged at Paris on 24 September to begin a five-day marathon exercise of visiting naval bases, warships, helicopter landing carriers and to be briefed in some detail on programmes. Organised by the French association's SOGENA and GICAN (and supported by *Ministere de la Defense*, DGA, *Marine Nationale* and *Secretariat General de la Mer*), there was no waste of time in getting on with what *Vayu's* Managing Editor came for !

Barely two hours after landing, we congregated at the

GICAN, the French marine industry association, represents the country's entire naval and maritime industry, from naval defence and maritime safety and security to marine environmental protection and commercial shipbuilding and repair. The association's 160 members cover every aspect of the French naval and maritime industry, from prime contractors, system integrators and equipment manufacturers to smaller specialist companies. GICAN members build and maintain vessels of all types and displacements for navies, cruise operators, shipping lines and other more specialised operators.

GICAN brings together and promotes the industry's expertise in France and abroad. It also works to ensure the industry's strategic positioning on the European stage and win international recognition for its advanced technologies and know-how. The organisation is supported by the French Ministry of Defence, the French defence procurement agency (DGA), the Navy, the Secretary-General for the Sea, and the Directorate of Maritime Affairs (part of the Ministry for Ecology, Sustainable Development and Energy).

*Ecole Militaire* in Paris for a pre-*Euronaval* press conference by the DGA, Navy and GICAN. Then, transferred to Creil airport from where we took a paratroop-configured CN-235 to Toulon, on the Mediterranean. On 25 September we toured the BPC *Tonnerre* (force projection and command vessel) followed by a presentation of BPC capabilities and missions. Ship and submarine builder DCNS further briefed us on the BPC as well as *Brave*, a versatile replenishment and support vessel.

Hereafter, Sagem took over on their naval optronics (all-in-one subsystems for detection, identification and engagement of conventional and asymmetric targets on surface ships and submarines), MBDA with their SIMBAD RC and Thales with



*The French Navy's La Fayette Class multipurpose stealth frigates were developed and built by DCNS. The French Navy awarded DCNS the contracts to construct the La Fayette (F710), Seen here are the Surcouff (F711) and Courbet (F712) frigates in 1988, and Aconit (F713) and Guepratte (F714) in 1992.*



*The air defence frigate 'Chevalier Paul'*

“intelligence on board the BPC”. This was followed by an extensive and detailed tour of the BPC. Then tour of the air defence frigate *Chevalier Paul* and even more detailed presentations by the French Navy, DCNS, MBDA (Aster and VL Mica), Thales (mission capabilities for anti-air, surface and anti-submarine warfare on the warship itself). Very impressive indeed!

We then left for Saint-Mandrier to be given an insight into electronic warfare training at the Saint-Mandrier Naval Instruction Center by DCI.

The next day to Le Mourillon (by bus) for briefings on MENASYM and ASTON by DGA TN as well as DCNS submarines and surface ship innovations and combat systems. Then to Sophia Antipolis the Thales’ site for underwater systems and Thales Safare, training and simulation as well as integrated and modular submarine sonar suites.

The programme continued: to Nice airport and back in the CN-235 heading

for Brest, the French naval base at the extreme western coast and tip of France. Agenda for the morning was minehunting operations, presentation and demonstration of ESPADON the naval surface drone, presentations by French Navy, DGA, DCNS, Thales and ECA and a very interesting presentation of the ASEMAR project, an AUV dedicated to maritime security.

In the afternoon, we learnt about the FREMM frigate programme, what it takes to maintain it, Thales with their outstanding multi-mission capabilities above and under water, MBDA and their MdcN and Exocet, Sagem's SIGMA 40 and Sagem inertial solutions and a tour of a FREMM frigate.

There was more to be seen, heard and discussed but enough for now - : we start with the French Navy itself!

The French Navy comprises 42,000 men and women, more than 180 ships, 200 aircraft and 6 commando units. It has a permanence presence of 30 ships at sea, 5 aircraft in the air and an SSBN undersea. France has defined a new strategy of national security that is structured around 5 strategic functions: protection, prevention, knowledge and anticipation, intervention and deterrence.

*Carrier battle group, amphibious battle group, escorts:* The naval action force (FAN) consists of 103 out of the 180 ships of the French Navy and of 12,000 men and women. The capital ships of this force, such as the aircraft-carrier or amphibious ships (LHD, LPD) are capable of taking action within a "group" (carrier battle group with the aircraft carrier, amphibious group with LHD and LPD). Frigates, destroyers and SSNs escort them for protection against air or underwater threats and a replenishment ship allows this force to remain at sea for significant periods of time.

## THE FRENCH NAVY TODAY



**Personnel Strength: 42,000**

### Principal Units:

- 4 x Strategic (Ballistic Missile) Submarines
- 6 x Attack Submarines
- 2 x Aircraft Carriers
- 11 x Destroyers
- 20 x Frigates

The French naval Strategic Nuclear Force (FOST) is based at Ile Longue near Brest. FOST consists of 4 x *Le Triomphant* submarines each with 16 x M-45 SLBM (submarine launched ballistic missiles). Each missile has 6 x warheads. At least one submarine is at sea at any one time and the permission to launch can only be given by President of the Republic.

In mainland France naval units are stationed at Cherbourg, Brest, Ile Longue, Lorient, Bayonne and Toulon. Naval bases overseas are at Fort de France, Degrad des Cannes; Dakar, Djibouti, Abu Dhabi, Port des Galets, Nouméa, Papeete.

French Naval Aviation (AVIA) has of approximately 150 aircraft and some 6,800 personnel of whom about 400 are pilots. Naval Air Bases are at Nimes, Landivisiau, Lann-Bihoue, Hyeres, Tontouta and Lanveoc-Poulmic. The aircraft carrier *Charles De Gaulle* is a major AVIA element.

The Naval Amphibious & Special Forces Group (FORFUSCO) consist of 8 x amphibious and support vessels. There are about 1,800 marines organised in 2 x battalions (Toulon and Brest) plus 7 x units of company plus-size varying from 100 to 150 personnel. About 600 commandos are organised into specialist elements for assault, reconnaissance, raiding, combat divers and support. The commandos are assigned to the French Special Forces Command.

The Maritime Gendarmerie consists of about 1,000 personnel operating some 30 small vessels. There are 3 x commands (Atlantic, Channel and Mediterranean) and a small unit in Paris operating along the River Seine.

Frigates, as multipurpose-ships, can also act independently to preserve national interests of the country's maritime areas and allow it to react to any imminent crisis. They are able to support an intervention force, to protect merchant shipping and to carry out special operations or humanitarian missions.

*Submarine forces group:* The four SSBNs successively patrol to assure permanence at sea of the nuclear deterrent, veiled in the ocean, undetectable, equipped with 16 missiles with multiple nuclear warheads. They are grouped together within the Strategic ocean force (FOST) that has carried out this mission since 1973.

Formidable hunter killers, the SSNs are essential to the FOST's security and support, as well as to the protection of a naval air force at sea. They also are a part of the conventional deterrence. They are able to join rapidly an operation theatre, to hold there for a long time, discreetly or conspicuously, to gather intelligence, and if need be to implement their weapons systems: torpedoes, anti-ship missiles and cruise missiles (for example, the *Barracuda* submarine).

The '2015 Navy' model defines the forces required to perform the tasks involved in the "permanent protection posture", deterrence, support of the FOST, prevention, the protection of France' maritime approaches and public service; as well as specifying the forces essential for engagement in one or more conflicts that require power projection. From the outset, the 2015 model has incorporated a degree of balance with their European allies. French "poles of excellence", which enable France to take responsibility for command of operations within a coalition force, can be considered as valuable assets. These are the aircraft carrier and its air wing, amphibious ships, SSNs and the mine warfare group.

In 2015, the Navy will deploy altogether:

- ★ a strategic ocean-going force consisting of four SSBN,
- ★ one or two aircraft carriers with a carrier borne air wing consisting of Rafale multi-purpose fighters and Hawkeye AEW aircraft,
- ★ an amphibious force consisting of four LPDs,
- ★ a group of twenty-six destroyers and frigates including four AAW and eight ASW ships,
- ★ six SSNs,
- ★ overseas forces consisting of six surveillance frigates, eleven patrol boats and five light transport ships (BATRAL),
- ★ a mine warfare force consisting of fifteen ships and a command ship,
- ★ a maritime patrol aircraft wing consisting of twenty-two Atlantique aircraft and ten maritime surveillance aircraft,
- ★ about fifty ship-borne helicopters.

This represents a total of 80 warships, 130 naval aircraft and five commandos units.

The Navy is already operating with a fleet close to this size. It is on this basis that it is modernising, as can be seen by the introduction into service of the nuclear aircraft carrier *Charles de Gaulle* with its Rafale aircraft, and more orders placed and various stages of delivery of the *Forbin* and *Chevalier Paul* Class warships, *Le Terrible* SSBN submarine, *Tonnerre* and *Mistral* (the third and fourth LPD), and the oceanographic ship *Beautemps-Beaupré*. They are also updating their Combat Management Systems (CMS), the modernisation of tripartite mine-hunters and the development of the new *Barracuda*-class SSNs. The modernisation is continuing with the launch of the new multi-role FREMM frigates. These will form backbone of the fleet and will replace most of the frigate fleet today made up of three classes: F67s, F70s and 'avisos' (light frigates). The management of naval aircraft has also been subject to rationalisation. Support helicopter activities have been refocused, particularly with regard to search and rescue (in combat and in peace) and logistic support, and will be gradually devolved to a joint organisation. These actions will reduce cost of ownership and facilitate re-equipment programmes such as the Rafale and NH90.

## UAVs on naval platforms

The French Defence Procurement Agency (DGA, *Direction Générale de l'Armement*) has recently conducted successful sea trials of D2AD, an automatic takeoff and landing system for rotary wing UAVs. D2AD is a demonstrator, designed and built by DCNS and Thales who were awarded the contract in late 2008. About thirty takeoffs and landings were performed aboard the French Navy frigate *Guépratte* from late September to early October 2012 off Toulon. Very delicate manoeuvres have been conducted with high level of precision. This R&T study is a major milestone in the process of raising the risks of the future programme of unmanned aerial system of the French Navy (SDAM - *Système de Drones Aériens de la Marine*). D2AD comprises a 'flight' segment composed of a beacon and a deck harpoon aboard the UAV, and a 'ground' segment composed of sensors located on the ship's aviation deck, a ship motion predictor station and a guidance station of the UAV. The D2AD is independent of any satellite positioning system and adaptable to different types of UAVs or naval platforms.



**D2AD demonstrator, designed and built by DCNS and Thales.**



# From Thales : naval drones, mine warfare and ESPADON

*The solution comprises, among others, a dedicated ship (pictured above) called 'heavy USV' and autonomous underwater vehicles (AUV). The USV deploys AUVs to detect, identify and neutralise naval mines. Project management consists of DCNS, Thales Underwater Systems and ECA Robotics.*

**A**s integrator of over half the world's in-service fleet of mine hunters, Thales covers the full spectrum for mine countermeasures including mine-hunting and mine avoidance sonars, influence sweeps, tactical systems and multi-influence measurement stations. The company has delivered, or has been contracted, for more than 300 mine-hunting sonar systems worldwide. The company offers a range of unmanned surface vehicles equipped with the T-SAS very high-resolution towed synthetic aperture sonar, and autonomous underwater vehicles, which are able to make decisions based on the situations they encounter.

Thales is working with some of the world's leading research organisations to design and develop unmanned vehicles. It has been carrying out this research for more than 10 years – founding partnerships with manufacturers of underwater and surface vehicles to develop concrete solutions for these systems of the future. Thales' added value in the unmanned domain



*PVDS Propelled Variable Depth Sonar onboard the ESPADON*

is its skill as system integrator, based on a “very good knowledge of the operational missions.” Available technologies allow it to define the unmanned system which will optimise the combination of platforms (AUV, USV, UAV) and the distribution of performance requirements between platforms and sensors; its capacity ensure the platform's autonomy, based on a simple principle: to have good “eyes” and a “brain” which operates well, allowing the unmanned vehicles to make good decisions. Thales

control of the complete technical channel “sensors – data processing – decision”. Alongside Thales innovations in synthetic aperture sonar, recent research has focused on the deployment and recovery phases of unmanned operations, leading to the development of the fully automated LARS launch and retrieval system.

ESPADON is an advanced study programme funded by the French defence procurement agency (DGA) with the aim of minimising risks surrounding certain aspects of the maritime drone-based future anti-mine warfare system. Thales and DCNS were awarded this major study contract in 2009 for a demonstrator of a new MCM solution. This partnership is first in the world to evaluate USVs deploying AUVs for full-scale MCM. DCNS, Thales and ECA have put forward a joint solution using USVs in preparation for the expected renewal of MCM systems among many navies in the coming decades. These vehicles offer the key benefit of keeping crew out of harm’s way. MCM operations have typically been performed by dedicated vessels, known as minehunters, and have exposed crews to considerable danger. The ESPADON solution comprises a dedicated vessel, two USVs and AUVs. The dedicated vessel remains at a safe distance from the minefield and controls the USVs, which are programmed specifically to operate in minefields. The USVs in turn deploy AUVs which are smaller and completely autonomous types of sub-sea naval unmanned vehicles equipped with sensors and robotic devices necessary for detecting and neutralising naval mines. On completing their mission, the AUVs return to the USVs, which then return to the mother vessel.

As part of ESPADON, Thales leads the USV, MCM outfitting and sensor module, as well as communications between the different components. The sensor module consists of an AUV and a towed sonar for mine detection, identification and location. DCNS, in addition to acting as lead contractor to the DGA for the overall project, is responsible for the USV platform and interface with the mother vessel. ECA will take charge of the design and development of the AUVs, their launch, as well as the recovery and USV remote control system. ESPADON initially consists of testing at sea the



*The T-SAS very high-resolution towed synthetic aperture sonar and autonomous underwater vehicle*

launch and recovery from a USV of a towed sonar and AUV. A complete mine warfare mission using an AUV, as well as a towed sonar and neutralisation means stemming from a USV, will then be conducted.

Asemar is a project for the development of a fully autonomous underwater vehicle (AUV) dedicated to maritime surveillance and security funded by the General Directorate for Enterprises (DGE) in France. The Asemar project involves several partners: two industrial companies (Thales and ECA) and four educational institutions. Thales is responsible for the overall project coordination and system deployment. In the scope of this project, Thales has supplied a next-generation high-resolution side-scan sonar with synthetic-aperture array which gives the AUV unparalleled measurement and imaging performance. The system is designed for surveillance of maritime areas, investigation and searches for submerged objects with certain characteristics. Its innovative and ambitious performance specifications include high levels of energy and decision-making autonomy, generation of high resolution underwater imagery from depth and compatibility with standard off-the-shelf equipment. The system has also the capability to track changes in the undersea environment between subsequent missions and compare the objects it detects with those stored in its database.



*ESPADON: The contract was signed in July 2009 and the drone Sterenn Du launched in December 2010. In 2011, its sea capabilities and retrieval of drone submarines were tested.*

# Firepower for warships and submarines: MBDA's VL MICA and MdCN

The ability to strike and destroy or neutralise targets such as military and economic infrastructures with metric precision from extended stand-off ranges has become a key operational requirement. MBDA's experience in this area has already been proven with the development and entry into service of the Storm Shadow / SCALP air-launched cruise missile. However, to provide modern armed forces with the added flexibility of a deep strike capability from a mix

*The French DGA (Direction Générale de l'Armement) has successfully carried out the first end to end firing of the MdCN (Missile de Croisière Naval or naval cruise missile) in its submarine version. This fourth development firing of the missile manufactured by MBDA took place from a platform representing a submerged submarine at the DGA's Levant missile test center located in the Var region of southern France on 24th October 2012.*

of air and naval platforms, MBDA is now developing the MdCN (*Missile de Croisière Naval* - Naval cruise missile). Following the operational requirement, MBDA has been contracted by the French DGA (*Délégation Générale pour l'Armement*) to provide the French Navy with a long-range cruise missile capable of being launched from surface ships and submarines.

MdCN benefits from the air-launched experience and equipment developed during the Storm Shadow / SCALP programme with obvious cost and technology advantages to the customer. The new missile draws from the functional architecture of the air-launched variant with commonalities in cruise and terminal phase. Mission planning for both naval and air variants of the MBDA cruise missile family is very similar, optimising the combined deployment from different platforms should this be called for by the mission in hand. MdCN will be vertically launched from France's future FREMM frigates using the A70 Sylver vertical launcher which is also capable of housing other MBDA missiles such as the ASTER family of air-defence missiles. On France's future *Barracuda* nuclear-powered attack submarines, MdCN will be launched through the torpedo tubes.

In December 2006, MBDA received notification from the DGA of the development and production contract for MdCN. The first test firing of the MdCN missile was carried out successfully by the French DGA (*Direction Générale de l'Armement*) in May 2010. In June 2011, in another significant advance for the MdCN programme, the first submarine launch was carried out by the French DGA. In July 2012, the first complete firing of the MdCN missile took place. Representing a frigate launch, this third development firing by the DGA saw the missile following a pre-planned course before striking its land target thereby displaying the high level of precision provided by the weapon's autonomous terminal guidance system. FREMM is expected to be equipped with the MdCN system as of 2014 and *Barracuda* as of 2017.

MBDA has also exploited the success and operationally proven capabilities of the in-service MICA air-to-air missile to develop two highly effective air defence systems, VL MICA (Land) and VL MICA (Naval). Both systems have been designed to offer a highly effective, rapid reaction, all-weather air defence against the widest range of threats.

The VL MICA (Naval) has been developed to provide self defence and local area defence capabilities to counter potential saturating attacks by anti-ship missiles.

Canisters can be installed in a silo structure, part or fully buried in the ship's deck. Alternatively, the canisters can be installed alongside the ship's hangar or any suitable vertical bulkhead. Installation in a wide range of either new or retrofit warships, from fast patrol craft to major vessels, is therefore relatively easy. The canister serves as the storage and transportation unit as well as the vertical launcher. Missile system life cycle costs can therefore be minimised.

Target designation can be derived direct from the ship's Combat Management System (CMS) with target data from a 3-D surveillance radar. Systems integration is facilitated via an electronic interface unit installed below deck. Each interface unit links 12 XVL MICA missiles to the CMS. As the system does not require dedicated target trackers, it has a truly 360° engagement capability.

Following a contract awarded in 2005 by the French DGA, to prepare the integration of the VL MICA (land) within a wider air defence network, a complete evaluation process has since been carried out by the French Air Force. The process was concluded by two successful live firings at ranges exceeding 15 km and involving the participation of military crews.



*Launch of the vertical launch MICA.*

# Sagem's critical technologies for naval combat platforms



The EOMS NG /  
Vampir IRST  
system

Sagem, the high-tech company in the Safran group, is a leader in optronics, avionics, electronics and safety-critical software for both civil and military markets. Sagem is No. 1 company in Europe and No. 3 worldwide for inertial navigation systems (INS) used in air, land and naval applications, and is also the world leader in helicopter flight controls and the European leader in optronics and tactical UAV systems. Mastering optronics and navigation systems and technologies, Sagem contributes to the operational efficiency of a combat ship across the spectrum of scenarios, from homeland security at the sea, guerrilla, high intensity engagements, to the most demanding combat or deterrence missions. Sagem is part of several major international programmes such as *Baynunah* in the Arab United Emirates, *Collins* submarines in Australia, ANZAC frigates, air warfare destroyer and landing helicopters docks in Australia, European FREMM, *Scorpene* SSK submarines of Brazil, Chile, India and Malaysia.

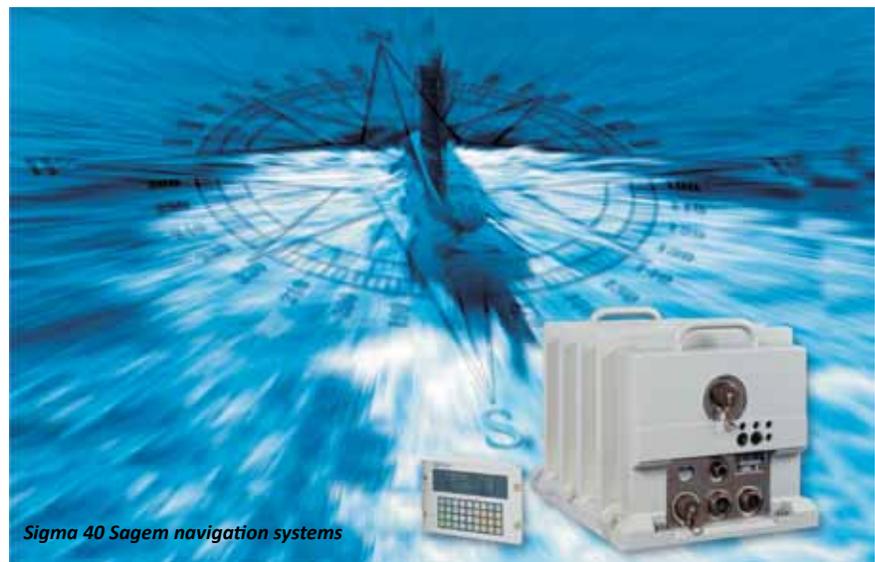
Projection and Command Ship (BPC) of the *Mistral* class: Sagem supplies the Sigma 40 gyrolaser navigation system and optronic IRST systems (EOMS NG for French BPC). During *Unified Protector* NATO operations, on the BPC, Army light aviation deployed the MPME planning system supporting Tigre, Puma and Gazelle combat helicopters in preparation of missions over Libya.

*Horizon* air defence frigates: Sagem develops and produces the NGDS self-

protection system (New Generation Dagaie System) and the IRST system. Sagem is main contractor of the navigation system of the *Horizon* frigates, in France and Italy. NGDS complies with the NATO self-protection doctrine for surface ships against missile threats.

FREMM frigates: Sagem develops and supplies the NGDS self-protection system (New Generation Dagaie System), the NAJIR MM optronic fire control system, and the navigation system (Sigma 40). The Sigma 40 laser gyro navigation system of Sagem has been adopted the Italian, Morocco program.

In response to the increased needs of surface combat ships, Sagem has developed new generations of optronic systems : VAMPIR NG, EOMS NG and Vigy Observer. This comprehensive range of optronics systems covers IRST (Infra Red Search and Track), surveillance system, aiming sight, and their integration to the combat system of the ship. Sagem combines the most performing stabilisation technics and high performing optronics. This know how is integrated in the new Vigy Observer light panoramic sight, now in series production for fast attack craft. Sagem has supplied optronic systems to more than 30 countries' naval forces. EOMS NG is in service on *Baynunah* corvettes, has



Sigma 40 Sagem navigation systems

been adopted for the modernisation programme of the *Floreal* surveillance frigates, and on the *Adroit* OPV of DCNS. *Vampir* is in service on the ANZAC frigates, and the AWD destroyer and LHD of Australia.

Sagem has more than 30 years of experience in optronic masts for submarines. This experience comes from traditional submarine programmes (*Daphné*, *Agosta*, *Agosta 90B*, *Scorpene*, *Narhvalen*, U209, *Challenger*), and nuclear ones: the 1st generation *Redoubtable* SSBS class, the SSBS NG *Triumphant* class and the SNA *Améthyste* class. The new solutions for optronic masts by Sagem, periscopes and radar masts are designed for new-generation submarines or ships in need of modernisation. The range of masts includes Series 10 Compact Submarines Radar, Series 30 Search Mast System, both relying on a non-penetrating architectures, and Series 20 Attack Periscopes.

On the DCNS *Scorpene* submarines, Sagem supplies detection masts and the navigation Sigma 40 XP system that are integrated in the DCNS Subtics combat system. Sagem has been selected to equip the future *Barracuda* nuclear attack submarines and modernise the navigation system of the French nuclear attack submarines (*Améthyste* class). The company is involved in modernisation programmes of submarines built by HDW, Rubin, Kockums for domestic and international market.

# DCNS FREMM frigates and BPCs



DCNS' FREMM Aquitaine

**D**CNS-designed FREMM multimission frigates offer navies “the ideal asset to lead or command protection, prevention or force projection actions on any scale against threats on land, air and sea.” The

FREMM baseline combines capabilities for anti-air, anti-surface, anti-submarine and land strike actions and can be tailored to each client navy’s operational needs and procurement policy. The FREMM baseline can accommodate expanded

capabilities for extended-area anti-air or anti-submarine defence.

FREMM Export frigates build on the stealth of the French Navy’s *La Fayette*-class frigates combined with advanced hull design and the latest



BPC Tonnerre

innovations developed for the FREMM family (including advanced automation and reduced operating costs). The high-performance export frigate is optimised for the protection of high-value assets at sea against a broad spectrum of airborne threats from asymmetric types to emerging anti-ship ballistic missiles. The state-of-the-art baseline boasts a sensor suite comprising both a long-range air-search radar and a Herakles multifunction radar, the latest Aster anti-air missiles (Aster 30 block 1), a powerful combat management system (CMS) and radically reduced crewing to ensure total anti-air protection and high efficiency.

The FREMM multimission frigate programme is Europe's biggest surface combatant programme and France has ordered eleven of these vessels. The contract for the first tranche of eight vessels was signed in November 2005 and that for the second tranche of three on 30 September 2009. Key FREMM missions will include air/sea dominance, active participation in joint operations and support for air/sea, carrier and amphibious assault groups. From the end of 2012, these 6,000-tonne frigates will form backbone of the French surface fleet.

The Setis CMS (combat management system) interfaces with all shipboard sensors, weapon systems and communications systems to make FREMM frigates front-line fighting ships in all domains: ASW (anti-submarine warfare): hull mounted sonar, very-low-frequency (VLF) towed array, NH90 helicopter and MU90 torpedoes; AAW (anti-air warfare): Aster 15/30 missiles in Sylver vertical launchers and MFR multifunction radar; ASuW (anti-surface warfare): 76- or 127-mm guns and MM40 block 3 missiles; land strike: 127-mm gun and MDCN naval cruise missiles; self-defence against asymmetric threats: 12.7-mm machine guns or 20-mm remote-control machine guns. The combat system was designed from the outset around a high-speed redundant data network serving all weapon systems.

To optimise overall performance, data from all sensors is correlated and displayed by the combat management system (CMS). The CMS can be reconfigured in real time so that combat information & command (CIC) operators and their multifunction consoles can be reassigned to different tasks to ensure both real-time

task optimisation and an optimal match with the tactical situation. This innovation offers a clear advantage over dedicated consoles.

The French Navy's FREMM frigates will deploy an NH90 helicopter, have Exocet MM40 anti-ship missiles, MU90 torpedoes, Aster 15 anti-air missiles for self defence and, in the case of the AAW variant, Aster 30 missiles for zone air defence. ASW variants will carry MDCN naval cruise missiles for deep strike missions.

The *Mistral*-class vessels are the biggest ships in the French fleet after the aircraft carrier *Charles de Gaulle*. In NATO terminology, they are classified as landing helicopter docks, or LHDs. The BPC baseline (from *bâtiment de projection*

allows for simple technology transfers and cooperation with either naval or commercial shipyards with DCNS supervision or support.

Three *Mistral*-class ships are currently in service with the French Navy: BPC *Mistral*, BPC *Tonnerre* and BPC *Dixmude*. The 21st century has brought significant changes in naval operations, including missions that are both more complex and more remote. Humanitarian and/or allied missions demand new and expanded sea-lift capabilities and even the capacity to reconfigure vessels en route or on site. Adaptability is essential.

BPC-type LHDs offer these capabilities and more, including an ultramodern 70-bed hospital and two operating theatres to NATO level-3 requirements.



*et de commandement*, or projection and command vessel) features a flush-deck architecture (i.e. unobstructed flight deck). DCNS designed the 21,000-tonne *Mistral* class to the French Navy's requirements. In response to emerging operational needs identified by other navies, DCNS offers variants with displacements starting at 14,000 tonnes for the BPC 140. The entire family benefits from the operations-proven design of French Navy's *Mistral* class.

Alternative propulsion arrangements are also available, including conventional diesel or electric. The BPC baseline

Force projection, peace-keeping and humanitarian support operations call for a shipboard command centre and long-term provisioning. This explains why the design includes a modular command centre complete with a high performance communications suite that can be readily tailored to the command team's requirements. NATO teams have already used and approved these capabilities. From the moment it entered service, BPC *Mistral* has demonstrated its operational capabilities during operation *Baliste* in Lebanon

## VAYU Interview with

### Bernard Buisson, Managing Director of DCNS India



**VAYU:** You have previously stated that DCNS is managing the indigenisation process for the P75 programme, with DCNS India providing Indian partners with know-how, training and technical assistance. What is the present indigenous content in each vessel, and what is the projected content by the time the final submarine is commissioned?

**BB:** First of all it is important to highlight that the P75 programme is the first programme anywhere in the world where all the submarines are entirely manufactured in the foreign customer's shipyard. Indeed, when TOTs are part of the contract the first of class (first submarine) is always manufactured in the OEM's shipyard in order to help the foreign shipyard acquire manufacturing know-how through on-the-job training.

All six P75 submarines are manufactured at MDL who has successfully absorbed the highly sophisticated TOTs to manufacture the vital pressure hulls which will protect and ensure the safety of the crew at great depths.

Equipment that is fitted onboard are part of the MPM (Mazagon Purchase Materials). Their indigenisation – or manufacture by Indian companies with genuine Transfer of Technology - is on its way and progressing very well with contracts already signed with 3 industrial partners and some equipment already delivered to MDL.

At end of the Indigenisation Programme, the Indian Navy and MDL will be able to integrate more equipment locally manufactured for the possible second batch of Scorpenes.

**VAYU:** What is the projected plan for indigenisation and transfer of technology for the Indian Navy's upcoming MRSV project? Is DCNS

able to customise the Mistral-class BPC for the Indian Navy, should the Navy require installation of domestic systems, compatibility with domestic weapons and craft etc?

**BB:** DCNS would like to propose for Indian Navy's LPD project, a ship based on the Mistral-Class meeting all requirements of the Indian Navy. We are partnering with Pipavav for this programme. We believe that competency of DCNS in design of such LPD and capacity of Pipavav in building such a big ship is the best suitable combination for meeting the requirements of the Indian Navy on time and quality.

Indeed, DCNS will be able to integrate in the LPD Combat System sensors and weapons requested by the Indian Navy as we are doing for the two Mistral Class LPDs with Russia for which the contract was signed in 2011.

The French Mistral-Class is 199 metres long and of 21,500 tonnes. The first two ships of this type, *Mistral* and *Tonnerre*, were delivered to the French Navy in 2006 and 2007 respectively. France's third LPD, *Dixmude*, ordered by the French defence procurement agency in 2009, was delivered on 3 January 2012, three months ahead of the contract schedule.

The French *Mistral* was involved in all Libyan multinational war operations and accomplished its missions successfully.

On a wider note, DCNS is willing to extend its participation in ongoing and future projects for the modernisation programme of the Indian Navy. Whatever the needs of Indian Navy are, DCNS can surely offer an adapted solution.

**VAYU:** DCNS has significant investments in civil technologies, especially relating to nuclear power generation. Is this a possible area of expansion for DCNS in India? If so, has there been any discussion with the Indian administration regarding this?

**BB:** DCNS is developing industrial capabilities in Marine Renewable Energies and Civil Nuclear Energy.

Since 2010, DCNS is working on developing energy solutions, linked to the sea and based on its naval expertise. DCNS is focusing on having low carbon emissions through civil nuclear energy (Flexblue, a subsea nuclear power plant) and marine renewable energy (offshore



The Scorpene.



Building the submarine at MDL.

wind, tidal and stream energy, wave energy, Ocean Thermal Energy Conversion).

Since India has a huge maritime footprint, DCNS will be happy to offer solutions in marine renewable and civil nuclear energy.

**VAYU:** Following the MoU signed with IIT Bombay in March, what benefits has DCNS Research seen? Is DCNS likely to cooperate further with educational programmes in India?

**BB:** The MOU has given a frame to build up common projects between IIT Bombay and DCNS Research. Scientific fields of possible cooperation have been identified, and will now be explored. A first project in cooperation will be submitted soon to the scientific committee of CEFIPRA (Indo-French Centre for the Promotion of Advanced Research ).

The relations with IIT Bombay are a first step for DCNS to collaborate with Indian academics, and DCNS is open to be involved in scientific and educational programmes with Indian institutes.

**VAYU:** Has any progress been made regarding installation of an AIP system on the final P75 vessels for India? Are there plans for a new AIP system for the P75I programme requirement?

**BB:** We are providing the Indian Navy with some information on integration of AIP on the last two submarines with the objective to preserve their present delivery schedules.

We would be totally ready to indigenise significant subsystems/components; some of which could be used for any other AIP, system the Indian Navy might want to choose later on.

Should the P75I programme require AIP we will be in a position to propose our latest state of the art AIP design.

**VAYU:** Could you share an update on the FREMM and Gowind OPV projects?

**BB:** DCNS is truly a unique player in naval systems (we are the only company developing such a range of solutions with OPVs to CVN and from SSKs to SSBNs) and associated services..

DCNS has developed a large range of Combat Systems for the French Navy from Frigate (FREMM), Aircraft Carrier (*Charles de Gaulle*), LPD (*Mistral-Class*), Submarine (*Scorpene*) and OPVs (*Gowind* family),

The Gowind OPV *L'Adroit* is a self-funded innovative platform benefitting from a very modern design with 360° bridge, which is operated by the French Navy since October 2011. DCNS manufactured and commissioned this in less than two years.

The FREMM are very high performance frigates of about 6,000 tons the first of which is completing sea trials. In total 11 such frigates are being produced at our shipyard.

**VAYU:** What is the possibility and scope of involvement in the Project 17A programme being undertaken by MDL, with whom DCNS already has an association?

**BB:** With our large and long experience in design and manufacture of various warships such as the FREMM frigates, should MDL require, we are indeed in a position to provide MDL with know-how to help them manufacture the frigates in an integrated construction and timely method.



Dassault Rafale with a bright red star painted on the fuselage top.

# 70<sup>th</sup> Anniverasary of "Neu-Neu"

On 14 September 2012, the Escadron de Chasse EC 2/30 *Normandie-Niemen* (nicknamed "Neu-Neu") celebrated its 70th anniversary. In 1942, this squadron was established in the Middle-East and on request by Stalin, were transferred to the Soviet Union for support in the airwar against Germany. Between 1942 and 1945 nearly 5500 missions were flown in 869 combat missions (one of the aircraft they flew, was the Soviet-origin Yak-3) EC 2/30 were the first French unit to enter Germany in 1944 and after the end of WW2 they returned to France in 1945.

In 2009 the EC 2/30 squadron with Dassault Mirage F1 was disbanded and in June 2012 became operational again at BA Mont de Marsan, with the Dassault Rafale (F3). The F3 variant of the Rafale is the latest variant delivered directly from the Dassault plant. Primarily to be used



Yakovlev Yak-3 alongside Dassault Rafale F.3



*A lone Rafale and two Mirage 2000s at the static display*

in the air-to-air role with the MICA missiles it also has a air-to-ground role with conventional and nuclear ordnance; in the anti-shipping role with the Exocet missiles and in the reconnaissance role with the new RECO-NG pod. This new RECO-NG pod is digitised and used for tactical and strategic reconnaissance missions, day and night. This reccepod was used extensively during the French operation *Harmattan*, as part of NATO's *Unified Protector* operations in 2011.

The anniversary of *Neu-Neu* took place on 14 September at their homebase BA Mont de Marsan. Because the connection with the former Soviet Union, there were special visitors from Russia: the Russian ambassador Alexandre Orlov and Commander of the Russian Air Forces Lt-General Victor Nikolaevitch Bondarev, welcomed by the Commander of the French Air Force (*Armee de l'Air*) General Jean-Paul Palomeros.

A static show was set up with 2 Mirage F1s, 2 Mirage 2000s, a (civil) Yak-3, a specially painted Rafale.



*The normal patch (right) and the special 70 year patch of EC2/30*

**Photos and text by Joris van Boven who visited Base Aerienne 118 BA Mont de Marsan Colonel Rozanoff in France**



*Proposed cockpit of the MC-21*

the entire contract will be completed by 2015. Irkut's versatility is exemplified by its MC-21 programme which is a civil airliner being manufactured at the Irkutsk city-based aviation plant. Aviation experts expect it to be a highly fuel efficient airliner owing to its narrow body and modifications like an extended wing made of composites. The fuel consumption is expected to reduce by 20 per cent. The wings prototypes are being tested at the TsAGI institute, the leading Russian Aviation Centre.

The MC 21 has received a positive response in the form of 266 orders of which 185 are firm. Mr Oleg Demchenko, the CEO, expects this aircraft to be a major revenue earner for the company. Similarly, the corporation expects the Su-30 fighters and Yak-130 trainers to do equally well.

# IRKUT speak: New Vistas Ahead

Irkut Corp., which has had a long standing partnership with India, is gearing up to start delivering a new batch of Su-30MKI fighters. The Corporation has acquired the reputation of a leader amongst the Russian aviation Industries and this reputation is largely dependent on the expanded family of Su-30 multirole fighters. The Russian MoD has also ordered the Su-30M two seat fighter with the aim of training pilots in preparation for their fifth generation

aircraft. The production and supply of Yak-130 combat trainers by Irkut has added to its growing revenues with the Russian MoD signing a deal with the company to supply 55 Yak-130 combat trainers. The Russian MoD has expressed the need for trainers so that pilots can begin training on this aircraft which is soon expected to become an intrinsic part of the Russian Air force. While the first batch of Yak-130s was handed over to the Russian Air Force on 5 October 2012,



*Mr. Oleg Demchenko, IRKUT's CEO*



*The Yak-130 light attack trainer*

# THE FRONTIER WAR OF 1962

## Whither Air Power?

*Hawker Hunter Mk.56s of the IAF in formation above the Himalayan foothills. The six squadrons with this type could have wreaked havoc against the advancing Chinese Army in October-November 1962.*

*In Vayu's Issue V/2012 was published the first part of this series written by Air Marshal (R) Bharat Kumar on Indian Air Force operations during the 1962 conflict. Focus was on the IAF's air transport and helicopter support to the Army in both the Ladakh and NEFA sectors. In this article, the Air Marshal reviews and analyses the decision NOT to use the IAF's combat sinews which could potentially have changed the entire scenario – and future history.*

The literal meaning of history is investigation and an investigation into the events of the 1962 Sino-Indian conflict brings out many unknown but interesting facts about readiness of the Indian Air Force to go into action. For example, how many military historians know that the Indian Air Force had plans in place for such a (Chinese) contingency? The plan called for counter air operations by Canberra bombers against Chinese airfields in Tibet; interdiction operations by Hunter and Mystere fighters in the Ladakh sector and by Vampire and Toofani aircraft in NEFA, air defence by Gnats, Hunters and Vampire night fighters in the Western sector while leaving the air defence primarily to Hunters in the Eastern Sector.

Other little known facts are that orders had been issued to recall all fully operational aircrew of fighter squadrons under Headquarters Eastern Air Command and redeployment of combat elements of the IAF throughout the country. This commenced in mid-September 1962 itself and was completed by 23 October; No.1 Operational Group was formed at Tezpur on 8 October 1962 to oversee all air and operations including fighter missions in NEFA. At least three air contact teams had been positioned in the Ladakh sector from August 1962 onwards and an air support signal network had been activated in the Western sector by first week of October 1962.



*Dassault Ouragon (Toofani) of No.29 Squadron at Tezpur. Instead of being effectively employed in the ground-attack role in NEFA, most of these aircraft were flown out "to safety" in West Bengal on 20 November, with orders that the balance be "self-destructed" on the airfield to prevent them from falling into Chinese hands!*

In early October, HQ Eastern Air Command launched a Vampire FR aircraft to assess the possibility of providing close air support in the Namka Chu area but narrowness of the valley and the fact that this Indian troops were located in the valley instead of being on dominating heights already occupied by the Chinese did not permit such an operation. These facts indicate that for all practical purposes the Indian Air Force was ready for combat once the code word for "go ahead" was given. But obviously something traumatic happened that held the Air Force back and the nation's Army faced a humiliating defeat which, for half a century, has affected the Indian psyche adversely: events of those days still haunt us today.

It can be said with confidence that the IAF would have been able to stem the Chinese advance, if not inflict certain defeat on them had it been unleashed on the advancing Chinese, both in Ladakh and NEFA. What then were the compelling circumstances which forced the Government of India to hold back the Indian Air Force?

It is obvious that the decision not to commit the IAF must have been taken at the highest political levels but this decision would have been based on inputs from the Services as well as other sources. Let us examine these one by one.

## The Services' View Point

First of all, the Indian Air Force itself. The still-unpublished Official History of 1962 conflict blames this on the recommendations in a note sent by the Director of Operations (then Group Captain HC Dewan) to the Chief of the Air Staff. In this note he stated that the terrain in the area of operations, especially NEFA, was heavily jungle-covered and close air support would be "difficult" and which could have very little effect on dispersed infantry. Since there was no possibility of large concentration of tanks or vehicles in these areas, there were "no worthwhile targets" for the Air Force. His note further stated that since Indian troops were critically dependent on air supply, it was best not to "provoke" the Chinese. Referring to "the large size of the Chinese Air Force", he pointed out that while China could easily replenish its losses, India could not. He also mentioned that Pakistan's attitude was a question mark and the IAF's resources had to be kept in the West to deal with this threat. The note concluded by referring to international repercussions of using air power, as the world would believe that India had "escalated" the conflict, which would deprive India of "international public sympathy" which counting was otherwise regarded as a victim of aggression.

Most of these constraints were equally applicable to Ladakh. It must be stated that a copy of this note is not available anywhere and one came to know about this only during an interview with Air Marshal Dewan almost 30 years after the event. Without discussing the professional veracity of these conclusions, a few points need to be recorded. Firstly, the note was apparently written in September 1962 : the assessment till then was that any confrontation would take place in Ladakh and nobody had visualised the possibility of conflict in NEFA. Secondly, one cannot state with any certainty if the CAS actually concurred with the conclusions indicated in the note. Thirdly, was the note even forwarded to the Ministry of Defence ? There are no records to show that it was Air Headquarters that recommended that the Air Force should not be committed. In fact, the CAS had offered to bomb Chinese targets in Ladakh in August 1962 but had been overruled by the Defence Minister, VK Krishna Menon. The subject had also come up earlier when the Galwan incident was centre of attention. The subject was again taken up with the Defence Minister, this time by the Army in early September

but the request was again turned down. If the CAS had concurred with the note and had forwarded the same to the Ministry, it is very doubtful that he would have taken up the issue with the Defence Minister. Thus to cite this note for the decision not to use the Indian Air Force would be incorrect. However, there is also no evidence on record that once hostilities broke out, Air Headquarters took up the matter with the Government to convince them that it would be a militarily correct decision to use the IAF in an offensive role and that it would not be escalatory in any way. Air Headquarters does seem to have asked permission to use the IAF as is evident from Air Marshal Engineer's statement to US Ambassador Galbraith that the Government "had not permitted the use of Air Force".

There is also an allegation that the IAF had a rethink about capabilities of

and indicated the same to the Ministry or the Prime Minister himself. This is also evident from the fact that with effect from 5 November 1962, the IAF had instructed its units to be prepared for offensive air support missions at short notice; however, it seems that the likely areas of operations were not indicated in such warning orders.

Hence, the Air Force cannot be faulted on this account and it can be said with certainty that orders not to commit the Air Force were certainly not based on recommendations of Air Headquarters. Further, one cannot say with any degree of confidence that the Chief of Air Staff was consulted in the matter at all. If there were any such attempts, the political and bureaucratic hierarchy would have stated that the IAF was not used "on the recommendations of Air Headquarters" : in fact, there is not even a single statement



*Pilot at cockpit readiness in Hunter at a Punjab airbase.*

the PLAAF. In a telegram to the United States State Department dated 1 November 1962, the American Embassy in Indonesia cited an interview with one Colonel Thapa, Indian Military Attaché there. The telegram reads: 'Stated USSR has backed out (of) recent MiG arms deal apparently under pressure from Red Chinese. India is now fearful of ChiCom (Chinese Communists) use of MiG-21 and Tu-16 aircraft against Indian forces which do not have weapons to oppose. Wanted details of MiG-21 if we had them.'

Apart from the inaccuracy of assessing aircraft types with the Chinese at the time, the date 1 November is vital as strictly speaking, the IAF should have been committed if not on 20 October itself when the hostilities opened but certainly by 23/24 October when the Indian Army was facing a major debacle in NEFA. There are no records whatsoever to indicate that Air Headquarters did revise its assessment

of this nature either in various speeches in or outside Parliament nor in various articles and books about the Sino-Indian Conflict that have been published till date.

What about the Army? The desirability of offensive air support was discussed at various times at Army Headquarters and had been accepted by Army Headquarters as is apparent from writings of Major General DK Palit and others. The likely threat to Indian cities also came up during these discussions. Prior clearance of the Government is required for any commitment of the Air Force in an offensive role : the rule still stands today as is evident that Air Headquarters had to await the Government's approval before launching first aircraft during the Kargil War of 1999. However, the matter was never taken up by Army Headquarters with the Government for necessary sanction. Strangely, this vital matter was never formally discussed between Air Force and

Army Headquarters or at the Chiefs of Staff Committee.

It must be remembered that there was no concept of joint planning; and the higher defence organisation which had worked reasonably well during the Kashmir War of 1947-48 had been rendered dysfunctional by the whimsical Krishna Menon. Hence these critical matters never came to be discussed in depth and everything went by the Defence Minister's perception : in fact there was not a single meeting of the Defence Committee of the Cabinet between 1957 and 1962! If this matter had been discussed in detail at the Chiefs of the Staff Committee and more importantly at the Defence Committee of the Cabinet, then it is likely that the assessment about the Chinese intentions and our reactions to their actions and consequently the course

and Indians on 7 October at Namka Chu and projected the same in his signal to Army Headquarters : "I recommend as a precautionary measure, offensive air support (perhaps a double-edged weapon, but worth a gamble) to be positioned suitably without delay and made available to me at the shortest notice, if necessary." Surprisingly, his request remained unanswered. He had a chance to plead his case on 11 October when he flew back to Delhi to apprise the Prime Minister and the Army Chief of the difficulty of clearing Thagla Ridge of the Chinese but surprisingly did not ask for provision of offensive air support, for reasons that remain unclear. Considering his close standing with the Prime Minister, it is more than likely that he would have been able to persuade the Prime Minister positively and the story would have been altogether different. As it

in Ministries of Defence and External Affairs "helped" Nehru make up his mind (not to use the Air Force in a combat role). Let us examine the attitudes of each of them.

### Dr BC Roy

Many prominent analysts and journalists have stated that a letter from Dr BC Roy, the powerful and highly respected Chief Minister of West Bengal "influenced" the Prime Minister the most and it was this letter that ensured that the IAF was kept out of the conflict. He is supposed to have suggested in his letter that air power should not be used against the Chinese lest the latter attack the city of Calcutta with all its consequences. He is supposed to have reminded the Prime Minister about the effects of Japanese bombing of Calcutta and Madras during the Second World War. Notwithstanding the total ineffectiveness of those bombs as far as damage to targets on the ground is concerned, there were disproportionate numbers of casualties owing to stampedes caused by fleeing public. By 1962, the population of Calcutta had increased manifold and any exodus would result in a much greater tragedy. Nehru, with his knowledge of history, must have been aware of these and could not afford to put the masses of Calcutta and other Indian cities at risk. Unfortunately, while everybody has quoted the letter but nobody seems to have actually seen it : it does not form part of Dr BC Roy papers available in various collections in the country. It may be mentioned that Dr BC Roy passed away on 1 July 1962 at which time there were no signs of any major conflict with China at least in the Eastern Sector, although things did heat up in Ladakh Sector in July-August. The situation was "normal" in the Eastern Sector till 8 September 1962. One therefore cannot fathom any reason for the Chief Minister to write such a letter. On the other hand, if the letter was indeed written, it would have greatly influenced Nehru.

### Ambassador John K Galbraith

It is generally believed it was the US Ambassador JK Galbraith who dissuaded Nehru from using the IAF. The fact that Galbraith met Prime Minister Nehru frequently cannot be denied but did he actually advise Nehru against using air power and, if so, when? Now declassified US State Department's records indicate that Galbraith sent two telegrams to President Kennedy on 20 November 1962, one in the morning in which he indicated his intention to speak with Nehru in this regard and the



*The IAF had three squadrons of bomber-interdictors in 1962, plus a strategic-reconnaissance and conversion training squadron, all equipped with the Canberra, arguably the finest tactical bomber of the world at the time.*

of the conflict would have been radically different. It is not surprising thus that Krishna Menon publically stated as late as September 1962 that there would be "no war with China" and that he knew how to resolve the problems "diplomatically".

Notwithstanding the desirability of offensive air support, as and when field formations did project demand for the same, their requests were turned down either at Command or Army Headquarters. It was felt that once air forces got involved in the conflict, it would adversely affect air transport operations and the ground forces would not get their supplies : their very life line for survival. The request by Commander 33 Corps was turned down by Army Headquarters as it felt that "use of offensive air support was not to our advantage". Palit and Lieutenant General BM Kaul had discussed the issue earlier and the latter realised the inevitable need for offensive air support when he personally observed skirmishes between the Chinese

happened, neither Air Marshal AM Engineer "or for that matter any representative from Air Headquarters was present at this meeting , when perhaps a suggestion for use of air power would have been made considering criticality of the situation and suitable arguments could have been give" if the matter had come up.

Once the military high command failed to project the need for using the IAF in an offensive role, what about the national leadership? That decision, in any case would have had to come from either the Defence Minister or the Prime Minister. Nehru was a historian and had held charge of the Ministry of External Affairs since Independence and thus had a mind of his own. But he must have been influenced by certain events and personalities in coming to this fateful decision. In this case, it is said that West Bengal Chief Minister Dr BC Roy, US Ambassador John K Galbraith, Director Intelligence Bureau BN Mullik, Professor Blackett and various bureaucrats

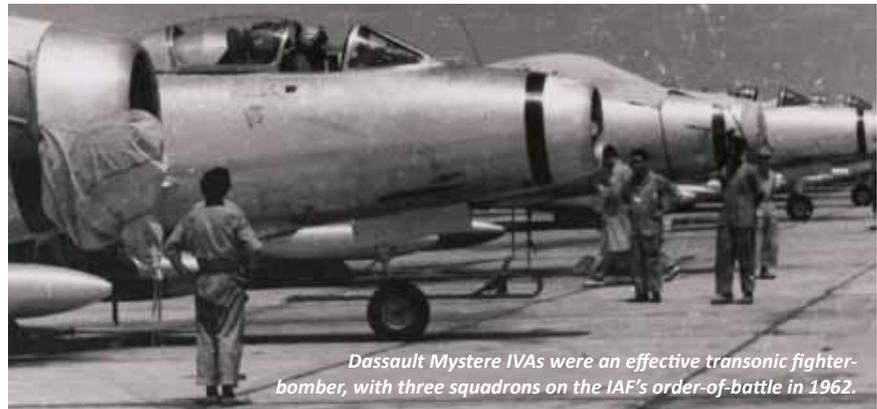
second at noon wherein he confirmed that he had met Nehru and had advised him not to use air power against the Chinese. "India should not commit its Air Force and that any hope that it would be effective against the Chinese ground movement was totally unwarranted and that Nehru should not be carried away by the enthusiasm of his Air Officers."

The use of Air Force would further escalate the conflict and "even the USAF could not ensure full protection to Indian cities". (Nehru had not till then sent his desperate letter to President Kennedy requesting for American aircraft.) He also wrote that he would be discussing the same with the Foreign Secretary to reinforce his argument. The date 20 November is vital in many ways : the Chinese declared ceasefire that day which came into effect next morning. However, the decision not to use the Air Force had been taken much earlier and even if there was reversal of the policy, it is very doubtful if the Air Force could have pushed the Chinese back at this stage : perhaps only stemmed their further advance. If the IAF had had to be committed, the decision to do so should have been taken either before or around 20 October and in any case by 15 November when the second phase of the Chinese attack commenced : 20 November was just too late. So, strictly speaking, the belief that Ambassador Galbraith dissuaded India is not entirely correct.

### Director Intelligence Bureau

Intelligence and assessment of an adversary's capabilities and his concept of operations in various contingencies plays a vital role when formulating own plans as faulty intelligence conclusion can play havoc in military planning. Considering the situation in Ladakh in August 1962, the CAS stated in a meeting presided over by the Defence Minister that he would "bomb the Chinese targets in the area, if required". BN Mullik, Director Intelligence Bureau opposed the suggestion and then gave his assessment of the PLAAF and its likely concept of operations. As is the norm, every adversary is "ten feet tall" while own capabilities, even of the same equipment as the adversary are somewhat diminished. There was no exception here. The picture painted by Mullik was indeed grim with the Chinese capabilities being highly exaggerated. It was stated that the Chinese had over 3000 aircraft (but actual deployability from limited airfields in Tibet was not taken into account) and that

Indian cities right up to Madras would be bombed ! The IB failed to factor in facts like the strained Sino-Soviet relations, poor Chinese aircraft serviceability owing to non-availability of spares, acute shortage of aviation fuel and complete dependence on the Soviet Union for the same and the fact that there had been no deployment of Chinese combat aircraft in Tibet during the period 1961-62. The assessment did not take into account that the Chinese had far more vital commitments, essentially those against Formosa (now Taiwan). But most importantly, the IB failed to give any rationale for the Chinese targeting Indian cities : was this going to be a border war or a war for the conquest of India? According to Mullik, the IB had been provided vital details by 'friends'.



*Dassault Mystere IVAs were an effective transonic fighter-bomber, with three squadrons on the IAF's order-of-battle in 1962.*

However, the British Intelligence assessment, which became available in mid-1963, was somewhat more sober. According to it, the PLAAF could at best deploy 180 aircraft at its airfields in Tibet and at best could launch 150 sorties per day, including those for air defence. This was contingent on the Chinese using almost their entire resources to position aviation fuel and spares at airfields in Tibet. The PLAAF could provide extremely limited close air support and their piston-engined bombers penetrating into Indian plains would be highly vulnerable to Indian interceptors. It was assessed that there could be some sporadic raids on the Indian cities but the rationale for the same was however not given. If one looks at the American assessment, even the British seemed to have over-estimated the PLAAF's capabilities; the US opinion was that 'the overall advantage in the air lies with the IAF rather than CCAF (Chinese Communist Air Force)'

The IB must have conveyed its assessment of the Chinese threat to the

Prime Minister and the apprehensions that the PLAAF could have a "free run" on Indian cities right up to Madras would have weighed heavily on Nehru's mind. He must also have realised that the PLAAF was numerically far superior to the IAF as it also enjoyed technological edge as well even though the reverse was the actual case. Apparently, the Prime Minister accepted the IB's assessment at its face value.

### Professor PMS Blackett

After independence, Nehru had appointed Professor PMS Blackett (later a Noble laureate) as an advisor on research and development needs of Indian armed forces. Amongst his work in India was the *Report on Defence Sciences for Indian Armed Forces*, also known as 'Blackett

Report on Indian Armed Forces'. While suggesting structure of the Indian Armed Forces, he brought out that a "bomber force could be used effectively against the cities at night, the military benefit of the same being derived by disruption of transportation system because of civilian's movement. In view of the high population density of Indian cities and the impossibility of affording adequate defence against enemy air attacks, *it would seem a great mistake for India to initiate such a campaign of monumental destruction and probably even a mistake to retaliate in kind even if attacked*" (emphasis added). He also 'warned' that action against densely-populated cities on the subcontinent would lead to excessive loss of life and property, and ought to be avoided. Blackett had recommended that India should not plan for air defence of cities nor should it go in for a large force of night fighter in view of the enormous cost ! He also mentioned ineffectiveness of heavy anti-aircraft guns against bombers dropping their bombs from high altitude.

These views were expressed well before the events of 1962 and even though quite a few recommendations of the Blackett Report were rejected, all the same these opinions could have influenced Nehru's perception of the vulnerability of Indian cities especially the impossibility of providing them with fool-proof defence against attacking bombers.

### The Bureaucrats

Bureaucrats have to interact frequently with the politicians in power and thus can influence their decision making process and opinions. As far as trouble with China was concerned, the two bureaucrats who were involved in the decision-making processes were the Foreign Secretary and the then Joint Secretary in the Ministry of Defence,

north Indian cities"! When Palit insisted, Sarin said that he would speak to Nehru once again on the subject.

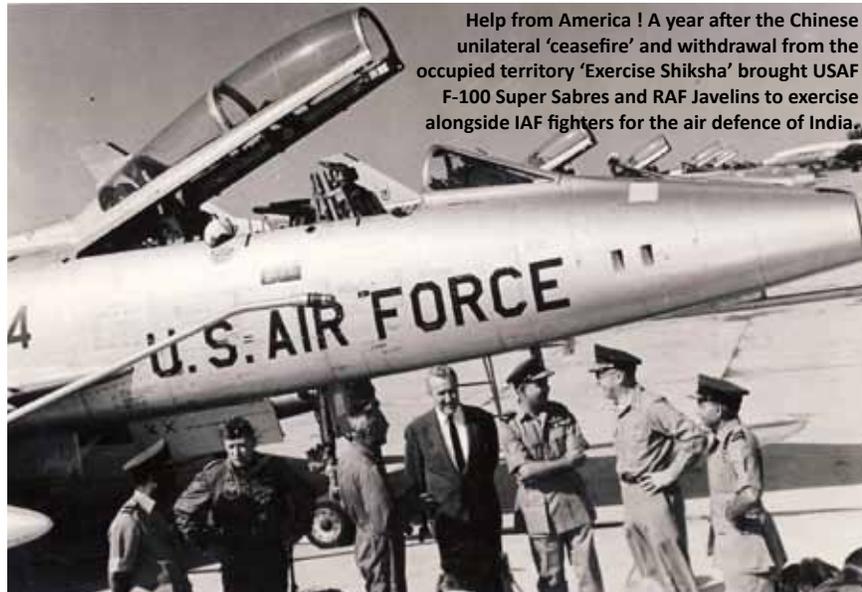
This proves that the Prime Minister had been discussing the use of IAF with bureaucrats and had been influenced by their views and opinions on the subject. However (and most surprisingly) there is nothing on record that the Prime Minister discussed the matter of employment of air power with the Chief of Air Staff and the reason for not discussing this vital matter with the CAS is not known. It is a fact that almost everybody has his views on the use of air power but it is not common for these decision makers to consult the professionals. 1962 was no exception as is evident from the fact that not only was Air Headquarters not consulted prior to

the IAF? It would unfortunately seem so. TT Krishnamachari, Minister for Economic and Defence Coordination, expressed these fears to the American Ambassador during their meeting on 19 November 1962. Nehru in his letter to President Kennedy wrote, "We have repeatedly felt the need for using the air arm in support of land forces, but have been unable to do so as in the present state of our air and radar equipment we have no defence against retaliatory action by the Chinese.... US fighters and transport planes manned by US personnel will be used to protect our cities and installations from the Chinese air attacks and maintain our communications. We should, if this is possible, also like US planes manned by US personnel to assist the Indian Air Force in air battles with the Chinese air force over Indian areas where air action by the IAF against Chinese communication lines supplies and troops concentrations may lead to counter air action by the Chinese." He expressed similar views in his letter to Chief Ministers in December 1962.

All decisions are based on perceptions and the Prime Minister's decision not to commit the Indian Air Force in an offensive role in the Sino-Indian Conflict of 1962 was based on his perception of the threat-and perhaps in the best national interests. It is moot that his perception was based on faulty inputs especially about intelligence on the Chinese air threat and his failure to discuss the same with air power professionals. The consequences of these faulty inputs did have very serious repercussions. If these inputs had been balanced, the course not only of the Sino-Indian conflict but of India's future history could have been altogether different.

**Air Marshal Bharat Kumar**

*(Based on the Author's Book 'Unknown and Unsung: Indian Air Force in Sino-Indian Conflict, 1962')*



both of whom interacted with the Prime Minister fairly regularly and thus "had his ears." They concurred with assessments of the Intelligence Bureau about efficacy of the PLAAF and its likelihood of attacking Indian cities in any conflict. There are no records to show if the Chinese air threat was discussed by these two ministries with Air Headquarters at any stage, the likely exception being the meeting of the Joint Intelligence Committee at which the overall Chinese threat would have been spelt out. For example, as late as 19 November 1962, when then DMO Brigadier DK Palit suggested to HC Sarin, Joint Secretary Defence to allow the IAF to be committed to battle to provide air support for the ground forces, the latter was chary of committing the air arm to a ground-support role "before we had ensured air cover for

the Prime Minister's letter to President Kennedy requesting for assistance by the United States Air Force but they were not even informed about the American refusal to send their aircraft to India !

Was the fear of attack on Indian cities the only reason for holding back

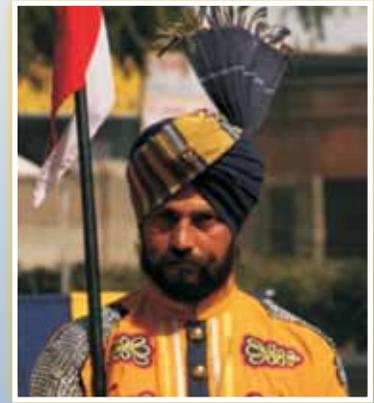


# REGIMENTS OF THE INDIAN ARMY



The 'Yellow Boys'

## THE "YELLOW BOYS" 1<sup>ST</sup> SKINNER'S HORSE



Sowar of Skinner's Horse.

**S**kinner's Horse – one of the most distinguished cavalry regiments of the Indian Army – was raised by legendary Lt. Col. James Skinner in 1803 at Hansi. The regiment was raised as Local Horse, became an irregular unit in 1840 but due to its outstanding performance and defection of the entire Bengal regular cavalry during the Great Mutiny of 1857, it became a regular regiment in 1861.

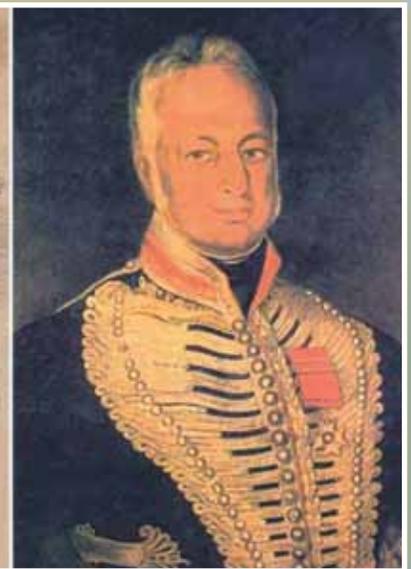
**The Founder:** James Skinner was born in 1778 in India to Lt. Col. Hercules Skinner, a Scottish officer in the East India Company's Army. His mother was a Rajputani, taken prisoner at the age of 14, and later married to Lt. Col. Skinner. The couple had 6 children – 3 girls & 3 boys; David, James & Robert. Hercules Skinner wanted to educate his daughters but his wife, with her strong attachment to Rajput traditions, was against the idea. She felt so strongly about it that she committed suicide when she could not do anything about it. James Skinner was first educated in a charity school then at a boarding school. His first job was in a printing press in Calcutta as an apprentice.

He did not like the job and ran away, surviving by doing odd jobs in a bazaar. However, he was soon found and taken back home. Thereafter he worked in a law firm, with similar disregard for his employment. He wanted to become a soldier in the EIC Army but was denied commission, as he was country born. He was then suggested to join Maratha Army.

A Frenchman, Benoit de Boigne, was the commander of the forces of Maharaja Scindia of Gwalior. James Skinner joined Scindia's Army in 1805 and served for 8 years, first under de Boigne and after his retirement, under Perron. After de Boigne's



Lt Col James Skinner



retirement, Perron became commander of Scindia's forces and had a body of 5000 native horsemen, called Perron's Horse. In January 1800, in the battle of Unaira, Skinner was shot in the groin and given up for dead. Left on the battlefield without food or water, he fought for his life for almost 24 hours, vowing to build a church if he were to survive. His prayers were answered and a native woman found him in the battlefield. She gave him food and water, following which he was taken to the enemy camp, where he was treated well and was released as soon as he recovered. James sent 1000 Rupees to the woman who had saved his life and, as a fulfilment of his vow, built St. James' Church near Kashmiri Gate, New Delhi.

During the Anglo-Maratha war of 1803, Skinner elected to remain loyal to Scindia but was dismissed from service for being British! Following this, Lord

Lake invited him to raise a regiment of Irregular Cavalry. Skinner accepted the offer, with the condition that he and his regiment would never be asked to draw their swords against his former master – the Maharaja of Scindia. After



Scindia's defeat in 1803 at Aligarh, 800 men of Perron's Horse (Skinner's erstwhile regiment) offered to join the British forces. When they were asked to choose their leader, they unanimously shouted "Sikandar Sahib" (this being

the name given to Skinner by his native soldiers) and thus the finest regiment of Indian cavalry began taking shape.

The regiment saw continuous action for the next six months and after the battle of Malagarh, Captain Skinner was placed in general command of the area between Aligarh and Delhi. But in 1806, Skinner was asked to disband the unit for economic reasons. He was allowed to keep a nucleus of the regiment and was given a grant of land and an income of Rs. 20000 per annum. But this income was later reduced to Rs. 300 per month!

In 1809, he was again ordered to re-raise the regiment. The strength of the regiment kept on changing until 1825 when James had 3000 men under his command and held the rank of Major. In 1826, he was to be made *Companion of the Order of the Bath* but it was realized that his rank was not high enough for the honour! It was then decided to promote him to Lieutenant Colonel, not because he was the ablest cavalry commander of the Indian army but because King George IV himself decided to confer the honour upon him. As a Lieutenant Colonel, Skinner had reached the limits of his promotion prospects. He once wrote, "I imagined myself to be serving a people who had no prejudices against caste and colour but I find myself mistaken."

He was more Indian than European and had a large family with 14 wives! He owned a mansion in Delhi and country houses in Hansi and Bilaspore where he used to take great interest in farming. He was more comfortable with Persian then English and spoke the local dialect fluently. He knew the names of all his men and would often invite soldiers all ranks to feast with him and lay an old spoon next to his plate to remind him of his humble beginning. Deep knowledge of his men, their language, culture and his leadership qualities made him the ablest commander of Indian cavalry. He died in December 1841 and was buried at Hansi. Two months later, his remains were brought to his final resting place – St. James Church, New Delhi – that he had built decades earlier.

**The Regiment:** When Lord Lake asked James Skinner to raise a unit of irregular cavalry, 800 men of Perron's Horse from Scindia's army were readily available (after Lord Lake had defeated



Scindia's forces). These 800 men were willing to join British forces and when they were asked whom would they choose as their new commander, they unanimously shouted "Sikander Sahib". That was how the finest cavalry regiment of the Indian Army was born on 23 February 1803 at Hansi. By 1814, the regiment grew to 1st, 2nd and 3rd regiments of Skinner's Horse and each regiment was 1000 men strong. 2nd Regiment was commanded by James' younger brother, Robert Skinner and the 3rd regiment was commanded by Major William Fraser until it was disbanded

in 1819. In 1815, establishment of each regiment was as follows:

- 1 Captain
- 5 Lieutenants
- 5 Cornets
- 10 Risaldars
- 10 Naib Risaldars
- 10 Jemadars
- 10 Kot daffadars
- 80 Daffadars
- 10 Nishanchis
- 10 Nagarchis
- 10 Vakils
- 100 Bishtis

In 1809, Galloper guns were attached to the regiments and 1 Havildar, 1 Naik & 50 Sowars were added to work with the guns. During the reorganization of 1861, 2nd regiment was renumbered as 3rd and it retained that number till 1921 when both the regiments were amalgamated to form 1st/3rd Cavalry regiment. Titles of 1st & 3rd regiments of Skinner's Horse kept on changing from 1803 till 1947. Here is a list of the titles:

1st Regiment	3rd Regiment
1803 – Capt. Skinner's Corp of Irregular Horse	1814 – 2 <sup>nd</sup> Corps of Capt.' Skinner's Irregular Horse
1803 – Skinner's Horse	1821 – Baddeley's Frontier Horse
1823 – 1 <sup>st</sup> (Skinner's) Local Horse	1823 – 4 <sup>th</sup> Baddeley's Regiment of Local Horse
1840 – 1 <sup>st</sup> Regiment Bengal Irregular Cavalry (Skinner's Horse)	1840 – 4 <sup>th</sup> Bengal Irregular Cavalry
1861 – 1 <sup>st</sup> Regiment of Bengal Cavalry	1861 – 3 <sup>rd</sup> Regiment of Bengal Cavalry
1896 – 1 <sup>st</sup> Regiment of Bengal Lancers	
1899 – 1 <sup>st</sup> (Duke of York's Own) Regiment of Bengal Lancers.	
1901 - 1 <sup>st</sup> (Duke of York's Own) Bengal Lancers (Skinner's Horse).	1901 - 3 <sup>rd</sup> Bengal Cavalry (Skinner's Horse)
1903 - 1 <sup>st</sup> Duke of York's Own Lancers (Skinner's Horse).	1903 – 3 <sup>rd</sup> Skinner's Horse
<b>1921 – Amalgamation of 1st &amp; 3rd regiments</b>	
1921 – 1 <sup>st</sup> /3 <sup>rd</sup> Cavalry	
1922 – 1 <sup>st</sup> Duke of York's own Skinner's Horse	
1927 – Skinner's Horse (1 <sup>st</sup> Duke of York's own Cavalry)	
1947 – Remained with Indian Army as "Skinner's Horse (1 <sup>st</sup> Duke of York's own Cavalry)"	
1950 – Skinners' Horse (1 <sup>st</sup> Horse)	

In 1823, 5 Corps of Irregular Horse in the Bengal Army were re-designated as Local Horse. Skinner's regiment being the senior most got the numeral 1st and the regiment got its title "1st (Skinner's) Local Horse". The regiment worked as Local Horse unit till 1840 when, during the First Afghan War it was found that they were not entitled to draw ration from the commissariat. Just before the men & horses of the regiment started starving, they were reclassified as "1st Bengal Irregular cavalry" and commissariat started issuing ration to them. During the Great Mutiny of 1857, defection of the entire Bengal cavalry made Skinner's Horse the senior most regiment and it became "1st Regiment Bengal Cavalry" in 1861.



During the 1903 reorganization of the Indian Army, it was proposed to rename the regiment as "4th (Duke of York's own) Mohammedan Regiment of Indian Cavalry" but it was turned down. The unit retained its numerical superiority and founder's title and became the "1st Duke of York's Own Lancers (Skinner's Horse)".

The regiment was famous as the 'Yellow Boys' because of the colour of their uniform. James Skinner, being half Rajput, selected this colour keeping the Rajput traditions in mind. It was said that a Rajput sardar going out to war would vow to return victorious or not at all. His men would honour his spirit and tie a yellow or saffron cloth around their heads and ride off into war to earn victory or martyrdom.



**Operational History:** Right after its raising in 1803, one of the Skinner's Horse regiment was present on any scene of action. Let it be Malagarh (near Meerut), the Anglo-Nepal war, Campaign against Pindaris, the second siege of Bhurtapore (Bharatpore), First Afghan War, Sikh Wars, 1857 Revolt, Second Afghan war, Boxer Rebellion, North West Frontier, Third Afghan War, World War I and II.

**1st Regiment:** After the victory of Malagarh in 1803, Capt Skinner was placed in general command of the country between Allygurh (Aligarh) and Delhi. After Scindia was defeated, British turned towards Holkar and Skinner's Horse were part of the British forces. During this campaign, newly recruited sowars started



*In ceremonial uniform.*

deserting. James tried to dissuade them but was unsuccessful. Finally Skinner, in anger, called them cowards and several shots were fired upon him. Seeing this, his 'Khas Rissala' came rushing, shouting their battle cry, and cut two-thirds of the mutineers to pieces. The rest escaped to Raja of Hathras. All the shots fired by the mutineers had hit Skinner's horse and he himself had a narrow escape. Lord Lake was so impressed by Skinner's gallantry and his regiment's service to the British against the Raja of Hathras that he presented his own sword to James. During the same campaign, for Skinner's Horse service against Holkar, Lord Lake presented a fine horse with silver trappings and a pair of his own pistols to Capt. Skinner. Lord Lake inspected the regiment and appreciated them with the memorable words, "By your service, you have established a claim for life on the British Government, which shall never be forgotten and your bread is made permanent."

The regiment performed so well while guarding the construction of the Ganges canal that Irrigation Department of United Province adopted yellow as the colour of their uniform as a mark of respect.

During the second Afghan War of 1879-1880, a sowar from 1st Regiment, Mazhir Ali Khan, saved life of Lord Roberts in the battle of Kila Kazi. In 1900, the regiment went to China to suppress the Boxer rebellion and made a brilliant charge cutting up the tartar cavalry, captured three standards and some cannons during their march up to Beijing. It also made a joint attack with a cavalry unit of the United States, the first time when forces of India and the USA served together on a battlefield.

During WWI, the regiment was in the North West Frontier and remained there to take part in Third Afghan War in 1919. 1st and 3rd Regiments of Skinner Horse were amalgamated in 1921 to form 1st/3rd Cavalry.

**3rd Regiment:** 3rd Regiment was raised at Hansi on December 7th 1814 by Capt. James Skinner as the "Second Corps" and was commanded by his younger brother Robert Skinner until his death in 1821. Capt. William Clinton Baddeley, an officer of 24th Bengal Native Infantry, assumed command after Robert Skinner, and the unit got the title "Baddeley's Frontier Horse", which



*Lancer of Skinner's Horse.*

Skinner's Horse regiment took part in the advance from Khyber to Kabul as well as in the 1897-1898 Frontier campaign.

During WWI, the regiment went to France as a part of the Meerut Cavalry Brigade & took part in all the battles fought by the 2nd Indian Cavalry Division till 1916 when it came back to the North West Frontier where 80 men of the regiment fought so well in the defence of Gumbaz Post that the action merited inclusion in the official list of battles of WWI. 1st and 3rd regiments of Skinner Horse were amalgamated in 1921 to form 1st/3rd Cavalry.

**1st/3rd Cavalry:** In May 1921, during the reorganization of the Indian Army after WWI, 1st and 3rd regiments of Skinner's Horse were amalgamated to form 1st/3rd Cavalry. The regiment got its more appropriate title "Skinner's Horse (1st Duke of York's own Cavalry)" in 1927. The regiment bade farewell to its horses in 1939 to become a motorized unit and moved to Sudan as 5th Indian Division's

reconnaissance regiment. The regiment began operating with Gazelle Force and fought one of the last horse-mounted battles in history when, in early 1941, it was attacked by an Italian-led local cavalry unit. After beating back the Italian attack, sowars of the Skinner's Horse regiment rounded up the abandoned horses of the Italian unit and rode them triumphantly. The commander of the Italian unit, Captain Baron Amedeo Guiller, became a lifelong admirer of the Indian cavalry, and when he became Italian Ambassador to India some thirty years later, he was made an honorary member of the 5th Indian Division!

The regiment then served in Egypt, Cyprus and Italy before coming home to serve in the North West Frontier. After independence, the regiment took part in Hyderabad Police Action in September 1948 to clear Bidar axis. In 1960, Lt. Col. Michael Alexandria Robert Skinner, great-great-grandson of the founder James Skinner, assumed command of the regiment. After 120 years, a Skinner commanded Skinner's Horse once more!

In 1965, equipped with Sherman tanks, the unit's 'B' Squadron supported the 50th Para Brigade near Dograi and two troops helped 3 Jat in the epic battle of Dograi. 3 Jat got the well-deserved Battle Honour 'Dograi' but Skinner's Horse was not awarded with the same. The regiment fought the 1971 Indo-Pakistan war with T-55 tanks and helped 1 Dogra in capturing Harar Kalan and received a well deserved Battle and Theatre Honour.

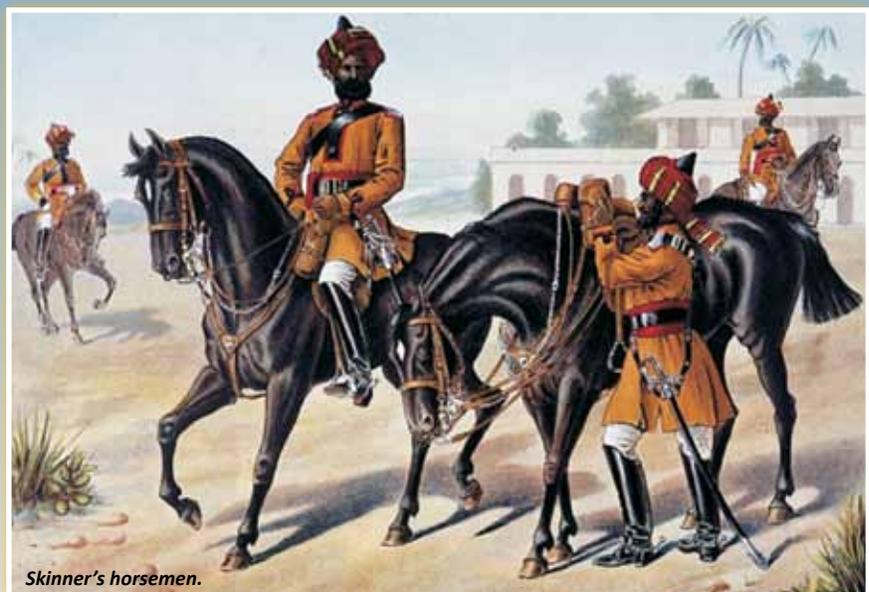
*Sumit Walia*



*Various uniforms worn by the Corps.*

changed to "4th (Baddeley's) Local Horse" two years later. The regiment took part in the capture of Khetal and Ghazni during 1st Afghan War, and the Gwalior Campaign, where they captured a standard of the Maratha Army during the Battle of Maharajpore. The regiment fought all the battles of First Sikh War.

During the 1857 mutiny, 1st Skinner's Horse was in Multan and remained loyal to British, partly because of the outstanding commanders and partly because it was away from the centre of the revolt. However, a portion of the 3rd Skinner's Horse stationed at Hansi mutinied, while the rest remained with the British and took part in mutiny suppression operations in Oudh and Bundelkhand. During the Second Afghan War of 1878-1880, 3rd



*Skinner's horsemen.*

## 1962 War : Supplying from the Air

Gp Capt Ashok K Chordia (Senior Fellow at CAPS) reviews this account of the IAF's role during the 1962 War

The 1962 frontier war necessitated the supply of critical stores troops along the borders. Time was at a premium and the forward locations rather difficult to reach by surface means. Airlift and airdrops turned out to be an obvious alternative, and those of the 1962 war are significant owing to a variety of reasons. They were carried out over the most treacherous terrain in the world when the resources, in terms of both aircraft and operating surfaces were very limited. The quantum of supplies to be delivered was well beyond the existing capacity of the Indian Air Force and the civil fleet combined but despite the constraints, supplies were delivered at a time when the ill-equipped ground forces needed them most.

Wing Commander M Sadatulla was part of the team which unflinchingly undertook these airlift missions. He flew a large number of sorties with senior IAF and Indian Army officers aboard his aircraft, top brass directing the operations and witnessed first-hand, many decision-making, planning and execution of operations. That experience compelled him to jot down notes. Sadatulla gives the credit for turning into a readable account to Air Commodore Jasjit Singh, Director General CAPS who not only prodded him to bring out a most engrossing narration of his experiences but has also provided a thought-provoking introductory essay, highlighting the importance of that airlift. He reminds readers of how IAF airlift operations saved the Kashmir Valley for India in 1947-48.

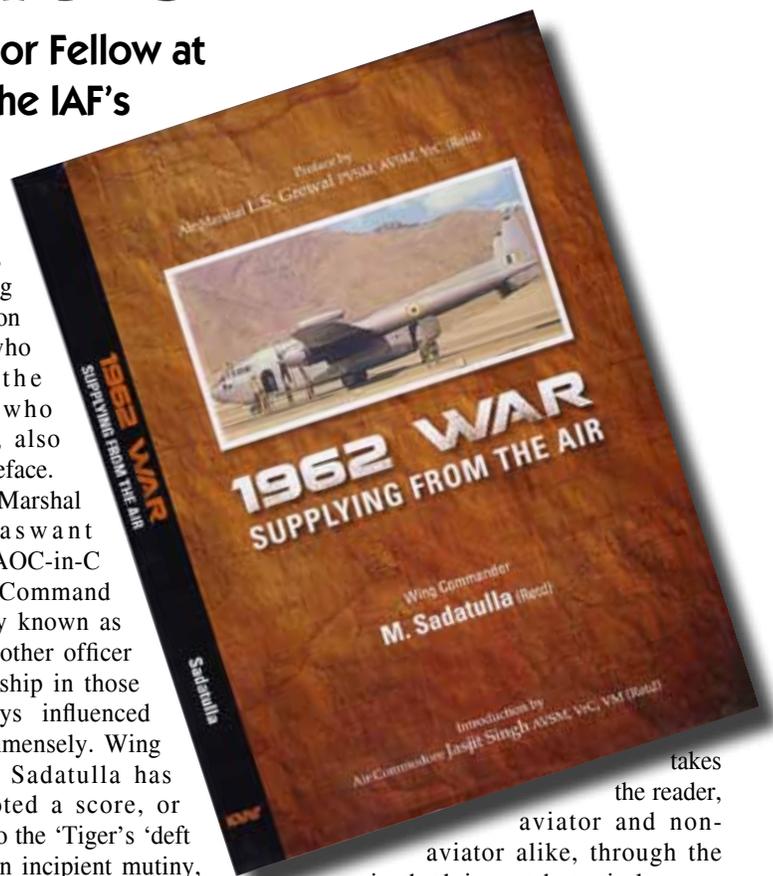
At a time when China is again the focus of attention and Indian institutions are sifting military history for 'still undiscovered' lessons, Sadatulla's 1962 War : *Supplying from the Air* reveals hitherto "less known but significant" role of the IAF. Sadatulla lauds the dedication and flying ability of the Air Marshal MS Grewal

(then Wing Commander, commanding No.12 Squadron Air Force) who led from the front, and who incidentally, also penned the preface.

Air Vice Marshal Kunwar Jaswant Singh, then AOC-in-C Eastern Air Command and popularly known as 'Tiger', is another officer whose leadership in those distressful days influenced the author immensely. Wing Commander Sadatulla has rightly devoted a score, or more, pages to the 'Tiger's' deft handling of an incipient mutiny, airlift of a fuel bowser in the C-in-C's own aircraft, concern for missing crew of a helicopter, fearless advice to superiors, as examples of unfading lessons in leadership.

The book is a major effort to record the saga of the IAF's airlift operations in the 1962 War. Wing Commander Sadatulla has written an account of the events as he saw them unfolding and it is devoid of too many dates and statistics, which make it more reader-friendly. While most of the earlier works on the 1962 War either point fingers or seeks absolution from the blame, Sadatulla's account is purely a narration of events giving the reader the freedom to draw conclusions. One such instance is the interaction between the 'Tiger' and Lt General BM Kaul followed by another between BM Kaul and Maj Gen AS Pathania, in 'Gloom over Tezpur'.

Simplicity is the hallmark of Sadatulla's work. He does not sermonise but gives down-to-earth descriptions of those momentous events, how the IAF met the daunting demands of airlift. The narrative



takes the reader, aviator and non-aviator alike, through the sorties that bring out the tactical success of the airlifting as well as the air-drops. On some drop zones, the quantum supplied by air exceeded the capacity of the troops on the ground to absorb.

These airlift operations were conducted away from public view and there was no media. Those who made the airlift possible did it with utter disregard to personal comfort and with single-minded devotion to their duty towards their comrades-in-arms. Sadatulla's effort is a tribute to those magnificent men. Everything about them will enthrall the civilian readers. The men in uniform will get a different perspective of the war and valuable insight into the role the IAF played in that war. The author's apparent regret is that all the flying done at considerable risk did not go far enough. Perhaps, with a much larger fleet of superior and larger aircraft, the IAF can today to meet airlift challenges in a much better way.

**1962 War: Supplying From the Air by Wing Commander M. Sadatulla (Retd)**  
**Publisher : Knowledge World, pages 128pp**

# 25 Years Back

## From Vayu Aerospace Review Issue VI/1987

### MiG-29 formal induction

The MiG-29 was formerly inducted into the Indian Air Force by Defence Minister, KC Pant, during a ceremony at the Poona Air Force Base on 6 December 1987. The MiG-29, christened as 'Baz' or Falcon, has reequipped the IAF's Nos.28 'First Supersonics' and 47 'Archers' Squadrons, both these units formerly flying the MiG-21FL.

Following inspection of squadron personnel and MiG-29s lined up on the tarmac, special invitees witnessed an air display which was initiated by a MiG-mix formation, led by a MiG-21bis and followed respectively by a MiG-23BN, MiG-25R, MiG-29M and 5 examples of the MiG-29, this most unusual flypast being, perhaps, the first such in aviation history, certainly outside the Soviet Union. A formation of 11 MiG-29s flying in a 'Baz formation' came next and the flying display was culminated by a ten minute aerobatic display by the CO No.28 Squadron who displayed the MiG-29's performance characteristics to advantage: the extremely short take-off run (in dry power) was followed by a vertical climb out, tight manoeuvres and slow handling followed by a high speed run and zoom climb.

### ATP tailplanes by HAL

British Aerospace has concluded an agreement with Hindustan Aeronautics Ltd for the supply of up to 150 sets of tailplanes for the ATP Advanced Turboprop regional airliner. It is envisaged that HAL will undertake more ATP work in the future as the project develops.

### LCA Programme Definition Phase

Avions Marcel Dassault-Breguet Aviation will provide consultancy for the programme definition phase (PDP) of the Light Combat Aircraft (LCA) project of the Aeronautical Development Agency (ADA). A contract to this effect, valued at around \$10 million, was signed in early October.

The French firm has been chosen, according to official sources because it has considerable experience in this field and is presently involved in the development of the Rafale. The contract provides for joint activities by both Indian and French designers, with work in India and France and access to French design data base and test facilities. The scope of consultancy contract is limited to project definition and there is no commitment on involvement of the French firm in the ultimate manufacture of the LCA.

### Vayudoot services in H.P

Extending airlinks to and within Himachal Pradesh, Vayudoot commenced services between Simla and Kulu in the mountainous state from 29 September operating Dornier 228 flights on every

Tuesday, Thursday and Saturday. The flights depart Simla at 0835 hours, reach Kulu at 0900, depart at 0920 and arrives back at Simla at 0945 hours. The one-way fare between Simla and Kulu is Rs 145.

### Air Force Day (1987)

Stressing the "pivotal importance" of winning the air war, Air Chief Marshal Denis La Fontaine said that in the event of an armed conflict the land forces would be otherwise placed in "an extremely difficult position". Speaking on occasion of the 55th anniversary of the Indian Air Force at a ceremonial parade at Palam's technical area, CAS said that such a need was clearly established during the recent tri-service exercises. The IAF's fighter pilots must be "tigers in the air", aggressive and with the aim to win every time.

### Coast Guard Air Station commissioned at Daman

The Chief of Naval Staff, Admiral RH Tahiliani, commissioned the first Coast Guard Air Station, at Daman on 29 October 1987. The CNS carried out an inspection of the guard of honour, comprising a hundred and fifty officers and naviks of the Coast Guard lined up in front of the backdrop of Coast Guard Dornier 228s and Chetaks on parade.

### IAF establishes TETRA

The Indian Air Force's No.1 Technical Type Training (TETRA) School was inaugurated at High Grounds, Chandigarh, by Air Chief Marshal Denis La Fontaine on 28 September. The need for comprehensive technical training was underlined by the La Fontaine Committee in 1983 and the TETRA schools will create the desired facilities for training of IAF's technicians, with specialisation on specific aircraft type.

No.1 TETRA is imparting training on the *Rakshak* (MiG-23MF), *Vijay* (MiG-23 BN) and *Bahadur* (MiG-27M) types, and will be followed by others in the country, required to replenish the technical manpower of the IAF, year. "Skill is not the only element for a good technician, his attitude to work is more important" stated Air Marshal KS Bhatia, AOC-in-C Maintenance Command.

### NAA receives special-purpose Dornier

Stated by experts as being perhaps the world's most advanced flight inspection system, the National Airports Authority (NAA) of India received their first Dornier 228 aircraft specially equipped for flight inspection of radio, navigation and communication systems on 10 November. The first NAA Dornier 228 (VT-ENK) was ferried to India by a HAL-NAA aircrew, to be based at Delhi, with a second Dornier Flight Inspection System aircraft being currently built by HAL at Kanpur. These will be employed for check-out of navigation aids throughout India as well as neighboring countries of Asia. The NAA's earlier fleet of two Avros and a Dakota are virtually grounded for lack of spare parts and the Dorniers will be employed to carry out the long overdue flight inspection of air-fields.

## UFOs on Indo-China Borders

It's for real ? ISRO scientists have confirmed sighting UFOs along the Indo-China borders in Ladakh, Jammu & Kashmir and Arunachal Pradesh ! Indian scientists opine that China sent these yellow orbs with high-intensity beams specifically for the purpose of siphoning off funds generated through various scams. Indian observers have condemned China over this and said the Indian media should be gagged and bound so that such amounts are not openly floated in the Indian airspace, fomenting easy piracy of the same.



Believe that or not, but meanwhile, the US Air Force which has forever been denying the existence of UFOs, was also secretly trying to build its own supersonic flying saucer. A recently declassified document

reveals that the USAF, in 1956, contracted a Canadian company to construct a circular craft that could take off and land vertically, as well as potentially reach a top speed of Mach 4 and fly as high as 100,000 feet over a range of 1,000 nautical miles.

You ain't seen nothing yet, baby !

## Supersonic Speeding Ticket!

Australian policemen conducting overspeeding enforcement near the RAAF airbase at Amberley were shocked when their radar guns began reading 500 kms per hour. The officer attempted to reset the radar guns, but they would not reset and then turned off. Just then a deafening roar



over the treetops revealed that the radar had in fact locked on to an RAAF F/A-18 Hornet which was engaged in a low flying exercise near the location.

The Patrol Sergeant fired off a complaint to the RAAF Base Commander and pat came the reply : "Thank you for your letter. We can now complete the file on this incident.

You may be interested to know that the tactical computer in the Hornet had detected

the presence of, and subsequently locked on to your hostile radar equipment and automatically sent a jamming signal back to it, which is why it shut down. Furthermore, an anti-radiation missile had also automatically locked on to your equipment location. Fortunately, the Senior Pilot flying the Hornet overrode the automated defence system before the missile was launched to destroy the hostile radar position.

Thank you for your concern !"

(Contributed by Lalit Mehra)

## Wear your baggage !

Want to avoid paying extra baggage charges on flights? Put on this 'wearable' suitcase! An Irishman has come up with a bizarre new 'wearable luggage' that can hold a total of 15kg of luggage and can help you beat the baggage charges levied by budget airlines.



Engineer John Power has invented a coat, priced at 56 pounds, which is made of light but strong polyester and has 14 variously sized pockets that can hold a total of 15kg of luggage. After boarding, the dress called 'Jaktogo' can be folded up and carried as a shoulder bag.

So there !

## Howler - 1

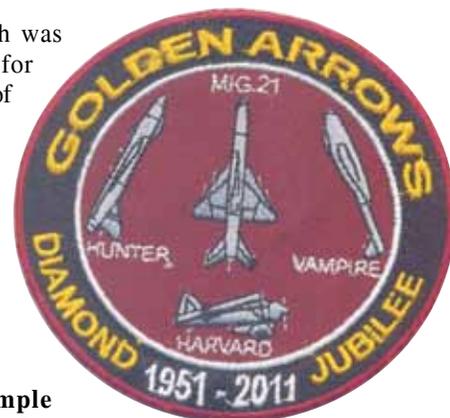
In a special feature timed with Indian Air Force Day 2012, a leading news journal wrote : 'Resurrection of 220 squadrons with Su-30 aircraft is on top of IAF's agenda to sustain credible combat force levels, despite the phasing out of certain legacy aircraft'.

Fantastic ! With some 20 aircraft per fighter squadron, this would give the IAF a mind-boggling number of 4,400 Su-30s, which would literally darken the skies over the sub-continent - nay the entire continent of Asia !

Perhaps the writer meant No. 220 Squadron?

## Howler - 2

This squadron patch was specially designed for the Diamond Jubilee of No. 17 Squadron ('Golden Arrows'). Smart readers should spot the odd plane out. Send the answer to 'Tale Spin' c/o Vayu Aerospace & Defence Review



Answer to the Simple Riddle in Vayu Issue V/2012:

NOTHING !

**Afterburner**

Bombardier

Shinmaywa