ECSS
EGYPTIAN CENTER
FOR STRATEGIC STUDIES
INTERNATIONAL

New Tactics and Multiple Challenges

Evaluating Combat Efficiency of Russian-Ukrainian Air Operations

Air Force Maj. Gen. **Imad Abdel Mohsen Mansi**
Former Director of the Air Force College
Advisor to the Nasser Military Academy for Postgraduate Studies

In modern wars, it is critical for the country launching the attack to achieve air supremacy or at least air control over the theater of war before launching a ground military campaign, just as the international coalition did during the war to liberate Kuwait (1990-1991) against Iraqi air defense.

In order to maintain air supremacy, an attacking air force must have an integrated air combat system that takes into account pilot skills, the variety of aircraft, and the availability of airborne radar stations to provide command and control, protect the airspace, and provide air refueling for aircraft. In addition, it needs to have electronic warfare aircraft to jam enemy air defense radars, reconnaissance aircraft to gather information and take pictures from the air, and a squadron of fighter-bombers to thwart reserve intervention. Obtaining this air supremacy creates favorable conditions for winning the ground battle.

The Egyptian Center for Strategic Thoughts and Studies seeks to present various visions and alternatives regarding strategic issues and transformations, at the local, regional and international levels alike. It pays special attention to issues and transformations of importance to national security and Egyptian interests.

Egyptian Center for Strategic Studies

en.ecss.com.eg
/ecss.en

Since the end of World War II Eastern and Western military doctrines have stipulated that any army launching an invasion should use the air force as a first line of defense by bombing command and control centers, early warning centers, air bases, airports, aircraft on the ground, transportation nodes, and other vital targets.

Due to the limited weight or impact of the bombs they can carry, air attacks typically take a long time to manifest their effects; therefore, they must continue for a long time to be effective. For instance, during the Second Gulf War's air campaign (the liberation of Kuwait), which lasted from 17 January to 23 February 1991, the coalition forces flew more than 100,000 sorties, dropped 88,500 tons of bombs, and utilized 4,933 different aircraft before making an impact. Similarly, Egypt launched the October War with an all-out air assault and intended to repeat it. However, the first attack was so successful, achieving an estimated 95 percent success rate with only 2.5 percent loss, that the second attack was canceled.

Why Did Russia Break the Established Rules of Engagement?

Although the Russian-Ukrainian war was categorized as a conventional war and the Russian Air Force possesses very large capabilities in terms of quantity and quality, Russia did not execute any type of comprehensive air attack (whether an air campaign, air operation, or comprehensive air strike), raising concerns about the factors

that may have prevented Russia from using its air forces more extensively.

These factors will be addressed by contrasting the air forces of the two sides prior to the start of the conflict, examining the hostilities and how they evolved over a year, talking about the Russian side's air force philosophy and the challenges and restrictions it faced, addressing the issue of providing the Ukrainian side with contemporary Western aircraft, and examining the way Russia uses its air forces through hypothetical scenarios.

Russian and Ukrainian Air Force Comparison

According to data from Global Fire Power, a website that focuses on military and logistical issues, the Russian army is ranked second in the world, while the Ukrainian army is ranked 22nd.

The following table compares the combat air forces of the Russian Federation and Ukraine (at the start of the conflict).

Table 1: Comparison between Russian and Ukrainian air force capabilities

	Fighters	Bomber Fighters	Utility Helicopters	Attack Helicopters	Total
Russian Air Force	722	739	990	544	2995
Ukrainian Air Force	69	29	78	34	210

*Other aircraft types, such as transport, airborne early warning and control, and reconnaissance aircraft, were not included.

The Russian Air Force employs numerous types of fourth-generation multirole fighter-bomber aircraft, including the MiG-29, MiG-31, MiG-35, Sukhoi Su-27, Sukhoi Su-35, Sukhoi Su-24, Sukhoi Su-25, Sukhoi Su-30, Sukhoi Su-34, and Sukhoi Su-57, and attack helicopters including the Kamov Ka-50, Kamov Ka-52, Mil Mi-24, and Mil Mi-28. The Ukrainian Air Force, on the other hand, operates a wide variety of aircraft, including fighters such as the MiG-29 and Sukhoi Su-27 and utility and attack helicopters such as the Mil Mi-8 and Mil Mi-26.

A New Russian Strategy: Missile Attacks to Begin Combat

The use of ballistic missiles to launch a missile strike to initiate the conflict, as opposed to conducting thorough airstrikes, was a novel strategy that Russia first used in this war. The application of this

concept was based on the fact that ballistic missiles are more cost-effective and more accurate at reaching their targets. However, as the battles progressed, it became clear that these attacks were insufficient, and the Ukrainian Air Defense Forces regained some of their efficiency despite having fewer capabilities.

The Ukrainians, on the other hand, relied on Western military assistance to develop a set of air and air defense capabilities to be able to thwart the Russian air force that is superior to them. Using affordable man-portable surface-to-air missiles, they were able to restrict Russian aircraft's flight in a number of eastern and southern regions, which significantly reduced Russia's ability to maneuver in the air.

Ukrainian experts claim that Buk M-1 and OSA-AK missile crews were ambushed and were given advance notice of the arrival of Russian aircraft by Georgian radars. To avoid being affected by Russian aircraft's electronic warfare techniques, the anti-missile batteries waited until the very last second to turn on their short-range radars.

Russia, for its part, resorted to using aircraft beyond the destruction range of air defense missiles, employing costly long-range smart air munitions that require specialized equipment and highly trained pilots. As a result, the Russians modified their strategy and launched long-range cruise missiles from launchers that were flying over Russian soil and out of the Ukrainian air defenses' range.

Russian military industries failed to recognize the importance of unmanned aerial vehicles (drones) and their significance in upcoming battles.

However, without access to sophisticated guided weapons, the Russian Air Force had to rely on more short-range, unguided ammunition; this meant more unguided bombs were needed to achieve the same level of destruction, and pilots had to fly at low altitudes near the target to drop this type of ammunition, thereby increasing the Russian Air Force's exposure to the risk of being shot down by Ukrainian air defenses.

The addition of a long-range missile system from Slovakia to Ukraine increased the vulnerability of Russian aircraft. Russian aircraft are compelled by the S-300 threat to fly at low altitudes in order to avoid the S-300 missiles, which increases their susceptibility to man-portable surface-to-air missiles.

Russian military industries failed to recognize the importance of unmanned aerial vehicles (drones) and their significance in upcoming battles. As a result, the Russian drones used in this conflict were not up to par and were not designed for modern warfare.

On 13 September 2022, Russia increased the use of the Iranian drone Shahid-136 when it successfully attacked military targets in the Kharkiv region despite attempts to shoot them down by the Ukrainian armed forces using small arms fire, heavy machine guns, transportable anti-aircraft missiles, and electronic jamming devices.

However, Russia recognized this and utilized Iranian drones extensively to alter the war's balance.

Drones are distinguished for their small radar cross-section, which makes it challenging for radars to detect them early at great distances. They are also only detected close to the target, which restricts the ability of air defense to deal with them aside from direct air defense weapons and anti-aircraft artillery above the target, an operation that typically yields only patchy success in eliminating the drones. It is noteworthy that the Battle of Beqaa Valley saw the first operational involvement in a true drone battle, and it demonstrated its efficacy and dependability.

Drones: The Surprising Element in War

On 13 September 2022, Russia increased the use of the Iranian drone Shahid-136 when it successfully attacked military targets in the Kharkiv region despite attempts to shoot them down by the Ukrainian armed forces using small arms fire, heavy machine guns, transportable anti-aircraft missiles, and electronic jamming devices.

Additionally, the Ukrainians have demonstrated a remarkable capacity for innovative resource use. This is demonstrated by the sinking of the Moskva, a flagship of the Russian Black Sea Fleet. The Moskva was sunk through a cunning double attack, according to Ukrainian officials, in which they fired Ukrainian-made Neptune anti-ship missiles before the crew of the Russian ship had a chance to retaliate after using several drones to overwhelm the Moskva's anti-aircraft defenses.

As both the Russians and the Ukrainians rely on unmanned aircraft to locate the enemy and guide strikes for their artillery, the widespread use of drones has thus far proven successful. In fact, drones have emerged as one of the biggest surprises of that significant war.

Evaluation of Air Battle Performance and Outcomes

While Russia may have been able to gain some degree of local air

It is now obvious that the Russian leadership is preparing for the worst in the event that the war's boundaries are extended, particularly to include a NATO member state.

control over some of Ukraine's airspace at the outset of the conflict, it was unable to establish full air sovereignty over the country. As the conflict continued, Russia suffered increasing losses of its aircraft due to Ukraine's remaining anti-aircraft weapons and the delivery of US and British short-range surface-to-air missiles to the country. Notably, Russia has never conducted a "strategic air campaign" in any of its wars.

The Russia-Ukraine war may have demonstrated the need for a reevaluation of the methods for using bomber fighters to provide air support to ground forces.

It was discovered that bomber fighters' effectiveness and advantages declined while the rate of injury rose. Close air support aircraft are an example of bomber fighters. These aircraft effectively support friendly forces in combat with hostile forces. Assuming that full or temporary air sovereignty or control over the battlefield is not achieved, and that the aircraft's self-protection electronic devices are inadequate, close air support aircraft, which include attack helicopters and airplanes, are deployed.

Given the scale of the Ukrainian Air Force's losses, the Russian army can be said to have largely neutralized the Ukrainian air capabilities and achieved the principle of shock, albeit without a preemptive strike that has continuity, particularly in regards to air defense elements.

Russia's Calculations for the Use of Air Force

Russia's air force can inflict devastating damage on Ukraine while suffering losses that are manageable or even acceptable. However, the Kremlin's reluctance to expand the scope of the Ukrainian crisis beyond the goals that the Russians set for this war (according to what Russia announced about the goal of the operation at the beginning of the war) may explain why full air force capabilities have not been used. Essentially, Russia sought to make it easier for it to annex portions of Ukraine in the future or to install a pro-Moscow government in Kiev after the current administration was overthrown.

It is now obvious that the Russian leadership is preparing for the worst in the event that the war's boundaries are extended, particularly to include a NATO member state. For this reason, Russia retains the majority of its forces in the event of a larger conflict in the region.

In addition, there are a number of significant practical and technical issues that prevented Russia from utilizing its air defense capabilities, including:

- The same identification systems (IFF: identify friend or foe), which Russian-made aircraft are equipped with, are used by both Russia and Ukraine, making it difficult to tell hostile from friendly aircraft during aerial combat, especially with the development of air-to-air missile ranges, so that firing occurs at extremely long distances (beyond visual range).

- The Ukrainian Air Defense can also use identification devices to track down Russian aircraft that use them. If these devices are not activated, aircraft will then be classified as hostile by the friendly air defense, which poses a problem. This issue was resolved for the ground forces by displaying the letter "Z" on Russian tanks and other military equipment, allowing the Russians to distinguish their troops from those of the Ukrainians.

- The NATO forces' monitoring of the electronic devices of Russian aircraft may be another factor. When Russian aircraft use their equipment during mission execution, electronic reconnaissance devices can track their movements, analyze their data, and determine their unique characteristics. For this reason, Russia refrained from using modern aircraft extensively out of concern that its information could be monitored or collected if it were dropped.

Overall, it is evident that Russian electronic warfare technology is lacking, particularly in terms of positive and negative electronic self-defense, i.e. the electronic warfare capabilities as well as chaff and flares do not keep up with the improvements made to Western shoulder-fired missiles in terms of utility and effectiveness.

The Challenge of Providing Ukraine with Modern Western Aircraft

Supporting Ukraine with modern aircraft is a highly substantive and technically complex issue, as Western aircraft are fundamentally different from the Russian aircraft that Ukraine employs, and the transition from using eastern weapons to western weapons takes at least three to five years, during which time pilots and technical crews must be trained, and warehouses must be stocked with spare parts (there are over 130,000 different spare parts for the F-16).

Additionally, in the next few years, all Ukrainian technical crews will need to be trained in all disciplines by large technical crews from the West that exported the aircraft. This is an extremely delicate and potentially hazardous situation.

The following are examples of notable Russian aircraft-carried missiles:

- **R-77:** An active radar-guided, inertial, medium- or long-range Russian air-to-air missile with a range of 80 km that can strike any aircraft flying at low altitudes or at altitudes up to 25,000 meters.
- **R-27:** An air-to-air missile with a medium- to long-range capability that typically has a greater range than the US AIM-7 Sparrow. It is commonly employed by Russian and Commonwealth of Independent States (CIS) armies.
- **KH-31:** A surface-to-air missile that can be launched from aircraft such as the MiG-29 and Sukhoi Su-27. It is distinguishable by its launch speed of up to Mach 3.5 and can be launched by combat aircraft. The Kh-31 is best known as an anti-radiation missile (ARM), but it is also available in anti-shipping and target drone configurations.

Scenarios for Using the Russian Air Force

The use of the Russian Air Force is related to potential war scenarios in the near future, which could be explained as follows:

- **Scenario One:** Russia ends the conflict by launching painful strikes that cripple Ukrainian infrastructure

To achieve this goal, the electronic obstruction work will be ramped up, and fighter-bombers will be used to launch concentrated air strikes against both the Ukrainian air defense and the most vital targets.

- **Scenario Two:** Protracted continuation of the war

Under this scenario, the Air Force's combat operations will continue at low rates, fighter close assistance sorties will be curtailed, and drone use will increase (likely scenario).

- **Scenario Three:** The conflict spreads to Europe

NATO's provocation of the Russian Bear could be one of the conditions that lead to Russia's direct confrontation with NATO. In the event of a direct clash, NATO forces might join the fight alongside Ukrainian forces, which would be disastrous and possibly spark a global conflict in which the Russian Air Force would engage with all of its might (improbable scenario).

NATO's provocation of the Russian Bear could be one of the conditions that lead to Russia's direct confrontation with NATO.