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Countering the Glide Bombs Threat in the Ukrainian Conflict

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Abstract

The integration of emerging technologies in the Ukrainian conflict plays an important role in the conduct of military actions and generally manages to capture the attention of military analysts in terms of characteristics, potential effects, or potential impact. Of similar importance in the conduct of the conflict is the revision or adaptation of old technologies to the current operational needs of force structures. The conflict in Ukraine provides the context for the revival and innovative use of classic weapon systems and munitions to meet the needs of combat forces. This paper deals with such an adapted use of classic aviation bombs in a gliding kit version, which has practically enabled the Russian Air Force to perform its basic missions in a new way. In the first phase, the focus of the paper is on describing the threat posed by glide bombs and their potential impact on the conduct of military actions, and in the second phase, I have presented possible ways of countering glide bombs, emphasizing the efforts of the Ukrainian forces and its allies to limit the number of glide bomb attacks. In carrying out the paper, I explored open sources of information through the method of documentary analysis in order to synthesize the most relevant aspects of the use and counteraction of glide bombs in the Ukrainian conflict. The results of the investigations emphasize the interest of the Ukrainian forces and their allies in identifying the most effective methods of adapting military actions to the new reality of the operational environment while also countering the threat posed by the mass use of glide bomb attacks.

Keywords:
glide bombs; aviation bombs; gliding kit; air defense; Ukrainian conflict.

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In 2023, the Russian Army was reported to be using the UPAB-1500 aviation bombs (weighing 1500 kg) in a variant equipped with a gliding kit and with the possibility of GPS target guidance. These bombs were presented by the Russian military for the first time in 2019 at the MAKS exhibition (Gheja 2023), and currently their technical characteristics open new possibilities for attacking ground reinforced targets in the Ukrainian conflict, in particular due to their 1,010 kg explosive charge and the ability to launch accurately from a distance of 40 km. Despite the advantages provided by these characteristics, the Russian military underestimated the need for such glide bombs and other types of precision-guided munitions before the invasion of Ukraine in February 2022, as it was admitted by the commander of the Russian Air Forces (Hardie 2024).

In order to write this article, I explored open sources of information, generally publications, various websites, and authored works, sources detailing relevant aspects regarding the use of glide bombs in the Ukrainian conflict, as well as ways to counter such attacks. Based on the method of documentary analysis (Okoko, Tunison and Walker 2023, 140), I aimed to systematically collect, analyze, and interpret the data obtained from the mentioned sources, with the purpose of understanding and synthesizing the main elements of interest for the present paper.

The concept of using glide bombs is not new, the first successful attacks with such munitions being attributed to the Nazi armed forces (Fritz-X) in World War II. The design of the bomb began in 1939 (Australian War Memorial 2025) under the direction of Dr. Max Kramer, and final acceptance tests were carried out near Foggia in Italy, in early 1942. Operational use began in mid-1943, and the most successful glide bomb attack was recorded in September 1943, when three Fritz-X bombs struck and sank the Italian battleship, Roma.

Currently, glide bombs are launched from fixed-wing aerial platforms, usually jets. It is the speed and altitude at which aircraft launch these bombs that provide the gliding kit mounted on them with the energy needed to engage targets at considerable distances. At the same time, the guidance systems built into the kit - inertial and GPS systems - allow the glide bombs' trajectories to be adjusted during flight, so that the targets can be engaged with the precision normally associated with other, more expensive precision munitions. Given the range of glide bombs and the accuracy with which they can engage ground targets, these munitions can be launched from areas that are safe for aerial platforms, out of the range of enemy air defense systems.

The threat posed by glide bombs

In the initial phases of the conflict in Ukraine, the Russian military failed to destroy the vast majority of Ukrainian medium- and long-range surface-to-air missile systems. This, coupled with Ukraine's constant resupply of man-portable air defense

systems, has posed a high risk to Russian air platforms designed to bomb targets close to the front line, as well as in more remote areas of Ukrainian territory. For this reason, by April 2022, the Russian military had limited aerial attempts to penetrate the enemy combat formation. In the Ukrainian conflict, the Russian Air Force is facing an enemy with a multitude of ground-based air defense systems that form a layered defense against aerial platforms. As I have mentioned, the Russian military has failed to destroy most of these air defense systems, in particular the Ukrainian S-300 and Buk-M1 medium- and long-range surface-to-air missile systems, respectively. As a consequence, Russian aircraft attempting to support by fire ground forces have to fly at low and very low altitudes when venturing close to the front line, but this makes them vulnerable to MANPAD-type systems and prevents them from effectively using unguided bombs.

The insufficiency of precision strikes has meant that the Russian Army's ground force support has been carried out with unguided projectiles, and therefore with very high risks for the aerial platforms engaged in launching them. This growing need for precision munitions prompted the development of the gliding kit - UMPK in January 2023. It is an inexpensive kit that can equip conventional aviation bombs with wings and guidance systems, allowing them to be deployed on fixed targets outside the range of Ukrainian air defense. The advent and use of glide bombs have practically brought the Russian Air Force "back to life", as it is now able to engage ground targets in the enemy's combat formation, without having to secure air superiority in advance or to venture by penetration inside the Ukrainian forces' combat system.

The UMPK gliding kit is the Russian version of the American-made JDAM (Joint Direct Attack Munition), more specifically the JDAM-ER (Extended Range) kit used by the Ukrainian army. It should be noted that, similar to the UMPK, the JDAM is a kit used to convert simple or standard unguided bombs into precision 'smart' munitions for use on ground targets, including in adverse weather conditions. With the addition of a new tail section containing an inertial navigation system and a GPS guidance unit, the JDAM kit improves the accuracy of general-purpose unguided bombs in all weather conditions. A version of the JDAM-ER kit used by the Ukrainian military is the one attached to the Mark 82 500-pound (230 kg) bombs

Figure 1 **JDAM-ER** (Newsweek 2023)

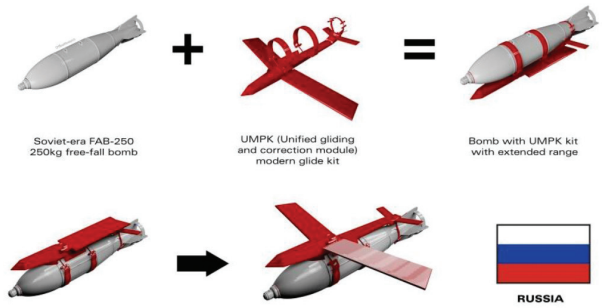

Figure 2 **UMPK** (Al-Rifai 2024)

dropped from Su-27 aircraft to hit targets at ranges of 72 km with a circular error of up to 11 m. (Kushnikov 2023)

According to Ukrainian Air Force spokesman Yuriy Ihnat (Hardie 2023), the UMPK gliding kit allows bombs to engage targets at ranges of 43 miles. He said that this provides Russian Su-35S or Su-34 aircraft with the ability to strike fixed targets at ranges of up to 12-18 miles inside the Ukrainian forces' combat formation while remaining out of range for Ukrainian air defense systems, which usually stay farther from the front line for safety reasons. One response to this type of action has been to bring air defense systems closer to the front line, thus increasing their vulnerability to artillery strikes and Lancet loitering type munitions.

Today, the use of the new munitions is described by the Ukrainian side as an extreme threat (Vesti din Rusia 2025), with the Ukrainian armed forces having difficulties in intercepting or jamming them. Glide bombs are conventional air-launched munitions that have been equipped with wings and satellite-assisted navigation to extend their range and accuracy in engaging targets. They represent a cheaper targeting alternative to the ballistic and cruise missiles that Russian forces regularly launch over Ukraine. Glide bombs, weighing between 500 kg and 3000 kg (Peleschuk 2024), are available in large numbers to the Russian military, including from the Soviet era, and can be carried by aerial platforms to be launched from outside the air defense ranges of the Ukrainian forces.

If a 152 mm artillery shell contains 6.5 kg of explosive material, a small-sized glide bomb contains over 200 kg (Inwood and Kharchenko 2024). Striking the defensive positions of Ukrainian forces with such munitions makes it almost impossible to withstand them, regardless of the degree of cover and reinforcement for defensive positions. The availability of sufficient quantities, coupled with the possibility of launching them from a distance, allows the Russian forces to practically pummel and annihilate any defensive position, regardless of their level of prior fortification. Moreover, these glide bomb attacks allow the annihilation of Ukrainian defensive positions without the use of Russian infantry, which in itself constitutes a considerable advantage for any adversary.

Glide bombs have been used successfully by Russian forces mainly in attacks on fixed targets such as command posts, fortifications, or ammunition depots, but these munitions have also been used against the civilian population, striking urban centers in places such as Sumy, Kharkov, and Zaporozhe (Hodunova 2025). The psychological effect thus achieved and the potential for influencing the morale of Ukrainian troops cannot be ignored. The very high destructive power of aviation bombs converted into glide bombs is a deterrent for Ukrainian servicemen, since the absence or impossible recovery of the bodies for those killed deprives their families or relatives of the due compensation (Watling and Reynolds 2025, 16).

Another noteworthy aspect of the use of glide bombs is, in my view, the exploitation of the characteristics of these munitions, particularly their accuracy and destructive power, to hit Ukrainian artillery firing positions, thus practically integrating glide bombs into the counter-battery fire of the Russian forces. The "artillery hunting" drones usually have small explosive charges and ensure the target neutralizing effect, but glide bombs contain significantly larger explosive charges, which ensure the destructive effect of artillery systems.

The threat from glide bombs is all the greater for the Ukrainian side if we consider the use of these munitions in combination with other "conventional" attacks, with standard missiles or cruise missiles, creating an overload effect on the possibilities of air defense systems. One factor that made it more difficult to counter glide bomb attacks was the delays in aid from European partners and delays in deliveries of arms and ammunition for Ukrainian air defense by the United States (Di Mizio and Barrie 2024).

The significant increase in the number of glide bombs from 40,000 units in 2024 to an estimated 70,000 units in 2025 (Watling and Reynolds 2025, 7) has a direct impact on the number of casualties among Ukrainian troops in defensive positions while defending important objectives. The highly destructive power, characteristic of glide bombs, has led to the need to adapt the arrangement of defensive positions of Ukrainian maneuver forces in the sense that platoon or company strongholds include larger underground communication networks to reduce the risk of burying servicemen in the event of hitting trench sections with such glide bombs. The effects of the increased threat of these glide bombs have also been felt by the Ukrainian armed forces and structures operating within their range, which have had to take additional protective measures either by dispersal or by camouflage and concealment in relation to the enemy's observation capabilities.

The technical characteristics and the availability of glide bombs in sufficient quantities made it possible to exploit their effects in the actions of maneuver structures, and they came to be used even for fire support of assaults using squads or platoons (Watling and Reynolds 2025, 8). The identification of the defensive positions of the Ukrainian forces by successive assaults is followed by artillery, drone, and glide bomb strikes of various sizes.

I have presented below in tabular form the destructive possibilities of glide bombs of various sizes that are available to the Russian forces.
The effective use of glide bombs by Russian forces in destroying fortified positions of Ukrainian defenders in towns such as Avdiivka, has prompted some media analysts to question whether glide bombs are Russia's ultimate weapon or a sign of Ukraine's poor equipment - *"Glide bombs: Russia's 'ultimate weapon' or a sign of Ukraine's under-equipment?"* (Lefief 2024).

TABLE NO. 1
Effects of aviation bombs used by the Russian Army

Bomb type	Lethal distance 100%	Probability of wounding 10%
FAB-100	7,75 m	31 m
FAB-250	10,12 m	40 m
FAB-500	12,75 m	51 m
FAB-1500	18,78 m	75 m
FAB-3000	24 m	167 m
FAB-9000	35 m	245 m

Source: (Miler 2024)

Ways to counter the glide bomb threat

The use of glide bombs in Ukraine has ensured that both sides in the conflict have been able to hit ground targets accurately, at long distances, while providing anti-aircraft safety for the aerial platforms destined to launch them. As for the Russian forces, the availability of generous stocks of aviation bombs has enabled the launch of increasing numbers of such glide bomb attacks, prompting the Ukrainian military and its allies to seek viable solutions to counter the threat.

This threat posed by glide bombs is recognized even at the alliance level (NATO 2025), as they are difficult to counter from an air defense point of view, due to the characteristics of the bomb (such as speed, thermal or acoustic signature) and the high volume of launches that can saturate air defense systems in the areas (or in the time frame) targeted by such attacks. Another aspect taken into account at the NATO level is the cost ratio in favor of glide bomb attacks, at the expense of the resources involved and consumed in air defense actions and in countering these munitions. As an additional element of the glide bombs' challenge, the aforementioned characteristics of glide bombs make some air defense assets ineffective in countering them. These include munitions using infra-red sensors such as the AIM-9 Sidewinder and FIM-92 Stinger missiles (Hodunova 2025).

The most practical methods to combat glide bomb attacks are, according to some experts (Hoehn and Courtney 2024) and Ukrainian officials, to combat aerial platforms intended to launch such attacks. Striking ground targets, represented by aircraft on the ground, by Ukrainian forces using both drones and Army Tactical Missile System (ATACMS) launched by High Mobility Artillery Rocket System (HIMARS), has proven to be the first such effective method of countering glide bomb attacks. Although it requires a longer period of time to produce effects, I may also mention here the reduction in the number of flights or sorties for carrier air platforms over time, by affecting any domain of the Russian aviation segment, as an effective method of reducing the number of glide bomb attacks.

Destroying aerial platforms, designed to drop glide bombs, in mid-flight would be a second effective method of countering glide bomb attacks. This effect can be achieved either by using air strike capabilities, such as the Advanced Medium-Range Air-to-Air Missiles (AMRAAM) carried by Ukrainian F-16s, or by having sufficient long-range air defense capabilities such as PATRIOT or SAMP/T (Peck 2024).

A third method of countering glide bomb attacks is through electronic warfare equipment. Jamming the GPS signal required by glide bomb guidance systems will cause ground target engagement to be based on secondary inertial systems, which will affect accuracy. The likely target hit errors increase in direct relation to the glide bomb flight distance without GPS assistance. An example of electronic warfare equipment, effective against glide bombs, seems to be the Lima system developed by the Night Watch team in Ukraine (Axe 2025). It works on several levels on navigation systems, using a combination of jamming, spoofing, and cyber-attacks on glide bomb GPS receivers, thus causing significant deviations from the intended targets, rendering glide bomb attacks ineffective.

Disrupting the supply chain of glide bombs by hitting production facilities, as well as their storage locations before they are loaded onto aerial platforms, is another effective method of countering glide bomb attacks. In 2024, several Ukrainian strikes, employing long-range drones, penetrated Russian air defenses and destroyed large munitions depots, including glide bomb depots located in the vicinity of airfields where carrier aircraft were stationed. One example is the attack and destruction of such a large munitions depot in Tikhoretsk (Al-Rifai 2024). To this end, the Ukrainian side also insisted on long-range munitions for HIMARS systems and the approval of the US administration to strike targets deep inside the Russian Federation.

Another method of countering glide bomb attacks is by destroying glide bombs in flight, using tactics proven effective against Russian Shahed 136 drones (Hambling 2025). These tactics are based on the placement of sensors and strike assets close to the front line in stand-off positions, aimed at detecting and intercepting glide bombs that are launched from enemy-occupied areas. The system integrates both artificial intelligence elements to increase the probability of success rate, and anti-aircraft guns or intercept drones to destroy glide bombs.

Regardless of which measures to counter glide bomb attacks are to prove their viability and effectiveness over time, the constant issue remains the need for combat forces to adapt to the new realities of the operational environment, a need that can reverberate in any domain. We are thus witnessing changes implemented by the armed forces of both warring parties, changes in the strategy applied in the conflict, changes in the doctrine for the use of land or air forces, changes in the way in which force structures are equipped and manned, changes in the way in which defensive positions are set up and occupied or assaulted, etc.

Conclusions

The use of glide bombs to attack various ground targets and support military action in general is not new today. These means have been exploited in many other conflicts in the past, their origins having been traced back to the world wars of the last century. The novel aspect of the recurrent use of glide bombs in operations is the exploitation of the large numbers of these means, mainly due to the cost-effectiveness involved, to overwhelm the air defense systems of any adversary. The development and refinement of gliding kits, in conjunction with effective target-guidance systems, gives today a substantial advantage to Russian forces in the Ukrainian conflict, ensuring the possibility of employing aerial platforms in a new way - different from the way they were used at the outset of the conflict, without having to secure air supremacy or air superiority.

The effects of the mass use of glide bombs are both physical, such as the destruction of any defensive positions in the advancing direction of Russian forces, and psychological, which has a significant impact on the morale of the Ukrainian defenders and the civilian population affected by these attacks. The need to eliminate or diminish the devastating potential of glide bombs has prompted the Ukrainian army and its allies to seek solutions so that glide bombs do not become a real game changer in the Ukrainian conflict.

In this paper, I have focused on the defining characteristics of glide bombs and the impact of glide bomb attacks in order to emphasize their potential threat to the military operation as a whole. At the same time, I have considered various viable solutions analyzed, both at the level of the Ukrainian military and its allies, to effectively counter the threat posed by glide bombs. One thing remains certain: the need to adapt the force structures, applicable to both warring parties, to the new reality of the operational environment in the Ukrainian conflict.

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