F/A-18F Super Hornet assigned to "Diamondbacks" of Strike Fighter Squadron, attached to Carrier Air Wing 5102, conducts flight operations, Atsugi, Japan, January 29, 2020 (U.S. Navy/Alex Grammar)

Airbase Defense Falls Between the Cracks

By Joseph T. Buontempo and Joseph E. Ringer

The fielding of fifth-generation aircraft like the F-22 and F-35 underscores the U.S. Air Force's ability to contribute to national-level objectives by refocusing on threats posed by surging strategic competitors such as Russia and China. These latest generation aircraft are primed to continue America's dominance in the air. But what happens when they are on the ground? On an airbase, the latest in stealth aircraft technology is not likely to cloak these aircraft from forces seeking an asymmetric advantage to counter Air Force superiority. The survivability of these assets is paramount to mission success. Furthermore, unlike the setbacks stemming from attacks on airbases in past wars, when aircraft replaceability played a muted role in basing considerations, today's jets, with unit costs of $100 million or more, considerably escalate the consequences of failing to secure the airbase from attacks. These economic considerations are now a factor for beddown of any fifth-generation aircraft during combat operations, with replaceability also assuming a prominent role in basing deliberations. For all their advanced technology, aeronautical superiority, and advanced situational awareness capabilities, fifth-generation aircraft share a feature with the Curtiss P-1 Hawk of the 1920s: they are vulnerable while on the ground.

Over the last few decades, locating U.S. overseas airbases far from the enemy has been sufficient to protect them during large-scale military operations. With the return of better organized, trained, and technologically equipped near-peers, however, distance is unlikely to provide refuge from the long reach of these more capable adversaries. This article considers two types of threats that could pose a serious challenge to airbases in the near future. The first is direct and indirect attacks to rear-area operations by adversary special operators, and the second is theater ballistic and cruise missile attacks. The Department of Defense (DOD) places responsibility for protecting airbases against such threats with the Air Force and Army (and host-nation forces as applicable). Unfortunately, airbase defense can fall between the cracks. The resulting

Dr. Joseph T. Buontempo is Assistant Director of the System Evaluation Division at the Institute for Defense Analyses. Lieutenant Colonel Joseph E. Ringer, USAF, is Senior Program Evaluator in Investigative Oversight and Special Investigations and Review at the Department of Defense Office of Inspector General.

deficit, which is likely to continue long into the future, can result in significant gaps in the defense of airbases.

Defense Against Special Operators

Highly trained and well-equipped special operators and extensive agent and sleeper cell networks, whose mission is to engage the fixed locations where airbase operations occur, present an acute threat to U.S. air operations. History provides many case studies on the devastating effect ground attacks can have on air operations. For insight on what this shift could mean to base defense, the Air Force needs to look no further than the Vietnam War, where roughly 1,600 aircraft were damaged or destroyed by Vietcong and North Vietnamese rocket and mortar attacks.[1] Likewise, the efficacy of British Special Air Services attacks on Axis airfields across North Africa during World War II, destroying 367 aircraft plus support facilities and equipment,[2] should remind airbase planners of the destructive precision of highly trained special operators and the ineffectiveness of distance as a means for security. Undoubtedly, today's advances in weapons, such as GPS-guided mortars, small unmanned aerial systems, and large-caliber sniper rifles, will serve to enhance the effectiveness and lethality of these elite forces. While true worldwide, it is particularly acute on the Korean Peninsula where it is estimated that North Korea employs nearly 200,000 special operations forces specifically trained to establish a second front, conduct sabotage operations, and attack high-value targets such as command and control nodes and airbases in South Korea.[3]

In many ways, the limited number of attacks on airbases experienced in recent wars and insurgencies has stunted U.S. development of airbase defense concepts and schemes to counter the capabilities of highly trained special operators. Moreover, the recently observed ineffectiveness of insurgents' use of standoff weapons, which should not be confused with the lethal precision with which advanced special operators employ the same weapon systems, may have served to further downplay the threat. But as the Air Force looks to grow its operational squadrons by 25 percent, base defense planners must reassess the impact this increase in beddown requirements will have on base defense forces and resources within a risk-based framework. The risk presented by threats such as special operations forces, irregular forces, and small tactical units, particularly from standoff weapons, is widely known yet insufficiently addressed. Given the history of conflict, particularly during the latter half of the 20th century, when standoff weapons attacks proved to be particularly effective in damaging and destroying aircraft,[4] effective controls and countermeasures to manage the risk posed by this threat are crucial for fielding fifth-generation aircraft. The emergence of small unmanned aerial systems as a threat to airbase operations adds even more incentives.

Within joint operating areas, airbases are intended to be protected in layers and in depth. Typically, base security forces defend from the base boundary inward, and U.S. Army Air Defense Artillery units, when available, provide cover from attacks from the air. Mobile security forces and, as required, Army tactical combat forces or host-nation security forces provide external defense from the base boundary outward. However, with base security forces as the lone exception, none of the entities responsible for security outside the base boundary are under the operational or tactical control of the airbase commander. This particularly consequential concern is made worse if the base boundary does not encompass the effective range of standoff weapons or if host-nation restrictions preclude U.S. forces from venturing "outside the wire." Thus, defense outside the base boundary is often subject to limited ground force availability and competing area commander or host-nation commander requirements. These demands, which can result in the absence of defending forces, may produce seams and gaps within the joint force's defense of airbases.

Events in recent conflicts have accentuated the potential for disastrous consequences due to insufficient planning and resourcing for base defense and force protection. In the 2012 ground attack on Camp Bastion in Afghanistan, a team of 15 heavily armed and well-trained—but not to the level of special forces—Taliban insurgents successfully infiltrated the base boundary and perimeter defenses to destroy six Marine Harrier aircraft with antipersonnel grenades. They also damaged ten other aircraft along with support facilities and assorted equipment.[5] Furthermore, 2 friendly forces were killed and 17 individuals wounded.[6] A subsequent U.S. Army investigation into the attack cited "failure to ensure that an integrated, layered, defense-in-depth was in place" as the causal factor for this base defense failure.[7] It also listed underestimation of the enemy, lack of unity of command for security, and failure to manage risk and vulnerabilities as contributing factors.[8] Airbase commanders faced a similar dilemma in Vietnam, where base defense was not viewed as a high priority for resources by higher echelons of command and, as a result, remained vulnerable to ground attack throughout the war.[9]

Joint doctrine recognizes the increased vulnerability of aircraft to attacks staged from areas contiguous to airbases during takeoff and landings, as well as when parked.[10] It even highlights the need to coordinate with area commanders to ensure base boundaries are adjusted to provide adequate protection from rocket, artillery, and mortar attacks. But joint doctrine stops short of prescribing inclusion of the effective ranges of these indirect fire weapons, also referred to as a "footprint," within the airbase boundary.[11] Yet, to be effective, the base defense plan must include key terrain outside the base boundary from which the enemy could affect air and space operations, in addition to the area inside the base boundary.

Guided by the principle that air and space assets are most vulnerable on the ground, Air Force Security Forces protect the base from the boundary inward by conducting operations to deter, delay, and defeat threats ranging from agents, partisans, and terrorists to small tactical

units and special operations forces.[12] Using an Integrated Defense concept to meld various Air Force capabilities into a comprehensive base defense strategy, base defense planners seek to leverage assigned resources against adaptive threats to protect U.S. and coalition missions and personnel. However, the Air Force's base defense inventory does not include organic counter-rocket, -artillery, and -mortar capabilities or the associated threat early warning alert systems. This capability must be coordinated with the Army or host-nation forces, if available.[13] While joint doctrine does not assign responsibility for counter–indirect fire to any Service component specifically, U.S. Army considers the ability to attack and defeat enemy rocket, artillery, and mortar attacks to be an air and missile defense competency that is executed by the Army within authorities granted by the joint force air component commander.[14] Undoubtedly the Army's capacity to support airbases with counter–indirect fire systems and associated threat early warning alert systems will be further stressed by the Air Force's force structure expansion plans and emerging concepts for distributed operations.

To account for the standoff range of indirect fire weapons, Air Force base defense planners developed the base security zone (BSZ) concept. The BSZ is an Air Force–unique construct that considers the area outside the base boundary—from which standoff and indirect fire weapons can engage the base and aircraft on approach and departure—in base defense planning.[15] After identifying the BSZ, the installation commander must then negotiate adjustment of this boundary to include those areas of concern that may extend far beyond the original base boundary.[16] Conceptually, establishing the BSZ is intended to expand the installation commander's authority and ability to directly address ground-based threats to airfield operations. However, in practice, it is not quite that simple, as the battlespace outside the base boundary is defined and controlled by the Army or host-nation forces, and approval from the area or host-nation commander is required before the base boundary can be adjusted to account for standoff threats.

Within the BSZ, efforts of security forces, or other base defense forces assigned area security duties, to suppress indirect fire threats consist of physical presence, aggressive patrolling, and limited active defensive measures designed to deny adversaries access to the standoff footprint.[17] Intriguingly, however, in what amounts to a significant omission for joint security operations planning, the BSZ is recognized as a planning construct that is used only by the air component.[18]

Defense Against Ballistic and Cruise Missiles

Russia and China continue to develop ballistic and cruise missiles with increasing accuracy, range, and complexity, and in increasing numbers, which could present a significant threat to U.S. forces in theater.[19] Currently, China has robust capabilities against bases and facilities extending to the First Island Chain in the Pacific Ocean, is acquiring an increasing number of medium-range ballistic missiles and cruise missiles that could hold at risk U.S. bases in Japan, and is looking to expand its capabilities to attack targets throughout the western Pacific Ocean, including U.S. bases and facilities on Guam.[20] Although its long-range strike capabilities currently have limitations, "China's commitment to continuing to modernize its strike capabilities indicates the risk will likely grow going forward."[21]

Russia has made a priority of developing cruise and ballistic missiles in the 21st century.[22] In particular, Russia has made "significant progress over the last decade operationalizing its long-range precision-strike capabilities, which could pose a significant threat to U.S. and NATO [North Atlantic Treaty Organization] bases, ships, and other military and civilian infrastructure targets in the European theater."[23] Notably, since 2014, the United States has found Russia to be in violation of the 1987 Intermediate-Range Nuclear Forces Treaty by developing and deploying a ground-launched cruise missile with a range of 500 kilometers (km) to 5,500 km, which would potentially enable it to reach targets in most of NATO's European countries.[24] Alarmingly, both Russia and China are also developing maneuverable hypersonic glide vehicles, which can glide at Mach 5 or greater at low altitudes.[25]

Russia or China could use ballistic and cruise missiles to target U.S. airbases to make the task of generating sorties difficult. RAND has examined the potential effects of Chinese ballistic and cruise missiles on U.S. airbases in the Pacific.[26] They found that approximately 30 to 50 ballistic missiles targeting an airbase could destroy air defenses and aircraft parked in all open parking areas and crater runways to prevent launching and recovering aircraft. In addition, if China simultaneously launched another 30 to 50 cruise missiles against the same airbase, they could also damage or destroy aircraft shelters, as well as fuel, maintenance, and other facilities. Based on its analysis in a combat scenario, RAND concluded that, by comparing the numbers of missiles needed "to close bases with the numbers that China is currently fielding, clearly the United States could face extended periods of time where few, if any, of our bases near China are operating."[27]

Countering air and missile threats to protect airbases and other critical assets is described in Joint Publication 3-01. At the theater level, the counterair mission "is the foundational framework"[28] for countering air and missile threats and "is inherently a joint and interdependent endeavor."[29] It consists of defensive counterair (DCA) operations supported by offensive counterair (OCA) attack operations. DCA operations consist of both active defenses, which engage and attempt to destroy attacking aircraft and missiles, and passive defenses, which include all the other measures used to reduce the effectiveness of the threats.[30] Some of the major active defense weapons systems include the Air Force surveillance and fighter aircraft, U.S. Army Patriot defense systems, U.S. Navy Aegis ships and Standard Missile interceptors, and Terminal High Altitude Area Defense (THAAD) systems. Passive defenses include detection and warning systems; camouflage, concealment, and

Senior Airman, response force leader with 791st Missile Security Forces Squadron, performs security sweep of landing zone near Minot Air Force Base, North Dakota, on January 25, 2017 (U.S. Air Force/Brandon Shapiro)

deception; dispersal of assets; and hardening of structures. If the United States is unable to conduct attack operations prior to threats being launched, "DCA, which is by nature reactive, must be flexible enough to prevent the enemy from gaining the initiative."[31]

Although a comprehensive doctrine exists for countering air and missile threats, in practice the Services can struggle to follow this doctrine. For instance, not only are a fixed number of U.S. Air Force fighter aircraft needed for both DCA and OCA attack operations, they are also needed for three other OCA operations—suppression of enemy air defenses, fighter escort, and fighter sweep—and also to support other missions, including strategic attack, air interdiction, and close air support.[32] Compounding this problem are the challenges the Air Force is facing in maintaining the readiness of its fleet of aircraft, due in part to the significant deployment rates experienced over the last couple of decades and to shortfalls in the numbers of pilots and aircraft maintainers.[33] For example, the 2017 mission-capable rates are approximately 49 percent for the F-22A, 55 percent for the F-35A, and 70 to 75 percent for the F-15 variants.[34]

The United States also does not have enough Army air and missile defense systems to protect every critical asset or enough interceptors to engage large threat salvos. Although DOD has invested in these capabilities, it "still lacks the ability to defeat large numbers of ballistic missiles, cruise missiles, unmanned aircraft, and other emerging guided weapons threats."[35] Patriot systems, for instance, "are expensive and their combined capacity would be insufficient to protect airbases and other military infrastructure that U.S. and allied forces would depend on during a major conflict with a great power."[36] Although the Army continues to invest in improving its capabilities to defeat ballistic and cruise missiles, this spending must also be used for programs, such as the Stryker-based Initial Maneuver Short-Range Air Defense system,[37] intended to protect maneuver forces. THAAD and some Navy Aegis ships can help provide protection against ballistic missiles if they are positioned to do so. However, as former Chief of Naval Operations Admiral Jonathan Greenert and former Army Chief of Staff General Raymond Odierno recently emphasized, there are "growing challenges associated with ballistic missile threats that are increasingly capable, continue to outpace our active defense systems, and exceed our Services' capacity to meet Combatant Commanders' demand."[38]

Even when they are available to defend airbases and other critical assets, active defense systems can have

performance limitations against advanced threats that reduce their effectiveness against these threats. To illustrate, a ballistic missile can challenge missile defense systems by following a depressed trajectory or releasing a maneuvering warhead or can carry penetration aids that attempt "to deceive, obscure, or jam sensors used to detect and track missiles and [reentry vehicles]."[39] Likewise, cruise missiles can attempt to hide from air defense radars by flying at low altitude or behind terrain features or by incorporating stealth design features.[40] In addition, salvos of ballistic and cruise missiles can be launched in a way to simultaneously strike an airbase in an attempt to overwhelm the raid handling capabilities of defensive systems. Finally, as stated above, Russia and China are developing hypersonic glide vehicles, and the "combination of high speed, maneuverability, and relatively low altitude makes them challenging targets for missile defense systems."[41]

The challenges associated with active defense make difficult the task of protecting airbases from air and missile threats. Moreover, because of the luxury of being able to use distance to help provide protection over the last few decades, passive defense measures have received short shrift for airbase defense. Although this situation could likely be improved, the seam between Air Force and Army responsibilities for providing air and missile protection allows each Service to implicitly assume that the other will fill any gaps, resulting in persistent limitations in protection.

The Way Forward

To better prepare for the reemergence of highly capable nation-state actors, joint effort is needed to reduce the number of seams in airbase defense and to close gaps where possible to help ensure the availability of airpower within a contested environment. One solution is to include the BSZ in joint doctrine as a construct for joint security operations planning as opposed to merely a tool used by air component planners. Currently, joint doctrine recognizes the threat posed by standoff weapons in areas contiguous to airbases and suggests the base boundary should be adjusted to account for these threats. It also recognizes the BSZ, but only as an air component planning construct. But these two points represent the issue; if it remains a suggestion, or something that should happen in air component planning, the default starting point for airbase defense planning remains status quo at best, and a point of contention at worst. Current joint guidance discusses what should be done, but the BSZ construct represents how it ought to be done to maximize effectiveness—succinctly and without ambiguity—from an air-minded perspective.

Codifying the BSZ as a joint security operations planning construct and battlespace, and identifying the installation commander as the battlespace owner, would eliminate the need to negotiate adjustments to the base boundary to account for the effective range of indirect fire threats. This would save time and potentially eliminate confusion related to boundary and area adjustments. Service components would need to assess the impact of such a decision, since one potential outcome is an increase in the demand for base security forces and resources. The BSZ concept also would facilitate deliberations about who defends what and to what extent, as seen through the eyes of the battlespace owner—an Airman. A battlespace that includes standoff threats, previously the responsibility of the commander of the joint security area, would now be under the authority of the airbase commander. This is not intended to imply the joint force commanders' authority to make force and resource allocation decisions, above the base and area security commanders' level, should be changed; rather, the joint force commanders' decisions regarding the shape of, and assets assigned to, the BSZ would influence which aircraft operated from a given location within a greater risk-management framework.

The complex nature of the environments where the Air Force may be tasked to operate, combined with the availability of joint and host-nation support, will undoubtedly necessitate some adjustments to the BSZ. But by establishing the BSZ as a battlespace within the joint operating area, a premise that considers threats to air operations across multiple domains will be formalized for use during campaign, deliberate, and crisis action planning for joint operations.

In addition, the Air Force should formally adopt a risk-based planning strategy for establishing airbases. This approach would explicitly account for defenses against the spectrum of likely threats as a critical planning factor. In doing so, the Air Force would address the multiple tradeoffs needed to effectively execute its mission while protecting its airbases. For example, an airbase could be located beyond the reach of relevant threats, but this might require strike aircraft to travel longer distances, resulting in less time spent on station, reduced sortie generation rates, and the procurement of additional tanker support. Risk-based airbase planning would also incentivize planners to adopt, wherever possible, methods to reduce the dangers posed by such threats. Passive defenses, in particular, are likely to play a significant role. Perhaps most important, airbase threat detection and warning systems could enable Airmen to adequately take cover when necessary. Other passive measures include camouflage, concealment, and deception; dispersal of on-base assets; and hardening of structures. Likewise, expeditionary basing and dispersed basing might help protect bases by making them more difficult for the enemy to monitor, target, and attack. However, this is not without its own set of base defense challenges. Multiple and likely smaller bases might not be capable of supporting the infrastructure available on permanent bases. Also, using many bases requires more forces and resources for protection and defense. In fact, given force structure limitations, it is doubtful that the Army or host-nation equivalent will be able to support simultaneous base defense tasks across a theater.

The planning process described above—not to be confused with the risk-based model the Air Force currently uses for Integrated Defense—would support deliberate and crisis action planning

Army test-fires Patriot missile, March 27, 2019 (U.S. Army/Jason Cutshaw)

in determining where assets should be based and what level of security will be assigned to each location. Under the most desirable conditions, sites capable of supporting the BSZ construct under the command of one commander, without constraints imposed by the host nation or geographical features, would be assigned organic base defense forces to defend and patrol the entirety of the BSZ. Air defense assets could also be assigned to provide cover from theater missile threats. In particular, these assets could be used to protect capabilities not protected by passive measures. The comprehensive defensive scheme of these locations would present a reduced risk from ground and missile threats, and consequently could serve as the beddown locations for high-demand, low-density assets such as fifth-generation aircraft. Conversely, locations that could not support these base defense considerations could be considered for basing aircraft that are easier to replace or have a smaller role in the overall campaign strategy. The result is a tiered and scalable assessment of potential airbases. This assessment, based on available and fixed vulnerability mitigating measures, would enable risk-based decisions regarding aircraft beddown in support of theater operations.

Conclusion

Joint, Air Force, and Army doctrine on airbase defense converge to form a complex system of systems. But the merge points of these concepts create seams and gaps that are ripe for exploitation by countries such as China, Russia, Iran, and North Korea. Considering America's technological advantage in the air, asymmetric attacks intended to disrupt and harass air operations on the ground remain a prudent and likely course of action for these nation-states.

One prominent seam occurs at the interface of the base boundary and the area immediately outside of the boundary, where area security operations occur. Two forces, Soldiers and Airmen, under two different commands in two separate areas of responsibility, conduct defensive operations near one another in order to deny access to the base and deter use of standoff weapons. Though battlefield coordination processes that are designed to protect critical resources and reduce the likelihood of fratricide appear throughout joint doctrine, the complexity and sheer number of these processes give rise to opportunities for miscommunication, misunderstandings, and divergent priorities. The latter case yields particularly dire consequences. Another prominent seam occurs in air and missile defense. Joint doctrine indicates that airbases will be protected by Air Force DCA operations and Army active defense systems. In practice, however, one Service implicitly assumes that the other will fill any gaps in defenses, resulting in limited protection.

The return of near-peer adversaries necessitates that the Air Force analyze all threats to airbases—the points of origin for all Air Force sorties flown. The formal adaptation of a risk-based airbase planning strategy will put the Air Force in a stronger position to decide the best courses of action for protecting airbases while executing its missions, and to decide how to judiciously employ the limited defense capabilities that the Army and host nations might bring. Central to this strategy is formalizing the BSZ as a planning construct for joint security operations. By examining all the relevant threats, tradeoffs, and mitigation measures pertaining to the BSZ, the Air Force would also be better postured to advocate for additional passive, active, and nonkinetic defenses, in terms of both procuring additional systems and developing new systems. The Air Force, then, must examine the tradeoffs between executing its missions and fully protecting its airbases in a manner similar to that used by the Navy when planning for the deployment of its aircraft carriers. For, in both cases, all the advanced fighter aircraft technologies designed to defeat a highly capable adversary will be for naught if the aircraft are destroyed before takeoff, or if the surface-based operations are forced to leave the theater. JFQ

Notes

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