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How Russia and China Could Strike the US Air Force's 'Achilles Heel'

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Russian and Chinese deployment of long-range air-to-air missiles—and the fifth-generation fighters to carry those weapons—could pose a significant problem for the Pentagon

A new generation of Russian and Chinese-built long-range air-to-air missiles could threaten the critical nodes that enable U.S. air operations. Those nodes include the AWACS, various intelligence, surveillance and reconnaissance (ISR) assets, aerial refueling tankers and electronic attack aircraft.

While often overlooked in favor of advanced anti-ship and surface-to-air missile systems when examining Russian and Chinese anti-access/area denial (A2/AD) capabilities, such long-range air intercept weapons—coupled with the right fighter—could cut the sinews that allow the United States to conduct sustained air operations in both the Asia-Pacific and the European theatres. Essentially, Russians and/or Chinese forces could pair long-range air-to-air missiles with aircraft like the Mikoyan MiG-31 Foxhound, Sukhoi T-50 PAK-FA and the Chengdu J-20 to attack American AWACS, JTARS and aerial refueling tankers like the Boeing KC-135 or forthcoming KC-46 Pegasus. Especially over the vast reaches of the Pacific where airfields are few and far between, lumbering aerial refueling tankers could be an Achilles' Heel that Beijing could chose to exploit. There are three long-range air-to-air missile programs that bear watching—the Russian Vympel R-37M RVV-BD, the Novator KS-172 (aka K-100) and the Chinese PL-15.

Russia's new R-37M RVV-BD long-range air-to-air missile is already at the initial operational capability (IOC) stage onboard the Mikoyan MiG-31BM Foxhound. It will also eventually be integrated onboard the Sukhoi Su-35S Flanker-E and the T-50 PAK-FA stealth fighter. The RVV-BD—also called the AA-13 Arrow by NATO—is claimed to have successfully intercepted targets at ranges greater than 160 nautical miles.

“The improved R-37M (RVV-BD, Izdelie 610M) missile is in serial production since 2014, and now, apparently, it is in an IOC stage in squadrons of MiG-31BM upgraded interceptors,” said researcher Mikhail Barabanov, editor-in-chief of the Moscow Defense Brief, which is published by the Centre for the Analysis of Strategies and Technologies (CAST) in Moscow. “The RVV-BD missile is also planned for use on the T-50 fighters.”

The original R-37 was originally developed by the Soviet Union to attack high-value NATO air assets such as the E-3 Sentry AWACS, E-8 JSTARS and RC-135V/W Rivet Joint. The idea was to use a high-speed fighter such as the MiG-31—which can sustain speeds of Mach 2.35 over a radius of 390 nautical miles [8] while carrying a significant air-to-air payload—with the new missile to eliminate those NATO air assets. An aircraft like the MiG-31—or a stealthy supersonically cruising airframe such as the PAK-FA—is ideal for such a mission because they are difficult to intercept due to their sheer speed and altitude.

“The R-37 was a dedicated missile for wiping out ISR assets that was developed and tested in the 1990s,” said Mike Kofman, a research scientist specializing in Russian military affairs at CNA Corporation [9]. “It was not meant for just the Mig-31. There is also a follow-on missile that's one of Novator's projects—the KS-172 or now often called K-100.”

After the 1991 collapse of the Soviet Union, the Russian defense industry continued work on the R-37 project but progress came slowly. The 1990s was an especially difficult time for the Russian defense industry as funding slowed to a trickle. Indeed, the original Soviet-era R-37 was

cancelled before being restarted as the current RVV-BD variant. “The pure R-37 (Izdelie 610) missile terminated development in 1997,” Barabanov said.

The R-37M is likely to utilize a combination of inertial guidance with course corrections from the launch aircraft and active radar guidance for the terminal phase. During combat operations, aircraft like the MiG-31 would make a high-speed dash towards its target and launch a salvo of R-37Ms. The Foxhound would likely track the target with its enormous Zaslon-M phased array radar and feed data to the missile until the weapons’ own radar went active. It might also have a home-on-jam feature similar to the one found onboard the U.S.-made AIM-120D AMRAAM to counter airborne electronic attack aircraft such as the Boeing EA-18G Growler.

The Soviet Union was well aware that one of NATO and the United States Air Force’s primary advantages was their ability to run a coordinated air campaign using assets such as the AWACS. The Soviet Union explored a variety of methods to counter aircraft such as the AWACS—including passive-homing long-range air-to-air weapons. “As I understand, the theme of air-to-air missiles with passive radar homing was popular in the Soviet Union in the 1980s (see also R-27P), but is now recognized as unpromising,” Barabanov said.

While the RVV-BD is a fearsome weapon, Moscow might be developing an even more capable missile called the Novator KS-172—which is sometimes also called the K-100. While the RVV-BD is thought to have a maximum range of less than 200 nautical miles, the Novator-designed weapon might be able to engage targets as far away as 250 nautical miles. “200 plus nautical miles is too steep for the R-37M,” Kofman said. “It is only Novator that makes something for targets at those ranges. That would be something like the KS-172 that was designed to try and hit beyond 200 miles.”

However, it is unclear when or even if the KS-172/K-100 missile will ever complete development and enter production. There are indications that the K-100 is likely a long-dormant project that might never see the light of day. “With the K-100 they were looking for Indian money to finish development,” Kofman said. “Nice missile from Novator, but I doubt it will see operational status—no need for that kind of a long poke to fit on any fifth-gen aircraft.”

Indeed, Moscow-based Barabanov said that the K-100 has likely been terminated. “As for the K-100 missile, I have my doubts that this an active program,” Barabanov said. “I think that the work on it stopped a long time ago.”

Meanwhile, on the other side of the world, China is developing the ramjet-powered PL-15 that could have a range as great as 120 miles. The PL-15 weapon has caused consternation within the top-ranks of the U.S. Air Force with Air Combat Command commander Gen. Herbert “Hawk” Carlisle citing the Chinese weapon as one of the pressing reasons for the United States to develop a next-generation replacement for the decades-old AIM-120 AMRAAM.

“How do we counter that and what are we going to do to continue to meet that threat?” Carlisle asked during a speech at the Center for Strategic and International Studies last year. Later, during an interview with *Flightglobal*, Carlisle said that countering the new Chinese missile was

an “exceedingly high priority” for the U.S. Air Force. “The PL-15 and the range of that missile, we’ve got to be able to out-stick that missile,” Carlisle said.

Indeed, the problem is not just that the PL-15 would out-range the AMRAAM, when coupled with the J-20, the Chinese could attack the tankers and ISR aircraft that would be the key enablers during any air campaign over the Pacific. A 2008 RAND briefing suggested that in order to sustain F-22 operations over Taiwan from Guam, the U.S. Air Force would need to launch three to four tanker sorties per hour to deliver 2.6 million gallons of fuel. That’s a fact that has not likely escaped Beijing’s notice.

While there is not much concrete data available about the J-20, the aircraft appears to have been optimized to high-speeds, long-range, stealth and a heavy internal payload. With a combination of reduced radar cross-section and high supersonic speed—armed with internally carried PL-15 missiles—it is possible that the J-20 could be used to threaten U.S. Air Force tankers and ISR assets in the Pacific theatre. As pointed out in the 2008 RAND study—Chinese derivatives of the Su-27 Flanker all but annihilated U.S. tanker, ISR, maritime patrol and command and control aircraft during a simulation using long-range air-to-air missiles.

The U.S. Air Force has looked at dispersed basing and developing robust logistical trains to supply those austere airstrips to counter China's A2/AD capabilities in the Pacific theatre. However, the Air Force does not appear to have fully developed a plan to protect its tanker, ISR and command and control assets from enemy air attacks. The only answer the service has to the problem is that those aircraft will have to be pulled back to safety outside the effective range of the Chinese threat. However, that would also shorten the effective range of the Pentagon’s short-range tactical fighters—reducing their ability to strike deep inside Chinese territory.

Thus, with the information available, it is likely that Russian and Chinese deployment of long-range air-to-air missiles—and the fifth-generation fighters to carry those weapons—could pose a significant problem for the Pentagon. It’s a problem that certainly bears watching in the coming years.