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Since World War II, the United States has enjoyed a period of unprecedented command of the air domain, doctrinally termed air control. The degree of air control the United States Air Force gains and maintains in conflicts has been either air superiority or even air supremacy. These levels of air control will not continue in the future due to advanced threats from adversaries with parity, or even higher levels of capability than the United States military. In order to cope with the challenges from future adversaries, particularly in the air domain, the United States Air Force must develop a new doctrinal

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NAVAL WAR COLLEGE

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Asymmetric Applications of Airpower: Air Denial Operations

by

Shawn Finney

Major, USAF

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Joint Military Operations Department and the Maritime Advanced Warfighting School (MAWS).

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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27 April 2020

Contents Page

Abstract

Since World War II, the United States has enjoyed a period of unprecedented command of the air domain, doctrinally termed air control. The degree of air control the United States Air Force gains and maintains in conflicts has been either air superiority or even air supremacy. These levels of air control will not continue in the future due to advanced threats from adversaries with parity, or even higher levels of capability than the United States military. In order to cope with the challenges from future adversaries, particularly in the air domain, the United States Air Force must develop a new doctrinal framework that considers the achievement of limited aims against a more capable adversary. Air denial operations and the framework detailed in this paper give commanders and planners at the operational level an opportunity to develop an operational idea in which tactical effects achieved in the air domain amplify within a more extensive joint campaign or operational plan in order to achieve political or strategic ends.

Air denial operations are the capacity to deny an adversary use of the air domain for their purposes for some time through asymmetric employment of airpower. This paper will detail how the employment of asymmetric airpower, air denial operations, will enable the weaker force to return to symmetric employment of airpower. An operational framework for air denial operations must consist of three stages: a combat generation stage; an offensive stage that expends a pulse of power; and finally an exploitation stage that seizes the initiative. Embracing the principles of asymmetric airpower employment through the air denial operational framework is key to maintaining the U.S.'s competitive advantage, even as the potential weaker force.

Introduction and Background

Employing asymmetric military force as a means to the achievement of a political or strategic end is nothing new in the context of military actions. However, the United States (U.S.) has rarely found itself as the side employing asymmetric means, which is to say, the weaker military force, against a more potent adversary capable of matching the U.S. combat potential in any domain. The assumption that the U.S. is the more substantial offensive military power has held, particularly in the air domain, since the last U.S. service member died from enemy air attack in 1953.[1] However, this planning assumption may not remain valid against adversaries who have military capabilities that enable parity or even surpass the capabilities of the U.S. military.

Doctrinally, the United States Air Force (USAF) seeks to gain air, space, and cyber superiority as the essential first steps in any successful modern military operation.[2] USAF doctrine and airpower theorists since Giulio Douhet have championed control of the air as the first and foremost mission of any modern air force.[3] The first task of any air force is to gain and maintain a high degree of air control, an objective often taken for granted when facing an inferior adversary that offers no real threat, or an adversary that at best offers parity.[4] The extent to which the offensive force has undisputed command of the air, otherwise known as air control, is generally discussed in three doctrinal terms: air supremacy, air superiority, and air parity.[5] According to the USAF basic doctrine, offensive counterair (OCA), and the air control gained from OCA missions grant freedom from attack, enabling increased freedom of action, and

[1] Peter Grier, "April 15, 1953" *Air Force Magazine*, June 2011.
[2] U.S. Department of the Air Force, *USAF Doctrine Annex 3-01 Counterair Operations* (Washington DC: 6 September 2019), 4.
[3] Milan N. Vego, *Joint Operational Warfare: Theory and Practice* (Newport: U.S. Naval War College Press, 2009), II-63.
[4] U.S. Department of Defense, *Joint Publication 3-0: Joint Operations (Washington DC: 2011), I-2.*
[5] U.S. Department of the Air Force, *USAF Doctrine Annex 3-01 Counterair Operations*, 4.

apportioning assets for other operations against the enemy.[6] Each term is associated with the degree an adversary threatens the offensive force within a given geographical area of operations. For example, an air force which had gained air supremacy faces no air or surface-based threat from an adversary, while an air force that had gained air parity faces an adversary with equivalent air control.[7]

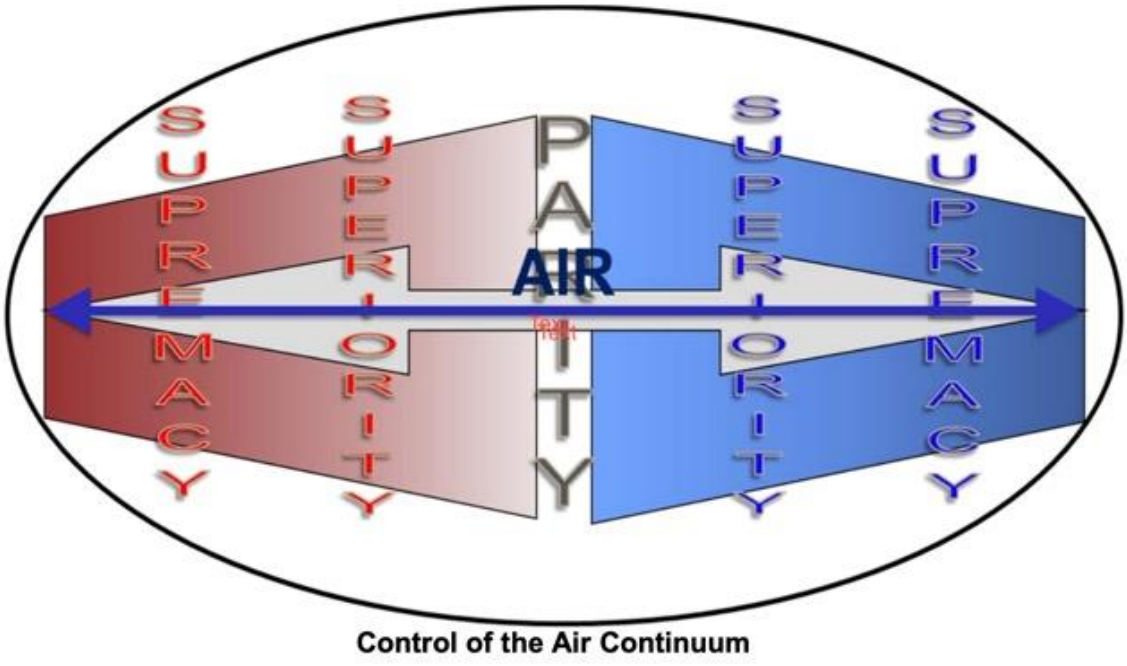

Figure 1. Current Air Control Continuum.

However, when air forces find themselves as the weaker force facing a superior adversary, what is airpower's response as the weaker force? In order to prepare for the potentiality that the U.S. military, and in particular the United States Air Force (USAF), might find itself as the weaker offensive force, there must be a framework developed at the operational level of war that employs air power asymmetrically against a stronger adversary. This paper

[6] U.S. Department of the Air Force, *USAF Doctrine Annex 3-01*, 24-25.
[7] U.S. Department of the Air Force, *USAF Doctrine Annex 3-01*, 4-5.

seeks to explore the offensive potential of a fourth, less considered form of OCA: air denial operations.

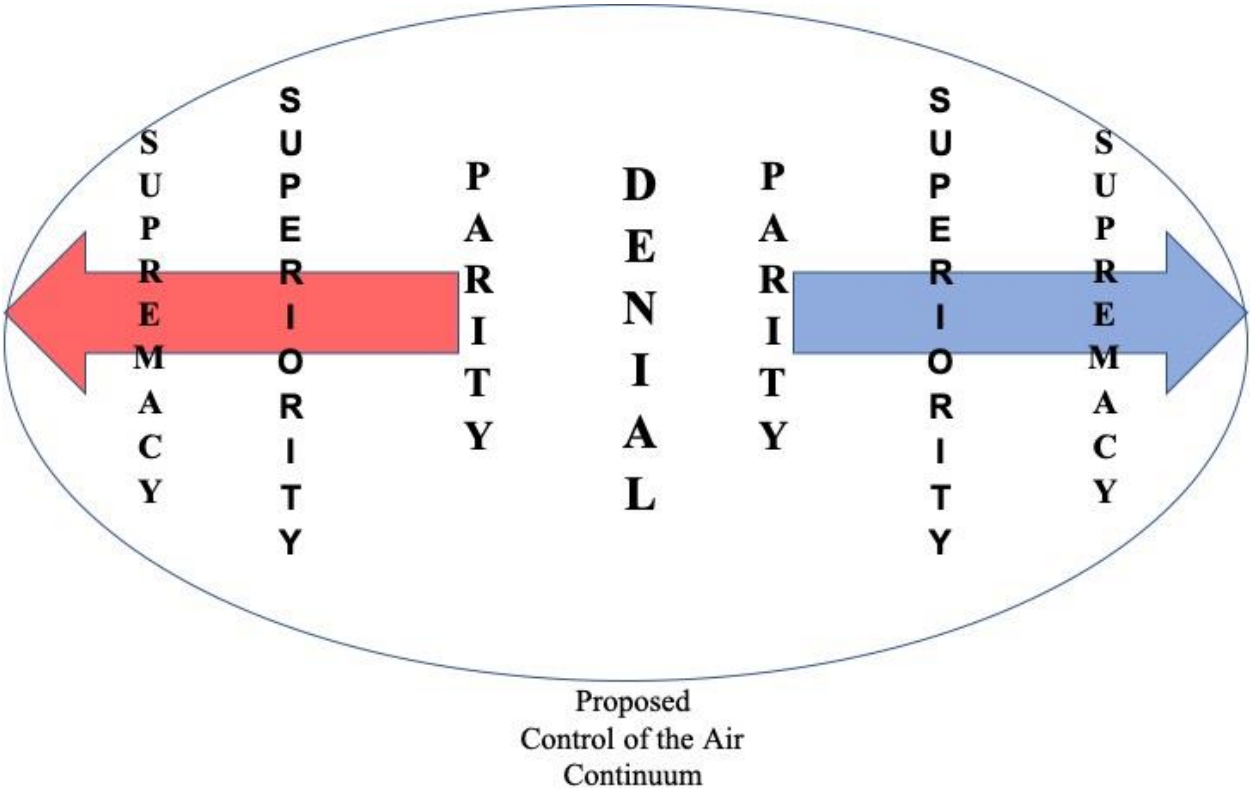

Figure 2. Proposed Air Control Continuum.

Air denial operations are the capacity to deny adversary use of the air domain for their purposes for some time through asymmetric employment of airpower. Unlike sustained symmetric airpower employment, a pulse of asymmetric airpower employment is a sudden and violent expulsion of offensive combat power against an adversary, which requires regeneration before following pulses. This paper will detail how the employment of asymmetric airpower, which is to say air denial operations, will enable the weaker force to return to symmetric employment of airpower. Therefore, an operational framework for air denial operations must consist of three stages: a combat generation stage that husbands, defends and builds a pulse of

asymmetric airpower; an offensive stage that expends a pulse of power against an adversary's critical vulnerabilities; and finally an exploitation stage that seizes the initiative as part of an integrated campaign or operational design that ultimately results in a power shift to symmetric employment of airpower.

Campaigns or operations designed by the weaker force are not unprecedented in military doctrine, theory, or history. From a doctrinal perspective, the maritime doctrine of sea denial offers a comparative parallel to air denial operations. Sea denial operations are "the capacity to deny an adversary the ability to use the sea for their purposes for some time."[8] Similarly, air denial operations seek to exploit the air domain for brief periods through a series of major or minor tactical actions without gaining the ability to retain control due to the adversary's stronger relative position and capabilities. From a theory viewpoint, the naval strategy of *Jeune Ecole* was initially designed by French naval theorists to counter the more powerful British naval supremacy by employing asymmetric tactics such as mines, torpedoes, and coastal fires against a much stronger adversary.[9] The introduction of mines and torpedo boats forced stronger adversaries, such as the Royal Navy, to adapt and honor the threat created by a weaker naval force.[10] Historically, sea denial operations have been successful in achieving limited political and strategic aims through the employment of naval power at decisive points (DP). Examples of sea denial operations at DPs include mining or closing sea lines of communication (SLOCs), and delaying the adversary while time-consuming mine-clearing operations occur.[11] The same objective is also true of air denial operations: a burst of offensive airpower massed at a DP in

[8] Milan N. Vego, *Maritime Strategy and Sea Denial: Theory and Practice* (New York: Routledge/Taylor & Francis Group, 2019), 104.
[9] Hugues Canuel, "From A Prestige Fleet To The Jeune École: French Naval Policy and Strategy under the Second Empire and the Early Third Republic (1852–1914)," *Naval War College Review* Vol. 71, No. 1 (Winter 2018), 93-105.
[10] Frank Hoffman, "What We Can Learn From Jackie Fisher," *United States Naval Institute: Proceedings*; Annapolis Vol. 130, Iss. 4, (Apr 2004): 68- 71.
[11] Vego, *Maritime Strategy and Sea Denial*, 118.

time and space in order to achieve limited aims. A DP is "a geographic place, specific key event, critical factor, or function that, when acted upon, allows commanders to gain a marked advantage over an enemy or contribute materially to achieving success"; in the case of air denial operations, effects upon the DP are acted upon from the air domain.[12]

The rationale for air denial operations is rooted in the argument that rather than expending combat power in the attrition of the adversary's air capabilities, air forces must accept the constrained operating environment, constrained due to enemy offensive and defensive capabilities, and employ airpower in measured bursts of asymmetric power that yield objectives. Air denial operations, like sea denial operations, are not a panacea. They are designed for employment by the weaker opponent as a means to deliver an asymmetric offensive pulse of power. Moreover, air denial operations should nest inside a strategy with limited policy aims. Employing air denial operations as a means to gain better leverage for negotiations, or exceeding the cost the adversary is willing to expend in pursuit of a political object are the political and strategic purposes of air denial operations. Commanders and planners at the operational level must translate political and strategic desired end states into campaigns and operations through the lens of air denial operations. The air denial operational framework provides a road map for commanders and planners at the operational level to translate asymmetric employment of airpower into an eventual return to symmetric employment of airpower.

Generation of Combat Power

The first stage is the combat generation stage during which the objective is preservation and survival of airpower's combat potential. Accomplishing this objective occurs in three ways: flexible basing to reduce the overall threat to air fleet, effectively ensuring the survival of the air

[12] U.S. Department of Defense, *Joint Publication 5-0: Joint Planning* (Washington DC: June 2017), xx-ii.

fleet through protection measures, and deliberate husbanding of airpower rather than sustained employment of airpower. In this stage, the purpose of offensive airpower is to merely to exist as a source of combat potential, whose existence will always be a lingering threat to the adversary. Naval theorist Julian Corbett details the concept of a naval fleet-in-being, which is a weaker force that threatens a stronger adversary.[13] The theory is valid for airpower as well. Unemployed airpower is very similar to unemployed naval power in the sense that it maintains its combat potential when not employed. Nevertheless, for a weaker force to be a threat to a potent adversary, the force — in this case, airpower — must be a credible threat. Therefore, taking careful preparations for the preservation and survival of airpower assets that employ air denial operations must be a priority line of effort prior to commencement of hostilities.

Disaggregation of assets is an essential component for the preservation and survival of asymmetric airpower. Unlike traditional employment of airpower where air superiority or even air parity exists, the weaker force employing air denial operations must build up combat potential until an opportunity exists for the employment of airpower in a limited burst of offensive combat power. Afterward, the defensible haven or "fort" regenerates combat power for future employment. The concept of a fortification where combat power is husbanded, protected, and generated until employed in a burst of offensive airpower is the linchpin for air denial operations; without a fort no safe haven for generation of combat power exists. Lord Horatio Nelson famously decreed, "a ship's a fool to fight a fort."[14] Coastal fortifications served in their day as the ultimate defense against maritime offensives, simultaneously defending men and equipment while building pulses of combat power in order to repulse attackers from the sea.

[13] Julian S. Corbett, *Some Principles of Maritime Strategy* (Annapolis: Naval Institute Press, 1988), 231.
[14] James Holmes, "Anti-Access and the Fortress Fleet" last modified 10 September 2012, https://thediplomat.com/2012/09/anti-access-and-the-fortress-fleet/.

Dramatic changes in technology and warfare have left the coastal fortifications that the Royal Navy feared much more vulnerable to attack than in Lord Nelson's day. Indeed, the airpower parallel is large behemoth airbases, particularly in the Western Pacific, where the USAF currently generates combat power in the Pacific area of operations. However, air denial operations modify the idea of a fortification. Rather than vulnerable airbases, a series of disaggregated airbases or even agile airbase locations seek to counter air and missile threats that could effectively destroy an entire airbase's combat potential.[15] These disaggregated, or agile airbases are the modern fortifications that generate air denial operations, yet also require protection measures to ensure their survival.

Despite the clear advantages of force dispersal in terms of survival and force protection, careful attention must also be paid to the systems, capabilities, and functions that ensure the fort survives and air denial operations continue, despite facing a stronger adversary and their capabilities. Survival of the fort itself is a critical objective in order to husband airpower's combat potential. Therefore, deliberate attention and planning to gain advantages in Command and Control (C2), intelligence, and early warning (EW) capabilities must be a prioritized line of effort by the Commander at the operational level to ensure that his or her forces continue to exist in order to generate the combat power needed for air denial operations.[16] However, despite active defensive measures, the nature of the adversary's more substantial combat potential in all likelihood means that attacks on forts will occur. This potential must be planned for starting at the operational level, and continue down to the individual unit level. Some examples of planning for survival include force protection levels, hardening of facilities, deception, camouflage, and

[15] Robert C. Owen, "Basing Strategies for Air Refueling Forces in Anti-Access/Area Denial Environments" (Thesis, Air Force Research Institute, Air University), 2015, 6-7.
[16] Christopher Lazidis, "Air Parity: Re-Discovering Contested Air Operations" (Thesis, School of Advanced Air and Space Studies, Maxwell AFB, AL, 2016), 36.

dispersal of physical assets at the fort.[17] Additionally, attrition should be planned into air denial operations when planners consider the generation of combat power during this stage. The combat generation stage's purpose is to not only exist as a threat to the adversary but to eventually turn the husbanded combat power generated during this stage into an asymmetric offensive pulse of power in later air denial stages.

History provides an example of both the fleet-in-being and a fortification that generates combat power in the case of Malta in World War II (WWII). During 1941 and 1942, the German Air Force (the Luftwaffe), the more potent force, routinely launched offenses against the beleaguered island to the point where the defending British forces lost all aircraft, runways, and seemingly any ability to generate combat power. However, time and again for over a year, the British rebuilt and rearmed the fortification, generating not only defensive airpower, but offensive airpower that threatened the German and Italian SLOCs.[18] The Luftwaffe continued to attack Malta not merely because it existed, but because it was a credible threat to the German and Italian strategic interests in the Mediterranean. Eventually, the British won a protracted struggle of survival and combat power generation. This case highlights the two critical components of the combat generation stage: maintaining a credible offensive combat potential that threatens the adversary and the requirement for a survivable and defensible fortification that not only generates combat power but expends from as well.

Translating the doctrinal concept of air denial operations from theory to future application is an important consideration as well. Both theory and historical case studies demonstrate the applicability of maintaining and defending the fleet within a series of fortifications, as well as how remaining a threat to the adversary ensures the survival of the

[17] Lazidis, "Air Parity," 37; U.S. Department of the Air Force, *USAF Doctrine Annex 3-01 Counterair Operations*, 9-10.
[18] Lazidis, "Air Parity," 50-53.

fleet's combat potential. In the Western Pacific, China's anti-access, area-denial weapons capabilities may force the USAF outside of the first island chain, and thus deny the USAF the ability to generate sustained combat power.[19] In order to counter this threat, air denial operations recommend preparing several disaggregated operating locations around the Western Pacific that generate a pulse of airpower before either retrograding in defense or moving to another operating location. These operating locations must focus on defense, survivability, and rapid repair in order to withstand attacks and quickly resume the generation of combat power. Neither recommendation is necessarily new or revolutionary. However, the key difference from a doctrinal perspective that air denial operations propose is the deliberate husbanding of airpower, as opposed to the sustained combat power that air superiority grants. Planning for the governance of combat power must begin at the operational level, and will ensure combat power built up in the first stage translates to objectives in the offensive stage.

Employment of Offensive Combat Power

The second component of the air denial operations framework is the employment of an offensive stage where the combat power husbanded and protected during the first stage gets expended in a pulse of power against the stronger adversary. The purpose of the offensive pulse of power is twofold: to attack the adversary's critical vulnerabilities, either directly or indirectly, and to gain control of DPs that enable follow-on actions against the enemy. Adversarial critical vulnerabilities may also be DPs, which is to say a physical location, key event, or critical factor whose control would benefit either combatant. Therefore, linking direct or indirect asymmetric pulse of power against a critical vulnerability should be an objective. The direct air denial attack targets the adversary's military capabilities in order to achieve objectives. In contrast, an indirect

[19] Owen, "Basing Strategies," 2-3.

attack targets the adversary government, primarily by attacking economic critical vulnerabilities, as a means of achieving objectives.

The first form of air denial operation, a direct attack, attacks the adversary's military critical vulnerabilities. The keys to successful direct air denial operations are: planning centered around an operational idea that incorporates deception, surprise, and a planned withdrawal in order to preserve force, and minimize risk to forces. Planners should also look to synchronize joint effects during the employment of asymmetric airpower in order to achieve objectives during the small windows of opportunity that airpower creates. In doctrinal terms, a raid is most analogous to these direct air denial attacks. Per joint doctrine, a raid is an operation to temporarily seize an area to secure information, confuse an enemy, capture personnel or equipment, or destroy a capability culminating with a planned withdrawal.[20] The purpose of air denial attacks that employ direct means is to mass airpower against the adversary's critical vulnerabilities in order to achieve major or minor tactical objectives. A historical example of a successful direct air denial attack was the 1981 Iranian airstrike against the Iraqi H3 airbase facility deep in western Iraq.[21] The attack was a long-range raid launched by Iranian forces to successfully destroy 48 Iraqi aircraft on the ground, with no enemy reaction or losses on the Iranian side.[22] This raid demonstrated that weaker airpower could execute a sophisticated direct attack raid that combined elements of deception, surprise, and meticulous planning in the achievement of a major tactical objective against a more potent adversarial air force.

Moreover, air denial attacks should indirectly target the adversary government as well, primarily by attacking economic critical vulnerabilities such as air and sea logistical hubs,

[20] U.S. Department of Defense, *Joint Publication 3-0: Joint Operations* (Washington DC: October 2018), VII-4.
[21] Darioush Bayandor, *The Shah, The Islamic Revolution and the United States* (Cham, Switzerland: Palgrave MacMillan: 2019), 54.
[22] Bayandor, *The Shah*, 54.

geostrategically significant choke points, and critical resource production facilities such as oil or gas refineries. Achieving a political or strategically significant objective while imposing a high material or economic cost on the adversary is the goal of indirect air denial attacks. For example, the alleged Iranian attacks on the Saudi Arabian oil refineries on 14 September 2019 were not only an audacious raid against an adversary's economic interests; the attacks also displayed on a global stage that Saudi Arabian defenses were incapable of preventing an asymmetric attack from a weaker opponent.[23] During the attack, small remotely piloted aerial (RPA) vehicles, suspected to be Iranian equipment, exposed a critical vulnerability in Saudi Arabian defenses by attacking oil facilities with an asymmetric pulse of power. The attack resulted in Saudi oil production temporarily cut by 50 percent and forced the global economy to react by increasing oil refinement in other locations.[24] Observing the 14 September RPA attack through the lens of air denial operations, the alleged Iranian perpetrators were able to achieve political and strategic objectives against a categorically superior adversary at a relatively low cost.

An asymmetric pulse of power brings offensive actions against the enemy's critical vulnerabilities, preferably at a DP, such as gaining temporary or local air superiority, that the weaker force exploits in the achievement of objectives. The purpose of discharging combat power generated during the first stage against the enemy is in the pursuit of objectives that nest themselves under a more extensive campaign or operational design. Limited though the effects may be, the operational idea that generates air denial operations should incorporate several tenets: surprise, deception, and a rapid operational tempo. Operation Focus, the preemptive Israeli airstrikes during the Six-Day War, is an example of air denial operations that incorporated

[23] Dr. Uzi Rubin, "Saudi Arabia's Black September," 15 Oct 2019, https://jiss.org.il/en/rubin-saudi-arabias-black-september/.
[24] Rubin, "Saudi Arabia's Black September."

all three offensive air denial elements in the achievement of a series of major tactical objectives.[25] During Operation Focus, the Israeli Air Force launched multiple attack waves against Egyptian, Jordanian, and Syrian airfields, which destroyed over 341 aircraft on the ground before major ground offensives during the Six-Day War.[26] Crucial to the success of Operation Focus: incorporation of surprise, deception, and rapid operational tempo during the planning phase. Additionally, success in the air domain achieved major tactical objectives at the DP, in this case, local air superiority that allowed freedom of action for Israeli ground forces.

Operation Focus, while successful, remains controversial due to its preemptive nature against a sovereign state. Planners must consider the legality and ethical nature of a preemptive attack and only recommend such a drastic course of action if existential indications and warnings exist. Also, planners must consider that the opponent might regard such an attack an existential risk to state survival and respond accordingly. The point of air denial operations is not to put either side on death ground. Instead, the objective is the accomplishment of limited political or strategic objectives through offensive pulses of powers. These pulses, carefully husbanded during the combat generation stage, are now employed either directly or indirectly during the offensive stage. The final consideration for commanders and planners at the operational level is the careful joint integration and synchronization of these pulses of offensive combat power into a more extensive offensive campaign or operation that achieves political or strategic objectives. In a potential future conflict with China, where the U.S. finds itself as the weaker opponent, the goal must be to deny access at the DP, even if temporarily, in order to exploit advantages, and then seize the initiative.

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[25] Ersun N. Kurtulus "The Notion of a "Pre-Emptive War" the Six-Day War Revisited," *The Middle East Journal* 61, no. 2 (Spring 2007): 220-238.
[26] Kurtulus "The Notion of a "Pre-Emptive War," 234-235; Ahron Bregman, *Warfare in the Middle East Since 1945*, (New York: Ashgate Publishing, 2008): 43.

Capitalizing on Asymmetric Combat Power

The final stage of the air denial operations framework is the exploitation of the combat power stage. The purpose of the exploitation stage is to capitalize on the advantages gained by the successful implementation of the first two stages of air denial operations. The correct application of the first two stages is the essential requirement for setting the conditions for the final stage of the air denial framework. Proper employment of the air denial framework fully realizes the potentialities of asymmetric airpower application; an opportunity for a decisive power shift from asymmetric to symmetric airpower is achievable through careful planning and seizing advantages created by the employment of offensive pulses of power against the adversary as a means of achieving the desired end state. Exploitation comes in two forms: regeneration and transition. Exploitation stages that employ regeneration as part of the operational idea seek to expend a pulse of power in the offensive stage, before returning to the combat generation stage in order to rebuild combat power, employed at a later time. Moreover, exploitation stages can also transition from husbanded pulses of power in the offensive stage to a sustained level of air control such that freedom of action and security from the adversary are ensured to a higher degree than air denial can provide. Doctrinally, this is the transition from air denial operations to air parity or even air superiority in some cases.[27] However, reaching this crossover point in the exploitation stage must be planned at the operational level, typically in conjunction with a phase transition of a campaign or major combat operations.

Regeneration of combat power during the exploitation phase implies a deliberate choice of when to employ a pulse of combat power in order to exploit advantages, and when to conserve combat power in order to regenerate prudently. The British Air Force offensive pulses of power

[27] U.S. Department of the Air Force, *USAF Doctrine Annex 3-01*, 5.

during the 1982 Falklands War display the principle of combat power regeneration in the achievement of an operational objective. During the 10-week conflict, British forces attempting to re-capture the Falklands faced near-daily strike and counterair missions from a strong Argentine opponent.[28] The Royal Navy and the naval air component were unable to gain air superiority, and at best had temporal parity with the Argentinian Air Force due to the relatively small number of Royal Navy aviation assets on-station.[29] The decisive moment of the conflict came during the amphibious landings and subsequent sustainment missions to retake the East Falklands. Combat power generation was unable to reach a threshold that gained and maintained air superiority during the amphibious operation, as amphibious doctrine recommends, which forced the British to conserve combat power.[30] Pulses of airpower were employed over the amphibious landing location and subsequently regenerated multiple times over days.[31] Regeneration of combat power in support of amphibious operations forced naval assets to incur higher risk to force without the protective cover of airpower against the Argentinian Air Force. Indeed, losses to Royal Navy assets did occur.[32] However, the operational objective of retaking the Falklands was successful. This case demonstrates that pulses of airpower can achieve operational objectives when those pulses of power are both nested inside a more extensive campaign or operational design without first gaining air superiority. Through regeneration, the weaker force can exploit critical vulnerabilities as long as airpower is expended at the decisive moment.

The exploitation of combat power also occurs in the form of transition from a lower level of air control to a higher degree of air control. Unlike regeneration, the transition is a sustained

[28] Nicholas van der Bijl, *Victory in the Falklands*, (Barnsley, Pen & Sword Military Publishing: 2007), 70-71, 97.
[29] van der Bijl, *Victory in the Falklands*, 70-71, 97.
[30] U.S. Department of Defense, *Joint Publication 3-02: Amphibious Operations* (Washington DC: 4 January 2019), I-5.
[31] van der Bijl, *Victory in the Falklands*, 93, 185-192.
[32] van der Bijl, *Victory in the Falklands*, 70, 186.

form of employment of combat power and effectively denotes the crossover stage from air denial operations to air parity, or even air superiority. The Battle of Britain in 1940 is a historical example of this form of the exploitation stage. In late July 1940, the Luftwaffe outnumbered the Royal Air Force approximately 2:1.[33] The demand for the Royal Air Force was so high that the British launched last-minute defensive counter air (DCA) missions only when alerted by EW and C2 of the incoming Luftwaffe fighters. During this stage of the Battle of Britain, only small bursts of offensive airpower were possible from British bombers attacking strategic targets at night, such as Berlin.[34] However, as the Battle of Britain continued into the late summer, the British capitalized on several factors to transition from air denial operations, into air parity with the Luftwaffe. These factors include superior EW, flexible and responsive C2, improved pilot tactics, and proficiency. Contributing to British success were the ever-changing German strategic objectives and targeting priorities established by the Luftwaffe commanders at the operational level.[35] By the end of the Battle of Britain in late fall of 1940, the Royal Air Force had transitioned from air denial operations to gaining and maintaining local air superiority over England. This condition did not exist before the battle in July 1940.[36]

The Battle of Britain case study illustrates several components of the air denial operations framework. First, the British employed air bases dispersed across southern England that generated combat power rather than large centralized hubs. These numerous airfields presented a targeting challenge for the Luftwaffe, forcing them to divide their forces rather than mass airpower at the DP. Second, air denial operations must either directly or indirectly target the adversary's critical vulnerabilities. In the Battle of Britain, the Luftwaffe vacillated between

[33] Lazidis, Air Parity," 30.
[34] Vego, *Joint Operational Warfare*, II-15.
[35] Vego, *Joint Operational Warfare*, II-15.
[36] Lazidis, "Air Parity," 26-31.

directly attacking British airfields, British Fighter Command, and strategic targets such as London. The conclusion for commanders and planners at the operational level is the importance of mission analysis. Had the Luftwaffe correctly identified the Royal Air Force's operational center of gravity, Fighter Command, and its associated critical vulnerabilities, the Luftwaffe might have defeated the Royal Air Force.[37] Instead, Fighter Command allowed the British to mass limited airpower at the DP in time and space and provided the defense of Britain until the Germans had reached the culminating point of attack in Fall 1940.

Finally, both the Falklands and the Battle of Britain demonstrate the necessity of incorporating the exploitation stage of air denial operations into a more extensive campaign or operational design in order to fully allow freedom from attack and freedom of action for either a brief period before combat power is regenerated or as part of a transition to symmetric employment of airpower.

The Case for Air Superiority: Counterargument

Some might argue that air denial operations are not a valid addition to the doctrinal framework of air control. USAF doctrine prescribes that air parity, not air denial, is the lowest form of air control on the control of the air continuum at which achieving desired effects from airpower is possible.[38] Airpower theory also supports the need for a high degree of air control. Lord Arthur Tedder, Deputy Supreme Allied Commander during WWII, contended, "Without a reasonable degree of air superiority, no air force can effectively assist land or sea forces or strike at the enemy's war potential.[39] Air superiority reduces the risk to mission, friendly forces, and allows follow-on operations to occur. The U.S. military campaigns in the Gulf War in 1990,

[37] Lazidis, "Air Parity," 36-39.
[38] U.S. Department of the Air Force, *USAF Doctrine Annex 3-01,* 5.
[39] Charles M. Westenhoff, "Military Air Power: The CADRE Digest of Air Power Opinions and Thoughts," (Air Force Research Institute Paper: Air University Press, Maxwell AFB, AL, Oct. 1990), 25.

Operation Allied Force in Kosovo in 1999, and Operation Iraqi Freedom in 2003 all gained and maintained air superiority as an operational objective in order to reduce risk from enemy attack, grant freedom of action, and allow follow-on air actions.[40]

Air denial operations, in contrast, force commanders to incur higher risk to mission, forces, and achievement of the objective. In today's doctrinal planning parlance, air denial missions would be considered a high or extreme acceptable level of risk, with anticipated attrition of forces to be half the forces assigned or greater [41] The example given in the USAF Integrated Planning and Employment manual for an extreme level of risk is the 1942 Doolittle Raid. The Doolittle Raid consisted of sixteen U.S. Army Air Forces (USAAF) B-25 bombers launched from the U.S. Navy carrier, the USS Hornet, in a surprise air denial operation against military targets in Tokyo. Indicative of the risks undertaken, the removal of defensive weapons reduced weight and gained vital endurance. While the bombers did reach Tokyo, every bomber crash-landed or ditched in Japanese-occupied China, and one bomber impounded in Russia.[42] This example supports two conclusions. First, the Doolittle Raid incurred an extreme level of risk to mission in order to achieve a minor tactical objective against military targets in Tokyo of minor significance. Second, the raid placed an extreme level of risk to force. Miraculously, out of the eighty total airmen that participated in the raid, sixty-nine were repatriated from China and continued to serve in the USAAF.[43] The fate of the remaining eleven airmen varied: some were captured and executed, some died in crash landings during the raid, and others died in captivity.[44]

[40] Vego, *Joint Operational Warfare: Theory and Practice*, II-67, II-71, XI-45.
[41] U.S. Department of the Air Force, *Air Force Tactics Techniques and Procedures: Combat Aircraft Fundamentals—IPE, AFTTP 3.IPE* (Published by 561 Joint Tactics Squadron, Nellis AFB, NV), 1-27.
[42] Robert B. Kane, "The Doolittle Raid – 75 Years Later," USAF Air and Space Power Journal, Maxwell AFB, Vol 31., Iss. 1, (Spring 2017), 75-76.
[43] Robert B. Kane, "The Doolittle Raid – 75 Years Later," 75-76.
[44] Robert B. Kane, "The Doolittle Raid – 75 Years Later," 75-76.

From an operational planner perspective, the Doolittle Raid was extreme on a risk level but did not achieve anything more than damage to targets of minor military importance in Tokyo.

However, from a strategic perspective, the Doolittle Raid was an overwhelming success. For the U.S. military and civilian psyche, the audacious air denial operations success galvanized the demoralized U.S. public. It gave confidence to the U.S. military, who had seen strategic misfortune and reversals since 7 December 1941.[45] For the Japanese, the utter shock and disbelief created by the raid not only demoralized the Japanese population but also eroded confidence in the military's ability to protect the Emperor, the Government, and the civilian population. Compelled to respond, the Japanese shifted resources away from other military operations to focus on the defense of the homeland. Arguably the final operational effect of this particular air denial operation was the acceleration of plans to attack Midway Island in 1943, where a joint U.S. Navy, USAAF, and US Marine Corps force inflicted a decisive defeat on the Japanese Imperial Navy.[46] While not immediately apparent, the Doolittle Raid snatched strategic victory seemingly from the jaws of operational and tactical failure. The Raid teaches that the repercussions of air denial operations may reverberate in improbable and unexpected ways. Capitalizing and seizing the initiative at these decisive crossroads rests ultimately with the force that better understands and exploits newly exposed opportunities and transforms them into strategic success.

Undoubtedly, planning for the Doolittle Raid did not include the far-reaching strategic and operational effects. However, this case study illustrates that campaigns and operations which incorporate air denial operations against enemy military and government targets have strategic significance that a joint plan can exploit, despite the high-to-extreme risk to both

[45] Vego, *Joint Operational Warfare*, II-14 &15.
[46] Vego, *Joint Operational Warfare*, II-14 &15.

mission and forces. To be sure, the Doolittle Raid contains several tenets of asymmetric airpower employment that resonate in current and future conflicts. First, the husbanding of airpower aboard defensible and agile aircraft carriers represents the fortification in the modern air denial framework. Second, an operational design combining surprise, speed, and deception in pursuit of a direct air denial attack shines clear when compared to modern examples of air denial operations. Finally, the regeneration of combat power following a burst of offensive airpower in order to prepare for future employment follows the principle of exploitation in order to shift from asymmetric to symmetric employment of airpower. Certainly, the reverberations of the Doolittle Raid leave an indelible blueprint on the air denial operations framework. Each air denial operations tenet represented a sequential building block for the successful achievement of the Doolittle Raid, without any of which the Raid might have failed to meet its strategic objectives.

Conclusion and Recommendations

The need for creative solutions to vexing future challenges has rarely been higher for the U.S. military. After decades as the more potent combatant, the U.S. military finds itself as a peer or potentially the weaker adversary in future conflicts. A potential conflict with China is the most dire predicament in terms of likely combatants for the U.S. military. Air denial operations offer a doctrinal framework in which a weaker USAF employs asymmetric airpower against an opponent in the achievement of a series of objectives nested inside a more extensive campaign or operation. While promising in the theoretical realm, the air denial framework must pass three critical milestones in development: intellectual refinement, rigorous verification through training events, and finally, codification in operational plans. First, the professional military education environment provides the structure that will refine, mature, and evolve the concept of air denial operations from ideation to a recognized addition to airpower theory. Second, the training

environment offers a source of friction, validation, or even potential invalidation of the tenets of air denial operations, without which commanders who must authorize asymmetric employment of airpower will reject the theoretical notion of air denial operations. The crucible of the training environment will result in the tactics, techniques, and procedures that ultimately metamorphose into operational plans. Incorporation into operational plans, the final milestone for the air denial operations framework, fully realizes the opportunity to plan, prepare, and anticipate the challenge of employing asymmetric airpower as the weaker force. The anticipation of the future problem and developing a solution keeps the USAF one step ahead of a potential adversary. Unlike previous periods history or conflicts of unquestioned military overmatch, the U.S. finds itself at the precipice of an uncertain future where innovation, preparedness, and a willingness to take risks are the foundational elements in achieving political or strategic ends in future conflicts. History has shown that when weaker forces embraced the asymmetric employment of power they have achieved desired end states. Embracing the principles of asymmetric airpower employment through the air denial operational framework is key to maintaining the U.S.'s competitive advantage, even as the potential weaker force. Sun Tzu sagely wrote that the acme of skill was to win without fighting.[47] The first victory against any future adversary, therefore, will be achieved by understanding, practicing, and implementing the tenets of asymmetric airpower employment detailed in the air denial operations concept.

[47] Sun Tzu, *The Art of War*, trans. Samuel Griffin (London: Duncan Baird Publishers. 2005), 115.

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