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AIR FORCE–NAVY INTEGRATION IN STRIKE WARFARE

A Role Model for Seamless Joint-Service Operations

Benjamin S. Lambeth

One of the most remarkable aspects of American joint-force combat capability today is the close harmony that has steadily evolved since the 1991 Persian Gulf War in the integrated conduct of aerial strike operations by the U.S. Air Force and U.S. Navy, along with the latter's closely associated Marine Corps air assets. This under-recognized and little-appreciated aspect of the nation's warfighting posture stands in marked contrast to the more familiar and contested relationship between the two services in the roles and resources arena, where a fundamentally different incentive structure has tended to prevail and where seemingly zero-sum battles for limited defense dollars have appeared to be the natural order of things from one budget cycle to the next. As a former Air Force three-star general and fighter pilot recently remarked on this important point, although there remains "lots to be done at the budget table, tactically the [two] services are [now] bonded at the hip."¹ Indeed, in the words of a former Navy Fighter Weapons School instructor, now the commander of Second Fleet, such integration "is now a part of the culture" of U.S. fixed-wing combat aircrews, regardless of whether the wings they wear on their uniforms are made of silver or gold.²

In this regard, the Air Force and Navy have come a long way since the Vietnam War and its early Cold War aftermath more than three decades ago, when the two services remained cultures apart, operated in wholly separate physical and conceptual worlds, and could claim no significant interoperability features to speak of. Once the unexpected demands of Operation DESERT STORM so starkly dramatized the downside consequences of that absence of interoperability between the two services, however, the Navy, in particular, responded with due

alacrity and began implementing the many needed changes in its equipment, doctrine, and operating practices to accommodate the demise of its former open-ocean mission against Soviet naval forces and the emergence of a need to work more closely with its Air Force sister service in the conduct of joint air operations in dealing with littoral combat challenges around the world.

For its part, the Air Force likewise embraced not only the new demand but also the many new opportunities for working more synergistically with its naval-aviator counterparts in both peacetime training and actual contingency operations. From the most tentative initial stirrings of this early move toward greater interoperability between the two services in the late 1970s, the Air Force and Navy registered ever-greater progress toward synchronized air operations throughout the 1990s, to a point where the fruits of that integration were finally realized during Operation ENDURING FREEDOM over Afghanistan in late 2001 and further clinched by the all but seamless joint combat performance of the two services a year later during the three-week period of major combat in Operation IRAQI FREEDOM.

A BACKDROP OF APARTNESS

The integration of the Navy and Air Force in aerial strike warfare is a fairly recent phenomenon in American military experience. For more than two centuries the Navy was proudly accustomed to operating independently on the high seas, with a consequent need to be completely self-reliant and adaptable to rapidly changing circumstances far from the nation's shores, with the fewest possible constraints on its freedom of action. The nation's sea service was forward deployed from the beginning of its existence and, throughout most of the Cold War, was the only service that was "out there," in and above the maritime commons and ready for action. Largely for that reason, operations integration between the Navy and Air Force was not even a remote planning consideration. On the contrary, the main focus was rather on force *deconfliction* between the two services. Not only figuratively but also literally, the Navy and Air Force conducted their daily routines in separate and distinct operating environments, and no synergies between the two services were produced—or even sought. Not surprisingly, a unique Navy operating culture emerged from this reality that set the Navy clearly apart from the Air Force and its more structured and rule-governed way of conducting its missions.

These widely divergent service approaches to air operations persisted throughout the 1970s and early 1980s, with the final years of the Cold War (after the nation's combat involvement in Vietnam ended in 1973) seeing little significant change from the previous pattern of segregated operations that had been the norm throughout the eight-year air war in Southeast Asia. Throughout

those final Cold War years, the Navy's carrier battle groups figured most prominently in a sea-control strategy that was directed against Soviet naval forces, including long-range and highly capable shore-based naval air forces, in open-ocean engagements around the world. Because the Maritime Strategy of the Reagan administration put the focus of American naval force projection more than a thousand miles away from the most likely focus of any Air Force

It would be hard to overstate the shock effect that DESERT STORM had on the Navy, to say nothing of carrier air, with respect to the newly emergent needs of joint strike warfare.

combat operations in both Europe and the Pacific, such geographic separation, in an apt portrayal, "simply ruled out any concern with or interest in cross-service synergies at the operational or

tactical levels."³ Any combat operations against Soviet forces in the northernmost reaches of the Norwegian Sea or off the Kamchatka Peninsula in the western Pacific would have involved solely the U.S. and Soviet navies, with no other force operations in the area. That accordingly freed the Navy to develop long-range fire-and-forget weapons, like the AIM-54 Phoenix air-to-air missile and the AGM-84D Harpoon antishipping missile, that were unconstrained by any need for concern over the risk of fratricide or the possibility of causing unintended collateral damage should they go astray.

For its part, the Air Force was looking at a very different and more complex operating arena in which friendly and enemy aircraft would be simultaneously airborne and often commingled in the same block of airspace. Unlike the Navy, which was focused literally a thousand miles away—on the open-ocean environment, on NATO's northern flank and the defense of northern Norway, and on Murmansk and the Kola Peninsula of the Soviet Union—the Air Force was preparing itself for joint operations in shared battle space with the Army and with the nation's NATO allies in Central Europe. Given that stark dissimilarity in outlook and mission orientation, the Navy and Air Force, in a fair characterization, "simply thought about and operated within two separate conceptual worlds."⁴

As a result of these widely divergent mind-sets and operating environments, a pronounced culture divide separated the Air Force and naval aviation in the strike-warfare arena. In telling testimony to this divide, Air Force pilots who participated in joint peacetime training exercises with their Navy counterparts during the early post-Vietnam years were often heard to tell horror stories about such (to them) cavalier and undisciplined Navy practices as last-minute unannounced changes in flight schedules, controlling agencies, radio frequencies, operating areas, or even mission profiles. For their parts, Navy pilots who flew in similar joint training exercises routinely complained that overly rigid adherence

to maintenance, operation, and crew-rest requirements greatly hampered the Air Force's ability to be fully flexible in executing its assigned missions. One junior naval aviator in 1991 voiced a commonly heard refrain that neatly encapsulated the essence of the cultural divide from the Navy's perspective: "Naval aviators are fond of saying that Air Force pilots may only do something if it is written somewhere that they can, while Navy pilots may do whatever they want as long as it isn't written somewhere that they can't."⁵

THE WATERSHED OF DESERT STORM

Iraq's sudden and unexpected invasion of Kuwait in August 1990 presented naval aviation, in particular, with a new and unfamiliar set of challenges. During the course of the six-week Persian Gulf War that began five and a half months later, the Navy's carrier force found itself obliged to surmount a multitude of new adjustments the need for which came to light for the first time in that campaign. Few of the challenges that were levied on naval aviation by that U.S.-led offensive, code-named Operation DESERT STORM, bore much resemblance to the planning assumptions that underlay the Maritime Strategy, which had been created during the early 1980s to accommodate a very different set of concerns. Although naval aviators had routinely trained for and were wholly proficient at over-the-beach conventional strike operations, the Navy's carrier battle groups during that period had been geared, first and foremost, to doing open-ocean battle against the Soviet Navy. As such, they were not optimally equipped for conducting littoral combat operations. They also were completely unaccustomed to operating within the Air Force's complex air tasking system for managing the large-force operations involving two thousand or more sorties a day that dominated the DESERT STORM air war.

Simply put, the 1991 Gulf War in no way resembled the open-ocean battles that the Navy had planned and prepared for throughout the preceding two decades. To begin with, there were no opposed surface naval forces or enemy air threat to challenge the Navy's six carrier battle groups that participated in that war. Moreover, throughout the five-month buildup of forces in the region that preceded the war and the six weeks of fighting that ensued thereafter, the Navy did not operate independently, as had been its familiar pattern throughout most of the Cold War, but rather in shared operating areas with the Air Force, Army, and Marine Corps.

With respect to equipment, the naval air capabilities that had been fielded and fine-tuned for open-ocean engagements, such as the long-range AIM-54 carried by the F-14, were of little relevance to the coalition's predominantly overland air-combat needs.⁶ Navy F-14s also were not assigned to the choicest combat air patrol (CAP) stations in DESERT STORM, because, having been

equipped for the less-crowded outer air battle in defense of a carrier battle group, they lacked the redundant onboard target-recognition systems that the rules of engagement promulgated by U.S. Central Command (CENTCOM) required for the denser and more conflicted air environment over Iraq. Relatedly, because of the Navy's lack of a compatible command and control system that would enable receipt of the document electronically, the daily air tasking order (ATO) generated by the Air Force-dominated combined air operations center (CAOC) in Saudi Arabia had to be placed aboard two S-3 antisubmarine warfare aircraft in hard copy each day and flown to the six participating carriers so that the next day's air-wing flight schedules could be written. As for the Navy's other equipment items and habit patterns developed for open-ocean engagements, such as fire-and-forget Harpoon antiship missiles and decentralized command and control, all were, in the words of the former vice chairman of the Joint Chiefs of Staff (JCS), Admiral William Owens, "either ruled out by the context of the battle or were ineffective in the confined littoral arena and the environmental complexities of the sea-land interface."⁷

Because of the Navy's lack of a significant precision-strike capability when the call to deploy for DESERT STORM arose, its six carrier air wings that participated in the campaign were denied certain targets, which were assigned to the Air Force instead, by default. The participating carrier air wings also had to turn down some target-attack opportunities because of their lack of a penetrating munition like the Air Force's Mark 84 improved two-thousand-pound bomb. One strike fighter squadron's after-action report, submitted not long after the Gulf War ended, remarked that the Navy's lack of the sort of precision-attack capability that the Air Force had used to such telling effect in the war "was eloquent testimony that naval aviation had apparently missed an entire generation of weapons employment and development."⁸

POST-GULF WAR ADJUSTMENTS TO NEW DEMANDS

It would be hard to overstate the shock effect that the DESERT STORM experience had on the Navy as a whole, to say nothing of its carrier air component, with respect to the newly emergent needs of joint strike warfare. As one rising naval aviator noted insightfully in 1992 in this regard: "Nearly two decades of narrow focus—on one-shot, small-scale, and largely single-service contingency operations—left naval aviation temperamentally, technically, and doctrinally unprepared for some key elements of a joint air campaign such as Desert Storm."⁹ Admiral Owens put the point even more bluntly four years later: "For the Navy, more than any other service, Desert Storm was the midwife of change. . . . [The war] confirmed the operational doctrines that the Army and Air Force had developed over the previous two decades, but it also demonstrated that the Maritime Strategy—the basic

operational concept driving Navy planning since the early 1970s—did not fit the post–cold war era.”¹⁰

Fortunately, although naval aviation entered the post–Cold War era ill equipped for that era’s new demands, the Navy quickly made the necessary adjustments in the early aftermath of DESERT STORM. In the realm of equipment, it stepped out smartly to upgrade its precision-strike capability by fielding both new systems and improvements to existing platforms, soon achieving a degree of flexibility that it had lacked throughout the six-week Gulf War. First and foremost, it moved to convert the F-14 from a single-mission air-to-air platform into a true multimission aircraft, through the incorporation of the Air Force–developed LANTIRN* infrared targeting system, which allowed the aircraft to deliver laser-guided bombs (LGBs) both day and night.

The Navy leadership also rectified its shortfall in precision-guided-munitions delivery capability, by equipping more F/A-18s with the ability to fire the AGM-84E standoff land-attack missile (SLAM) and to self-designate targets. To correct yet another equipment-related deficiency highlighted by the DESERT STORM experience, naval aviation also undertook measures to improve its command, control, and communications arrangements so that it could operate more freely with other joint air assets within the framework of an ATO. Those measures most notably included gaining the long-needed ability to receive the daily ATO aboard ship electronically.

Finally, in the realm of doctrine, the Navy began to accept the value of strategic air campaigns and the idea that naval air forces must become more influential players in them. As Admiral Owens noted as early as 1995, “the issue facing the nation’s naval forces is not whether strategic bombardment theory is absolutely correct; it is how best to contribute to successful strategic bombardment campaigns.”¹¹ In a major move to formalize this new thinking, the Navy and Marine Corps on 28 September 1992 promulgated a fundamentally new strategy for the naval establishment in a white paper called . . . *From the Sea*.¹² That new mission orientation put the main emphasis on power projection and explicitly envisioned naval forces as working jointly with both Air Force and Army elements to control events ashore. Importantly in this respect, Admiral Owens later stressed that “naval aviation must see itself as a component part of the full air power the nation can bring to bear on military problems, especially in support of land and air campaigns.”¹³

There were notable changes as well in naval aviation tactics, techniques, and procedures to make the nation’s sea-based strike fighters more compatible with the needs of joint warfare. After DESERT STORM, naval aviation’s emphasis

* LANTIRN is an acronym for “low-altitude navigation and targeting infrared for night.”

shifted from air superiority and battle-group defense to multimission operations against heavily defended targets ashore. Although the air-to-air skill set was retained, the focus of naval fighter training in the 1990s took a pronounced swing toward ground-attack operations, with a predominant stress on day and night precision strike. The effect of these improvements in equipment, doctrine, and concepts of operations was to transform carrier-based air power from a force configured mainly for sea control to one able to exploit sea control as a basis for enabling and participating in joint strike operations ashore.

To be sure, despite these nascent trends toward more harmonious cooperation in joint strike warfare, a number of disconnects between the Navy and Air Force persisted throughout the 1990s. One recurring manifestation of the cultural divide that still separated the two services in air warfare came in the form of continued expressions of Navy discomfiture over the Air Force–inspired ATO

During the Cold War a pronounced culture divide separated the Air Force and naval aviation in the strike-warfare arena.

and the way in which, at least in the view of many naval aviators, it sometimes made less than the best use of the nation’s increasingly capable carrier-based strike

forces. Ever since their first exposure to operating in an ATO context during DESERT STORM, naval aviators had been inclined to chafe, sometimes quite insistently, at the alleged rigidity of that document and at its perceived insensitivity to certain unique features of sea-based air power, such as the inescapable operating requirements and limitations imposed by the carrier deck cycle.

This persistent Navy discontent with the air tasking process, which was almost exclusively a mission-management artifact of the Air Force, was especially apparent during the contingency-response operations that were conducted by the Navy’s carrier air wings, in conjunction with Air Force and allied air assets, over the Balkans in the 1990s. After the first of those early joint evolutions, Operation DELIBERATE FORCE, ended in success, there were recurrent expressions of Navy dissatisfaction over the Air Force’s centralized control of mission tasking, especially with respect to the air tasking message (ATM), which specified munition types to be used against particular targets and numerous other mission particulars.

Some of those complaints merely reflected a less than full understanding of the air tasking process and what lay behind it. Most of them, moreover, would have been voiced under just about any alternative mission-management arrangements as well. Often overlooked was the fact that NATO operations over the former Yugoslavia were highly constrained exercises in force employment, in which it was not possible for CAOC planners to make optimal use of *any* air assets, Navy or any other. In those cases, the ATM often provided a convenient

lightning rod for Navy complaints that were actually prompted by severe operating limitations imposed by U.S. political leaders in the interest of avoiding fratricide, collateral damage, noncombatant civilian casualties, or other violations of standing rules of engagement, with the intent both to reassure reluctant NATO allies and to prevent tactical mistakes from producing undesirable strategic consequences.

In all, the single most influential factor in bringing the two services together during the 1990s was the nation's ten-year experience of operations NORTHERN WATCH and SOUTHERN WATCH, in which both Air Force land-based fighters and Navy carrier-based fighters jointly enforced the United Nations–imposed no-fly zones over northern and southern Iraq that had been first put into effect shortly after DESERT STORM. That prolonged aerial policing function proved to be a real-world operations laboratory for the two services, and over time it was the main crucible in which their integration in strike warfare was forged. By conscious choice, both services sent their best tacticians and intelligence officers to serve temporary-duty assignments in the supporting CAOCs in Turkey and Saudi Arabia, working together in the joint planning and execution of those nonstop air operations over Iraq. Their working relations became more and more transparent and seamless. Viewed in hindsight, this convergence was not just a result of the Navy's need to acquire the wherewithal for remaining relevant in joint warfare but even more a direct outgrowth of conscious leadership determination in *both* services, based in considerable part on steadily evolved mutual trust relations, to move toward a more common operating culture when it came to coordinated joint-force execution.

A CONVERGENCE OF INTEGRATION OVER AFGHANISTAN

The terrorist attacks carried out against the United States on September 11, 2001, levied upon the nation a demand for a deep-strike capability in the remotest part of Southwest Asia, where the United States maintained virtually no access to forward land bases. That unusual demand required the Navy's carrier force to provide the bulk of strike-fighter participation in the joint air war over Afghanistan that ensued soon thereafter.¹⁴ To be sure, Air Force heavy bombers also played a prominent part in that air-centric campaign, code-named Operation ENDURING FREEDOM. Nevertheless, carrier-based aviation operating from stations in the north Arabian Sea substituted almost entirely for what would have been a far larger complement of land-based strike fighters in other circumstances, because of an absence of suitable forward operating locations close enough to the war zone to make the large-scale use of the latter practicable.

Between 7 October, when ENDURING FREEDOM began, and 23 December, when the major combat phase ended with the rout of the ruling Taliban, some

6,500 strike sorties were flown by CENTCOM altogether. Navy fighters accounted for 4,900 of the strike sorties flown during that period, 75 percent of the total. For its part, although the Air Force flew only a quarter of the strike missions, its aircraft dropped 12,900 munitions, adding up to more than 70 percent of the total. The heavy B-52s and B-1s flew only 10 percent of the total strike missions, yet they delivered 11,500 of the 17,500 munitions, accounting for 65 percent of the total and 89 percent of all the munitions dropped by the Air Force.¹⁵

Much energy was wasted during the war's early aftermath in parochial fencing between some Air Force and Navy partisans over which service deserved credit for having done the heavier lifting in ENDURING FREEDOM, with Air Force advocates pointing to the preponderance of munitions and overall tonnage dropped by that service and Navy proponents countering that it had been carrier-based aircraft, in the end, that had flown the overwhelming majority of combat sorties and that had performed nearly all of the "true" precision LGB attacks. That contretemps was entirely unhelpful to a proper understanding of what integrated Air Force and Navy strike operations had actually done to produce such a quick and lopsided win over the Taliban and al Qaeda. True enough, Air Force F-15Es and F-16s operating out of the Persian Gulf flew only a small percentage of the overall number of fighter missions conducted in ENDURING FREEDOM. Yet Air Force B-1 and B-2 bombers, with very few exceptions, dropped nothing but satellite-aided precision munitions of various types, and Air Force B-52s dropped large numbers of accurate Joint Direct Attack Munitions (JDAMs), in addition to unguided Mark 82 five-hundred-pound general-purpose bombs. It accordingly is a toss-up as to which service predominated in the precision-strike arena. Arguing over whether Navy or Air Force air power had been more important in achieving the successful outcome of ENDURING FREEDOM is on a par with arguing over which blade in a pair of scissors is more important in cutting paper.

The fact is that, for the first time in the history of joint warfare, Operation ENDURING FREEDOM showed real synergies in Air Force and Navy conduct of integrated strike operations. Navy fighters escorted Air Force bombers into Afghan airspace until assured allied air supremacy was established. For its part, the Air Force, along with the United Kingdom's Royal Air Force (RAF), provided roughly 80 percent of the tanker support that allowed Navy carrier-based fighters to reach central and northern Afghanistan. That support, in turn, enabled sea-based strikes far beyond littoral limits as well as a sustained carrier-based strike-fighter presence over remote target areas for hours, if needed, for on-call strikes on time-sensitive targets.

In addition, for the first time naval aviators found themselves occupying key CAOC positions, ranging from the deputy combined-force air component

commander (CFACC), then–rear admiral David Nichols, on down. These positions included that of the night CAOC director; the night guidance, apportionment, and targeting cell director; and codirectors or principal deputies for all key CAOC divisions (strategy, combat plans, combat operations, and ISR*).¹⁶ In hindsight, two knowledgeable commentators on the evolution of the Air Force–Navy relationship since DESERT STORM were more than a little prescient in having predicted, on the very eve of the September 11th attacks, that the coming year would witness “a triumph of the synergistic view of jointness . . . where the Navy and Air Force are concerned,” and in turn a “closing of a promise-reality gap” that would yield “effects-based capabilities that are good for our regional commanders in chief and right for our nation.”¹⁷

FURTHER CONVERGENCE IN OPERATION IRAQI FREEDOM

If the air war over Afghanistan was tailor made for integrated Air Force and Navy strike operations, the three-week campaign a year later to topple Saddam Hussein would prove to be no less so. During that second campaign’s unpreplanned opening night on 19 March 2003, in response to what President George W. Bush and his principal deputies believed at the time to have been solid last-minute intelligence reporting that Hussein and his two sons were meeting at a certain location in the Baghdad suburbs, Navy EA-6Bs provided electronic jamming support for Air Force F-15Es and RAF Tornado GR4s. The latter opened a penetration corridor for the two Air Force F-117 stealth attack aircraft that led the ultimately unsuccessful decapitation attempt, followed shortly thereafter by forty Navy theater land-attack missiles fired against the suspected meeting site. As had been true in operations ALLIED FORCE and ENDURING FREEDOM, the availability of Navy EA-6B jamming support was an ironclad go/no-go criterion for all IRAQI FREEDOM strike missions, including those that involved stealthy Air Force B-2s and F-117s.

Later the next morning, when the Iraqis fired several theater ballistic missiles at Kuwait in a response to the initial U.S. attack, the Navy’s USS *Higgins* (DDG 76), a guided-missile destroyer on station in the north Arabian Gulf, transmitted launch-point information to the CAOC, which in turn targeted two Air Force F-16s that geolocated and destroyed the Iraqi missile launchers. Similarly, Air Force B-1 bombers used their onboard moving-target-indicator radar in an ISR role to geolocate time-sensitive targets and transmit their coordinates to Navy strikers. Several days later, the Air Force E-8 Joint Surveillance Target Attack Radar System (JSTARS) aircraft was used as a dynamic retasking tool to direct and redirect Navy strike aircraft during a three-day sandstorm that occurred during the campaign’s first week, as was a pair of Air Force RC-135 Rivet Joint aircraft

* ISR: intelligence, surveillance, and reconnaissance.

when Navy satellite-aided JDAMs were needed to replace LGBs that would not function to their fullest potentials during the sandstorm. Once the sandstorm abated, Air Force RQ-1 Predator unmanned aerial vehicles provided accurate target geolocation for Navy JDAM strikes. Air Force Special Operations Command joint terminal attack controllers on the ground also provided updated target coordinates for Navy JDAM attacks.

Operation IRAQI FREEDOM also set a new record for close Navy involvement in the high-level planning and conduct of joint air operations. As the deputy CFACC once again, Rear Admiral Nichols was not just the “senior naval representative” in the CAOC but the alter ego, to all intents and purposes, to the Air Force CFACC, then–lieutenant general T. Michael Moseley, when it came to commanding and managing the air war. In addition, alternating with Colonel Douglas Erlenbusch of the Air Force, Captain Russell Penniman of the Navy was codirector of the combat plans division, which did all of the target analysis and weaponeering.¹⁸ Captain (now Rear Admiral) William Gortney was the naval air liaison coordinator. That representation and more stood in stark contrast to the Navy’s less gratifying experience twelve years before during DESERT STORM, when the overwhelming majority of the targeting cell’s staff had been Air Force officers, its Navy members both too few in number and far too junior in rank to influence the day-to-day decision making.

In sum, Operation IRAQI FREEDOM was a true joint-service effort involving wholly integrated Air Force and Navy strike operations. In the apt words of two historians writing an early synopsis of the war, that effort saw “little of the petty parochialism that too often marks interservice relations within the [Washington] Beltway.”¹⁹ Speaking as the combined-force maritime component coordinator for IRAQI FREEDOM, Admiral Timothy Keating characterized the operational payoff of all this as “joint warfighting at the highest form of the art I’d ever seen. . . . There was understanding, friendship, familiarity, and trust among all the services and special forces working for [Army] General [Tommy] Franks [the overall joint-force commander for the three-week campaign]. He did, in my view, a remarkable job of engendering that friendship, camaraderie, and trust. In fact, he insisted on it. . . . There was no service equity infighting—zero.”²⁰

EMERGENT TRENDS IN AIR FORCE–NAVY INTEGRATION

The performance of Air Force and Navy strike assets in the first two American wars of the twenty-first century bore ample witness to the giant strides that have been made in the integration of the two services’ air-warfare repertoires since DESERT STORM. The two wars saw naval aviation fully integrated into the joint and combined air operations that largely enabled the successful outcomes in each case. They also showed increased Air Force and Navy acceptance of effects-based

thinking and planning, as well as a common use of the joint mission-planning tools that the Air Force had refined during the decade after DESERT STORM. As attested by the Navy's experiences in both ENDURING FREEDOM and IRAQI FREEDOM, the CAOC-generated air tasking order is now disseminated electronically to carrier strike groups in an easily usable form and is updated hourly for each carrier via secure e-mail. Moreover, prompted by the experiences of ENDURING FREEDOM and IRAQI FREEDOM, prospective carrier air-wing commanders and other rising naval aviation leaders now routinely spend upward of a hundred days forward deployed in the Central Command Air Forces' new combined air operations center at Al Udeid Air Base in Qatar for operational-planning familiarization in senior CAOC staff assignments before assuming their new command responsibilities. They also routinely attend the Air Force's strike planning course at Hurlburt Field, Florida, and later, having moved on to postcommand billets, its week-long CFACC course at Maxwell Air Force Base, Alabama.

This convergence was not just a matter of the Navy's accommodating to the Air Force by seeking ways to work more easily with the latter's ingrained practices. At about the time that CENTCOM was gearing up for the major combat phase of IRAQI FREEDOM, the Air Force chief of staff, General John Jumper, frankly conceded that some criticism of the ATO process had a legitimate basis. Said General Jumper: "We take a rap in the Air Force about having a 72-hour ATO cycle. . . . It is really not true. It's the planning cycle that is 72 hours. The execution cycle can be instantaneous." However, he went on to note, "There is a point to that argument. . . . You go into an AOC [air operations center] today, and what will you see? Tribal representatives sitting down in front of tribal workstations, interpreting tribal hieroglyphics to the rest of us who are on watch. And then what happens? They stand up and walk over to another tribal representative, and reveal their hieroglyphics, which are translated by the other tribe into its own hieroglyphics and entered into its own workstation."²¹ His point was a need for tighter horizontal integration of command and control both within each service and across service lines in the interest of shortening the sensor-to-shooter connection.

In this regard, with the advent of the global command-and-control system, Link 16, and related cross-service connectivity improvements, the prospect has finally emerged of joint operations by the two services that entail what two early commentators on air-naval integration called "true interoperability, functional integration, and order-of-magnitude improvement in capability."²² This welcome prospect has arisen in part from the Navy's development of cooperative engagement capability (CEC) during the waning years of the Cold War. Responding to the stress in that period on space-based surveillance and to the need to be capable of reacting to a common operating picture, CEC laid down the

needed groundwork for closer operational convergence of the Navy with the Air Force. As early as 1993, the Navy demonstrated cooperative engagement and its potential by linking the Commander in Chief, U.S. Atlantic Fleet, with the Air Force's Air Combat Command and the Army's Forces Command, and subsequently Fleet Marine Force, Atlantic as well. Thus were planted the seeds of a growing convergence by the Air Force with the Navy's concept of network-

The fruits of integration were finally realized over Afghanistan in late 2001 and further clinched by the all but seamless joint combat performance in Operation IRAQI FREEDOM.

centric warfare. As the commander of Naval Air Systems Command remarked in 1999, "We have spent this whole decade concentrating on better interoperability. We learned a lesson in

Desert Storm that we have to pay more attention to operating with our counterparts. . . . We must be able to communicate freely—both in planning and in operations—and many of the systems we have in development or deployed today are aimed specifically at improving that ability."²³

As a result of these developments, the second Gulf War, in 2003, featured a more closely linked U.S. force than ever before. As one CENTCOM staffer put it, "everything that had a sensor was connected."²⁴ To note a representative example, the aircraft carrier USS *Abraham Lincoln* had a joint "fires" network and CEC system that allowed strike-group participants to share radar information and fire missiles on the basis of off-board information provided by other ships in the battle group. This capability was expanded with the arrival of the carrier USS *Nimitz* and the first Navy E-2C Hawkeye aircraft equipped with the system. The joint fires network allowed carriers to receive imagery from airborne platforms and signals intelligence from the Air Force's RC-135 Rivet Joint. Similarly, the Multifunction Information Distribution System, a nodeless and secure, Link 16-based, jam-resistant tactical data link, also made a major difference, by enabling enhanced interoperability with other joint and multinational platforms equipped with that capability.²⁵

As for other signs of progress toward greater cross-service integration in strike warfare, there have been steady improvements in joint operations and training between the Air Force and Navy since American combat involvement in Vietnam ended more than three decades ago. For years, naval aviators have routinely taken part in the Air Force's recurrent RED FLAG, a realistic large-force employment training exercise that began in late 1975 and continues to be conducted roughly six times a year on the instrumented range complex north of Nellis Air Force Base, Nevada. Also, the Air Force's and Navy's undergraduate pilot training (UPT) programs are now fully integrated, with Air Force officers commanding Navy primary UPT squadrons and vice versa. The two services

continue as well to provide exchange officers to each other's line squadrons and flight-test units on a regular basis; a Navy lieutenant commander, for instance, was recently assigned to fly the F-22A Raptor fifth-generation Air Force fighter with the 422nd Test and Evaluation Squadron at Nellis. In addition, Navy E-2C crew members regularly fly aboard the Air Force's E-3 AWACS* whenever there is an operational need for their presence at the console. Similarly, ever since the Air Force retired its EF-111 electronic-warfare aircraft, not long after DESERT STORM, Air Force aircrews have routinely been assigned to full tours of duty with the Navy's EA-6B shore-based expeditionary squadrons.

Furthermore, there have been recurrent cross-communication and cross-fertilization between the Air Force's and Navy's weapons schools in an instructor exchange program that has experienced ups and downs since its inception during the late 1970s. During the late 1980s and early 1990s, when the Air Force Weapons School produced three classes per year, the instructor exchange was a standard, twice-yearly exercise. However, when the Air Force Weapons School went to two classes a year and the Navy's TOPGUN program moved from Naval Air Station Miramar, California, to NAS Fallon, Nevada, those initial exchanges began to die on the vine. There was none from 1999 until the most recent commander of the Air Force Weapons School's F-15C Division pressed hard to re-establish the program, the first renewed exchange taking place in June 2006. The exchange was adjudged by all participants to have been a great success, with useful and important lessons learned by both sides. Thanks to that success, a repeat performance was scheduled for June 2007, the F-15C Division's commander having arranged to host a TOPGUN deployment to Nellis to keep a resurgent yearly exchange program going.²⁶

Perhaps most constructively of all, the two services continue to bring their respective forces and combat-support assets together in a variety of joint training and experimentation exercises aimed at further honing their interoperability and extracting the most from their synergistic potential in effective strike operations. One such recent exercise brought Air Force and Navy air assets together in the Alaskan operating environment in a scenario that focused on homeland security and entailed military responses to a range of simulated natural disasters and terrorist events. That exercise, the 2005 iteration of the annual NORTHERN EDGE series, featured the involvement of both a Navy surface maritime action group and Air Force, Navy, and Coast Guard aircraft, which took part in various at-sea deterrence and defense operations over five days. Significantly, during this evolution, the Navy exercised for the first time tactical control of an Air Force AWACS in a maritime-operations scenario, and the participating Air Force F-15Es

* AWACS: Airborne Warning and Control System.

were controlled by the guided-missile destroyer USS *Russell* (DDG 59). After the exercise ended, the maritime action group commander, Captain Vic Mercado, reported that “the coordinated joint surveillance resulting in the call for a show-of-force by the [Air Force] fighters was a highlight for the maritime operations, because it demonstrated a key exercise objective of cooperation and interoperability among the services for homeland defense.”²⁷

Most recently, joint Air Force and Navy involvement in realistic large-force training in a maritime setting occurred during Exercise VALIANT SHIELD '06, a five-day evolution conducted in the vicinity of Guam from 19 to 24 June 2006. Admiral Gary Roughead, USN, then commander of U.S. Pacific Fleet, served as joint force commander for the exercise, with Lieutenant General David Deptula, commander of U.S. Pacific Command Air Forces' Kenney Warfighting Headquarters at Hickam Air Force Base, Hawaii, as his joint-force air component commander (JFACC) and Rear Admiral Mark Emerson, commander of the Naval Strike and Air Warfare Center at Fallon, assigned as deputy JFACC. VALIANT SHIELD involved the participation of some twenty-two thousand personnel, 280 aircraft, and thirty ships, including the aircraft carriers *Kitty Hawk*, *Abraham Lincoln*, and *Ronald Reagan* and their respective air wings. The largest military exercise conducted in Pacific waters since the Vietnam War, it represented the first installment of what will become a regular biennial exercise series involving various U.S. service branches and communities.

After the exercise ended, with nearly two thousand sorties having been flown by all participating aircraft, General Deptula characterized it as “an opportunity to interface large numbers of [American] air and sea forces together in a unique environment and to work out some of what we call frictions. . . . You find out things that might not go as you would have anticipated or planned. These types of exercises allow us to work out those challenges in advance.” On the synergy that was sought and achieved during the course of the joint-force exercise, he added: “We’re not interested in what Navy or Air Force airplanes are doing separately. We take the approach that air power is air power, and we’re interested in ensuring [that] we take a unified stance in working those assets together with our sea-based assets in achieving the commander’s overall objectives.”²⁸

A NEW SYNERGY OF LAND- AND SEA-BASED STRIKE WARFARE

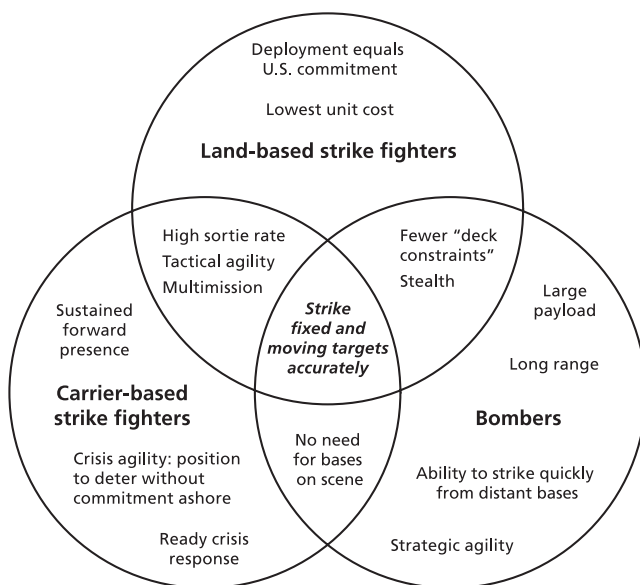
The unprecedentedly close integration of Air Force and Navy strike operations during the first two American wars of the twenty-first century handily confirmed the observation of a respected ship-design specialist when he wrote in 1998 that “carrier-based and land-based tactical aircraft, as well as the CONUS [continental United States]-based Air Force bomber force, are intertwined in their support of each other.”²⁹ To be sure, the two services have long paid lip service to

their mutually reinforcing potential in their declaratory rhetoric. Yet in the increasingly competitive annual budget battles within the Pentagon, the strike-warfare components of the Air Force and Navy have all too often appeared as though they were mainly devoted to putting each other out of business.

The real-world experience described above, however, strongly suggests that when it comes to the crucial matter of integrated strike-warfare operations, the two services are, and should duly regard one another as, natural allies in the roles and resources arena. They did not compete with each other in Operation ENDURING FREEDOM or IRAQI FREEDOM but rather supported one another in the successful pursuit of joint campaign objectives. Indeed, when viewed from an operational rather than a bureaucratic perspective, the Air Force's and Navy's long-standing involvement in air-delivered conventional force projection are complementary rather than competitive in the service of joint force commanders; land-based bombers and fighters and carrier-based fighters are not duplicative and redundant but rather offer overlapping and mutually reinforcing as well as unique capabilities for conducting joint strike warfare (see the Venn diagram, which captures this unique interrelationship).³⁰

For example, Air Force long-range bombers can penetrate deeper beyond littoral reaches than can carrier-based strike fighters supported solely by organic tanking. They also can launch directly from their home bases in the United States, if no carrier strike group is positioned within immediate reach of a designated target area. Unlike bombers, however, carrier air power can provide a sustained presence as long as may be required over a target area once it is in place and provided with the requisite nonorganic tanker support. The greatest liability of aircraft carriers for immediate crisis response is that they may not be close enough on short notice to where they are most needed. In sharp contrast, the greatest advantage of long-range bombers is that they can be over a target complex anywhere in the world within twenty hours of takeoff. The downside for bombers, however, is that they cannot loiter for long or regenerate striking power

ATTRIBUTES OF DIFFERENT FORMS OF AIR POWER



Source: Reproduced from Benjamin S. Lambeth *Combat Pair: The Evolution of Air Force–Navy Integration in Strike Warfare*, MG-655-AF (Santa Monica, Calif.: RAND Corporation, 2007), pp. xi, 83.

ated target area. Unlike bombers, however, carrier air power can provide a sustained presence as long as may be required over a target area once it is in place and provided with the requisite nonorganic tanker support. The greatest liability of aircraft carriers for immediate crisis response is that they may not be close enough on short notice to where they are most needed. In sharp contrast, the greatest advantage of long-range bombers is that they can be over a target complex anywhere in the world within twenty hours of takeoff. The downside for bombers, however, is that they cannot loiter for long or regenerate striking power

once their munitions have been expended, whereas carriers—especially with more than one on station—can offer persistence once they are in place.

Therein lies the synergy offered by Air Force bombers and land-based fighters and Navy carrier air wings when employed in an integrated fashion, as was amply demonstrated over Afghanistan and Iraq during the first two American wars following the terrorist attacks of September 11, 2001. As one commentator noted in this regard long before those two wars bore compelling witness to his observation, “bombers are quick to respond over vast distances to deliver very large bomb loads to an increasing variety of targets, but they are not as responsive to quick-turnaround requirements. Carrier air provides a visible presence and does not need anyone’s permission to ‘be there,’ but has limited assets and potentially long deployment times. Theater-based attack air has the potential to provide quick turnaround in high numbers and can deploy relatively quickly but is dependent on a dwindling number of forward bases. In short, each element has strengths and weaknesses. To shortchange any one area is to hamstring the nation’s ability to protect its global interests.”³¹

One area in particular in which land-based and sea-based air power has a symbiotic relationship that warrants further nurturing has to do with nonorganic in-flight refueling. As was shown during operations ENDURING FREEDOM and IRAQI FREEDOM, the participating Navy carrier air wings plainly needed the support of long-range Air Force and allied tankers to generate mission-effective sorties on a sustained basis. Yet the tankers also needed the protective screening against potential enemy threats that was offered by Navy fighters in a situation in which land-based fighters were unavailable in sufficient numbers due to the lack of adequate regional basing. For his part, especially in the case of Operation ENDURING FREEDOM over remote Afghanistan, the air component commander needed *both* force elements in order for the nation’s air weapon to offer its greatest contribution to joint warfare, a fact that bore out the observation of one Air Force advocate almost a decade before that “there is a place on the team for *all* the nation’s land, sea, air, and space forces,” with the only real question being one of appropriate mix and affordability.³²

In both wars, to sum up, each service brought a needed comparative advantage to the fight. In the case of ENDURING FREEDOM, Air Force bombers flew only around 10 percent of the total number of combat sorties but dropped roughly 80 percent of the ordnance, including the preponderant number of satellite-aided JDAMs. For its part, although the Navy needed the support of Air Force tankers to be mission effective, its sea-based strike fighters operating off the coast of Pakistan from the north Arabian Sea provided an essential combat capability in a part of the world where the Air Force both lacked the needed access to operate its fighters most efficiently and remained limited in the number

of fighter sorties it could generate even after it finally achieved its needed access. The reason for the latter was the substantially greater distances to Afghanistan from forward land bases in the Persian Gulf that demanded fighter missions lasting as long as fifteen hours, which were unsustainable by the Air Force over the long haul.

In both cases, carrier air power, long-range bombers, land-based tankers, and land-based fighters were all eventually available and ready for CFACC tasking when the time came, and all four force elements were crucial to the timely achievement of the joint-force commander's declared objectives. Rather than continuing to engage in pointless either-or arguments over carrier versus land-based air power that miss this overarching point, Air Force and Navy proponents should instead be using their recent combat experience as a model for seeking ways, as one writer put it over a decade ago, to "enhance the synergy of the air power triad of long-range projection forces" consisting of bombers, land-based fighters, and sea-based fighters that, taken together, make up the nation's overall air power equation.³³ The former commander of Naval Air Force, U.S. Atlantic Fleet, Vice Admiral John Mazach, gave clear voice to this critically important point when he reflected after the Afghan air war: "Rather than pitting one variant of air power against the other, . . . Enduring Freedom convincingly demonstrated that such 20th-century interservice rivalries have no place in the 21st-century U.S. warfighting establishment. The operation was remarkable for its degree of seamless interoperability between the U.S. Air Force and the Navy–Marine Corps team's sea-based aviation. . . . In short, aircraft carriers and [land-based] bombers should not be viewed as competitors for resources, but as partners able to leverage unique synergies on the modern battlefield."³⁴

FUTURE CHALLENGES AND OPPORTUNITIES

Air Force and Navy integration in aerial strike warfare has shown remarkable progress in the nearly two decades since DESERT STORM, when such integration could be fairly said to have been all but nonexistent. By the frank admission of key participants in both services, that process still has a way to go before it can be rightly described as having fully matured. Nevertheless, there can be no doubt that the strike-warfare arena is now by far the most developed area of force integration in the nation's joint-operations repertoire. Indeed, one can safely say that it has now progressed to a point where it can be showcased as an object lesson in the sorts of closer integration that can be successfully pursued by the Air Force and Navy in other mission areas where the air and maritime operating mediums intersect, as well as by the Air Force and Army, for that matter, when it comes to joint air-land operations.³⁵

As for still-unresolved issue areas between the two services where further work can be done in the interest of closer Air Force–Navy integration, senior leaders in each service have often cited continued communications shortcomings as one important problem area in need of further attention. Within that arena, bandwidth limitations remain, by all accounts, a major constraint on the implementation of many good-in-principle ideas in the realm of C4ISR integration that could bring the services more closely together as a joint warfighting team. One step toward a possible resolution, in the views of both Air Force and naval warfighters, would be a dynamic bandwidth management system that automatically prioritizes incoming messages.

Another persistent sore spot between the Air Force and Navy, at least from the Navy’s perspective, has to do with a rapidly looming problem in the electronic-attack mission area. When the Air Force decided to retire its twenty-four aging EF-111 Raven electronic jammer aircraft not long after DESERT STORM, primarily because of excessive upkeep costs, the Navy and Marine Corps picked up the tactical electronic-attack mission with their now greatly overworked EA-6B Prowlers, with the result that those aircraft became, to all intents and purposes, high-demand/low-density national assets. That arrangement has, by and large, worked satisfactorily until now, but the EA-6Bs are rapidly running out of service life, the first replacement EA-18G Growlers will not enter fleet service until 2009 at the earliest, and the interservice memorandum of agreement that made the Navy the lead service in the provision of standoff jamming after DESERT STORM expires in 2011. Accordingly, senior naval aviation leaders insist that the Air Force will soon have to decide, conjointly with the Navy, what it intends to do by way of proceeding with timely gap-filler measures.³⁶

Still other possible joint ventures worth exploring in the training arena by the Air Force and Navy might include

- More recurrent exercises between the two services, to include greater Air Force involvement in Navy carrier air-wing predeployment workups at Naval Air Station Fallon and more Navy participation in Air Force RED FLAG and other large-force training evolutions, as instruments for spotlighting persistent cross-service friction points
- Greater joint reliance on distributed mission simulation, which will entail high buy-in costs but can offer substantial long-term payoffs as fuel and associated training costs continue to soar
- A more holistic look at the joint use of training ranges, perhaps with a view toward ultimately evolving to a truly national range complex

- More comprehensive joint use of realistic adversary threats in training, not only in air but also in space and cyberspace operations
- Extending integrated air-warfare training to the surface and subsurface Navy
- Enlisting the real-time involvement of air operations centers worldwide.

Many such initiatives are already being cooperatively pursued, or at least carefully considered, by the Air Force Warfare Center at Nellis Air Force Base and the Naval Strike and Air Warfare Center at Naval Air Station Fallon, Nevada, with the primary limiting factor being insufficient funds to support them.

As for additional areas of possible closer Air Force and Navy cooperation that pertain more to investments in equipment and hardware capability, the two services could usefully consider

- Continued pursuit of ways of bringing their connectivity systems into closer horizontal integration
- Greater attention to exploiting the promise of new electronic-warfare means in joint warfare
- Getting the greatest operational leverage for the least cost out of the high-commonality F-35 multirole combat aircraft that both services will be acquiring in the coming decade
- Further coordination in setting agreed integration priorities.

Finally, in the studies and analysis arena, one potentially high-payoff initiative that would cost essentially nothing beyond a determined Air Force and Navy effort to devote the right talent to it would be a careful review of any and all archived aircrew mission reports and other records associated with past training exercises and actual contingency-response operations since DESERT STORM in search of any friction points that may still be in need of cooperative attention and correction by both services.

Even with this much room remaining for further progress, however, the overall record of Air Force and Navy accomplishment in integrated air-warfare planning stands as a resounding good-news story that is a credit to each service both separately and together. As such, it offers a role model for what can be done along similar lines elsewhere, not just in the interface between air and maritime operations, but even more so in the still-troubled relationship between the Air Force and Army when it comes to the most efficient conduct of joint air-land warfare. Furthermore, the operational integration described above had to overcome multiple barriers and the most deeply ingrained resistance to change in both services. The fact that organizations, especially military organizations, tend to resist rather than

embrace change makes the history and experience described above all the more remarkable.

More encouraging yet, thanks to the guiding role played by individuals in both services with the right focus and a determination to act on it, there is now a well-ensconced successor generation in place in both the Air Force and the Navy who grew up as line aircrew members during the formative years of this integration process. Those individuals have since migrated through such midlevel positions as CAOC night coordinators, combat plans and operations staffers, and strategy division principals to the more senior flag ranks and positions that will help them ensure that the strike-warfare communities in both services continue to pursue an increasingly common operational culture. Today, such commonality of purpose at the operational and tactical levels has become more important than ever as the nation finds itself increasingly reliant on the combined-arms potential that is now available in principle to all services for continuing to prosecute counterinsurgency and counterterrorist operations, while hedging also against future peer or near-peer competitors at a time of almost unprecedented lows in annual spending for force modernization.

NOTES

- This article is extracted and adapted from the author's recent RAND study *Combat Pair: The Evolution of Air Force–Navy Integration in Strike Warfare*, MG-655-AF (Santa Monica, Calif.: RAND Corporation, 2007).
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 4. *Ibid.*
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 6. James A. Winnefeld and Dana J. Johnson, *Joint Air Operations: Pursuit of Unity in Command and Control, 1942–1991* (Annapolis, Md.: Naval Institute Press, 1993), p. 115.
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 11. *Ibid.*, p. 96.

12. The full citation of the 17-page document was U.S. Navy Dept., . . . *From the Sea: Preparing the Naval Service for the 21st Century* (Washington, D.C.: 1992).
13. Owens, *High Seas*, p. 49.
14. For a full treatment of that joint air war, see Benjamin S. Lambeth, *Air Power against Terror: America's Conduct of Operation Enduring Freedom*, MG-166-CENTAF (Santa Monica, Calif.: RAND Corporation, 2005).
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16. The first CAOC director for ENDURING FREEDOM, Air Force then–Maj. Gen. David Deptula, summed it up this way: "What was amazing to me in the CAOC was the seamless nature of the way the components worked. . . . It was just great, it was so refreshing, particularly between the SOF folks, the Navy, and us [in the Air Force]. . . . I have good things to say about the Navy. It really, really worked well in the CAOC." Comments by General Deptula on an early draft of the author's RAND study *Air Power against Terror*, 24 January 2004.
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30. This figure is a development of a most instructive graphic that originally appeared in David A. Perin, Angelyn Jewell, Barry F. McCoy, and Stephen C. Munchak, *Comparing Land-Based and Sea-Based Aircraft: Circumstances Make a Difference* (Alexandria, Va.: Center for Naval Analyses, May 1995).
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32. Col. Brian E. Wages, USAF (Ret.), "Circle the Carriers: Why Does 'Virtual Presence' Scare the Navy?" *Armed Forces Journal International* (July 1995), p. 31 [emphasis added].
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34. Vice Adm. John Mazach, USN (Ret.), "The 21st-Century Triad: Unconventional Thinking about the New Realities of Conventional Warfare," *Sea Power* (March 2002), p. 53.
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the author, 2006 annual meeting of the Tailhook Association, Reno, Nevada, 8 September 2006; Rear Adm. Mark Emerson, USN, Commander, Naval Strike and Air

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