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Modernizing The Ukrainian Air Force

Reuben F. Johnson | 08/09/2022

Kyiv seeks better aircraft from West to defend its airspace



Source: Ukrainian Min. of Defense

Ukraine's aging MiG-29 fighter fleet has provided the core of its aerial Combat power in its fight against the Russian invaders. The jets have performed well but Kyiv has begun to seek more modern aircraft from its Western allies to bolster its capabilities against more advanced Russian jets. Above, a MiG-29UB combat trainer conducts a training flight from Lutsk Military Airfield in northwestern Ukraine in the summer of 2019.

After nearly six months of war in Ukraine, the West is beginning to grapple with the challenge of rebuilding the Ukrainian armed forces on the fly. Deliveries of portable anti-tank and surface-to-air missile systems and donations of Soviet-era armor dominated the early phases of the conflict. More recent deliveries have included advanced self-propelled howitzers and multiple rocket launchers, with new air defense systems also on the way. Meanwhile, the air force has been called to continue defending Ukrainian skies with the aging aircraft already in inventory in February.

As the war grinds on, however, attention is turning to what could be done to improve Ukrainian aerial capabilities. Over the last few weeks, the Ukrainian air force has been putting on a full-court press in Washington, D.C., with the goal of securing enough U.S.-made fourth-generation fighter aircraft to turn the tide in the war with Russia.

Zelenskyy Pushes For Weapons

The public face of the war against Russia has been the TV comedian-turned-president, Volodymyr Zelenskyy, who has been tirelessly pushing for the U.S. to continue providing the Ukrainian military with modern weapons, such as the portable FGM-148 Javelin (/weapons/missilesrocketsbombs/anti-tank/fgm-148-javelin-anti-tank-missile) anti-tank missile.

More recently, Washington has stepped up its aid with M142 High Mobility Artillery Rocket Systems (/weapons/missilesrocketsbombs/multiple-rocket-launchers/high-mobility-artillery-rocket-system-himars) (HIMARS), although only after heavy lobbying efforts. The multiple rocket launchers quickly made their presence known in strikes on Russian ammunition dumps and command facilities well behind the front lines. They have also become the tip of the spear in the Ukraine counteroffensive to retake the southern city of Kherson.

Four more HIMARS units arrived on Aug. 1, bringing the total delivered to 16. Ukrainian media reported that on the night of Aug. 2-3, several Russian military bases and arms warehouses in the Kherson oblast (region) were struck with HIMARS rockets and that Russian ammunition depots were hit in Berislav, another Russian-held zone along the Dnipro River east of Kherson.

Air Force Fights On With Aging Platforms

The story in the air has been different. The Ukrainian air force is using the same aging combat aircraft that were in inventory at the start of the war. No new hardware has arrived to enhance its combat power. In 2019, the service's fleet was rated as having not much more than five years of service life left.

The air force primarily consists of older Mikoyan MiG-29 (/weapons/aircraft/fighter/mig-29-fulcrum) fighters and Sukhoi Su-25 (/weapons/aircraft/attack/su-25-frogfoot-attack-aircraft) strike aircraft and a small force of Sukhoi Su-27 (/weapons/aircraft/fighter/su-27-flanker-b)s. The Ukrainian defense industrial base is largely autonomous in servicing and maintaining these aircraft, even though the original equipment manufacturers (OEMs) are in Russia. Much of the Western effort to support the air force has been in the provision of spare parts for Ukrainian jets.

So far, the combined Ukrainian ground, air and air defense forces have inflicted significant hardware losses on the Russian military. The Ukrainian Defense Ministry claims its forces have taken out 174 Russian cruise missiles since the conflict began. It has also verified the destruction of 1,768 tanks,

223 aircraft, 15 ships and nearly 3,000 other types of military vehicles.

The number of cruise missiles and ballistic missiles shot down by Ukrainian air defense forces represents a significant achievement given the age of its platforms, the newest of which are pre-modernization variants of the Russian S-300 (/weapons/ground-combat-vehicles/air-defense-anti-air/sa-10-grumble) system. Russia's use of advanced air-, sea- and ground-launched missiles highlights the need for more modern capabilities, such as the U.S. PAC-3 (/weapons/missilesrocketsbombs/anti-ballistic/patriot-advanced-capability-3-pac-3) system.

Old Weapons Still Take Toll

The air force's performance has been impressive. Not only have Ukrainian jets prevented the Russian aerospace forces from operating freely over their country, but they have shot down a significant number of Russian combat aircraft as well as some cruise missiles.

While the air force operates Russian-designed jets similar to those flown by Russia, the Ukrainian aircraft feature few, if any, of the improvements made by the Russian military over the past three decades. Most Ukrainian aircraft are at least a generation behind their Russian analogues.

For example, Ukrainian jets are equipped with mechanically steered array radars. These are based on the Cold War-era Phazotron N019 and NIIP N001 (<https://www.militaryperiscope.com/weapons/sensorelectronics/airborne-radars/n001-mech-fire-control-radar>) models. The chief medium-range air-to-air missile in Ukrainian service is the Russian-designed R-27 (NATO: AA-10 Alamo (/weapons/missilesrocketsbombs/anti-air/aa-10-alamo)) built by the Artem plant in Kyiv. Russian fighters are equipped with the more advanced, active-homing R-77/RVV-AE (AA-12 Adder (/weapons/missilesrocketsbombs/anti-air/aa-12-adder)) missile.

The R-27 missile is guided by the semi-active AGAT 9B-1101K seeker, making it roughly equivalent to the older U.S. AIM-7 Sparrow (/weapons/missilesrocketsbombs/anti-air/aim-7-sparrow-iii). These require Ukrainian aircraft to maintain a positive radar lock on the target until the missile is in the terminal phase. They are not "fire-and-forget" designs like those available to Russian fighters.

'Suicide Missions'

Due to the intensity of the fighting, the fact that their aircraft are wearing out and the increasing attacks on their military infrastructure, Ukrainian pilots increasingly describe their sorties as "suicide missions." Moreover, the attrition rate of Ukrainian fighters means that the Russian aerospace force could achieve air superiority if current trends continue.

One Ukrainian pilot told the *Air Force* magazine that "every one of us understands that we have lack of capability in old airplanes."

"The Russian airplanes have much more capabilities," he said. "They usually fly beyond visual range. They usually use missiles that have a range of more than 80 miles" (130 km).

He said that a colleague had flown over the Russian-occupied eastern Donbas region but without being able to use his radar. Instead, this pilot was forced to visually scan the night sky for Russian fighters and could only engage with R-73 (AA-11 Archer (/weapons/missilesrocketsbombs/anti-air/aa-11-archer)) short-range infrared homing missiles.

Ukrainian pilots who have gone up against the latest Russian fighters, such as the Su-30SM (/weapons/aircraft/fighter/su-30-flanker-multirole-fighter) and the Su-35 (/weapons/aircraft/fighter/su-35-flanker-multipurpose-fighter), find themselves at a significant disadvantage. These jets are equipped with the NIIP N011M and N035 electronically scanning

antenna arrays and the latest in active-homing air-to-air missiles. Consequently, by the time a Ukrainian pilot sees an Su-30 or Su-35 within visual range, "it has already fired," the pilot told *Air Force*.

Ukrainian pilots have described flying two to three sorties a day in fighter aircraft that are equipped with almost all 1980s technology. "My guys, they were struggling fighting against Russian pilots in advanced airplanes," another pilot said.

Western Jets Wanted

Despite numerous appeals for U.S.-made F-16

(<https://www.militaryperiscope.com/weapons/aircraft/fighter/f-16-fighting-falcon-multirole-fighter>) fighter aircraft, the U.S. government has been non-committal until recently. Col. Yuri Ignat, the chief spokesperson for the command staff of the Ukrainian air force, outlined his service's wish list. He called for two F-16 squadrons, each with 12 aircraft, plus some reserve jets and two-seat trainers, which he said would change the course of the war with Russia.

"We are defending our cities with fighter jets, those cities like Zaporizhzhia, Mikolaiv, the cities that are under Ukrainian control," said Ignat, referring to the cities threatened by Russia in southern and eastern Ukraine. "We also will need these fighter jets to use for the de-occupation of our territories," he said. "We are not speaking about attacking territories, but we are speaking about de-occupying those that are Ukrainian."

Air Force Chief of Staff Gen. Charles Brown appeared to open the door to support the Ukrainian air force during last month's Aspen Security Forum in Colorado, when he said that "there's a number of different platforms that could go to Ukraine," including jets made by the United States, Sweden, France or the multinational Eurofighter consortium. Brown also appeared to dispense with previous plans to provide Ukraine with used MiG-29 (</weapons/aircraft/fighter/mig-29-fulcrum>)s that could be acquired from other nations who operate the type.

He noted that any aircraft provided to Ukraine would need to be "something non-Russian," because acquiring spare parts for Russian-made aircraft is becoming progressively more difficult.

"You want to build a long-term plan on how do you build their air force and the air force that they're going to need for the future," said Brown. His comments came days after the U.S. Congress authorized US\$100 million to train Ukrainian pilots to operate American combat aircraft.

U.S., Swedish or Korean Jets Could Fill the Gap

There are several courses of action that could unfold:

- One of the more popular ideas has been to provide Ukraine with used F-16 jets. The U.S. Air Force plans to retire more than 40 Block 50 aircraft, which could fill the stated Ukrainian requirement.
- The Ukrainian air force has previously requested price and availability on the advanced F-15EX (<https://www.militaryperiscope.com/weapons/aircraft/fighter/f-15e-strike-eagle-multirole-fighter>) fighter, believing it to be the most effective response to the Russian Su-35. However, this aircraft is not available in the numbers that Ukraine requires, and its maintenance costs are much higher than the single-engine F-16. Used F-15C/D (<https://www.militaryperiscope.com/weapons/aircraft/fighter/f-15-eagle-air-superiority-fighter>)s could be provided, but again the ground support requirements are more complex.
- The most affordable option, and one with the ability to operate from highways and other unimproved surfaces that the Ukrainians have used during the war, is the Swedish JAS 39 Gripen (</weapons/aircraft/attack-fighter/jas-39-gripen-multirole-fighter>). It has the smallest maintenance footprint and can be fitted with an advanced active electronically scanned

antenna (AESA) radar array. It contains a high percentage of American content – including a General Electric (GE) jet engine – making it palatable if U.S. funding was used to acquire it.

- A wild card option for the future is the South Korean KF-21 Boromae (/weapons/aircraft/fighter/kf-21-boromae) fighter. The initial prototype recently made its first flight. The design is stealthy in the mode of the U.S. F-35 (<https://www.militaryperiscope.com/weapons/aircraft/attack/f-35-lightning-ii>), but it is powered by two GE F414 engines, potentially also an American radar set, and can carry ordnance externally. For a nation looking for a less-expensive, new-generation fighter that still employs a considerable degree of American technology, this may be a more affordable option once Ukrainian pilots have acclimated themselves to U.S. technology on an F-16 or other fourth-gen aircraft.

When asked at the Aspen forum how long it might take for a Ukrainian pilot to transition to an American fighter aircraft, Brown noted that U.S. pilots train to operate a new type of aircraft in two to four months.

The process of Ukrainian pilots making the move from a Soviet-era platform to an American jet would be "a little harder," but there are NATO nations with such experience who could support Ukraine in this transition, he said.

Having advanced American aircraft is not just "showing off" or a needed morale booster, said one U.S. government defense analyst with experience assessing former Soviet and Warsaw Pact nations modernizing their forces to NATO standards.

The advantage that the U.S. believed the Russian military would have in a conflict would be that "Putin could control the level of violence," he said. "That his military would have what we refer to as 'escalation dominance.' Clearly, the Russians lost that ability to control the initiative in the first phase of the war; they have tried to re-establish it [more recently] in the Donbas."

"But Ukrainian forces have been able to blunt that effort with the use of HIMARS and other advanced U.S. systems. The only way that Ukraine can rob the Russians of that initiative is for the escalation dominance to rest in their hands and not in Moscow's. That can only happen by the Ukrainians not only receiving more HIMARS that include the longer-range ATACMS rounds, but they will also need these tactical aircraft to press home any counteroffensive on the ground. It is the only way to undo the Russian military for good."

Nevertheless, in a press conference on Aug. 8, Undersecretary of Defense for Policy Colin Kahl emphasized that the U.S. was focused on getting Ukraine what it needed for the current fight, with the latest aid package covering HIMARS rockets and 155-mm artillery ammunition among other weapons. Work was underway in the Pentagon and Europe to help Kyiv identify its medium-to long-term requirements. Western jets could be part of that mix, but the final analysis had not been completed, he said.

The need has been apparent for some time. There are signs that Ukrainian public diplomacy may be shifting the conversation in its favor. Yet, it will likely be some time before the Ukrainian air force obtains new jets.

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