

AIR superiority is the single most important factor in deciding the outcome of a modern conventional war. Military operations on land, sea, or in the air are extremely difficult, if not impossible, for the side that doesn't control the sky. In the words of Field Marshal Bernard L. Montgomery, "If we lose the war in the air, we lose the war and we lose it quickly."

There's a difference between air superiority and air supremacy, terms often used synonymously. Air superiority is defined as being able to conduct air operations "without prohibitive interference by the opposing force." Air supremacy goes further, wherein the opposing air force is incapable of effective interference.

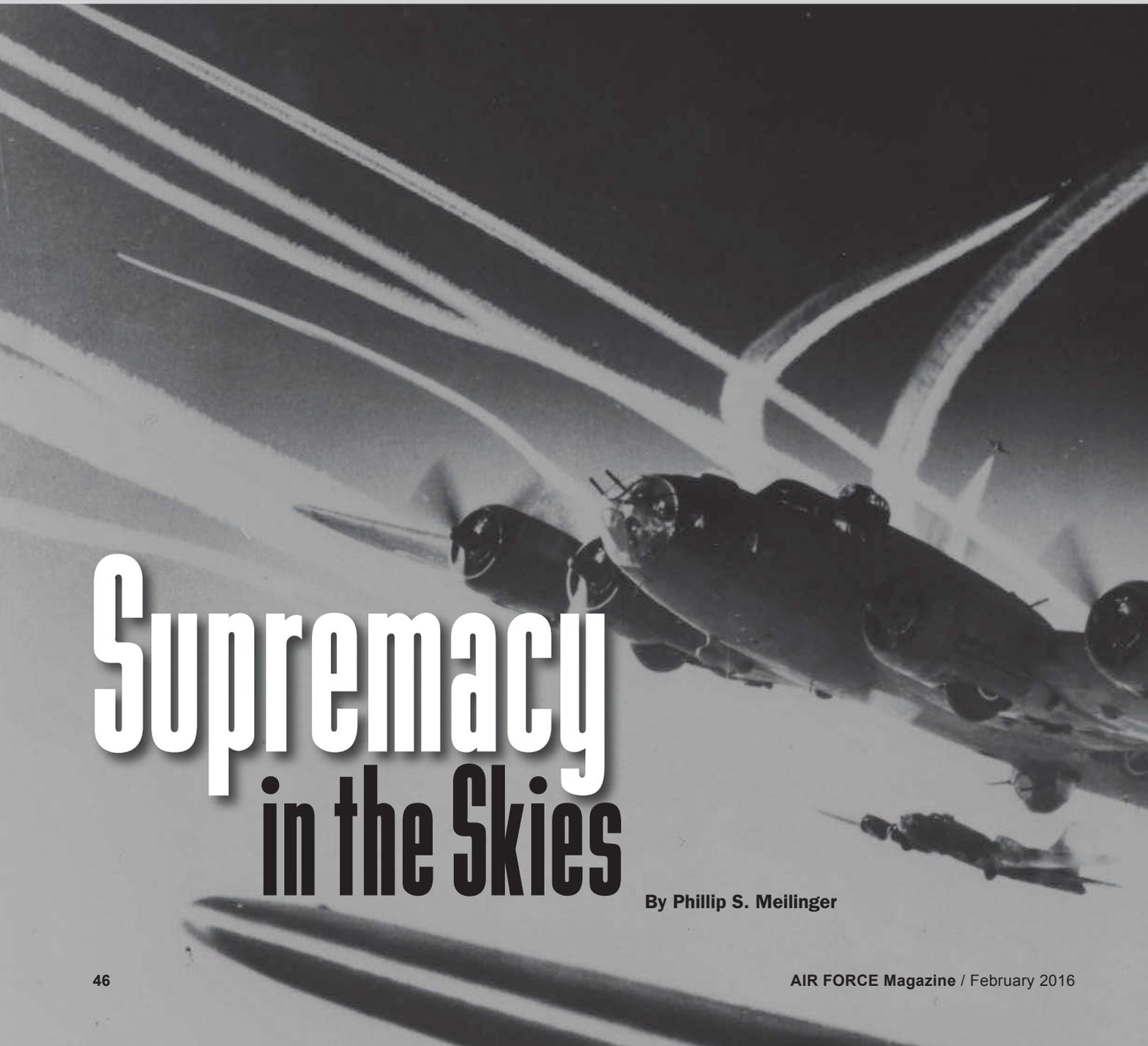
Gaining air superiority isn't an end in itself. It's a means to an end: to damage, destroy, or otherwise affect an enemy's centers of gravity, whatever they may be.

Air superiority must be a commander's top priority, however. If surplus airpower is available, it can be allotted to other air

campaigns. Such "parallel operations" are unique to airpower and are one of its greatest strengths.

The Italian general Giulio Douhet and Marshal of the Royal Air Force Hugh M. Trenchard in Britain were the seminal thinkers on air superiority. They believed that airpower's ability to leap obstacles and attack anywhere, at any time, without warning, meant that defense against air attack was almost impossible. They considered anti-aircraft artillery so ineffective it could be ignored—a gross mistake—but also doubted the usefulness of air interception. Writing in the days before radar, they believed detection and timely interception of enemy attackers was unlikely. As bomber aircraft flew faster and higher in the 1930s, this belief grew even stronger. As a result, many airmen thought air-to-air combat unlikely and that enemy air forces could be ignored.

Billy Mitchell disagreed and argued that bomber deficiencies in speed and maneuverability would put them at a disadvantage when engaged by enemy fighters. Mitchell imagined a tough



Supremacy in the Skies

By Phillip S. Meilinger

struggle for air superiority between attacking bombers and defending fighters.

In *Victory Through Air Power*, Alexander P. de Seversky called for long-range fighter escort for attacking bombers. Most engineers at the time doubted that a fighter could be built having speed and agility as well as the long range of a bomber, but de Seversky, himself an aircraft builder, was sure it could be done. Others thought that even if the bomber was vulnerable to defending fighters, escort was inadvisable. Claire L. Chennault, later of Flying Tigers fame, perceived the fighter as an inherently “offensive” capability and opposed attempts to turn it into a “defensive” escort.

In World War II the Allied bomber offensive against Germany quickly settled the question: Air battles would occur, they would be long and bloody, and long-range escort was essential for daylight bomber attacks. The arrival in the theater of the P-47 and P-51, having the range to accompany bombers deep into Germany, proved a breakthrough. Upon taking command

at Eighth Air Force, Brig. Gen. James H. “Jimmy” Doolittle changed tactics to take advantage.

In early 1944, he decided that using fighters as bomber escorts was misguided. Doolittle directed fighter pilots to concentrate on enemy fighters, arguing for an aggressive doctrine of seeking out and destroying the enemy air force, which would in turn protect the bombers. The shift proved highly effective.

Allied air leaders also realized in early 1944 that if the aim was to eliminate the Luftwaffe, then bombers had to threaten targets so vital that the enemy was compelled to defend them. The bombers effectively became the bait that lured the Luftwaffe into the air, where it could be destroyed by Allied fighters.

Allied leaders at that time were preoccupied with the Normandy invasion. Because they realized air superiority was essential to the success of Operation Overlord, it was necessary to find a vital target quickly, attack it, and draw the Luftwaffe into the skies. Gen. Carl A. “Tooney” Spaatz, commander of the US Strategic Air Forces in Europe, believed such a compelling target was

The methods may change over time, but the need for air supremacy never goes away.



Fighter escorts leave vapor trails while accompanying B-17s over Germany during a mission in 1943. In 1944, US fighters shifted from an escort focus to making the destruction of the Luftwaffe the priority.



USAF photo

German oil refineries. Allied bombers, accompanied by their new escorts, struck oil targets deep in Germany, provoking a monumental air battle. It proved a decisive factor in the success not only of Overlord but of the entire Allied war effort.

After the war, air doctrine changed rapidly. The nuclear standoff between the two superpowers, the US and the Soviet Union, was one of intercontinental ranges, making the idea of fighter escort impractical. Attacking bombers would now rely on speed, surprise, altitude, decoys, night, and electronic warfare (EW) to penetrate enemy airspace.

Most American postwar bombers had little capacity for defending themselves: The B-52 relied on a lone, four-barreled gun in its tail. The situation had reverted to that envisioned by Douhet. The air superiority battle was simply assumed away.

During the Korean War, American B-29s couldn't hold their own against Soviet-built MiG fighters, and the use of escorts was revived. Korea was seen as an aberration, however, and by the early 1960s the idea of using fighters to gain and maintain air superiority was largely dead. Fighter pilots in aircraft like the

American pilots were initially at a disadvantage in contests against nimble North Vietnamese fighters.

Programs like Top Gun and Red Flag eventually made up for the skill deficiencies of the previous decades. Yet again, it became clear that penetrating enemy air defenses was difficult and required a number of tactics and technologies to ensure success.

The 1991 Gulf War was a watershed because stealth technology introduced an unprecedented element into the air superiority campaign: The F-117 stealth attack jet was virtually invisible to Iraqi radar. In a sense, air war had circled back to the era before radar, and the ideas of Douhet and others about the challenges of defending against air attack were again valid.

There are two faces to air superiority. The first—well-understood by soldiers—is that the enemy is prevented from attacking friendly forces and infrastructure. The flip side is that the enemy can't prevent attacks on his own forces and facilities. This aspect of air supremacy is often taken for granted, but it underpins the American way of war as it has been practiced for the last 25 years. Without air supremacy, all the missions on which ground forces depend—close air support, air interdiction, deep strike, reconnaissance, airlift, medical evacuation—are problematic. Allowing an enemy to obstruct those missions will likely mean failure on the ground.

Since 1991, the US has fought a number of air wars: over Iraq, Bosnia, Kosovo, Afghanistan, Libya, and Syria. In all cases air supremacy was quickly obtained and not a single USAF aircraft was lost in air-to-air combat. Only six Air Force aircraft have been lost in combat over the past 24 years, and most of the crew members were rescued.

Air commanders have a lot to consider in thinking about how best to achieve air supremacy. Is it necessary to attain theater air superiority or merely localized dominance in a specific time and place? The answer depends on the military objective of the operation, the expected duration of the action, the capabilities and nature of the enemy, and the geography of the area. The degree of air superiority needed to protect a major amphibious assault against a moderate-size country equipped with a modern air force, for example, is different from that needed for evacuating noncombatants from a small country with no air



US Army photo by SSgt. Jose Otero

Top: A North Vietnamese MiG-17 is blasted with 20 mm shells from a USAF F-105D during the Vietnam War. Here: The carcass of an Iraqi MiG-29 lies on the desert floor after it was destroyed by coalition forces during Operation Desert Storm.

F-105 spent more time training to deliver nuclear bombs than they did practicing air-to-air tactics.

Vietnam changed things. The need for dogfighting to achieve air superiority was proved once more. Because air-to-air combat skills had been allowed to atrophy,

force. In the former case, the struggle for air superiority would likely be not merely a battle but a campaign. This degree of air dominance takes time to achieve and requires constant maintenance thereafter.

Another issue is the relative balance between offensive counterair operations (OCA) and defensive counterair operations (DCA). Several air theorists have pushed the idea that the best defense is a good offense, but this is often politically unacceptable. A country's leaders can't tell their people they've rejected defensive measures so they can concentrate on hitting an enemy harder than he can hit back. Instead, politicians may insist on a robust air defense. An example of this occurred, fortunately, in Britain before World War II and produced victory in the Battle of Britain. Nonetheless, it's generally wise to use airpower's inherently offensive characteristics to attack and take the initiative.

There are several types of OCA. The first is suppression of enemy air defenses (SEAD), a mission that has steadily gained importance as worldwide air defenses have improved. Specialized aircraft have been developed to jam a defender's radars and communications or to track emitters and destroy them with homing missiles. SEAD has become a critical element in any air campaign, essential to reducing losses.

Another OCA mission is the offensive fighter sweep; however, this is generally unsuccessful until air superiority has been gained. The RAF attempted this over France in 1941 as a way of luring the Luftwaffe into battle, but the sweeps were a costly failure. The Luftwaffe wasn't compelled to engage on other than its own terms. In these early sweep operations, the initiative lay with the defender. Once the Allies gained air superiority over Western Europe in March 1944, aggressive sweep operations to find and destroy lucrative ground targets (including aircraft) proved very successful.

A third OCA mission is escort, or what's now termed "force protection." This is one of the oldest OCA missions, but it remains one of the most important. When attack aircraft are loaded with offensive ordnance and have to concentrate on finding and hitting ground targets, they need escorts to watch for enemy interceptors and to destroy them or drive them off.

The fourth form of OCA is airfield attack, the attempt to eliminate the enemy

air force on the ground by destroying the eggs in their nests, as Douhet said.

Defensive counterair, in the form of an interceptor force, can sometimes win air superiority over a specific area for a period of time. The Battle of Britain was perhaps the most telling example of this, but the resistance of the Luftwaffe prior to March 1944 is also significant. So was Egypt's layered, overlapping, and highly integrated ground-based air defense network in 1973, which proved formidable to the Israeli Air Force.

There are many advantages to playing defense, especially when the defender has a powerful interceptor force, an extensive air defense system, and an effective command and control network to tie it all together. It means shorter lines of communication—which generally translate into higher sortie rates and the conservation of resources—a good chance of rescuing downed aircrew, and the psychological advantages of defending one's own territory. Even so, DCA has not had an overly prominent role to play lately, partly because OCA has been so effective.

TACTICAL SUPERIORITY

While airmen have tended to dismiss the danger from enemy ground defenses, historically it has been anti-aircraft artillery and surface-to-air missiles that have proved most lethal to attacking aircraft. Even during World War II, ground fire brought down most aircraft lost in combat. In the 1991 Gulf War, all coalition aircraft lost—with one possible exception, a Navy F/A-18—were downed by ground defenses. Since the Vietnam War, USAF has not lost a single aircraft in air-to-air combat.

In a major OCA campaign, destroying several target sets is mostly likely to result in air superiority.

■ **Aircraft**—Destroying aircraft air-to-air is the least efficient, though most glamorous, way of gaining air superiority. However, there are exceptions. The F-15 and F-16 have been incredibly successful in air-to-air combat worldwide—some sources indicate these two aircraft have achieved more than 170 air victories with no losses. The F-22, though not yet tested in air-to-air combat, promises to be even better.

Destroying enemy aircraft on the ground often promises to be the quickest and easiest method of gaining air superiority.

The Luftwaffe destroyed more than 4,000 Soviet aircraft, most of them on the ground, in the first week of Operation Barbarossa.

In the first two days of the 1967 Arab-Israeli War, the Israeli Air Force destroyed over 400 Arab aircraft on the parking ramp.

In the first Gulf War, only 33 of the nearly 200 Iraqi aircraft eliminated fell in air-to-air combat; the rest were caught on the ground. Given the potential decisiveness such targets present, most air forces have labored over the past three decades to disperse and camouflage their aircraft and, when possible, place them in hardened shelters.

■ **Crew Members**—Modern combat pilots require a minimum of two or three years of highly specialized and expensive training to prepare for combat—more to become truly proficient. An attacker recognizes that his opponent's supply of combat pilots is limited and irreplaceable in the short term.

■ **Command, Control, and Communications (C3) Facilities**—This was a primary target of coalition aircraft in the 1991 Gulf War and every conflict since. Usually, the first targets struck are air defense radars and command and control facilities. The intent is to cut off individual air defense units from a centralized control and information network. In Iraq in 1991 and again in 2003, these efforts were successful. In fact, in 2003 no Iraqi aircraft took off to contest the coalition.

■ **Tankers and Other Enablers**—Air strike packages are highly dependent on specialized air assets such as tanker aircraft. Without tankers, much of Afghanistan, for example, would have been out of reach for most US aircraft. If prospective enemies are also dependent on air refueling, their tanker fleet should be considered a high priority target.

Electronic jamming assets are also essential. Without them, non-stealth aircraft are highly vulnerable. Unfortunately these assets are often in short supply, and a loss of even a handful of these airplanes would have big consequences.

■ **Runways and Other Bottlenecks**—Systems that are of inordinate significance to the overall operation make good targets. Hitting runways and airfields, for example, is a time-honored method of shutting down an enemy air force. During the First World War, Trenchard's bomber force devoted 40 percent of its sorties to enemy airfields.



An F-117 flies over the Nevada desert. Despite more than 1,300 combat sorties during Desert Storm, none of the stealthy attack aircraft were even damaged. During its operational lifetime, one F-117 was lost in combat—over Serbia in 1999.

In the Falklands War, the RAF used 11 tankers to put one Vulcan bomber over the Port Stanley airfield. This Vulcan strike illustrates both the strength and weakness of airfield attacks. Despite the effort, only one bomb of the entire string actually hit the runway, which was quickly repaired. Even so, the Argentines felt compelled to redeploy their Mirage interceptors to bases north near Buenos Aires, thus sacrificing their ability to contest air superiority over the Falklands.

In both Gulf Wars, scores of sorties were flown to crater Iraq's runways and keep its air force out of the sky. However, airfield attacks are risky and usually only close an air base briefly, while repairs are made. Therefore, they are justifiable only if it's necessary and worth the risk to attacking aircraft to shut down an airfield or fix the enemy in place for a short period of time. Hitting other airfield targets—such as refueling or rearming sites, command centers, or maintenance hangars—might have longer-term effect.

EXPLOITING VULNERABILITY

Intelligence, surveillance, and reconnaissance play a crucial role in an air superiority campaign. It's essential to have accurate and current knowledge of the enemy's air order of battle, tactics, doctrine, disposition, leadership, capabilities, and intentions. The success of the counterair campaign will often hinge on this.

Surface forces can also play an important role in destroying enemy surface-to-air defenses and in pinning the enemy down or flushing him out.

In 1973, for example, the depth and redundancy of Egyptian air defenses made Israeli air operations hazardous over the

battle area. It was necessary for Gen. Ariel Sharon's forces to cross the Suez Canal and sweep away four Egyptian air defense sites in order for Israeli aircraft to resume operations at an acceptably reduced risk.

In addition, the presence of substantial coalition ground forces in the Gulf Wars forced Saddam Hussein's forces—as well as the Taliban in Afghanistan—into an insoluble dilemma. If they concentrated to meet a ground attack they were vulnerable to air attack. On the other hand, dispersal eliminated their effectiveness in the face of widespread coalition ground forces. An army is never more vulnerable than when it turns to run. At such times a vigorous pursuit can turn a victory into a decisive rout, and nothing pursues like airpower. The synergies of air and ground forces are a key consideration in any campaign.

New technologies also affect air campaigns.

■ **Stealth**—The value and effectiveness of low observable technology was hotly debated prior to the first Gulf War, and skeptics doubted whether it was as good as advertised. All doubts were erased in the skies above Baghdad. Despite the nearly 1,300 F-117 combat sorties flown, no aircraft were even damaged by the enemy. Since then, only one stealth aircraft has ever been lost in combat—an F-117 over Serbia in 1999 (the pilot was rescued). The efficacy of stealth countermeasures is once again a subject of intense debate, but its utility in the near term is not in question.

■ **Precision Guided Munitions**—Stealth, or even modern high-performance aircraft in general, are so complex and expensive that only the richest countries can field them. This is not so, however, regarding PGMs and penetrators, which are true force multipliers.

Iraq's hardened bunkers of reinforced concrete and earth may have been designed to withstand a nuclear attack, but not a direct hit from a well-placed penetration bomb. The proliferation of PGMs and penetrating bombs makes it crucial to seek practical methods for shielding aircraft, command facilities, and other high-value targets from air attack.

■ **C3 in the Cockpit**—New to the air superiority campaign is the abundance of data that can now be piped into the cockpit. Space-based communications and information systems have increased by orders of magnitude the amount of data available to airmen. The result is a worldwide linkage to aircraft with real-time intelligence.

Air superiority continues to be the essential factor in modern military victory. It must be won, and to maintain it requires constant investment and training. It's not an end in itself but a tool to be exploited, and that exploitation will require commanders to understand the most useful ways it can be applied. Although air superiority will not by itself bring victory, it is almost impossible to achieve success without it. ★

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