RUSSIA'S AIR DEFENCE STRATEGY

ATUL KUMAR SINGH

The air defence organisation of the Soviet Union was heavily influenced by the events of World War II, where it was on the defensive against the German air offensive owing to a lack of credible air defence and quality fighter aircraft. Anti-aircraft artillery which was the core of Soviet air defence, was ineffective against high altitude Luftwaffe air attacks. Post-World War II, the Soviet Air Force and air defence forces evolved with the defensive mindset and the main task for the air force was to support ground forces; consequently, the aircraft produced were also of tactical nature, with limited radius of action. The increasing threat from US strategic offensive forces and the nuclear missile threat compelled the Soviet Union to develop a vast and very dense network of air defence radars, early warning systems, a variety of surface-to-air missiles (SAMs) produced at rapid pace and large numbers of fighter aircraft, starting with the MiG-15 in the early Fifties. Throughout the Fifties and Sixties, the Soviet Union continued to build on its air defence forces (PVO) and during the late Sixties and mid-Seventies, it was the second largest independent Service of the Soviet armed forces. The air defence-centric Soviet military doctrine and resultant density of deployment of air defence weapons is aptly explained by Air Commodore Jasjit when he argues that "....the Warsaw Pact air defence system for a 600-odd km frontage is believed to have cost in excess of $ 120 billion; and it incorporates (according to the US Secretary of Defence) 'over 4,600 tactical SAM (surface-to-air missile) launchers and 12,000 AAA (anti-

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aircraft artillery) pieces' besides the 25,000 shoulder fired launchers at tactical level alone and the 5,000 odd fighters to protect frontage equivalent roughly to the Kashmir-Punjab segment of the Indo-Pak border."[1]

At the time of Soviet disintegration in December 1991, the Soviet Union had a quantitatively formidable air defence network, though qualitatively it was inferior to Western systems. Russia inherited a crippled air defence organisation because 30-40 percent of the Soviet air defence infrastructure was buried under the debris of the collapsed Soviet Union, and there were many areas of defence industry where Russia had to start from scratch. In addition to the resource handicap, the Russian armed forces were also beset with many socio-economic problems that retarded the development of the air force and air defence forces until 1997-98 when the process of reforms started gaining some momentum.

In the first decade of the 21st century, the Russian Air Force is well on its way to modernisation. An improved economy, increasing defence budget and the geo-strategic environment played a vital role in shaping the new Russian military doctrine in the year 2000, which emphasis on modernisation and acquisition of strategic offensive and defensive capabilities. There is also a renewed emphasis on an assertive nuclear policy.

The Russian military leadership has deliberated over the strategic role of air power in the 1991 Gulf War, Kosovo Operations and Iraq War and there is an understanding of independent strategic functions of a conventional air force in future wars and conflicts. This understanding is determining the organisational restructuring of the Russian Air Force (VVS) and planning of the Strategic Air Defence Forces (PVO) for the Russian Federation. The air defence doctrine of Russia had transited from point defence to area defence and once again back to point defence (mainly because of constraints of resources). In spite of a very turbulent decade of disarray, post-Soviet disintegration, today the Russian Air Force has a formidable air defence infrastructure, in terms of aircraft, SAMs, AAA, communications, electronic warfare and restructured organisation. However, there are still many issues such as upgrade/modernisation of interceptor aircraft, antiquated radar and early warning systems, lack of flying and ground training,

1. Air Commodore Jasjit Singh, *AWACS the New Destabiliser* (New Delhi: Lancer International,1987) ,p.67.

technological lag, automated command and control systems and, ultimately, the ability to compete and meet the capabilities of its immediate Western adversaries.

In the light of the changing global perspectives on application of force through aerospace power and the consequent shift in military strategies of leading air forces to concentrate on offensive capabilities, the significance of air defence has enhanced, firstly, to increase the survivability of own offensive assets, and, secondly, the precision stand-off weapons and ballistic missile threat has added to the complexity of air defence of strategic assets. The objective of this paper is to study the evolution of Russia's air defence strategy in the context of its overall military doctrine, effects of the disintegration of the Soviet Union, impact of recent wars on the military doctrine and the emerging air defence strategy in the context of the overall Russian aerospace strategy for the 21st century.

RUSSIA'S MILITARY DOCTRINE

The Russian military doctrine of 1993 was amended and approved by President Vladimir Putin on April 21, 2000. The military doctrine, clearly spells out the Russian threat perception, externally from the North Atlantic Treaty Organisation (NATO) countries and the USA and internal threats from secessionist forces similar to Chechnya. The doctrine lists the types of military conflicts that Russian forces are likely to be involved in, and emphasises the use of military forces in quelling internal conflicts and for international commitments like peace-keeping operations. Emphasising the use of nuclear weapons, Russia's military doctrine states, "The Russian Federation reserves the right to use the nuclear weapons in response to the use of nuclear and other mass destruction weapons against Russia and its allies – as well as in response to a large scale conventional aggression in critical situations for Russia and its allies." Both Russian and Western strategic analysts believe that Russia's traditional conventional military superiority, vis-à-vis NATO, the USA and Japan has declined in terms of both qualitative and quantitative aspects relating to the military balance. Therefore, Russia is now aggressively posturing and adopting a strategic concept of nuclear first use in order to compensate for the weaknesses in conventional military forces. The main pillars of the new Russian military

doctrine are nuclear deterrence, nuclear first use, robust conventional defence, and military role in conventional conflicts.[2] Russia is deliberating on the draft of a new military doctrine prepared by the Defence Ministry expert group in 2006. It is reported that the new military doctrine would be the permanent military doctrine of a democratic state. The proposed doctrine visualises the threat for Russia emerging from the USA, NATO and international terrorism.[3]

POST-SOVIET RUSSIAN AIR DOCTRINE

In a traditional Soviet military doctrine, air power was subordinated in a secondary role as a supporting element in the combined arms approach. The complex problems following the break-up of the Soviet Union and the impact of the Gulf War and NATO operations in Kosovo almost overnight changed the thinking of Russian military experts and their stress shifted to regional power projection which was the greatest strength of the VVS. Alexei G. Arbatov, in an analysis of the VVS, articulates the VVS thinking, "The success of ground operations increasingly depends upon air force missions, from achieving air supremacy to until the moment the enemy surrenders."[4] Seconding the analysis of A.G. Arbatov, Gen. Deinekin, commander- in-chief of the Russian VVS in 1992, had said that "the main goal of VVS restructuring through the year 2000 will be to create from existing formations, a separate highly mobile branch of armed forces featuring an appropriate mix of personnel, platforms and weapons able to perform the full spectrum of combat missions either jointly or independently." Gen. Deinekin later elaborated that the VVS had a decisive role in:

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- Winning strategic air supremacy.
- Weakening the enemy's military-economic potential.
- Disorganising his state and military command and control.

2. Alexei G Arbatov, "The Transformation of Russian Military Doctrine: Lessons Learned from Kosovo & Chechnya's." (analysis of Russian military doctrine) Available on http://www.marshallcenter.org accessed on July 25, 2007.
3. "Russia's New Military Doctrine Declares USA & NATO as Key Potential Enemies," Pravda, available on http:// english.pravda.ru/print/russia/kremlin/84521-Russia_doctrine, accessed on July 25, 2007.
4. Benjamin S. Lambeth, *Russia's Air Power at the Crossroads* (Santa Monica: RAND Corporation 1996). p.67.

- Engaging strategic and operational reserves.
- Providing air support to large strategic formations of the ground troops and naval forces.

Notwithstanding the objectives of Gen. Deinekin and the dismal working conditions of the VVS throughout the Nineties, VVS Commander-in-Chief Gen. Kurnokov described in 2001, the tasks of the VVS in the 21st century as follows:[5]

- Repelling first surprise air attack preceding land and naval invasion...
- Inflicting a defeat on the main forces of the aerospace adversary by coordinated actions of defence forces engaging aerospace offensive weapons in flight...and attacking forces throughout their basing system.
- Providing air support and air cover for the armed forces land units and assisting them to seize the initiative.
- Providing air support and air cover for joint actions by the armed forces and other troops of the Russian Federation.
- Participating in peace-keeping operations outside the Russian Federation.

The main difference between the VVS tasks expressed by Deinkin and Kurnokov is that while Deinkin emphasised on achieving strategic air supremacy, Kunokov has been more cautious, considering the lack of strategic offensive capability, and emphasises upon defending the first wave of aerial and naval invasion of an "aerospace adversary," hinting at the importance of aerospace defence (ballistic missile defence – BMD).

HISTORICAL BACKGROUND

At the end of the World War II (1939-1945), the Soviet air defence system was based entirely on visual observation and, to some extent, on sound detectors. The lack of early warning radars and communication network was perhaps the most striking weakness of the Soviet Air Force. Absence of a reliable air defence organisation was apparent during Operation Barbarossa when the Luftwaffe

5. Stéphane Lefebvre, "The Reforms of the Russian Air Force" in Anne C. Addis and Roger N. Mcdermott, eds., *Russian Military Reforms* (London: Frank Cass, 2003) pp.144-145.

bombers made unhindered and devastating air attacks on Soviet airfields and other targets before Soviet fighters and anti-aircraft could be brought in. The strongest part of the Soviet air defence in World War II was its artillery arm but this was used primarily in tactical ground battles as anti-tank or mass artillery support for ground forces. Similarly, only one fighter air division with an estimated strength of 250-300 fighters was assigned to the continental air defence of the USSR. By the end of World War II, in the autumn of 1945, the Soviet military leadership realised that a radically new approach to air defence was required.[6]

The Russian Army's doctrinal belief of integral air defence through AAA was the result of the near loss of the air war against the smaller Finnish Air Force in 1939-40 and its recovery from the brink of defeat against Luftwaffe air attacks between 1941- 43. The Soviet fortunes were reversed because the Germans had to divert one-third of their air force on the western front and the number and quality of aircraft with Soviet forces increased with the help of the USA and indigenous production. Experiences such as these led to the formation of air defence forces as a separate Service. "The fundamental doctrinal differences between the USA and USSR strategy could be apportioned to such experiences of Soviet forces, whereas the USA Army, barring once at Kasserine Pass in 1943, was never subjected to hostile air attacks."[7]

Post-World War II

The lesson from World War II for the USSR was clearly to lay greater emphasis on strategic air defence and device a long-term plan to strengthen fighter and gun defences against atomic air attacks through long range strategic bombers. The first step was to establish an efficient early warning radar system, a prerequisite for coordinated air defence by fighters, guns and missiles. The post-War Soviet strategic air defence plans were

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6. Asher Lee, *Soviet Air Force* (London: Gerald Duckworth, 1961), pp.109-113.
7. Air Vice Marshal A. K. Tiwary, *Aerospace Defence: A Holistic Appraisal* (New Delhi: Manas Publications, 2006), pp. 33-34.

accelerated by the large numbers of captured electronic equipment and early warning radars like the Freya and Wurzburg, produced and operated in East Germany and Poland, which could not be destroyed or evacuated during the final retreat of the Germans. On similar lines, hundreds of Luftwaffe radar personnel who had manned the German early warning systems and were prisoners of war, were transferred to train Soviet Air Signals units in Leningrad, Kiev, Riga, Moscow and Tashkent. In addition, hundreds of German radar engineers with production and maintenance experience at the German electronic firms Siemens, Askania and Telefunken, helped the Soviets to set up skeleton early warning systems from East Baltic to Eastern and Central Europe as early as end 1946.[8]

The main thrust of the Soviet strategic air defence was marked by progress in the development of jet fighters. In 1944, the Soviet High Command created a special fighter command in the PVO organisation, which is referred to in Soviet air documents as IA-PVO [*Istrebitel Aviatsia*-(Fighter Aviation) *Protivo-Vozdushnaya Oborona* (Anti-Aircraft Defence)]. The first two Soviet post-War jet fighters the MiG-9 and the YAK-15 were test flown by April 1946. To catch up with the Western technologies of that time, the USSR bought 25 Rolls-Royce Nene and 30 Rolls-Royce Derwent turbo-jets from Great Britain. These engines advanced the development of aircraft like the MiG-15, MiG-17 and YAK-23. At the outbreak of the Korean War in June 1950, the Soviet air defence fighter arm of over 2,000 aircraft was equipped with MiG-15 aircraft. The Korean War provided the test bench for Soviet-made radar equipment manned by Soviet signals personnel. The MiG-15 jet fighters were controlled and guided by early warning radars supplied by the Soviets. The Korean War showed that the Soviets had adapted well to German early warning systems; however, there were delays in the development of airborne radars, air-to-air and surface-to-air missiles.[9]

By the end of 1950, the Soviet artillery arm of the PVO had been substantially strengthened by hundreds of radar controlled heavy anti-aircraft guns of up to 120 mm calibre. The early warning radar screens in Eastern and Central Europe, over the Baltic, the Arctic and the Far Eastern maritime provinces were being

8. Lee, n.6 p.115.
9. Lee, Ibid., pp. 116-118.

gradually extended and improved. The major deficiency of an airborne radar and radar gunsight in the MiG-15 aircraft was also remedied by the end of the Korean War, when the Soviets tested their first all weather jet fighter, the subsonic YAK-25. This aircraft was inducted into the day and night air defence regiments of the PVO Command in 1955. On the other hand, the MiG-17 started replacing the MiG-15 in 1953 and equipped both strategic and tactical Soviet air regiments and units of the Soviet Navy. The first supersonic MiG-19 began to equip PVO fighter regiments in 1955-56.[10]

Birth of PVO (Protivo-Vozdushnaya Oborona)

From those beginnings has followed the construction of the modern Soviet air defence systems. In 1948, command of the troops for National Air Defence was removed from the Soviet Army artillery.[11] The experiences between 1939 to 1941 against Finland and Germany led the Soviet military leadership to understand the requirement of national air defence, thus, separating the air defence elements from the army, and establishing a national air defence force (PVO) separate from the Soviet Air Force (VVS). The strategic air defence operations in order of priority, included:

- Protecting administrative-political, military-industrial and communication centres.
- Providing cover to air bases, missile troops and major headquarters.
- Defending concentrations and deployment of major ground forces groupings and second echelon of reserves.

The PVO was designed to intercept United States Strategic Command bombers as they penetrated the Soviet air space in the Cold War period. The three main branches of the PVO were fighter interceptor units, radio technical troops and surface-to-air missile formations. A network of early warning and ground control intercept (GCI) radars, anti-aircraft defences and interceptor bases with communication links were constructed.[12] From the mid-1960s however, anti-

10. Ibid., pp. 118-120.
11. Air Vice Marshal R. A. Mason, "The Contribution of Air Power to Soviet Strategic Objectives" in Col. Carl W. Reddel, ed., *Transformation in Russian and Soviet Military History (*Washington DC: USAF Department of History 1990), p.282.
12. Mason, Ibid., p.283.

rocket defence (PRO) and anti-space defence (PKO) started gaining strength, eventually leading to the Russian Space Forces. The era of the MiG-15 was followed by that of the MiG-21 and SAMs. The impact of the destruction of Gary Power's U-2 in 1960 exposed the vulnerability of high altitude manned aircraft to SAMs, which led to low level attack profiles. Further development of the Foxbat family, later versions of SAMs, improved radars and, ultimately, the entry of the Il-76 Mainstay airborne warning and control system (AWACS) have brought home the achievements of strategic air defence. The US upgrade programme of the B-52, the extensive resource investment in the B-1 and B-2 programme and the US allocation of high priority to stealth technology were the responses to the comprehensive air defence network of the Soviet Union.[13]

FROM SOVIET TO RUSSIAN AIR FORCE

Prior to the dissolution of the Soviet Union, the air defence force (PVO) was the second largest independent Service of the Soviet armed forces, and it consumed a major share of the military's annual resource allocation. Since the 1983 shooting of the civilian KAL-007 airliner and the 1987 landing of Mathias Rust in a Cessna at Red Square, the PVO was under constant scrutiny for the effectiveness of its roles and missions. By 1991, the PVO was in the process of redefining its missions. However, after the collapse of the Soviet Union, the senior leadership of the PVO was replaced and the robust air defence organisation of the Soviet Union was severely degraded.[14] The collapse of the Soviet Union posed an immediate challenge to the air defence of the former USSR's territorial space, owing to the loss of forward bases, early warning radars, large numbers of fighter aircraft, poor economic conditions and, most importantly, the loss of strategic depth provided by the East European countries and the seceding regimes of western/southern USSR.

The first major change was the rapid reduction in force levels: the air force potential dropped from 20,000 pilots and 13,000 aircraft to 13,000 pilots and 5,000 aircraft. Russia lost mainly to Ukraine and Belarus about 37 percent of the former

13. Ibid., p.283.
14. Linda Hor Vlahos, Micheal J. Deane, Marc J. Berkowitz, "Aerospace Defence Requirements in Post- Soviet Russia,"*Comparative Strategy*, vol 11, 1992, pp. 431-445.

Soviet Air Force MiG-29s, 23 percent of the Su-27 fighters and about half of its 40 IL-78 refuelling tankers, 43 percent of about 500 IL-76 transport, most of its Tu-95s and all but two operational Tu-160 strategic bombers. Russia also lost its forward air bases and air surveillance systems in East Europe and Baltic countries, and all of a sudden, it had several new neighbours right on its borders. Russia's air base network was reduced to 50 per cent as compared to that of the former Soviet Union. The contractual commitments of the Conventional Forces in Europe (CFE) Treaty signed in November 1990 and the Tashkent Treaty of May 1992 reduced the strength of aircraft with Russia to 3,450. (The CFE Treaty was suspended by Russia on July 17, 2007.) The air force units equipped with the best and modern aircraft fleets were transferred from East Germany and Poland to the areas of St. Petersburg, Moscow and Northern Caucasus.[15]

The Commander-in-Chief of the VPVO, Col. Gen. Victor Prudnikov favoured a common air defence for the Commonwealth of Independent States (CIS), because the disintegration would mean the loss of forward radar cover of 800 to 1,000 km and scattered disposition of VPVO interceptors and SAMs[16] would also require considerable expenditure towards developing a parallel command structures. Post-Soviet Union, only 70 percent of the VPVO's original assets remained on Russian soil and it became increasingly difficult to maintain the integrity of Russian air defence at an acceptable level. Despite lip-service from the other republics for an integrated surveillance and monitoring system, the same republics declined to recognise the operational control of Marshal Shapasnikov's CIS joint command. States like Ukraine that received a large portion of Soviet air defence assets, including some of the radar production centres, demanded that the VPVO assets on Ukrainian soil be handed over for their own sovereign air defence. On the break-up of the USSR, the result was an overnight disappearance of what Marshal Shapasnikov called a "single military strategic area" developed over a 70-year span of Soviet history.[17]

The air defence forces also found it difficult to maintain a high state of

15. Russian Air Force, "Period of Transition" available at www.sci.fi/~fta/russia2.htm accessed on February 25, 2007.
16. Lambeth, n.4 p.20.
17. Lambeth, Ibid., p.22.

readiness. In February 1996, the Commander-in-Chief, Gen. Viktor Prudnikov, admitted that inadequate funding and poor material and technical support had lowered the standard of combat readiness of his branch. Russia's missile forces receive no systematic daily training, and there is no firing-range practice. Air defence pilots get little flight time, and no funds are available for maintenance or aircraft parts. As of 1996, the air defence forces had not received funds for new orders for two years, and no improvement was expected in the near future.[18] Post-9/11 attacks on the USA, it was reported in the Russian media that what happened in New York could have easily happened in Moscow. In December 2001, the commander of the VVS radio technical troops, Lt. Gen. Aleksandr Shramchenko, admitted that since the reforms had started, 50 per cent of the troops' capabilities to monitor Russia's air space had been lost. "In fact, we do not control the air space from the Ural Mountains to Kurile Islands."[19]

IMPACT OF GULF WAR AND KOSOVO OPERATIONS

The disintegration of the Soviet Union came immediately after the Gulf War and Soviet leaders observed the dominating role of air power during the war. The Soviet, and later, Russian military leadership used the example of the Gulf War and the stunning ability of Coalition forces to seize, maintain and exploit control of the air to project the Western air threat for Russia's air defence. In February 1991, Minister of Defence Yazov said, "What happened in Kuwait and Iraq necessitates a review of the attitude towards the army air defence and the country's entire air defence system..... When we ask ourselves, did it work in Iraq, we have to answer, mostly it did not."[20] The success of Operation Desert Storm provided three sobering conclusions for the future of the Russian air defence: [21]

- The Soviet supplied air defence systems to Iraq were either easily suppressed or easily avoided by Coalition forces.
- The Coalition achievement of air superiority within hours of the conflict's onset virtually decided the outcome of the war.

18. "Russia: Troop Support Elements," available on www.russiansabroad.com accessed on Jun 13, 2006
19. Lefebvre, n.5, p.154.
20. Hor Vlahos *et al,* n. 14, p.436.
21. Hor Vlahos *et al,*Ibid.

- With the use of advanced conventional munitions, strategic objectives could be achieved by air power alone, either through massed strikes or highly selective "pinpoint" strikes against key targets.

In short, the Soviets found that their air defence systems proved to be woefully ineffective against technologically sophisticated weapon systems. The Soviet military leadership also visualised the changing nature of war where the foundation to achieve strategic objectives could be laid by the persistent use of air power and invasion by ground forces was no longer the main thrust of war. Gen. Maj. V. I. Slipchenko, chief of the scientific research section discussed the Soviet military views of the lessons of Desert Storm and concluded that the primary contingency for military planning would be the "aerospace war." The other implications drawn by the Soviet military leadership were:[22]

The primary contingency for military planning would be the "aerospace war."

- Need for adoption of the ''point defence'' system capable of defending specific targets but with sufficient mobility to build up air defence grouping in the regions with increased military tensions, without compromising the reliability of air defence over installations in other areas.
- The need to lay emphasis upon "aerospace defence" in particular.
- To maintain high combat readiness and institute such qualitative military reforms that would stimulate such air defence assets that could survive the most advanced air and space attack weapons.

While the Russian military doctrine of 1993 was heavily influenced by the conduct and end result of the Gulf War, the attack on Yugoslavia in March 1999 marked a watershed in Russia's assessment of its own military requirements and defence priorities. The military doctrine approved in April 2000 takes into account the evolving threat from the technologically superior NATO countries. The new versions of *the National Security Concept and Military Doctrine* largely reflect

22. Ibid., p.437.

Moscow's military reaction to the Balkan War.[23] "Today Yugoslavia-Tomorrow Russia" was the deeply felt public consensus which compelled the Russian military leadership to launch military reforms even though economic conditions were not favourable for development and deployment of sophisticated high technology weapons. To protect its industrial and economic assets, infrastructure and military targets from the kind of precision stand-off weapons used in Yugoslavia, there was a renewed determination on building up and modernising Russia's air force, air defence and naval assets. Development of the S-300 and S-400 series of missiles, a new air superiority multi-role fighter, development of the fifth generation fighter, the new Yakhont type cruise missile and new long range conventional anti-shipping missiles are some of the examples of Russia's modernisation efforts.[24]

REFORMS IN THE RUSSIAN AIR FORCE

The Russian Air Force (VVS) was established on May 7, 1992. The VVS was organised into major commands subordinated to the authority of the VVS commander-in-chief and large strategic formations subordinated to the long range, frontal and military transport aviation commanders. The reforms introduced by VVS Commander-in-Chief Gen. Deinekin in 1993 were to be implemented in three stages. The first stage from 1991-92, included the formation of the new VVS high command and revision of the VVS organisational development concept. The second stage from 1993 to 1995, included withdrawal of all VVS assets from former Warsaw Pact countries, development of new VVS formations in Russia, planned reduction in personnel, and reforms in the acquisition and cadre systems. The third stage, from 1995, was to include the complete overhaul of the airfield network and the implementation of new logistical and cadres training systems.

Russia's military aviation industry nearly collapsed in 1990s. For most of the decade, the Russian government avoided buying any significant numbers of aircraft (only 9.4per cent of VVS procurement programme were funded in 1996, 3.4 per cent in 1997 and 1.6 percent in 1998), forcing the industry to focus its activities on the export market.[25] The modernisation of the fighter fleet continues

23. Arbatov, n.2, pp. 7-11.
24. Arbatov, Ibid., p. 12.
25. Lefebvre, n.5, p.154.

to lag behind schedule. As of 2002, 50 percent of the aircraft were more than 15 years old and another 20 percent were at least 10-15 years old. The VVS' objective is to modernise 20-25 percent of the fleet to fourth generation-plus level until a fifth generation multi-role aircraft enters service around 2010 to replace the MiG-29 and Su-27 aircraft. The development cost of fifth generation aircraft, officially referred to as the frontal aviation advanced aviation system *(Perspektivnyy Aviatsionnyy Kompleks Frontovoy Aviatsii- PAK FA)* is expected to reach US $ 1.6 billion, of which Russia is expected to cover only 20 percent of the cost and the remaining is to be funded by export customers.[26]

The modernisation of air defence focusses on upgrading or replacing the older radars and weapon control systems in order to maximise the effectiveness of new precision guided missiles and avionics suites. The infrastructure projects include development of over the horizon (OTH) and bi-static radars. A new civilian-military surveillance system called the federal system for reconnaissance and control of the air space of the Russian Federation (FSR I KVP) is being developed, which will provide Russia with a unified air traffic control system.[27] There is considerable emphasis on building up a reliable air defence:

> The most important priority of our state's military reforms must be the reliable air defence of our economic potential and infrastructure, which must be transformed into an all state strategic aerospace (anti-missile, anti-space, and anti-cruise missile simultaneously) precision defence....It is necessary to destroy the aggressor's air and naval delivery systems before the point at which they launch their precision cruise missiles.... The country's air defence (PVO) must include simultaneously anti-aircraft, anti-cruise missile, anti-space and anti-missile defences.... The new military dangers of the future cause the need in the course of state military reform to create a space grouping composed of several hundred satellites for various purposes by no later than 2015; without this, Russia will be left in the past generations of wars with all the ensuing consequences.[28]

To support the military modernisation plan, Russia increased its military

26. Lefebvre, Ibid., p.156.
27. Ibid.
28. Vladimir Slipchenko, "The Strategic Content of the State's Military Reforms (A Prognostic View)," *Vooruzheniye Politika Konversiya,* July 7, 2003, as cited by Dr Andrei Shoumikhin in "Wars of the Future: Implications for the Reforms of the Russian Armed Forces" in National Institute for Public Policy, April 2004.

spending by 8.8 percent in real terms in 2005. At the presentation of the 2005 budget, Minister of Defence Sergei Ivanov said that for the first time after 1991, the Russian budget fully reflected the needs of the military.[29] Between the years 2000 to 2004, the average Russia military expenditure has been 4.06 percent of the gross domestic product (GDP). An analysis of Russia's military expenditure would indicate that between 2000 and 2005, the Russian military expenditure has grown from US $ 14,100 millen to $ 28, 814 million, a growth of more than 100 percent, at the 2005 value of the US$.[30]

However, all modernisation programmes are not achieving the desired results. As of 2007, the VVS is not in a position to project power far beyond the Russian landmass and air defence is incapable of aerospace defence in the true sense. In 2004, Anatoly Kornukov, the former commander of the Russian Air Force said, "Russian air defence is in deplorable condition, but it is not hopeless, the country's air defence weapons remain the same as several decades ago due to the lack of funds and the absence of modernization. Russia needs an inexpensive but reliable space defence system, capable of protecting it from air and space strikes." Space defence should become a vital part of a system to deter possible aggression against Russia.[31] Clearly, the Russian military leadership feels that it continues to lack the aerospace defence capability. Though it was predicted in 2002 that a modern air force with a professionally and technically proficient staff is not likely to emerge until 2010, five years down the line, it appears that even 2010 was perhaps an optimistic prediction.

Merger of VVS and PVO

As part of organisational reforms, a 1995 study on "The Russian Air Force" (conducted by the VVS high command and directed by Gen. Deinekin) laid out the motives of merging the VVS with the air defence forces (PVO), then one of the five branches of the armed forces.

The merger of the VVS and PVO was motivated by the necessity to have a centralised view of the air picture.

29."Military Expenditure," *SIPRI Year Book 2006*, (New York: Oxford University Press, 2006) p.321.
30. Ibid., p.330-348
31. "Russian Air Defence," available at www.gateway2russia.com, accessed on May 25, 2007.

The merger of the VVS and PVO was motivated by the following factors:[32]

- Historical experiences.
- The organising principles of foreign armed forces with the three branches of the Services.
- Necessity to have centralised view of the air picture.
- Optimised use of resources and cutting expenditure.
- Joint procurement, logistics and training practices.
- Reduction of personnel from 340,000 to 180,000.

The merger was decreed by President Boris Yeltsin on July 16, 1997, and it was to be completed by January 1, 1999. The PVO's missile and space defence troops *(Voyska Raketno-Komicheskoy Oborony-RKO)* were excluded from the merger and subordinated to the strategic missile forces. The merger of the VVS and PVO was followed by reduction of manpower where the air defence forces lost 30 percent of the units and 60 percent of the trained personnel. The merger proceeded in two stages; the first stage, completed on March 1, 1998, saw the integration of two high commands (VVS and PVO) into one. The second stage, completed in the end of 1998, saw the reorganisation of both branches' large strategic formations.

This included formation of:[33]

- Moscow Air Force.
- Air Defence District (renamed Special Purpose Command of the Central Air Defence Zone in 2002) in the western strategic sector.
- Air force and air defence armies under the operational control of military districts commanders.
- Independent Air Force and Air Defence Corps in Volga and Ural military districts.

At the time of the merger, the biggest problem was to devise a single command and control system for all air force assets. The aviation command and control systems were not protected sufficiently and had very little mobility. The

32. Lefebvre, n.5, pp.145-146.
33. Lefebvre, Ibid.

communications, radars and electronic support equipment that were working were mostly obsolete. Frontal aviation was divided into air force and air defence armies directly subordinated to the commander-in-chief, but under the operational control of military districts, each corresponding to an operational strategic command.

OPERATIONAL DEPLOYMENTS: THE CHECHEN CAMPAIGN

During the two operational deployments of the Russian Air Force in Chechnya (1994-96 and 1999-2002), the air defence forces were not tested at all. During the first campaign, the focus of the Russian Air Force was mainly on reconnaissance, air strikes on the Chechen Air Force, interdiction sorties, fire support to ground troops and air transport support operations. The VVS easily eliminated the Chechen Air Force and its 266 aircraft. A-50 (Mainstay) AWACS maintained round-the-clock surveillance to monitor all incoming or outgoing traffic on all sides of Chechnya. Surveillance and monitoring of air traffic had commenced in August 1993 to close the Chechen air space to prevent influx of military assets of any kind. The VPVO had employed two to six MiG-31 or Su-27s on constant combat air patrol to intercept any aircraft that may attempt to resupply the Chechens or interfere with Russian troops on the ground. Since there was no other air-to-air threat, these were the only fighters involved in the war. By the end of January 1995, VPVO interceptors had flown 1,500 hours on combat air patrol (CAP) to blockade Chechen borders from external resupply by air.

A-50 AWACS covered virtually the entire region and were supported by low-level gap filler radars provided by VPVO radar platoons and companies.[34] AWACS assisted in achieving the strategic politico-military objective by exploiting information warfare techniques and eventually allowed the Russian Air Force to eliminate President Dudayev. In April 1996, while talking on a cellular phone, he was reportedly targeted by the Russian A-50 (AWACS), which is capable of tracking radio frequencies. The A-50 relayed the target data to Su-25 ground attack aircraft armed with laser and TV guided bombs. A picture

34. Lambeth, n.4, pp.199-200.

taken by the warhead as it approached Dudayev was printed in *Argumenti I Fakti*, a publication thought to have close ties with Russian intelligence.[35]

In the second Chechen campaign, the VVS air support missions were better coordinated and fewer fratricide cases were reported as compared to the first campaign. Once again, Su-27s were used for CAP missions and A-50 AWACS were used for sanitising the air space. Since Chechen air defence forces were negligible, the Russian Air Force operated in conditions of complete air superiority.

AIR DEFENCE FORCES AND CURRENT CAPABILITIES

Fighter Aircraft

The Russian Air Force has a fleet of 660 aircraft (multi-role and interceptor aircraft) for the air defence role. The major portion comprises about 220 MiG-29 ''Fulcrum'', 240 MiG-31 ''Foxhound A'', 130 Su-27 "Flanker-B" and smaller quantities of Su-30SM "Flanker-B" and MiG-23 M "Flogger" Su-30, Su-35, etc.[36] The MiG-29, Su-27 and Su-30 are more than 20-year-old aircraft and their avionics, airborne radars, fire control systems need to be upgraded. Quantitatively it remains a formidable force, but qualitatively, these aircraft are much behind their Western counterparts. Therefore, development of fifth generation fighters and finding collaboration partners willing to invest in the Russian PAK-FA project become that much more crucial to the future of Russian air defence forces. The progress on the PAK-FA project is not known, and though India and Russia have agreed on joint development, the deal has not been finalised as yet. As of now, it appears it may not be feasible for Russia to achieve the deadline to meet the initial operational capability in 2010, as reported in the media, and 2015 would be a more realistic time-frame to see the PAK-FA in operation.

Surface-to-Air Missiles (SAMs)

Development of SAMs in the erstwhile Soviet Union and in Russia has kept pace with the evolving technology and changing nature of warfare. The

35. Timothy L.Thomas, "Air Operations in Low Intensity Conflict: A Case of Chechnya " *Airpower Journal,* Winter 1997, p.54.
36. *Jane's World Air Forces*, issue 24, August 2006, p. 402.

modern generation systems like the SA-13 "Igla", Tungushka, Tor-1M, BukM1-2, S-300 variants take care of all kind of aerial threats from aircraft, unmanned aerial vehicles (UAVs), and cruise missile systems. The existing air defence network of Russia extensively relies upon SAM systems which cater to the threat at varying altitudes and ranges, with overlapping and supporting coverage.[37] The Russian air defence forces currently deploy more than 30 regiments equipped with S-300 (NATO reporting name SA-10 Grumble) missile complexes. The multi-channel mobile S-300PMU serves for covering cities and industrial installations from enemy air raids, defending command and control posts located in strategic depth. The system has a short reaction time, high degree of automation, and high firing capabilities (3 seconds per launch). It can simultaneously track nine targets and independently fire at six targets. The S-300PMU can hit targets flying at speeds of up to 10,000 km/h at altitudes from 25 to 30,000 metres and has a guaranteed effective range of 90 km. The system consists of the 6AN6E "Big Bird" phased array surveillance radar, the 36N6E "Flap-Lid" phased array multi-function engagement radar capable of tracking stealth targets. The system employs the 48N6E SAM. It is a single-stage solid-propellant missile, effective against aircraft, helicopters, tactical and cruise missiles. The shipborne version, S-300F Rif (Reef) (USA/NATO designation Grumble), is intended for maritime air defence against enemy aircraft and cruise missiles. The S-300F is effective against manoeuvring and sea-skimming targets. The ammunition of the Rif may consist of 48 or 64 SAMs. This system is installed on the Slava class cruisers in eight cell rotary launchers.

Meanwhile, on August 6, 2007, Russia deployed the first air defence regiment equipped with state-of-the-art S-400 Triumf (NATO codename SA-21 Growler) missile system near the town of Elektrostal, about 50 km east of Moscow.[38] An S-400 battalion comprises at least eight launchers and 32 missiles and a mobile command post. The missile has been designed to intercept and destroy airborne targets at a range of 400 km (250 miles), that is twice the range

37. Tiwary, n.7, pp.35-36.
38. Dadan Upadhyay, "Russia Deploys Modern Air Defence Missiles Around Moscow," *The Indian Express,* August 7, 2007.

of the US MIM-104 Patriot. The system is reportedly highly capable of destroying stealth aircraft, cruise missiles, and ballistic missiles with a speed of up to 4.8 km per second (17,280 km/ph). Experts believe that the ability to intercept and destroy cruise missiles and ballistic missiles makes the S-400 a crucial part of theatre missile defence. Lt. Gen. Alexander Gorkov, the air force air defence chief, said that Russia plans to deploy new air defence systems primarily around all strategically important administrative and political centres in two stages by 2015.[39]

Ground-Based Radars and AWACS

In the erstwhile Soviet Union, a network of more than 10,000 radars provided virtually complete territorial coverage at low, medium and high altitude within and in some areas well beyond its borders. Post-Soviet Union, however, Russia lost large numbers of early warning radars deployed in the Soviet states. A majority of the ground-based radars of the Russian Air Force are of the old generation (P-18, P-19, P-35/37 P-14, etc) and very little upgradation or modernisation has taken place. An estimated 50 percent of Russia's border is unprotected by radar because the equipment of the radio-technical forces is inoperable. In December 2001, the commander of the VVS radio technical troops, Lt. Gen. Aleksandr Shramchenko, accepted that there is only a thin thread of radar coverage along the borders with Kazakhstan, Mongolia and China. The radars in service were of a very old generation and only about 10 percent of them could be modernised every year.[40] The Rosoboronexport State Corporation has upgraded older radars like the P-18-2 and the company is promoting newly developed radars like the 1L117, 64L6E Gamma-S1E, 67N6E Gamma-DE, Kasta-2E and Oborona-14 early warning and surveillance radars for induction in the Russian Air Force.[41]

Russia is also in the process of developing an integrated automated radar system and it is likely to be operational by 2010. The commander of the air force radiotechnical troops, Maj. Gen. Anatoly Boyarintsev has indicated that the

39. "Russia to Deploy S-400 Air Defence Systems Around Moscow in August," Moscow, July 27, 2007, available on www.domain-b.com accessed on August 01, 2007.
40. Lefebvre, n.5 pp.154-155.
41. "Land-Based Air Defence Radars" in Martin Streetly, ed., *Jane's Radars and Electronic Warfare System* (2006-2007), pp. 25-34.

programme was launched in 2006 and US$ 170 million (Roubles 4.5 million) has been earmarked for the development. It will integrate the technical and financial capacities of all Russian agencies that have radar facilities and enable the air defence tasks to be carried out more effectively. The Russian Air Force will also receive a new type of radar to be used in mountainous terrain in early 2008.[42]

The Russian Air Force operates the 12-15 Beriev A-50 AWACS. This system is at least 20 years old. There are unconfirmed reports that an upgraded version known as the A-50U is already in service with the Russian Air Force and a new variant, with a new radar, better tracking ability, faster data processor and new electronic warfare suite is likely to be inducted in 2008.

Air-to-Air Missiles

There are large numbers of-air-to air missiles in the Russian Air Force inventory and some of them have been developed during last the 20 years. The Vympel Corporation has designed a wide range of air-to-air missiles for new Russian fighters and it includes the short range R-73 (AA-11 Archer), medium range R-27 (AA-10 Alamo), active radar homing R-77 (A-12 Adder) and long range missile to counter bomber targets R-33 (AA-9 Amos). The different versions of the R-23, R-27, R-77 are widely used amongst many air forces in the world. Russia's primary medium range missile, the R-27R, entered service as a semi-active radar homing missile. The subsequent versions of these missiles are known as the R-27T (thermal IR) and R-27P (anti-radiation) and R-27 E (extended range). In 1992, Russia announced that it had two new versions, the R-27 EA with an active radar homing head, and the R-27 EM, which is a semi-active radar homing head specifically designed for Su-35 aircraft.[43]

The R-77 (RVV-AE) active radar homing head beyond visual range (BVR) missile, with significant amount of manoeuvring capability, is comparable to the USAF AMRAAM. This missile is in service with the Su-27M, MiG-29 M and MiG-31M aircraft. It is reported that at least two more versions of this missile are at the research and development (R&D) stage, one with improved infra-red (IR)

42. n.39.
43. Russian Air Force, "Weapon Systems: Aircraft Radars Systems and Homing Heads," available at www.sci.fi/~fta/ russia2.htm accessed February 25, 2007.

seeker and another one with more powerful propulsion. The latter is expected to attain ranges up to 160 km at higher altitudes.

The R-33 (AA-9 Amos) was developed specifically for the MiG-31 as a semi-active radar homing missile. The missile is designed for targets with less manoeuvrability like bombers, and maximum range is reported to be 120 km. In the advanced MiG-31M version, the plan is to replace the R-33 with the R-37 missile in which a semi-active homing head has been replaced with an active radar. However, progress on the development of the MiG-31M and the missile is not known.

The Russians also brought up the idea of a missile that could be fired backwards. The missile design is based on the R-73 (AA-11 Archer); it weighs 5 kg more and is about 30 cm longer. It is an IR seeking missile and operates on two wavelengths. The angle of view is 60 degrees and the range is from one km to 10-12 km. The missile range is affected by unfavourable launch velocity conditions. This is primarily a self-defence missile for bombers and intelligence aircraft.

The missile production in Russia is also facing similar financial problems as aircraft production and missile development programmes are considerably slow because of the dependence on export markets. Yet after the first few years of despair, the Russian aircraft and missile industry has continued to produce technologically advanced weapon systems comparable to Western systems. With an improving economy and resurgent armed forces, the prospects for the defence industry are looking better.

Capabilities

As of 2007, the Russian air defence is recovering from two decades of organisational restructuring, operational redundancy and financial crisis. With the existing resources and development plans, Russian air defence is capable of defending its strategic political, military and industrial assets from a smaller regional adversary's and as well as internal and external subversive forces. However, the existing air defence network may not stand up to a technologically superior coalition like the NATO countries or the might of the aerospace power of the USAF. Russia is still considered a militarily strong nation primarily because of the potential of its

defence industry and its strategic nuclear capability. Since the Russian focus is on the USA and NATO countries, it has virtually left unattended the air defence requirements east of the Urals against China and Japan. The radars and early warning resources are stretched and a large territory of Russia is bereft of radars cover, the airborne early warning systems are very old and need to be upgraded, and the state of fighters has already been covered earlier. Russia also lacks integrated command and control systems for air defence operations, and its space-based capabilities, as compared to its adversaries, are severely limited. Therefore, the Russian air defence remains handicapped to that extent and it is not in a position to take on a numerically at par but technologically superior adversary. Nonetheless, Russia aims to launch a technologically competitive and professional air force and air defence forces by 2015, and considering the rising economy and defence expenditure, it may be possible for it to catch up with its Western adversaries by 2020, if not by 2015.

CONCLUSION

Russia is cautious of aerospace threats from the USA and the NATO countries, including stealth technology, precision cruise and ballistic missiles, information warfare systems. The Russian military strategy has always laid greater emphasis on deterring and repelling aggression, hence, the role of air defence forces has always remained central to the country's overall military doctrine and is seen as a major deterrent in preventing a military conflict and protecting Russia's sovereignty, while supporting the ground and naval forces. This doctrine is now shifting towards an independent strategic role for the VVS, and air defence moving into the sphere of aerospace defence.

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The Russian politico-military leadership is deeply conscious of the sliding status of the Russian Federation from one of ''most powerful country'' in the world to one of

''bigger country'' which hurts the Russian self-respect and public sensibilities. Therefore, it is one of the objectives of the Russian leadership to restore the pride and status of Russia as one of the most powerful nations. This would require a powerful air force with an effective air defence capability. There are signs that the transition of the Russian Air Force through the period of despondency and economic crisis will end sooner rather than later. The process of reforms, higher oil prices, an improving economy and increasing defence budgets are showing the light at the end of the tunnel. There are signs of accelerated processes to modernise, upgrade and introduce new radars, fighters, SAMs, electronic warfare systems, etc.

The Ministry of Defence has issued a comprehensive document clearly articulating the development goals and perspectives for the Russian armed forces.[44] The impact of an improving economy and modernisation is already visible in the aggressive politico-military activities of the Russian leadership, especially since 2005; the decision of President Vladimir Putin to suspend the CFE Treaty on July 14, 2007,[45] is one example and the recent flights on two occasions of Russian strategic bombers, TU-95 (Tu-160), in the north Atlantic towards the British coast, which were intercepted by Norwegian F-16 and British Tornados[46] and the media reports of Russian bombers buzzing the US base in Guam and planting of the Russian flag under the North Pole are all indicative of a more assertive Russia determined to develop offensive and defensive capabilities to match its adversaries over a period of the next 10-15 years. The process of modernisation of the Russian air defence has started; however, there are many factors that would decide the pace of the modernisation, and it appears that "a modern air force with a professional and technologically proficient staff is not likely to emerge until 2020."[47]

44. "Russian Armed Forces: Development Goals and Perspectives," The Ministry of Defence of the Russian Federation, 2004.
45. "Russia Suspends CFE Treaty," *RIA Novosti*, (Moscow), July 14, 2007, downloaded from www.indiadefence.com on July 30, 2007.
46. Richard Beeston, diplomatic editor, "RAF Scrambles to Intercept Russian Bombers," available on http: // www.timesonline.co.uk accessed on 27 Jul 2007.
47. Lefebvre, n.5, p. 157.