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NOTAM

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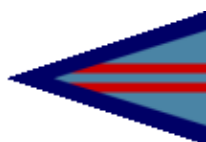
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Sukhoi PAK-FA - Russia's Strategic 'Game Changer'

Air Power Australia - Australia's Independent Defence Think Tank

Air Power Australia NOTAM

15th February, 2010



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The first high quality in flight image of a PAK-FA prototype to be released by Sukhoi/KnAAPO (Sukhoi).

When a nation accustomed to decades of projecting power loses control of large tracts of airspace, that is a strategic disaster. If that nation loses control of the airspace over its homeland, that is a strategic catastrophe.

America has enjoyed air superiority over airspace in locations of its choice for about 40 years. The F-22A 'Air Dominance' Raptor and the clear intent to establish the next level, air dominance, was an aircraft thirty years ahead of its time. Its concept design is now twenty years old, and the aircraft should be in full stride and in its prime. The Sukhoi PAK-FA is the new, younger, tougher kid on the block, and is likely to become the nemesis of the F-22A, but still prey to a more advanced F-22C.

Some will say, "if we are defeated in the air, the Navy will protect us". "With what?", is the response; "legacy aircraft like the F/A-18s, or the F-35B/C, with performance worse than the pre-legacy F-4E, so that its manifold deficiencies must be papered over by marketing spin like: 'manoeuvre is irrelevant – let the missiles do the turning?'". So when these aircraft are shot down by the PAK-FA escorting a swarm of [Su-35S Flankers](#) delivering carrier-killing supersonic missiles, the USN fleet is a sunk cause.

"Oh, well, the Army will protect us," is the next response. Pity the poor Army. No US ground forces in recent times have ever operated without overhead air superiority, and as professionals, they know the dire consequences if the enemy controls the air. As an example, an Su-30/35 can carry three KAB-1500 bombs with a thermobaric fill. Detonate these in airburst above a dug-in Battalion, and

nobody emerges alive or without serious, debilitating injury. One aircraft, three bombs, one Battalion.

"Well, we all know that Russian aircraft are rubbish, and won't work in a real war" is the next piece of hubris. America, you have been here before. Here is what Robert Coram wrote in his biography of [John Boyd](#), whose 'energy-manoeuve' analysis became the genesis of the hugely successful air combat aircraft of the latter part of the 20th century, the F-16 and the F-15 – which has over 100 kills and no losses in air combat ('Boyd', Page 211):

'If there was a turning point, a time when even the most jingoistic Air Force General at last understood that Communist forces could build fighter aircraft superior to anything that America put in the air, it was Vietnam in 1967, the worst year of the war for the Air Force. It finally sank in that, as Boyd had said for years, the air force had no true air-to-air fighter. It is said that combat is the ultimate and unkindest judge of fighter aircraft. That was certainly true in Vietnam. The long-boasted-about ten-to-one exchange ratio from Korea sank close to parity in North Vietnam; at one time it even favored the North Vietnamese. When the war finally ended, one Air Force pilot would be an ace. North Vietnam would have sixteen.'

And so it goes. Yet today, the Gates OSD has killed the only program that has a chance of developing a capability to engage and defeat the PAK-FA – the F-22 Raptor, designed from the outset as an 'air dominance fighter'. To make matters worse, the Gates OSD has delivered a 'double-dog-in-the-manger' to its allies by not producing enough F-22A aircraft to protect its own airspace of interest, let alone airspace of its threatened allies, AND by denying its allies access to the F-22A through a Foreign Military Sales export program.

Killing the Raptor program is transparently a marketing ploy designed to ensure that the F-35 JSF will be bought simply because it becomes a forced monopoly in the production and sale of US air combat aircraft.

The entry of the PAK-FA could see this backfire big-time on US industry. Nations like Japan and Israel could well take the attitude: "OK USA, we are under imminent threat, you cannot protect us with a meagre 187 F-22As, the F-35 is not up to the task, you won't sell us the F-22A, so we will see what Sukhoi has to offer. And we will save money as the way things are going with the JSF Program, the PAK-FA will likely cost less than half the price of an F-35 and be fully operational that much sooner."

Sukhoi has negotiated co-production of the PAK-FA with India, and further co-production deals could the centre of gravity of production of top-tier air combat aircraft to East Asia. Israel would no doubt be delighted to participate; its excellent avionics industry already provides equipment used in several types of Sukhoi combat aircraft. Operating the PAK-AF would give it access to Regional airspace where no F-35 would be able to enter and survive.

The US would be left with the scraps, producing ineffective combat aircraft that

could only be sold by forcing purchases onto the wary and resentful US Armed Services, who would know that they are now 'second tier' and likely to be slaughtered en-masse in a shooting war.

This outcome would overturn President Obama's 28 January 2010 statement that "I do not accept second-place for the United States of America" when it comes to any contest with Russia, India or China.

President Obama, ask your Intelligence Services for a 'warts and all' assessment of the air combat capabilities of the F-22A and the F-35 JSF, and those of the Su-35S and the PAK-FA, and be prepared to change the course of the Nation to ensure you are developing air dominating air power¹.

The new *Air Power Australia Analyses* technical analysis paper '[Assessing the Sukhoi PAK-FA](#)', produced by Carlo Kopp and Peter Goon, both of whom are experienced design engineers with complementary skills in other areas, while necessarily preliminary because of the recency of the maiden flight of the PAK-FA, clearly reveals this aircraft will become a giant, standing on the giant shoulders of the F-22A and the YF-23².

Sukhoi and the Russian MoD have maintained a clear understanding of the strategic value of control-of-the-air, and through a cost-effective and risk mitigating merge of evolutionary and revolutionary capability development, have drawn from their own knowledge, and knowledge borrowed from the USA, to produce what could, if left unchecked, become the world's deadliest air combat fighter. There should be no sentimentality about these aircraft, they are killing machines in a world where it is 'kill or be killed,' and technical systems superiority puts pilots and nations well along the path to victory.

For the F-22A to defeat the mature versions of the PAK-FA requires that the existing production line remain open to provide interim protection for the US, and export aircraft for its allies, and to provide the industrial base to develop the F-22C Raptor II, with advanced capabilities such as an expanded kinematic operating envelope, more range, improved sensors and missile countermeasures, and a range of new air-to-air weapons that will be effective in finding and killing the PAK-FA³.

These capabilities could be added to the F-22 design in minimal time and at modest cost. The Raptor needsIRST sensors, more advanced control surfaces and control authority to provide extreme agility, advanced countermeasures including apertures for electronic jamming and towed decoys, 3D thrust vectoring and a variable-cycle engine to improve thrust and fuel efficiency at all altitudes. Using the Russian 'evolutionary development' model rather than the now favoured US rent-seeking 'start from scratch development' model, these enhancements would be added to a proven and effective aircraft at a fraction of the cost of development of the failed F-35 JSF, or the development of an entirely new aircraft. The US has sufficient lead in this area to stay ahead of the PAK-FA for the foreseeable future if it acts decisively, and acts now.

And how to fund the F-22C? Well, the answer has been staring everybody in the face for ages: kill the deeply troubled F-35A program and transfer the funds and recoverable technology to future F-22A and F-22C production – the economies of scale will result in a lower unit cost, saving around US\$50 to US\$70 million per aircraft.

The USMC F-35B? Well maybe, but the Marines should be asked again whether they really want to be in an F-35B with Su-35S and PAK-FA's in the airspace. Perhaps they would feel safer and more effective in an F-22A or F-22C fleet, as proposed last year by APA⁴.

And the USN F-35C? No way – the PAK-FA (and, likely, the Su-35S) will be carrier based and to counter this, the USN needs a navalised F-22N developed in parallel with the F-22C to keep those supersonic anti-ship cruise missiles away from vulnerable surface fleet hulls⁵.

To conclude on a lighter note, NATO should assess the PAK-FA as a new type of air combat aircraft. We can speculate on what 'F' word they will choose, but 'Fighter' seems appropriate, for the time being.



Notes

1 [Obama's State of the Union Address](#); President outlines domestic, international priorities for 2010, THE WHITE HOUSE, Office of the Press Secretary, January 27, 2010.

2 Dr Carlo Kopp, SMAIAA, MIEEE, PEng, and Peter Goon, BE (Mech), FTE (USNTPS), [Assessing the Sukhoi T-50 PAK-FA](#); Sukhoi/KnAAPO T-50/I-21/Article 701 PAK-FA; Перспективный Авиационный Комплекс Фронтальной Авиации, *Air Power Australia Analysis 2010-01*, February 2010.

3 Refer Dr Carlo Kopp, MIEEE, SMAIAA, PEng, [When America's Stealth Monopoly Ends, What's Next?](#), APA NOTAM #37, 04/03/2009, and WGCDR Chris Mills, RAAF (Retd), [Air Combat: Russia's PAK-FA versus the F-22 and F-35](#), APA NOTAM #39, 30/03/2009.

4 WGCDR Chris Mills, RAAF (Retd), [F-22A Raptors for the Marine Corps](#), APA NOTAM #28, 09/02/2009.

5 WGCDR Chris Mills, RAAF (Retd), [Navalising the F-22 Raptor - Restoring America's Maritime Air Dominance](#), APA NOTAM #32 23/02/2009.

Air Power Australia Research and Analysis -<http://www.ausairpower.net/research.html>

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