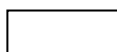


**REACHING GLOBALLY, REACHING POWERFULLY:  
THE UNITED STATES AIR FORCE IN THE GULF WAR**



**A REPORT**

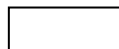
**SEPTEMBER 1991**



## ***To Those Who Fell In Desert Storm***

*". . . they are marked out not merely by the inscription over a grave in their own country but in other lands also by an unwritten memory, recording their spirit more than their actions, which lives on in the minds of men. Emulate them, then, in your own lives. . ."*

*--from the funeral oration of Pericles,  
during the Peloponnesian War*



## PROLOGUE

A year ago, the United States sent its finest citizens in the defense of freedom. For months, Americans watched and wondered what the outcome would be; whether aggression would go unchecked, whether the military services could adequately fulfill the tasks for which they had prepared. Then came the violence of Desert Storm which, true to its name, broke suddenly and furiously, as the combined power of American and coalition forces decisively defeated Iraqi forces, liberating the tiny country of Kuwait. And so the war ended: troops are home, planes have returned, ships are in port, tanks are in depots, the dead have been buried, the yellow ribbons have come down, the parades are over. Now is time for reflection.

Throughout American history, the armed forces of the United States have joined together in decisive partnerships to crush the dreams and hopes of aggressors and tyrants; the Gulf War was no different. This is the story of just one service's role in the war; others have their own stories of vital accomplishment to tell. Collectively, they all offer an important lesson for the future: *the war was won because, for twenty years, the nation's political and military leadership worked together to ensure that America had the best-equipped, the best-led, the best-trained, and the best motivated military forces in the world.* It did this cognizant that freedom means accepting responsibility. Each generation has to consciously commit itself, its time, and its resources to ensure freedom's preservation; otherwise, what many previous generations have vigilantly produced, one generation can lose--and lose quickly. It is a lesson *never* to be forgotten.

# I

## BACKGROUND TO CONFLICT

### Global Reach--Global Power: Strategic Vision for the Aerospace Age

In June 1990 the United States Air Force issued *The Air Force and U.S. National Security: Global Reach--Global Power*, a White Paper which delineated the ways in which the Air Force contributes to national security. It recognized and boldly stated that air power in the modern world offers a measure of leverage and power hitherto unknown. Striking with *speed, range, flexibility, precision, and lethality*, air forces have the ability to reach in minutes or hours anywhere around the globe with decisive military power, unconstrained by geographic limitations. *Global Reach--Global Power* did not constitute a dusting-off of some doctrinal notions salvaged from the height of the Cold War, or an attempt to rework aging strategic visions to a rapidly changing world. Rather, it constituted a thoughtful, reasoned approach to the use of military force and presence in the post-Cold War period.

*Global Reach--Global Power* envisioned five main objectives for air power in the modern world: *sustaining nuclear deterrence; providing versatile combat forces; supplying rapid global mobility; controlling the high ground via surveillance, communications, and navigation systems; and building American influence via airlift, crisis response, and presence.* It specifically addressed the use of force to defend freedom in crisis areas around the world, bluntly warning:

"In the Persian Gulf, our objectives will remain to support friendly states and prevent a hostile power--any hostile power, not necessarily the Soviet Union--from gaining control over the region's oil supplies and lines of communication."<sup>1</sup>

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<sup>1</sup> USAF, *The Air Force and U.S. National Security: Global Reach--Global Power* (Washington, D.C.: Office of the Secretary of the Air Force, June 1990), p.2.

This, of course, referred to the growing threat to international order and stability presented by the regime of Saddam Hussein, the dictator of Iraq. Over the previous decade, Iraq had greatly expanded its military forces, and, indeed, the *Global Reach--Global Power* White Paper noted that "Iraq maintains a larger tank force than *any* European NATO state." At the very time of its preparation, Saddam and his ministers were likely already planning the forceable annexation of Kuwait.

### **Iraq: The Rise of a Rogue State**

In the months before the outbreak of the Gulf War, some critics belittled the comparisons President George Bush made between the Saddam Hussein regime and that of Adolf Hitler's Third Reich. In fact, there were remarkable similarities between Saddam's Iraq and Hitler's Germany. Both espoused militarist and expansionist philosophies hearkening to an allegedly more glorious past of conquest and subjugation. Both were countries that armed on a massive and disproportionate scale to their neighbors, with the full intent of going to war at some future time. Both incorporated leadership personality cults. Both were societies where the leader relied upon a praetorian guard for his security, and where internal control was in the hands of a ruthless secret police. Both were intolerant of any dissent or criticism. Both persecuted and waged war upon minorities. Finally, both justified their egregious behavior by accusing their neighbors of all sorts of imagined slights and desires.

In 1990, the Iraqi regime had an annual military budget of \$12.9 billion, an average of \$721 per Iraqi citizen, in a country where the annual income is but \$1,950. Indeed, between 1980 and 1990, the Saddam regime spent at least \$80 billion--much of it on credit--to build its military into the most formidable force in the Persian Gulf region; \$23.5 billion of this equipment came from the Soviet Union. In that time, Iraq fought a war against Iran,

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using high technology, high-leverage military systems and imaginative tactics to overcome a 3:1 inferiority in the number of combat forces. As one of the world's major oil producing nations, Iraq had the financial strength to give it easy access to arms markets around the world. Between 1980 and the summer of 1990, Saddam boosted the number of troops in the Iraqi military from 180,000 to 900,000, creating the fourth-largest army in the world. With mobilization, Iraq could raise this to 2 million men under arms--fully 75% of all Iraqi men between ages 18 and 34. The number of tanks in the Iraqi military rose from 2,700 to 5,700; artillery pieces went from 2,300 to 3,700; and the number of combat aircraft went from 332 to over 950. Iraq's air force, the IQAF, had generally played a minor role in the Iran-Iraq war, though it had attempted strategic attacks against Teheran and Iranian airfields. It was far more successful in making long-range anti-shipping strikes against tankers and other vessels, including a tragic, mistaken attack on the American frigate U.S.S. Stark on May 17, 1987. At the end of the war, in conjunction with its army and special operations forces, the IQAF played a significant role in routing Iran's last military offensive, resulting in Iraq's relative success in this bloody and prolonged conflict.

By the summer of 1990, the IQAF constituted the sixth largest air force in the world, with 750 fighter, bomber, and armed trainer aircraft, supported by 200 miscellaneous types, including an Iraqi-built airborne early warning aircraft derived from the Soviet 11-76 transport. Iraq's air force included the modern MiG-29 Fulcrum interceptor and air superiority fighter, the MiG-27 Flogger strike fighter, the MiG-25 Foxbat interceptor, the MiG-23 Flogger fighter-bomber, the MiG-21 Fishbed fighter, the Sukhoi Su-25 Frogfoot ground attack airplane, the Sukhoi Su-24 Fencer strike aircraft, the Sukhoi Su -7, -20 and -22 Fitter family of fighter-bombers, and the Tupolev Tu-16 Badger and Tu-22 Blinder bombers. Additionally, it had Chinese-made H-6 and J-7 aircraft, the Czech L-39 armed trainer, and French Mirage F-1 fighters. These carried a variety of Soviet and European air-to-air missiles, bombs, bomblet dispensers, and smart weapons such as the French-built AS-30L laser-guided weapon. The

Iraqi air force operated from 24 main operating bases and 30 dispersal bases, with extensive nuclear-hardened shelters and multiple taxiways to multiple runways. It was a balanced, robust force manned by combat-experienced airmen, of whom the Mirage Pilots were considered the best. Iraq patterned its air defense network upon standard Soviet practice: a strongly internetted, redundant, and "layered" air defense system that blended radars, hardened and buried command and control facilities, surface-to-air missiles, interceptors, and anti-aircraft artillery. By the summer of 1990, Iraq possessed 16,000 radar-guided and heat-seeking surface-to-air missiles (SAMs), including the Soviet SA-2, SA-3, SA-6, SA-7, SA-8, SA-9, SA-13, SA-14, and SA-16, and the Franco-German Roland, and 7,000 anti-aircraft guns. On the eve of the war, the defenses of Baghdad were denser than the most heavily defended Eastern European target at the height of the Cold War, and seven times as dense as Hanoi's defenses before Linebacker 11 in 1972.

Iraq's ground forces were equally impressive. Its 900,000 troops were organized into approximately 60 regular divisions and eight Republican Guard divisions, the latter analogous to the SS combat forces of Hitler's Wehrmacht. Over 3,000 tank transporters supported deployment of the country's 5,700 tanks, and the mobile forces for the army consisted of 5,000 armored vehicles such as personnel carriers and 5,000 other support vehicles. Soviet-built transport aircraft furnished the army with significant air mobility, as did up to 160 armed helicopters and troop-carrying helicopter gunships. Over 3,700 artillery pieces could support Iraq's ground forces in action, and the Iraqi army possessed a number of multiple battlefield rocket launchers of Soviet and Brazilian manufacture. The experience of the Iran-Iraq war had combat-hardened Iraq's enlisted and officer cadres. Iraqi combat engineers were masters of fortifications, deceptive camouflage, and improvisation. Overall, the country possessed excellent redundant command, control, and communications, with numerous dispersed switching stations, extensive telecommunications installations, land lines, fiberoptic communications, and reliance upon what were considered bombproof command posts and bunkers.

Most ominously, in the decade of the 1980's, Iraq made significant progress towards developing weapons of mass destruction. The Iraqi regime aggressively pursued development of nuclear, biological, and chemical weapons, attempting to circumvent international controls on such technology and to illegally purchase critical materials from foreign nations, including companies in the United States. Iraq liberally used chemical weapons against Iranian forces during the Iran-Iraq war, and subsequently against his own Kurdish minority population in particularly brutal and wanton attacks. Iraq contracted with foreign arms manufacturers for the purchase of exotic technology, including large-bore hypervelocity long-range cannon, electronic detonators suitable for nuclear weapons, and large numbers of Soviet-designed Frog and Scud ballistic missiles. Further, Iraq built large numbers of long-range derivatives of the Scud missile, the *Al-Hussein* and the *Al-Abbas*, and manufactured mobile transport-erector-launchers (TELS) to create a mobile missile force able to strike over hundreds of miles, even into countries that did not border Iraq. By the time of the Gulf War, with both foreign purchases and indigenous manufacture, Iraq possessed approximately 1,200 Scud and Scud-derivative missiles. There could be little doubt that Iraq had every intention of using such weapons; Iraq first used Scuds against Iran in 1982 and both countries rocketed each other's cities with Scuds during the so-called "Battle of the Cities."

Iraq had long coveted Kuwait. During the Lebanon crisis in 1958, concerns that a new revolutionary regime in Iraq might invade Kuwait caused President Dwight Eisenhower to then move American forces into the Persian Gulf. In 1961, Iraq did threaten Kuwait, but backed down in the face of an international force that protected the tiny oil-rich country from its aggressive neighbor. In the summer of 1990, with \$40 billion in debts from the Iran-Iraq war, Iraq determined to seize Kuwait, a nation that had an army but *one sixtieth* the size of Iraq's, and with an air force *one-twenty-fifth* the size of its larger neighbor. Over the summer, the Saddam regime made increasingly bellicose pronouncements concerning the Middle East and the United States.



In July, he dismissed America's concern, disparagingly remarking that "Yours is a society that cannot accept 10,000 dead in one battle." A week later, on the morning of August 2, Iraq invaded Kuwait.

### **The Air Force and the Defense of Saudi Arabia**

Tiny Kuwait fell so rapidly that the nations of the world could not respond in time to preserve its independence; its army and air force, though small, fought courageously until overwhelmed. Saudi Arabia was likely Saddam's next target. Since the time of President Franklin Roosevelt, the United States had recognized that Saudi Arabia's defense was vital to the national security interests of the United States. The challenge now was to back up American interests and commitments with deeds--and to do it quickly. The massive deployment of land-based air power could fill the bill for, as retired Chairman of the Joint Chiefs of Staff Admiral William J. Crowe stated after the invasion, the only significant option was to "get land-based air power into Saudi Arabia." On August 6, King Fahd bin Abd al-'Aziz Al Sa'ud of Saudi Arabia invited friendly nations to participate in the defense of the royal kingdom, marking the beginning of Operation Desert Shield, the defensive deployment of U.S. military forces to protect the Gulf region from further Iraqi encroachment.

On January 1, 1983, the Department of Defense had established U.S. Central Command (USCENTCOM), with responsibility for an area covering nineteen nations across Southwest Asia. Its creation signaled America's willingness to protect the nation's interests in the Persian Gulf region through the use of American force. From that time on, the forces of the United States and Arab nations worked together to create and refine a mutually beneficial military relationship dedicated to preserving the independence of the Persian Gulf nations against any aggressor. As part of its responsibilities to USCENTCOM, the Air Force subsequently prepositioned \$1 billion worth of fuel, ammunition, and equipment (the equivalent of 1,800 airlift missions) in Saudi

Arabia, complementing material stored elsewhere on prepositioned ships. Further, Saudi Arabia built numerous airfields that could be used on an emergency basis should the Gulf region be threatened by an aggressor--any aggressor. This foresight paid tremendous dividends, as land-based air power arrived in the Gulf region with great speed and in quantities that no other form of military power projection could match.

On August 8, Saudi time, the first F-15C Eagles arrived, from Tactical Air Command's 71st Tactical Fighter Squadron at Langley AFB. They had flown nonstop fully *armed over 8,000* miles in fifteen hours. Only 38 hours after the pilots received their initial deployment notification in the Tidewater region of Virginia, they were in their cockpits, sitting alert in Saudi's bleak deserts. Within five days, five fighter squadrons had arrived in the Gulf region, together with an airlifted brigade of the Army's 82nd Airborne Division. By August 21, they had been joined by more Eagles, F-16C/D Fighting Falcons, F-15E Strike Eagles, F-4G Wild Weasels, F-117A stealth fighters, A-10 Thunderbolt II attack aircraft, E-3B Sentry AWACS airborne warning and control aircraft, RC-135 reconnaissance aircraft, KC-135 and KC-10 tankers, C-130 Hercules transports, and Army air defense Patriot and Stinger surface-to-air missiles. That day, Secretary of Defense Dick Cheney declared that the threat of an Iraqi invasion to Saudi Arabia had ended. Air power had already achieved the first of its many successes in the Gulf--it had protected Saudi Arabia from Iraqi aggression.

### **Airlift: The Critical Factor**

Stabilizing the crisis was the first major challenge. The Air Force responded by rapidly deploying ground combat forces into the Gulf. This deployment occurred even as teams in Diego Garcia readied prepositioned ships to deliver their cargo of equipment and weapons. But the timely and effective airlift of equipment, weapons, and personnel into the Gulf proved critical. It was the only rapid mobility tool that could deliver significant combat

strength at long ranges within hours. Six weeks into the Desert Shield deployment, airlift had already flown more ton-miles than the entire Berlin airlift, an operation that took over ten times longer. The results validated the service's investment in its long-range high-payload airlifters--the Military Airlift Command's C-141B, C-5A, and C-5B--together with the experience of organizing and executing large-scale troop movement exercises such as REFORGER (Return of Forces to Germany). In 1973, timely airlift had helped save Israel from possible defeat during the 1973 Arab-Israeli war. Then, Air Force airlifters moved an average of 4.4 million ton-miles (MTM) per day of cargo. Now, at the height of the Desert Shield airlift, *17 MTM* were being provided daily for the Persian Gulf. At the beginning of November, Allied strength in the Gulf stood at 243,000 personnel. On November 8, President Bush ordered additional forces placed in the Gulf so that the allied coalition arrayed against Iraq could, if necessary, eject Saddam's forces from Kuwait. Airlift moved into even higher gear.

Altogether, Desert Shield/Desert Storm required 80% of the Air Force's C-141 fleet, and 90% of the C-5 fleet. These two aircraft systems moved nearly three-quarters of the air cargo and one-third of the personnel airlifted into the Gulf region. Within the Gulf region, the C-130 met theater airlift needs. By October 1, C-130's were providing daily airlift to every major CENTCOM base through an intratheater channel airlift system. "Camel" missions moved cargo, and "Star" missions moved passengers. Approximately 32% of the Air Force C-130 fleet was in the Gulf, and, through Desert Shield/Desert Storm, they flew nearly 47,000 sorties, delivering over 300,000 tons of cargo and 209,000 troops. To meet additional airlift needs, the government activated the Civil Reserve Air Fleet (CRAF) for the first time in its 38-year history. American airline companies furnished cargo and passenger aircraft to support allied airlift requirements. Eventually, a second-stage CRAF expansion took place when Desert Storm commenced, and the total number of civilian aircraft assigned for military use reached 158. By the middle of December 1990, sixteen different airfields were receiving up to 8,000 troops

daily, delivered by an average of 65 aircraft, the equivalent of one landing every 22 minutes. During Desert Storm, this would peak at 127 aircraft per day, an average of one landing every 11 minutes.

Thanks to Air Force airlift, in partnership with sealift and coupled with CENTCOM's superb in-theater logistics system, American forces in the Gulf War were better-supplied, better-maintained, and better-supported than any fielded American force in any prior war. Operating with an optimal efficiency and attention to schedule that surpassed the best of airlines, Military Airlift Command's regular and reserve aircrews--many of the latter who temporarily exchanged their airline uniforms for Air Force "green bags" --kept the combat forces ready. They played a critical role in one of the most remarkable accomplishments of the Gulf War--supplying key items that enabled ground crews to maintain sophisticated American combat aircraft at higher mission capable readiness rates while deployed in the austere environment of the Gulf than during peacetime at bases in the Continental United States.

The tremendous productivity of the airlifters would not have been as impressive were it not for the synergy of Strategic Air Command's tankers with MAC's transports. The advent of large-scale aerial refueling transformed the United States Air Force in the 1950's into a true global striking force. The expansion of air refueling capability to transport aircraft in the 1970's had an equally significant impact on readiness and rapid deployment. Tanker support in Desert Shield was no less significant than it was during Desert Storm itself. During Desert Shield, SAC tankers flew 4,967 sorties totaling nearly 20,000 flight hours, refueling 14,588 airplanes (including 5,495 Navy and Marine aircraft), and off-loading 68.2 million gallons of fuel. Without the timely investment in tanker technology made in the late 1970's, the burden of tanking would have fallen exclusively on the KC-135A Stratotanker, an aircraft dating to the mid-1950's. As it was, the newer KC-10 Extender tanker-transporter and the re-engined KC-135R contributed significantly to the total force capabilities of the air units placed in the Gulf, complementing the older

Stratotankers. Fully 75% of the Air Force's KC-10 fleet and 44% of the KC-135 fleet were committed to the Gulf crisis.

### **Crafting a Plan**

The 1980's were a period of intense reflection within the Air Force on its role in future conflict. That reflection manifested itself in three notable ways-- the issuance of a new edition of Air Force Manual 1-1, the basic doctrine of the Air Force; an intellectual ferment revisiting the tenets of air power typified by such publications as Colonel John A. Warden III's *The Air Campaign*; and the publication of *Global Reach--Global Power*. Collectively, this body of thought coalesced to create what became the most successful air campaign in military history.

There were many skeptics who did not believe that air power could have a decisive impact on the Gulf War. "Historical" lessons and outdated "conventional wisdom" failed to convey the revolution in military air power that had occurred since the days of the Vietnam war. Many pointed to that war as an example of why air power couldn't be expected to exert decisive influence. The widespread dissemination of the belief that air power at best could only play a "supporting" role likely encouraged Saddam Hussein to remain in place, for, as he told a visiting group of journalists in the early fall of 1990, "The United States relies on the Air Force and the Air Force has never been the decisive factor in the history of wars." It was a miscalculation for which Iraqi military forces would pay dearly.

Air Force planning to confront Saddam began virtually immediately upon the outbreak of the crisis. General H. Norman Schwarzkopf, USCENTCOM commander, requested Air Force inputs on offensive air options. Air Staff planners, working with Navy and Marine representatives, rapidly sketched out a concept for an offensive air campaign which subsequently won General Schwarzkopf's endorsement; it formed the roots for what became Desert Storm. The concept plan was sent forward to the theater where Lt. Gen.

Charles Horner, commander of USCENTCOM's air forces (CENTAF) and the Joint Force Air Component Commander (JFACC), directed Brig. Gen. Buster Glosson to transform the concept into executable reality. General Glosson formed a strike planning cell in Riyadh eventually known as the "Black Hole," and, in great secrecy, took the basic strategic air campaign concept and elaborated, refined, and expanded it to meet CENTCOM's needs.

Early in the planning process, CENTAF's planning staff recognized the importance of a strategic air offensive against Iraq: crafting a plan that would inflict *strategic* paralysis upon the Iraqi military machine. The plan they structured had three key phases: a strategic element, attacks in the Kuwaiti Theater of Operations (KTO) to suppress enemy air defenses, and attacks on the Republican Guards and Iraq's army in Kuwait and Iraq. Though generally sequential in nature, there were no "hard" boundaries between them. In fact, when the war was actually fought, considerable overlap occurred throughout the campaign as circumstances dictated. The first and third phases were the most critical on the impact they would have upon the outcome of the war. The strategic phase emphasized attacks to disconnect and disrupt the working of the Iraqi command structure and military forces, with strikes upon militarily significant targets such as internal control organizations, communications, electrical power, the transportation network, and oil refining capacity. Such attacks in the Second World War had required thousands of heavy bombers dropping millions of tons of bombs, with large-scale civilian casualties. In this conflict, a key goal was minimizing civilian casualties; the coalition's war was with the Iraqi regime, not with the Iraqi people. As a result, air power would have to strike precisely, yet devastatingly.

The immediate challenge would be to seize air superiority, for without it, other military missions could not be performed. The Air Force would do this with strikes against Iraq's hardened air defense sector control centers and headquarters using F-117 stealth fighters from the 37th Tactical Fighter Wing to blind and cripple the air defense network. Follow-on strikes by Air Force electronic warfare and Wild Weasel aircraft, complemented by electronic

warfare and air defense suppression missions by other services and the coalition air forces, would take-down the Iraqi radar defenses, opening up Iraq and Kuwait for attack by conventional non-stealthy attackers. Aggressive counter-air operations by Air Force F-15's would sweep the skies of any Iraqi fighters that did manage to takeoff.

Chairman of the Joint Chiefs of Staff General Colin Powell and General Schwarzkopf had stressed that the Air Force should destroy as much of Iraq's armor and artillery forces as possible. Therefore, the third phase of the air campaign plan emphasized targeting the Iraqi army and its equipment. From the very first day of the air campaign, B-52 strikes every three hours hammered Iraqi forces, while other attackers went after supply depots, headquarters, supply lines, bridges, convoys, and individual vehicles. From the outset, planners were confident that they could achieve genuine interdiction against Iraq--not because it was a desert environment (in fact, the region between the Tigris and Euphrates rivers is quite fertile), but because of the remarkable precision of modern air-delivered weapons.

Very quickly, artificial distinctions between "strategic" and "tactical" warfare disappeared, as did restricted thinking that typecast certain aircraft as "battlefield attack" or "deep strike" vehicles. In the actual war, for example, F-111F "Aardvarks" and F-15E Strike Eagles proved devastatingly effective anti-armor aircraft, dropping laser-guided smart bombs on Iraqi tanks, while the A-10 "Warthog" went deep into Iraq, hunting for Scud missiles. Planners capitalized on the fact that an aircraft is an aircraft--it is the mission that determines whether a particular strike is "strategic" or "tactical." When two Boeing E-8A JSTARS theater surveillance aircraft arrived, Generals Schwarzkopf, Horner, and Glosson realized that though they were experimental, they could nevertheless offer profound leverage over Iraqi forces by detecting vehicle movements throughout the Kuwaiti Theater of Operations, acting like an AWACS for the ground forces.

Air campaign planners had a profound appreciation for the *operational* level of war, structuring an air campaign plan to meet not the limited purposes

of "local" tactical aviation, but, rather, a *theater-wide* air campaign plan to achieve the overall objectives of the theater commander. If all went well, approximately thirty days after the onset of the air campaign, the Iraqi ground forces would be sufficiently devastated and attrited that the coalition's own ground forces could move quickly into Iraq and Kuwait.

### **On the Brink of War**

On the eve of the war, coalition air strength numbered 2,614 aircraft, including 1,990 American. Of these, 1,540 were land-based, and another 450 were on board six aircraft carriers either on station or en route to the Gulf. Over 76% of American aircraft were fighter and attack aircraft. In the last weeks before the war, Air Force personnel sharpened their skills. Maintenance crews had first call on key airlift support, and, as a result, average mission capable rates for Air Force fighters averaged over 85%. During the war itself, they would soar to above 90%, unequaled by the standards of previous American air wars, and a testimony to both the Air Force's reliance on supremely capable people and high-technology weapons.

Two other Air Force commands not directly involved in combat played key roles in ensuring readiness and peak capability in the Gulf: Air Force Logistics Command, and Air Force Systems Command. Air Force Logistics Command streamlined logistical support procedures and established a responsive "customer service" system for addressing Gulf needs, Air Force Systems Command developed simplified procedures for maintaining high-technology weapons systems and responding to particular problems--such as erosion of sensitive seeker heads by desert grit. Eventually, AFSC would achieve the seemingly impossible--developing, testing, and deploying an entirely new 4,700 lb. deep penetrating bomb (the GBU-28) for use by F-111F's against high-value buried targets in just *seventeen days*. So fast was this development process that when the bombs were loaded on their "Aardvarks," their casings were still warm to the touch from the molten bomb-



mix poured into them back at Eglin AFB. Likewise, Tactical Air Command played a key role supporting the Desert Shield and Desert Storm effort. As the parent command of Ninth Air Force, the air component command (CENTAF) of CENTCOM, the men and women of Tactical Air Command performed a multitude of critical tasks in facilitating and assuring every need of the deployed air force was met.

Training and readiness for the unexpected occupied a major portion of CENTAF's prewar activities. Constantly, E-3B AWACS aircraft maintained a vigil in Saudi skies, looking north for any sign that Iraq might elect to launch a preemptive Strike. Mock strike packages formed up and practiced tanking and ingress procedures. F-15 pilots honed their skills with dissimilar air combat training. A-10 pilots teamed with Army AH-64 Apache crews and refined joint air-attack tactics for the time when they might operate against Iraqi armored forces. Intelligence collection systems monitored Iraqi communications and signals, acquiring information for electronic warriors and Wild Weasels. For their part, the Iraqis tested the coalition as well, racing MiG-25's to the frontier, then turning back when illuminated by F-15 radars. On the ground, Iraqi forces dug in, hoping that they could withstand any allied air attack and then decimate allied ground forces advancing in the open.

At home, millions of American citizens watched the rapidly unfolding events with unease, but with pride, faith, and confidence in their military. Dissent is the essence of a free society, but the Gulf crisis was quite unlike Vietnam, and a broad-based support, rather than a protest, movement emerged. Some critics who did not appreciate the extensive investment the Department of Defense had made in reliable and maintainable systems implied little would work right: high technology would collapse amid the grit and heat of the desert; sophisticated aircraft would be grounded for maintenance as soon as the war forced high utilization rates; stealth aircraft would be detected and engaged by defenses; heat waves off the desert would defeat electro-optical sensors; and dug-in troops would be impervious to coalition bombs. The air war, some even predicted, would only strengthen Iraq's resolve, for it

would "certainly" result in "massive" civilian casualties and the destruction of Iraq's cultural heritage by "imprecise" bombing. Such statements reflected only that the authors did not appreciate the evolution of air power, the nature of aerospace technology, and the skill and dedication of the Young Americans who would be called upon to deliver it, should last-minute diplomatic measures fail.

The United Nations had passed Resolution 678 on November 29, 1990, authorizing the use of force to expel Iraq from Kuwait if it did not leave by January 15. In early January 1991, Secretary of State James Baker met with Iraqi foreign minister Tariq 'Aziz, who refused to transmit a personal letter from President Bush to Saddam Hussein. President Bush had requested Congressional concurrence in the United Nations resolution, and, following a lengthy and forthright debate, the Congress joined with the administration in bipartisan votes of support on January 12, Saddam Hussein still showed no sign of leaving Kuwait, and the deadline of the 15th passed. Accordingly, President Bush signed a National Security Directive authorizing military action. Desert Storm was about to break.

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## II

### THE AIR FORCE AT WAR

#### The First Night

Early on the morning of January 17, waves of coalition aircraft took off into the dark Arabian night, joining Air Force tankers and strike aircraft setting forth on the largest air campaign since the Second World War. Aloft, 160 tankers at multiple refueling tracks outside of Iraqi radar range awaited the strikers so they could "tank" before entering Iraqi air space. AWACS kept track of friendly forces and focused its probing radar eye deep into Iraqi territory. The challenges facing the AWACS were considerable; the young E-3 crews had to act as lookouts, fighter directors, and airborne air traffic controllers. It is a tribute to their skill and expertise that not a single mid-air collision occurred between coalition aircraft during Desert Shield and Desert Storm.

As the clock edged towards 3:00 a.m. Baghdad time, the scheduled opening of the air offensive, a number of events took place. In the dark skies, a greater diversity of aircraft flew towards Iraq than had been airborne at any time since the Second World War. In the first four hours of the air war, nearly 400 Allied strike aircraft from the coalition stormed across Iraq, supported by hundreds of others over the Gulf region and over the fleet at sea. At sea, ships launched Tomahawk land-attack cruise missiles (TLAMs), and carriers launched aircraft to protect the fleet and hit selected targets ashore. Altogether, in that first night, 668 aircraft attacked Iraq, 530 from the Air Force (79%), 90 from five Navy carriers and the Marine Corps (13%), 24 from Great Britain (4%), and 12 each from France and Saudi Arabia (2% each). In the first 24 hours, over 1,300 combat sorties were flown by American and coalition airmen.

In the last hour before the attack opened, there was a deceptive calm along the Iraqi-Saudi border- Within Iraqi radar range, just behind the border,

F-15C's cruised along three combat air patrol tracks, appearing no different than they had on many previous nights. Behind them, three AWACS maintained station, their Powerful radars looking deep into hostile territory. If what happened near the border seemed routine, the events occurring beyond Iraqi radar range were anything but. Opening honors belonged to Task Force Normandy, an Air Force-Army team flying MH-53J Pave Low and AH-64 Apache helicopters, and the 315th Tactical Fighter Squadron's F-117 stealth fighters.

At 2:20 a.m., with H-hour still forty-minutes away, Task Force Normandy--two Pave Lows from the Air Force's First Special Operations Wing acting as navigational pathfinders for two four-ship teams of Army Apache gunships--clattered across the Iraqi border from Saudi Arabia. Task Force Normandy had a small but important mission: destroy two Iraqi early warning radars that might detect low-flying LANTIRN-equipped F-15E strike aircraft heading for Scud sites in Western Iraq. The helicopters followed a circuitous route, flying a nap-of-the-earth profile, descending into wadis and hugging the desert floor. It was daunting, demanding work, requiring the highest standards of airmanship. The Air Force Pave Low crews had no difficulty locating the vans. Their job done, they veered off. At H-22 minutes--2:38 a.m. local time--the Apaches destroyed the vans. Task Force Normandy turned for home, dodging two heat-seeking SA-7 SAMs on its way out of the country. Twenty-five miles away, already over Iraq and skimming the earth at nearly the speed of sound, an ingressing LANTIRN-equipped F-15E crew saw one van explode in flames as the Eagle blew through the radar hole left by the SOF crews. But an Iraqi outpost made a frantic call to Baghdad, for the skies over Saddam Hussein's capital city erupted with withering anti-aircraft fire, interrupting evening news back in the United States, where it was approximately 6:45 PM east coast time, January 16.

Having flown almost the length of the Arabian peninsula, the F-117 stealth fighters finished tanking, silently dropped off the booms, and then began their individual approaches into Iraq. By their nature, the stealth

fighters were loners; each pilot had an individual mission plan tailored to his target and the threats that surrounded it. Effectively compressing the detection range of radars, stealth fighters could trace their way through a layered, redundant air defense network the way a commuter might step around pools of water on the way to work. Quietly, ominously, the F-117's passed into Iraqi airspace and headed for their targets in and around Baghdad: hardened air defense sites endangering non-stealthy attackers, and critical command and control facilities. So dangerous was downtown Baghdad that the air campaign planners excluded all other attackers, except for F-117's and cruise missiles, from striking it. As they approached weapons release, the warning from the frontier reached Iraqi command posts, and tracer from automatic weapons, punctuated by heavier flak and an occasional unguided missile blasting heavenwards, curtained the sky. Confident only an unaimed "golden BB" could endanger them, the stealth pilots did their best to ignore the light show outside and concentrated on acquiring their targets and designating them for their smart bombs. The first to go--about nine minutes before H-hour--were air defense control centers in southern Iraq that could endanger the coalition's non-stealthy strike packages. But the most spectacular targets were those set for H-hour itself, in downtown Baghdad.

In one F-117 cruising over Baghdad, a stealth pilot carefully kept the cross-hairs of his laser designator on a building the principal master attack planner had dubbed the "AT & T building:" a telecommunications center vital to Iraqi military command and control. The weapons bay snapped open, disgorging a 2,000 lb. LGB, which sank away from the black arrowhead, streaming wisps of vapor off its fins as it maneuvered to pick up the "basket" and plunge at supersonic speed towards a little spot of laser light fixed unerringly on the top of the center. In Riyadh, General Horner and his "Black Hole" staff were waiting for CNN, broadcasting via telephone from Baghdad, to go off the air. In Washington, planners and senior defense officials alike counted the minutes, fascinated at the irony of events about to unfold. If all went well, the first "BDA" --bomb damage assessment--would be inadvertently

transmitted in "real time" directly to the people most responsible for executing the strike as well as to the world at large. In Baghdad, CNN correspondents Bernard Shaw and Peter Arnett were reporting the antiaircraft fire over the city to American audiences. Shaw: "We have not heard any jet planes yet, Peter." Arnett: "Now the sirens are sounding for the first time. The Iraqis have informed us--" Nothing but abrupt static. CNN's link went off the air. *The United States Air Force had delivered the first Allied air weapon to strike into the heart of Saddam Hussein's city.* In both the Black Hole and in the depths of the Pentagon, a wild cheer erupted.

All over Iraq that night, young men from many nations and varied religions laid their lives on the line. Suited up, breathing hard, plugged into their aircraft with radio leads, oxygen hoses, and G-suit connections, strapped into their ejection seats, they fought solitary wars, peering through their Head-Up Displays and at the often frightening spectacle outside as they sought to impose by force what Saddam Hussein had refused to grant by reason. From below, long fingers of bright tracer weaved towards them. At a distance, coalition pilots could see dense flak over Baghdad from over 100 miles away. Across the border, safe themselves from Iraqi defenses, sophisticated EC-130H Compass Call electronic warfare aircraft jammed communications, hindering the effectiveness of Iraq's already crumbling integrated air defense network. SAM's raced off their launch rails and snaked upwards, most fooled by electronic warfare stand-off jamming or from pods on the strike aircraft themselves, though some came close enough to send aircrews into violent breaks to escape their lethal paths. Regrettably, one destroyed a Navy F/A-18C, and its pilot became the first coalition airman to die in combat. Such losses, fortunately, were a rarity. Indeed, over the entire war, only ten coalition aircraft fell to SAM's, against thousands of SAM's fired against them--thanks to the heavy investment in electronic warfare technology and protection pods that had been made since the Vietnam War.

F-4G Wild Weasels fought a merciless electronic war, identifying Iraqi radars, locking onto them, and shooting them with missiles, even as the sky

around them filled with SAM's. Occasionally it was like old times: one Weasel crew dodged five SA-2's, the F-4's old Vietnam nemesis, while hunting down and destroying its controlling Fan Song radar. At one point, over 200 HARM missiles were in the air simultaneously, homing on Iraqi radars. The Iraqis soon learned that turning on a radar was tantamount to suicide, and the mere threat of Weasels and other radar-hunters generally guaranteed that those Iraqi radars still active shut down fast. Occasional heat-seekers shot skywards, forcing strike aircraft into abrupt jinks and triggering long strings of defensive flares that popped out like fireworks behind them.

As the night wore on towards dawn, strike flights returned to their bases, even as others sortied to keep up the pressure. Baghdad's offensive weapons and research and production sites--the known nuclear, biological, and chemical (NBC) weapons research, production, and storage centers--underwent repeated attacks in an effort to ensure that their products did not endanger the coalition. F-117's proved particularly devastating, for they could destroy hardened targets. Laboratory, research, and production facilities staggered under stealth-dropped smart bombs. Though constituting less than 2 1/2 percent of all Allied fighter and attack aircraft in the Gulf, the F-117 attacked over 31% of strategic Iraqi targets struck on the first day of the war. Overall, during the entire Gulf air war, the stealth fighter flew only 2% of the combat sorties, but attacked 40% of the strategic targets--a measure of stealth's leverage. Other strikes shattered communications and control centers, hammered storage and maintenance facilities, saturated air defense sites, and struck at Iraqi airfields. Unseen, an F-117 pilot cruised over Iraqi air force headquarters, dropping a smart bomb down its elevator shaft and blowing out the bottom of the building. A massive strike force of nearly 100 airplanes targeted Iraqi air defense positions, with waves of F-16's attacking SAM sites and anti-aircraft artillery. Huge B-52G's also struck deep into Iraq. The big "Buffs" skimmed the earth at less than 400 feet, stunning defenders with the shattering noise of eight thundering engines, before popping up to bombing altitude and unleashing dozens of bombs on their targets. They were

far from alone in the night sky; one Buff copilot yelled "Look at those guys!" as a pair of F-15E's raced below them at over 600 knots. F-111F's and F-15E's ranged over Iraqi airfields and Scud sites, as did other coalition aircraft.

Severed from its leadership, attacked where it lived, the Iraqi Air Force was largely preempted from fighting. Those few pilots that did go aloft did not fair well. Captain Steve Tate, the flight leader of four F-15's from the 1st Tactical Fighter Wing, saw "solid streams of tracers" over Baghdad, arcing "like colored snakes," with "bombs going off everywhere." An AWACS warned him of an Iraqi Mirage F-1, which had just taken off and was closing on the four Eagles from astern. He broke hard, turned behind the Mirage, fired a AIM-7 Sparrow, and watched it track the Iraqi fighter, which disintegrated in a huge fireball--one of thirty-five Iraqi airplanes that eventually fell to American and Saudi fighters. With runways cratered and many aircraft destroyed as ground crews readied them for flight, Iraqi commanders chose to keep their remaining planes sealed in bunkers, safe until they could be used at a moment of Iraq's own choosing. Thus, the Iraqi air force never really got into the air.

*By the time dawn broke the morning of January 17, Iraq was well on the way to losing the war, thanks to the strategic air campaign. That morning, a humane leader would have sued for peace, for all he could expect now would be the continued dismembering of the Iraqi infrastructure and its remaining military forces by virtually Olympian air power.* The previous night's attacks separated Saddam Hussein and his leadership from their military forces. It drove his regime underground, where they no longer could control events or react to Allied initiatives. The most critical military support networks--command, control, communications, and intelligence (C3I), integrated air defenses, and power generation capacity--were in a shambles.

Indeed, the major damage occurred in the first ten minutes. Minutes after H-hour, the lights went out in Baghdad, and did not come on again until well after the cease-fire. Within a few more, communications--the microwave towers, telephone relay exchanges, cables, and land lines--had been



transformed into rubble. (Eventually, by the end of the second week, with even back-up communications systems disrupted, Saddam Hussein was reduced to sending orders from Baghdad to Kuwait by messenger; the trip took at least 48 hours). The coalition air attack had imposed strategic paralysis upon the Hussein regime. Within the first hour, the integrated air defense network had collapsed; SAM sites and interceptor airfields were no longer under centralized control. Radar sites were destroyed or intimidated. Sector control stations and air defense headquarters were blasted into rubble. Antiaircraft forces were operating on their own, without broader information or support. Within several hours, attacks had left key Iraqi airfields with cratered runways, taxiways, and ramps. Below, the Iraqi air force remained in its bunkers. Known facilities for the research and manufacture of weapons of mass destruction had been destroyed or rendered unusable.

### **The Weather Factor**

With the decisive first night of the air war behind them, CENTAF planners settled down to fulfilling the remaining objectives of the air campaign. Joining in on the third day were aircraft from a Joint Task Force in Turkey--essentially a large composite wing of over 130 airplanes--that conducted both offensive and defensive air operations over northern Iraq. This task force consisted of 28 F-15C's for air superiority operations; 46 F-16C, F-111E, and F-4 strike airplanes; 32 F-4G, F-16C, and EF-111A Wild Weasel and electronic warfare aircraft; and approximately 30 other support aircraft for AWACS, reconnaissance, tanking, and intelligence gathering.

The weather over Iraq during Desert Storm was the worst in fourteen years, twice as bad as the climatological history of the region would have suggested. The conditions, in fact, approximated a rainy European summer, not the kind of blue-skies conditions one normally associates with desert warfare. Cloud cover exceeded 25% at 10,000 feet over central Iraq on 31 days of the 43 day war; it exceeded 50% on 21 of those days, and 75% on 9

days. Accompanying this cover were occasionally violent winds and heavy downpours that played havoc with targeting and bomb damage assessment. Eventually, about half of all sorties to Iraq were affected by weather, resulting in cancellations or diversions. The weather problem proved very serious, particularly because the coalition's rules of engagement (ROE) demanded stringent identification of targets before weapons release.

This self-imposed constraint--a constraint not imposed by technology limitations, but rather as insurance against "collateral damage" --particularly constrained the F-117's. During the Gulf war, F-117's flew 1,270 combat sorties and dropped over 2,000 tons of bombs. Stealth pilots were under strict orders to attack targets only if they had positive identification and good weather conditions; otherwise they were to bring their bombs home. So great was planners' faith in the F-117's targeting system that, indeed, their instructions usually stipulated not merely hitting particular buildings or shelters, but a particular portion of a building or shelter--for example, a corner, a vent, or a door. In fact, if they hit the building, but not the particular spot, their sortie counted as a miss, not a hit. Nevertheless, despite this stringent requirement, at least some of the F-117's pilots returned from the war with perfect bombing records--every bomb they had dropped during the war had scored a direct hit.

### **The Great Scud Chase**

Iraq's Scud missiles posed one of the air campaign's most serious challenges, for the Scud had the potential of dramatically affecting the conduct and outcome of the war; the weather situation made it worse. Although air attacks dramatically reduced the frequency of Scud launches, the mobile missiles proved particularly difficult to detect, and were never fully suppressed. The anti-Scud campaign highlighted what will undoubtedly be a major research and development challenge in the 1990's, given the great proliferation of mobile ballistic missiles around the world. It will call for

developing means of detecting and destroying mobile missile launchers before they can fire.

The Scud-hunting campaign hinged on the accuracy of intelligence estimates relating to sources of production and supply, storage, location of Scud units and fixed launch sites, and numbers of mobile launchers. Unfortunately, the total number of Scud launchers that Iraq possessed was far higher than what prewar national intelligence estimates had indicated. Further, the Iraqi rocket force had surveyed and prepared a number of launch sites within Iraq and Kuwait, so they could fire their weapons with relative confidence that they would hit city-size targets in Saudi Arabia and Israel.

In the late afternoon of January 17, Iraqi rocket troops launched the first two Scuds fired at Israel. The missiles reentered, broke out of low cloud and rain, and plunged into the ocean, scant yards off-shore. Then, early in the predawn darkness of January 18, Iraq's rocket forces launched more Scuds against Israel and Saudi Arabia. At 2:15 a.m., the first of seven Scuds fell around Tel Aviv, fortunately without causing serious damage or death. At 4:45 a.m., the first Scud fired at Saudi Arabia plunged into the atmosphere, on its way to Dhahran. In a dramatic intervention, a Mach 3+ Army Patriot PAC-2 missile nailed it at 17,000 feet--the first combat use of an anti-missile missile. The firing of Scuds against Israeli population centers enraged the Israeli leadership, fueling their natural impulse to join the air attacks against Iraq. The Air Force rushed Patriot batteries to Israel, delivering 32 missiles in 17 hours (against a planned delivery schedule of 22 missiles in 18 hours). Thereafter, Patriots routinely scored against Scuds. Thus, Saddam Hussein's attempts to fracture the coalition with his Israeli "wild card" failed, though he tried repeatedly to use his Scuds to force Israeli retaliation.

The resulting Scud hunt triggered by these first firings was intense and ran throughout the war, ultimately involving 2,493 sorties, the greater number of which took place within the first three-weeks of the war. The goals involved targeting the missiles, their numerous TEL's, and the Scud-support infrastructure Iraq had developed. Two sets of "Scud boxes"--a western set of

Scud launch points aimed towards Israel and south towards western Saudi Arabia, and an eastern set of launch points in Iraq and Kuwait aimed south at Saudi Arabia and the other coalition states--constituted major coalition hunting grounds. The anti-Scud air campaign involved a variety of aircraft, and courageous American and British special operations forces (SOF) on the ground deep behind enemy lines hunting them down and calling in air strikes. The air element primarily involved orbiting LANTIRN-equipped F-15E strike aircraft cued by JSTARS as to the probable location of Scud TEL's or roving on their own; Royal Air Force recce Tornados paired with strike Tornados in "look and shoot" teams; F-16C/D and A-10 road reconnaissance missions to detect TEL's on the highways and under overpasses; B-52G and F-117A strikes against Scud storage and production facilities; and use of waiting Patriot batteries when all other methods of stopping the missiles had failed.

JSTARS used its side looking radar to detect possible TEL's, passing along the information via data link to ground stations for air and ground force commanders, and to airborne F-15E's. Sometimes, since launches took place at night, Strike Eagle crews on orbiting anti-Scud patrols would actually see a launch, occasionally jinking hard in case it was a SAM. But then the missile would streak straight away, too fast for interception by air-to-air missiles, and the attackers would go low, attempting to find the launcher and destroy it. Iraqi Scud teams could fire a missile, drive away, and hide in a culvert, all within five minutes. Then, after letting the launcher cool to reduce its infrared signature, they would drive off to some remote location to wait out the day, resuming firings the next night. Iraqi forces took to hiding TEL's in residential neighborhoods or under highway overpasses. Consequently, likely culverts and hiding areas were routinely bombed to prevent their use by Scud firers. The intensive air campaign produced some gratifying video shots of Scud sites and desperately maneuvering TEL's. When they were found, precision-guided weapons and occasional dumb bombs made short work of them.

That the Scud was a very dangerous weapon was tragically confirmed when, in the single worst loss of American forces in the war, a Scud

unengaged by Patriot surface-to-air missiles hit a barracks housing Americans in Dhahran. The warhead of this one missile killed 28 American soldiers and wounded 97 others. This single event thus produced 25% of the deaths from enemy action and 25% of the wounded from enemy action that all American forces suffered in the entire war. The potential losses that could have come from larger numbers of missiles can well be imagined. Thus, though the Scud remained a problem throughout the end of the war, the air campaign clearly had a demonstrable impact, and, in conjunction with Army Patriot missile batteries, prevented possibly thousands of additional casualties and greater damage to property and material. Scud launches, which averaged five per day for the first ten days of the war, averaged only one per day for the last 33 days. Further, the intensity of the air attacks increasingly forced the Scud teams to fire their missiles "on the run" from unprepared and unsurveyed sites, thus seriously degrading their chances of hitting population centers or militarily significant targets. The "high point" of Iraq's rocket campaign came on day nine, when Iraqi rocketeers launched 10. Saddam Hussein did not fire his last Scud against Israel until February 25. Two days later, an Air Force air strike cued by special operations forces destroyed a force of Scuds which had been assembled by Saddam Hussein's rocket troops, perhaps in a last-ditch bid to swamp Israel's Patriot defenses.

### **The Strategic Air Campaign: Decisive Accomplishment**

Speaking before the Senate Armed Services Committee on February 21, 1991, three days before the onset of "G-day," the invasion of Iraq and Kuwait, General Colin Powell stated that:

"Air power is the decisive arm so far, and I expect it will be the decisive arm into the end of the campaign, even if ground forces and amphibious forces are added

to the equation. If anything, I expect air power to be even more decisive in the days and weeks ahead."<sup>2</sup>

Overall, the coalition air campaign accumulated a total of 109,876 sorties over the 43-day war, an average of 2,555 sorties per day. Of these, over 27,000 targeted Scuds, airfields, air defenses, electrical power, biological and chemical weapons, headquarters, intelligence assets, communications, the Iraqi army, and oil refining. Aerial tanking was crucial to producing these sortie figures. During Desert Storm, Air Force tankers exceeded even their Desert Shield support record, flying 15,434 sorties-nearly 60,000 flying hours--refueling 45,955 aircraft (20% of which were Navy or Marine airplanes), and off-loading 110.2 million gallons of aviation fuel. American airmen dropped 84,200 tons of bombs in the course of approximately 44,145 combat sorties, 67% of which were flown by the Air Force, 19% of which were flown by the Marine Corps, and 14% of which were flown by the Navy. Of the total bomb tonnage dropped, the Air Force dropped 72%, roughly 60,624 tons of both "smart" and "dumb" weapons, the Navy and Marine Corps sharing the remaining 28%. The Air Force dropped 90% (6,660 tons) of the precision munitions (7,400 tons total) that American forces expended in the war, the Marine Corps and the Navy accounting for the remaining 10%. Roughly 30% of the Air Force smart bomb tonnage was dropped by F-117's. The Air Force dropped 70% (53,964 tons) of the dumb bomb tonnage (76,800 tons total) expended in the war, the Marine Corps and the Navy roughly splitting the remaining 30%.

Though prewar campaign planning set sequential phases for the air war, giving the impression that the campaign would turn from "strategic" to "tactical" targets, and eventually (in its fourth phase) to direct support of ground forces via close air support and battlefield air interdiction strikes. In fact the actual campaign as executed had considerable overlap. Right to the

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<sup>2</sup> Transcript of testimony of General Colin Powell before the Senate Armed Services Committee, February 21, 1991.

end of the war, all phases of the air plan were still being flown simultaneously, though at varying levels of effort. The even greater force buildup that accompanied the second phase of the Desert Shield deployment also changed the strategic air campaign. Planners had initially anticipated that the "Phase I" strategic air campaign would sharply drop off by day 7 of the air campaign, from about 700 sorties per day to less than 100 per day. In fact, the added air assets enabled the coalition air forces to fly approximately 1,200 strategic sorties per day at the outset--almost twice as many as the planners initially had anticipated prior to war--and sorties never dropped to less than 200 per day over the first 35 days. Air defense suppression, the "Phase II" of the plan, likewise proved more extensive than in prewar plans. "Phase III" attacks against the Iraqi field army, instead of beginning about day 5 and building to about 1,200 sorties per day, started on day 1. "Phase IV" attacks targeting Iraqi forces reached nearly 1,700 sorties per day during the 4-day ground operation at the end of the war.

One can get some perspective on the scope of the Gulf air war by comparing it to some predecessors. The following table presents U.S. Army Air Forces, and U. S. Air Force bomb tonnage statistics extracted from various wars, compared with Air Force tonnage dropped in the Gulf War:

<i>War</i>	<i>Tonnage</i>	<i>Length</i>	<i>Tonnage/Month</i>
WW II	2,150,000	45 months	47,777.78
Korea	454,000	37 months	12,270.27
Vietnam/SEA	6,162,000	140 months	44,014.29
Gulf War	60,624	1.5 months	40,416.00

Viewed in this fashion, the Gulf War was not, as some alleged, an exercise in massive bombing unparalleled in previous air war history; neither the sortie rates nor the bomb tonnage statistics made it so. The Air Force's tonnage expenditure in the Gulf War was only 11% of that expended against Japan (537,000 tons), less than 4% of that expended against Nazi Germany (1,613,000 tons), and less than one percent of the tonnage which the Air

Force dropped in Southeast Asia. In measures of tonnage dropped per month, the Gulf air war ranked significantly below Vietnam, and was only 85% of that in the Second World War. *Yet it was more decisive overall in what it achieved than any of these previous wars.*

What made it decisive was what the strategic air campaign managed to accomplish. One can comprehend what strategic air Power achieved in the Gulf War by looking at five separate categories of effort against militarily significant targets: attacks on command and control; power generation; refined fuel and lubricants production; the transportation infrastructure; and the Iraqi air force.

*First, the strategic air campaign struck 45 key military targets in the Baghdad area with the result that the Hussein regime was driven underground in disorientation, confusion, and ignorance, preventing Iraqi decision-makers from controlling events or reacting to Allied initiatives. Yet the strategic air campaign did this without "carpet bombing" Baghdad or inflicting massive civilian casualties as, say, the bomber raids on Berlin that forced Hitler underground had caused during the Second World War. indeed, as was reported by one physician who visited Iraq after the war, the strategic air campaign hit with "neurosurgical precision."*

*Second, the strategic air campaign shut down the Iraqi electrical power grid by attacking selected generation plants across the country. The power strikes, which included cruise missile attacks and a little over 200 sorties by strike aircraft, were particularly significant, for to modern military forces--and Iraq's were very modern indeed--electrical power is absolutely vital. It cannot be stockpiled, and thus by targeting power generation, one shuts down so many other military facilities that large scale bombing is unnecessary--one has achieved passive, as opposed to active, destruction. Again, the unprecedented accuracy of modern munitions meant that the coalition achieved maximum military effect with minimal force and minimal sorties. One airplane dropping two precision-guided bombs sufficed to destroy a single power generation station's transformer yards. During World War 11, in contrast, the Eighth Air Force found it took two full combat wings, a force of 108 B-17 bombers (flying*



in six combat "boxes" of 18 aircraft each), dropping a total of 648 bombs (six 1,100 lb. bombs per airplane) to guarantee a 96% chance of getting just two hits (the minimum necessary to disable a single power generating plant for several months) on a single power generating plant measuring 400 x 500 feet. *Thus, by the time of the Gulf War, a single strike airplane carrying two "smart" bombs could function as effectively as 108 World War II B-17 bombers carrying 648 bombs, and crewed by 1,080 airmen.* Further, for the number of bomber sorties in World War II required to disable just two power stations, the coalition disabled the transformer capacity of every targeted power generation facility in Iraq.

*Third, the strategic air campaign targeted fuel and lubricants:* the lifeblood of any military machine. Iraq was a major petroleum and electrical power exporter, with one of the most modern petroleum extraction, cracking, and distillation industries in the world. Before the war, it already possessed fifty times more reserve oil, per person, than the United States; after seizing Kuwait's oil assets, Saddam Hussein's government controlled more than ten percent of the world's oil production capacity and twenty percent of the world's known oil reserves. The oil campaign was as decisive as it had been in World War II, but in a shorter time, with greater effectiveness, and with incomparably fewer losses. Further, it only targeted Iraq's militarily significant refined product production, and not its crude oil production facilities; there was no desire to impose greater hardship on Iraq than necessary. In the Second World War, American bombers dropped 185,841 tons of bombs during 50,000 sorties against 69 Nazi refineries (an average of nearly 2,700 tons of bombs per refinery), cutting refined petroleum production by 60%. Of this total bomb tonnage, only fifteen percent--approximately 27,876 tons, an average of only 404 tons per refinery--actually hit within the target area. In contrast, in the Gulf War, strike aircraft flying slightly over 500 sorties precisely dropped 1,200 tons of bombs on 28 Iraqi refineries (an average of only 43 tons per refinery), effectively ending refined petroleum production. Thus, for less than half the tonnage dropped on a single German refinery

during the Second World War, Allied strike aircraft destroyed &U of the Iraqi refineries targeted for attack, a clear indication of the greater precision and destructiveness of modern air attack. (It should be noted that the Iraqi refineries were at least as large as, and more sophisticated than, German ones had been). For only two-and one-half percent of the sorties as would have been required in World War 11, and for only one-and one-half percent of the bombs that would have been necessary in that earlier conflict, the Gulf attackers shut down Iraq's refined petroleum production. Within three days of the commencement of oil strikes, Iraqi refined oil production was only 50% of its prewar level; within 5 days, it was at 10%, and five days later it was at zero.

*Fourth, the strategic air campaign achieved--for the first time in military aviation history--clear-cut interdiction of Iraqi transport into the Kuwaiti theater of operations. At the start of the war, there were 54 railroad and highway bridges in Iraq, most on roads running southeast from Baghdad into Basra and Kuwait. At the end of the war, 41 of the 54 were dropped (others had not been targeted for various reasons), and 32 pontoon bridges hastily built to offset the Allied air attacks had been destroyed as well. It had taken only 450 bomb-dropping sorties to accomplish this. As a result, the flow of supplies and some key communications between Iraq and Kuwait were totally disrupted. By the third week of the war, transport south from Baghdad was so badly damaged that the amount of supplies getting to Basra--the major transshipment point for the Iraqi army in Kuwait--was far below the amount necessary to maintain any sort of meaningful combat effectiveness. Historically, bridges have been profoundly difficult targets that have quickly become flak traps for attacking aircraft. The precision-guided bomb, either a laser-guided or electro-optical guided weapon, dramatically revised that relationship.*

*Fifth, the strategic air campaign destroyed the Iraqi air force, preventing it from coming to the aid of the Hussein regime and its fielded forces in Iraq. As mentioned previously, the Iraqi air force played little role in*

the war, for two reasons. First, Saddam Hussein evidently believed that the coalition could not sustain its air effort beyond four or five days, and then the Iraqis could come out of their shelters and fight. Secondly, when they did venture out, they ran into a veritable buzz-saw of eager Eagle pilots ready to do battle. During the immediate pre-war period, the first two weeks of January, the Iraqi air force had averaged approximately 55 "shooter" sorties per day, and another 40 or so sorties by support aircraft. On the first night of the war, they flew about 25 "shooter" sorties and 90 or so support ones. For the first week, IQAF fighter sorties averaged about 30 per day, but they quickly found that United States Air Force fighters--and Pilots--were better. Altogether, fourteen Iraqi fighters fell before F-15's during that first week. Very quickly, the Iraqis decided not to fight.

Coalition air leaders were initially uncertain of their success in so effectively shutting down Saddam Hussein's air force. Accordingly, they were on the lookout for a possible "Air Tet" that Iraq might spring for maximum destructive and propaganda effect. Thus, on January 23, day 7 of the war, the coalition began an active program of "shelter busting." If the IQAF would not fight, it would be bombed in place. Allied strike aircraft carrying hardened laserguided bombs began striking Iraqi shelters, which had been designed to withstand the rigors of nuclear attack. The impact was immediate. On day 9, January 25, the IQAF appeared to "stand down," to take stock of what was happening to it. Then, the next day, it "flushed" to Iran. Why the IQAF fled to Iran 'is not precisely known, and the answer may never be fully known. In any case, Iraqi fighters and support aircraft fled for the border. More than 120 left, trying desperately to evade the probing eye of AWACS and the F-15's powerful air-to-air radar. Some ran out of fuel and crashed over Iranian territory. Others fell to Air Force F-15 barrier patrols (the last on February 7), raising total coalition fighter-vs.-fighter victories by the end of the war to 35 enemy versus no friendly losses. Meanwhile, back in Iraq, over 200 aircraft were destroyed on Iraqi airfields, and hardened 2,000 lb. bombs devastated Iraq's supposedly impregnable shelters (patterned on Warsaw Pact models designed

to withstand nuclear blast overpressures) and the aircraft within many of them. Eventually day-and-night air strikes destroyed or seriously damaged 375 shelters out of a total of 594.

All success in war is, unfortunately, accompanied by loss, and each loss is tragic and profound; sadly, the Gulf War was no exception. But what was different about this war was the remarkably low loss rate of Air Force and coalition aircraft.

Optimists predicted losing one-half of one percent of all sorties, (150 aircraft over a 30,000 sortie campaign, a .005 loss rate) with roughly a quarter of all shot-down aircrews killed, a quarter captured, and half rescued or able to return to friendly territory. Thoughtful pessimists estimated losses at 2% (which the Israelis had suffered in their spectacularly successful campaign of 1967), or possibly 3%. Dire pessimists--and there were some--forecast losses as high as 10%, equivalent to the casualties experienced by RAF Bomber Command and the 8th Air Force during the worst days of 1943. General Glosson had greater confidence than this; in October, during a briefing to President Bush, he predicted that the coalition would certainly lose no more than 80, and probably less than 50, aircraft in the entire campaign. In actuality, the Air Force lost 14 aircraft in the war, giving an overall Air Force loss rate in Desert Storm of .00047--one twentieth of one percent--per CENTAF combat sortie: unprecedented in military aviation history. It was not accidental; rather, it reflected Glosson and Horner's commitment to avoiding aircraft losses and associated casualties. For the first three weeks of the war, for example, Glosson restricted attack aircraft from descending below 8,000 feet to avoid dense antiaircraft fire that had proven so murderous in previous wars. Under the overall air management of Air Force Special Operations Command, joint service combat search and rescue forces worked heroically to extract coalition aircrews that were shot down over enemy territory. Unfortunately, so dense were the concentrations of Iraqi troops that often downed airmen were captured before any search and rescue effort could be mounted. Sadly, several of the rescuers were themselves killed, wounded,

and/or taken prisoner during attempts to rescue downed airmen from deep inside hostile territory.

Key to the success of the air campaign was maintenance; from the suppliers to the line crews sweating under the desert sun, the Air Force's maintainers worked miracles, enabling ever-higher sortie rates as the war progressed--essentially, a constant surge. As a result, wartime mission capability rates actually exceeded peacetime rates. The following are peacetime and wartime mission capability rates (in percent) for selected Air Force aircraft in the Gulf War:

<i>Aircraft</i>	<i>Peacetime</i>	<i>Gulf War</i>
A-10	90.4	95.5
C-5	69.0	78.0
C-130	78.0	84.0
C-141	80.0	86.0
F-4G	83.7	88.7
F-15C/D	85.1	93.7
F-15E	80.4	95.5
F-16	90.2	95.4
F - 117	81.6	85.8
KC-10	95.0	95.0
KC-135	86.0	89.0

These rates--and generally similar ones for the Navy and Marine Corps--validated the Department of Defense's investment in high-technology, high-leverage systems, refuting prewar critics who suggested that such policy had resulted in acquisition of overly complex and unreliable systems that could not be maintained in the operational intensity of actual war.

### **The Strategic Air Campaign as the Public Saw It**

In sharp contrast to Saddam Hussein's wanton endangering of civilian populations in Israel, Saudi Arabia, and the Gulf States, stood the precision of

the coalition's air attacks and the lengths to which coalition planners and aircrews went to minimize any chance of civilian casualties. As news and, in particular, video accounts of the air war over Iraq reached the rest of the world, a remarkable transformation in popular attitudes towards air power took place. The skepticism, doubts, and outright pessimism that had characterized previous judgments were at once swept away. Pictures of bombs threading their way down ventilator ports, elevator shafts, and bunker doors demonstrated more eloquently than any amount of written analysis how effectively and devastatingly air warfare could strike. Further, the close agreement between the public pronouncements of officials in Washington and reporters on-scene in Baghdad offered dramatic proof of the integrity of the Air Force leadership in selecting only targets of demonstrated military value, and even then going to extreme lengths to avoid civilian casualties.

The precision and damage limitation of air attacks particularly impressed reporters in Baghdad, and those who visited the city afterwards. In April, writer Milton Viorst arrived in postwar Iraq as a reporter for *The New Yorker*. Baghdad, he found, was not a blitzed city like Berlin or Tokyo at the end of the Second World War. In contrast, the damage was extraordinarily precise:

"Oddly, it seemed, there was no Second World War-style urban destruction, despite the tons of explosives that had fallen. Instead, with meticulous care--one might almost call it artistry--American aircraft had taken out telecommunications facilities, transportation links, key government offices, and, most painful of all, electrical generating plants. . . .The central post office, in downtown Baghdad, was struck with such exquisite accuracy that three of its four brick walls remained standing but the interior was transformed into a maze of twisted girders and piles of debris."<sup>3</sup>

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<sup>3</sup> Milton Viorst, "Report from Baghdad," *The New Yorker*, 67, 18 (June 24, 1991), p. 58.

In every war, tragic mistakes happen, and bombs or missiles stray off course, killing civilians. But whereas such casualties had been numerous in previous wars, in Iraq they were remarkably low, thanks to the technology of precise air attack. Well into the war, until an air strike on a command and control facility used also as a shelter (unknown to strike planners) on February 13 killed a hundred or more Iraqi civilians, the Hussein government was claiming that only a total of 41 Iraqis had lost their lives to coalition air strikes—a figure so extraordinarily low that it would have been considered preposterously small in previous wars. Allied attempts to minimize civilian casualties were evident to the Iraqis themselves, as Iraqi soldiers repeatedly sought shelter in civilian areas, knowing they would not be hit. The effectiveness and precision of coalition air strikes, which furnished decisive results without inflicting massive destruction and death, confirmed a revolution in air power and signaled a new objective reality of modern war.

### **The Anti-Armor and Artillery Campaign**

From the first night of the air campaign, the Air Force directed air attacks against the Iraqi army, both in Kuwait and in Iraq. After the war, Air Force Chief of Staff General Merrill McPeak stated that, "There was no time from day one on, that the Iraqi ground forces were not under heavy air attack."<sup>4</sup> Such attacks reflected the strategic goals of air campaign planners, as well as General Powell's and General Schwarzkopf's wishes that Iraqi tank and artillery strength be reduced as much as possible.

One of the major challenges confronting allied attackers was ensuring that significant numbers of Iraqi tanks and artillery were destroyed so that when "G-day"—the onset of ground operations to reoccupy Kuwait—came, coalition ground forces would face minimal resistance and suffer minimal

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<sup>4</sup> Transcript of remarks by General Merrill A. McPeak, Pentagon Press Conference, March 15, 1991.

casualties. Four problems were inextricably bound up within that challenge: locating the tanks, mechanized vehicles, and artillery; discriminating between real targets and decoys; successfully attacking the real targets; and getting reliable bomb damage assessment (BDA) that could give General Schwarzkopf accurate information on which to base his subsequent actions.

The first problem was by no means an easy one. Iraq's ground forces were superb combat engineers, adept at digging in, camouflaging, and hiding forces and weapons. Locating vehicles in the open was obviously not as difficult as locating ones buried in defensive positions. Various overhead systems, including the E-8A JSTARS and the Lockheed TR-1 and U-2R possessed optical and electronic sensors that could "image" a tank or artillery piece against its background. Dug-in tanks and artillery were a different matter, and made more complex by Iraq's heavy investment in decoy technology.

During the Gulf War, smart weapons overwhelmed tank, artillery, and mechanized vehicle targets. After the war, General Horner recalled that one Iraqi general, a prisoner of war, stated during interrogation that "During the Iran War, my tank was my friend because I could sleep in it and know I was safe . . . . During this war my tank became my enemy. . . none of my troops would get near a tank at night because they just kept blowing up. "Swing-wing F111F "Aardvarks" dropping laser-guided bombs were particularly successful. Carrying the Pave Tack targeting pod, F-111F's would cruise over Iraqi lines, using the swiveling FLIR pod to sweepsearch back and forth across the ground, a technique they had refined before the war. Twilight and night attacks proved particularly devastating, for the differential cooling rate of metal vehicles and equipment against a desert background produced a heat pulse well above the ambient infrared background. With a tank or vehicle located, the F-111F weapons system operator would designate it with a laser, then drop a 500 lb. GBU-12 laser-guided bomb. Using these tactics, the F-111F became an outstanding anti-armor airplane. In the last days before G-day, F-111F's achieved up to 150 armor kills per night; in one concentrated



period of attacks over a single target area, F-111F's destroyed 77 armored vehicles and tanks. Overall, F-111F's were credited with over 1,000 verified kills of Iraqi tanks and armored vehicles throughout the conflict. Other strike airplanes were also very effective using laser-guided bombs; on one occasion, a two-ship of LANTIRN-equipped F-15E's destroyed sixteen tanks with an expenditure of sixteen GBU-12 bombs.

The GBU-12, ideally sized for destroying Iraqi vehicles, constituted nearly fifty percent of all "smart" bombs dropped by American forces, but the Maverick missile also played a major role in the destruction of Iraq's mechanized forces, artillery, and fortified positions. During the war, the Air Force fired over 99% of the nearly 5,500 Mavericks American airmen employed in the war, from F-4G's, F-16's, and, primarily, from A-10's. Two-thirds of these were AGM-65D imaging infrared (IIR) versions of the missile, thirty percent were TV-guided AGM-65B's, and 3% were larger warhead IIR AGM-65G's. (The Marines fired the remaining Mavericks used in the Gulf, the laser-guided AGM-65E). When employed against tanks, the \$70,000 AGM-65D IIR missile routinely destroyed \$1.5 million T-72 tanks in virtual "one missile, one tank" exchanges, an example of the high leverage and cost-effectiveness of smart weapons on the modern battlefield.

Accuracy of intelligence estimates was the single most controversial issue during the entire air campaign, particularly bomb damage assessment. Was, in fact, the air campaign achieving the levels of destruction that planners had hoped and that videotapes seemed to indicate? On the eve of "G-day," CENTAF's planners estimated air attack had destroyed approximately fifty percent of Iraqi tanks, forty percent of Iraqi artillery, and a third of Iraqi armored vehicles in the Kuwaiti theater of operations. Others estimated that losses were no greater than twenty to thirty percent, and some analysts declared them as low as fifteen percent. In fact, CENTAF's estimates were conservative. The actual Iraqi losses by the eve of G-day were much higher--on the order of sixty percent of tanks, sixty percent of artillery, and forty percent of armored vehicles. Eventually, by the end of the war, Iraq had lost

over ninety percent of its tanks, ninety percent of its artillery, and nearly fifty percent of its other armored vehicles in the KTO. Had General Schwarzkopf not believed his air campaigners, he might have unnecessarily prolonged the air campaign, revisited destroyed targets, and unnecessarily endangered the lives of his aircrews. Strike video, showing the results of a Maverick or GBU-12 hitting a tank or other target, generally proved the most useful means for planners to assess true destruction.

Many Iraqi divisions were suffering severely under Allied air attack, as prisoner interrogations were already revealing. Over time, the effective strength of these Iraqi divisions was sinking to about the fifty percent combat strength level, from deaths, wounding, desertions, and surrenders. At that point, a military unit—even a remarkably resilient and motivated one—is so damaged as to be essentially unusable; thus, there was no real point in bombing them below the fifty percent combat effective level. In mid-February, still over a week away from the launching of the ground operation, General Schwarzkopf issued guidance directing that Iraqi units not be bombed below the fifty percent strength level. He was convinced of the success of the air campaign, and his timely action prevented unnecessary wasted sorties.

### **Destroying the Battlefield**

To understand what air power enabled the land operation to accomplish, it is worth examining what it was intended to do, via the air campaign's "Phase III" attacks. The air campaigners had targeted Iraq's fielded military forces with a view to reducing their effective combat strength, cutting off their supplies, and destroying their command and control. To the ground forces, these strikes constituted "preparing the battlefield;" but JFACC planners saw it differently. "We are not 'preparing the battlefield,'" the director of the strategic planning cell in Riyadh declared emphatically, "we are destroying it."<sup>5</sup>

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<sup>5</sup> Quote from a sign posted in the Black Hole on January 29, 1991.

And so Air Force airmen were, in around-the-clock strikes, in conjunction with their American and coalition colleagues. More than 35,000 coalition attack sorties pounded Iraqi troops, including 5,600 directed against the Republican Guards. Every day, all day, and every night, all night, a constant parade of "Shooters," from old warhorses such as the B-52, to high-tech F-15E's and stealth fighters, entered Iraqi and Kuwaiti airspace. No airplane received more attention during the war than the A-10, the least sophisticated strike airplane that operated in the Gulf. Flown with rare courage, dedication, and fierce loyalty--as befitted men who saw themselves the heirs of the P-47 tradition from the Second World War--the A10 demonstrated its versatility and value in a variety of missions, although its vulnerability to gun and missile systems eventually caused General Horner to limit its use in high-threat areas. Throughout the war, the 144 A-10's in the Gulf flew almost 8,100 sorties. Used against Scuds and on armed road reconnaissance missions, the A-10 proved devastatingly effective, in part because its pilots used binoculars to assist in identifying targets, an aspect of the "down and dirty" A-10 war not shared by other fixed-wing aircraft. Due to the low-altitude ground-to-air threat and the greater precision necessary to hit targets from higher altitudes, its principal weapon proved to be the Maverick missile, rather than its much-touted 30mm GAU-8 rotary cannon. Overall, Warthog pilots destroyed 1,000 tanks, 2,000 other vehicles, 1,200 artillery pieces, and two helicopters (shot down by the cannon).

The 249-large F-16 force generated more sorties--nearly 13,500--than any other strike aircraft in the Gulf war, covering an array of targets ranging from Scuds to production facilities through battlefield emplacements and dug-in armor and artillery. The "Electric Jet" flew primarily as a "dumb" bomb-dropper, though one Air National Guard squadron operating in the close air support (CAS) role relied upon a 30mm gun pod carried under the plane's belly. The F-16's did yeoman work, literally swarming over the battle area and earning the nickname "killer bees." Killer scouts--F-16's configured as controllers and target markers--marked targets and directed attack aircraft

hitting targets within individual 15 x 15-mile "kill boxes"--grids laid out across the KTO in a fashion analogous with the tactics employed by "Fast FAC's" during Vietnam.

The effect of all of these attacks was a veritable firestorm of munitions raining down upon Iraqi forces. It inflicted operational paralysis upon the Iraqi soldiers in the KTO, immobilizing them, preventing them from fighting, breaking their will, and reducing many units to a rabble waiting to surrender. Previous attacks on Iraqi communications had so decimated Iraq's command and control structure that it was unlikely that Saddam Hussein knew how much his forces were actually being hurt. The destruction in Iraqi armored and infantry divisions was severe. Each armored division averaged approximately 250 main battle tanks, 175 armored personnel carriers, and 75 artillery pieces, and each infantry division also possessed substantial numbers of tanks, mechanized vehicles, and artillery. Repeated air attacks reduced the military effectiveness of these formations from a mid-January level of nearly 100% to mid-February average levels of less than fifty percent for units along the Kuwait-Saudi border (the "tactical" echelon), roughly seventy percent for second-echelon forces further back (the "operational" echelon), and approximately eighty percent for "theater" echelon forces (primarily Republican Guard), located deeper in Iraq, or clustered along the Iraqi-Kuwaiti border near Basra.

Precision strikes were critical for targeting Iraq's military equipment, but area strikes against Iraqi troop formations were equally important, both for inflicting casualties and inducing surrenders. Here the aging Boeing B-52G Stratofortresses proved particularly devastating. Overall, the Stratofortress flew 1,624 sorties in the Gulf War--some from bases in the continental United States (in a true example of global reach and global power), others from Great Britain, Spain, and the Middle East--and dropped 25,700 tons of munitions, approximately 30% of all U.S. bombs. The B-52G's bomb tonnage alone was 42% of that dropped by the Air Force overall. Beginning the first day, they were bombing Republican Guard positions every three hours. Despite the

intensity of Iraq's antiaircraft and missile defenses, which forced special attention by coalition air defense suppression forces to protect the gargantuan Buffs, only one was lost, and that to a non-combat accident while returning to base. As had been true in the Vietnam war, prisoner interrogations revealed that the B-52 was the weapon ground forces feared most. Between 20% and 40% of Iraqi troops attacked from the air deserted their units prior to G-day, and B-52 strikes appear to have played the major role in forcing their decision. One troop commander, interrogated after the war, stated he surrendered because of B-52 strikes. "But your position was *never* attacked by B-52's," the interrogator exclaimed. "That is true," he stated, "but I saw one that *had* been attacked."

From the First World War onwards, air strikes against military formations have always generated profound psychological effects, and the Gulf War was no different. One deliberate demonstration pointedly hinted at what air power could do. The crew of a Lockheed MC-130E Combat Talon special operations airplane (a modified version of the ubiquitous Hercules transport) dropped a massive 15,000 lb. BLU-82 bomb in the midst of barren desert near Iraqi positions. The bomb detonated in an awesome and thunderous explosion that momentarily lit up the entire front. A leaflet drop followed advertising more such bombs directly on Iraqi positions caused mass defections, including virtually the entire staff of one Iraqi battalion. In sum, delivered by long-range bombers, shorter-range fighters and attack aircraft, and specialized attackers such as the MC-130E, air power was decisive in cracking Iraqi morale. One Iraqi prisoner, a division commander, put it bluntly. "Why did your men give up?" his interrogator asked. "You know," he replied sullenly. "I don't know. Why?" the interrogator persisted. "It was *the airplanes!*", he responded.

### **Khafji: Iraq Strikes Back**

Much as coalition air planners worried that Saddam Hussein might husband his air force for an "Air Tet" that might have profound psychological

and political impact even if its actual military impact was small, coalition ground planners remained alert to the possibility of a "Ground Tet" too--an attempt to interrupt the careful Allied ground preparations by an Iraqi thrust against coalition forces. Such concern was well founded, for Hussein's military did exactly that on January 29, when they launched the battle of Khafji. Saddam's motivations in striking at Saudi Arabia remain unclear, but seem to have been to entangle coalition forces in ground combat and then withdraw while in contact, dragging them back into his defensive positions, and setting the stage for a protracted and bloody ground engagement.

In retrospect, Saddam appears to have begun his buildup for a probe into Saudi Arabia a week earlier, on January 22. Unfortunately for Iraqi forces, that day, an E-8A JSTARS happened to be orbiting over Saudi territory, its moving target indicator and side-looking radar system looking deep into the KTO, laying bare the battle area. An experimental airplane, the JSTARS was anything but "user friendly;" it had, as its commander Col. George Muellner recalled subsequently, "four very highly paid Ph.D.'s from the contractor keeping its software going."<sup>6</sup> But what it could furnish was remarkable. During its 14-hour missions, the JSTARS could locate targets as small as individual vehicles, and then direct strike airplanes to them, increasing sortie productivity. This meant that with so many targets available, properly cued attack aircraft would run out of weapons before they ran out of fuel, rather than Wasting fuel searching and having to return with or jettison unused weapons. With JSTARS, fighters went 'bingo ammo,' not 'bingo fuel.' Further ' it furnished such precise guidance to attackers that they located their designated targets on almost all of their initial passes, thus minimizing exposure over the battlefield and potential losses from having to make multiple passes to acquire a target. During its orbits on this particular mission, the crew detected an Iraqi armored division's assembly area, and a sixty-vehicle convoy ominously moving towards Kuwait. In one of the most dramatic

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<sup>6</sup> Colonel George Muellner, "TAF's New Technology in Desert Storm," Seventh Washington Symposium, Society of Experimental Test Pilots, April 26, 1991.

examples of how battlefield intelligence coupled with responsive targeting and the lethality of strike airplanes transforms modern warfare, the JSTARS crew vectored two A-10's and an AC-130 gunship onto the convoy. Between them, the two Warthogs and the AC-130 destroyed 58 of the 71 vehicles--82% of the available targets.

On January 29, the actual battle for Khafji itself began. The attack opened with three brigades of Iraqi mechanized forces supported by an off-shore landing force. On the ground, Marines and Saudi National Guardsmen stood firm, destroying Iraqi armored vehicles with TOW missiles; Qatari tankers took a heavy toll of Iraqi vehicles. In the air, American and coalition airmen struck at the *Iraqi* forces. Fighting continued for two days, with the off-shore Iraqi reinforcements failing victim to coalition land- and Sea-based air attacks. Though Saddam Hussein's forces had gone to ground in Khafji, Saudi and Qatari troops quickly routed them, supported by Marine and *Air Force* air attacks. Iraq's offensive, utterly shattered, collapsed, over 200 vehicles in all being destroyed or disabled. Saddam Hussein's surviving soldiers wisely surrendered. The victory came at the price of a special operations forces AC-130H gunship shot down by an Iraqi missile, with the loss of all fourteen crewmen, and the deaths of seven Marines killed in a light armored vehicle hit by an errant Maverick missile fired from an A-10.

This tragic incident of air-to-ground "friendly fire" was one of several involving air and land forces that stimulated programs to develop technical means of identifying friendly vehicles and forces from above. As a result of this multi-service activity, evaluators examined sixty different ideas, with test models of proposed equipment being evaluated at the Yuma Proving Ground. By late February, 15,000 simple infrared beacons termed "Bud lights" were delivered to the Gulf, together with 190 more-sophisticated blinking Anti-Fratricide Identification Device (AFID) IR lights developed by the Defense Advanced Research Projects Agency and known more familiarly as "DARPA lights." They complemented identifying symbols painted on vehicles and proved very useful. Unfortunately, they did not arrive in time to prevent some

very serious incidents, including several friendly fire exchanges in the heat of battle between ground units, and a misidentification that resulted in two A-10's attacking a British armored force, destroying two personnel carriers and killing a number of British soldiers. Friendly fire, from the air and on the ground, is clearly a subject demanding intensive work to prevent such episodes in future conflicts.

The battle of Khafji was an important engagement for reasons that went beyond American casualties and friendly fire. Saddam Hussein had tried and failed to engage coalition forces in a bloody, prolonged war. If he and his generals. hoped to grasp onto the allies and then drag them into a larger and more costly engagement, they failed. As coalition ground forces fought valiantly and to good effect against the Iraqis, coalition air power broke the back of the assault, transforming troop carriers and tanks into blackened hulks. General Norman Schwarzkopf clearly and commendably appreciated that there was nothing to be gained by prematurely coming to grips on the ground with Saddam Hussein's forces. Instead of directing that ground units pursue and close with Iraqi forces, a traditional approach that could have led to serious and unnecessary casualties, General Schwarzkopf let air do this follow-up.

### **Towards G-day**

In the weeks prior to G-day, preparations went forward for the reoccupation of Kuwait. Over three months before, in early November, General Schwarzkopf had decided on his basic strategy. Together with his combat commanders, he sketched out what became known as his "Hail Mary" play, a rapid relocation of forces into the west. On G-day, these forces would begin driving north into Iraq, the onset of the fourth phase of Desert Storm, effectively cutting all contact between the eastern and western portions of the country, and hooking back eastwards to prevent the Iraqi forces in Kuwait from retreating. After developing his strategy, General Schwarzkopf



understandably worried that Hussein would redeploy to cover his flanks, particularly after mid-November, when the size of coalition forces increased dramatically. Once the air war started, he was relieved--any opportunity Saddam Hussein may have possessed to redeploy his forces along the Saudi-Iraqi frontier had passed. "The day we executed the air campaign," Schwarzkopf recollected subsequently, "I said 'We gotcha!'"<sup>7</sup> Air would fix him in place, destroy his ability to fight, and leave him with no militarily significant options. Joint Chiefs chairman General Colin Powell put it bluntly in a press conference on January 23, a week into the war: "Our strategy to go after this army is very, very simple. First we're going to cut it off, and then we're going to kill it."<sup>8</sup>

As the air campaign pounded Iraq, General Schwarzkopf directed the redeployment of American and attached foreign forces to the far west, beginning his Hail Mary maneuver. It was an extraordinary logistical effort; two whole Corps--the XVIII airborne and the VII armored, totaling 200,000 troops, involving 65,000 American and coalition vehicles--moved 250 and 150 miles, respectively, across the desert. In any one minute, every hour, 18 trucks would pass a given spot. The Abrams tank and Bradley fighting vehicle, two systems targeted by some critics for alleged 'unreliability," experienced no difficulties during the move. The 3rd Armored Division, for example, moved approximately 125 miles at night, and not a single one of its 300 tanks broke down. The C-130 theater transports were vital to the Army's move. During the westward shift, they flew almost 1,200 missions, delivering 14,000 people and over 9,000 tons of equipment; at the height of the airlift, C-130's flew with 10 minute separation between planes, a surge rate that required some airlift units to fly at twice their programmed wartime utilization rate. The Army's airlift needs resulted in establishment of Logistics Base Charlie--a selected strip of the Trans-Arabian Pipeline (Tapline) Road measuring a mile long. C-130's flew

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<sup>7</sup> Interview with David Frost, July 3, 1990.

<sup>8</sup> Transcript of remarks, Gen. Colin Powell, Pentagon Press Conference, Jan. 23, 1991.

hundreds of sorties into this base furnishing fuel and general cargo to the Army's XVIII Corps.

To cover the move west, the Marine Corps maintained a highly visible east coast presence, and the "necessity" of an invasion was broadly hinted. Iraq took the bait, and, from its position in Kuwait, continued to look east and south, well away from the west. More berms went up, more fire trenches were dug, more minefields were laid (on land and sea). Meantime, the coalition forces spread out. On the eve of G-day, the Iraqi forces in the KTO-43 Divisions, 142 Brigades--were confronted, from east to west, by Saudi-Qatari-UAE-Omani-Bahraini-Kuwaiti forces; Marine divisions and an Army brigade; and a coalition Arab force of Saudis, Syrians, Egyptians, and Kuwaitis. Then, further west along the Saudi-Iraqi border, came the VII Corps and British forces, and, in the far west, the XVIII Corps and French troops.

By this time, Kuwait resembled a Dante-inspired vision of Hell. Saddam Hussein's troops had begun torching Kuwaiti oil fields, igniting pipelines and well-heads, and sending billowing orange flames and dense black smoke skyward. This was but their latest environmental atrocity, for earlier, on January 25, Iraq had deliberately fouled the Persian Gulf with a massive oil spill. Two days later, on January 27, F-111F's launching GBU-15 guided bombs, managed to destroy the oil manifolding from storage tanks to the terminal, drastically cutting the oil flow, but not before so much had already spilled that the ecological system of the Gulf region was severely damaged. Now, the oil fires posed new threats; many of the wells emitted great quantities of poisonous gases so that they endangered anyone who ventured near them. Further, other wells had failed to ignite, forming vast pools of raw crude, covering hundreds of acres and, in addition to destroying the desert's fragile ecosystem, creating potential fire traps for anyone caught in them. So great was the smoke from burning oil well-heads--eventually over 700 would be torched--that it severely limited visibility in the KTO and into Saudi Arabia as winds blew it around. For fliers, it often meant repeatedly transitioning abruptly from clear skies to instrument flying conditions. The weather likewise

was miserable, with routine oil-thickened overcasts. Occasional cold, drenching downpours turned the surface of the desert to a thick, viscous mud that vehicles churned up. Obscuring fogs settled into wadis and depressions. Howling *shamals* blasted grit across people and equipment alike, endangering sophisticated optical systems and permeating clothing. overall, the Pervasive stench of black-spattering oil-laden rain, settled like an evil grimy mist on all it touched.

### **End-Game**

The fourth phase of Desert Storm opened at 0400 local time, February 24. Over the previous several days, a series of air and artillery strikes had destroyed much of the Iraqi artillery that had survived the weeks of air attack, and helicopter attack teams had decimated Iraqi command posts, air defense sites, and gun positions with Hellfire missiles. Thus, when the invasion actually began, it went quickly. The I Marine Expeditionary Force (I MEF) began the assault at 0400, breaching Iraqi defenses and driving towards Ahmad Al-Jabir airfield. Fixing attacks prevented Iraqi forces from maneuvering, and when they did so, they were pounded unceasingly by air, artillery, and tank fire. Masses of Iraqi soldiers ("ridden down by bombing," as one British spokesman described them), began surrendering, fearful at first, and then running towards Allied troops in great rushes, clutching surrender leaflets or anything white. They were starving; air attacks had cut their supplies of food and water to nothing, and most were infested with lice, covered with sores, sick, demoralized, or in shock from the constant scream of jets and blast of bombs. Over 8,000 prisoners were in custody by day's end; over 78,000 more would be eventually picked up. The VII and XVIII Corps advanced rapidly as well. Less than eight hours into the operation, the westernmost coalition forces were now poised to threaten the entire region of the Tigris and Euphrates valley. The 24th Mechanized Infantry began an end-run north that eventually sent it hooking around over 250 miles, ending up 27 miles west of Basra, a

charge of epic proportions. When Iraqi resistance showed itself, on-call Air Force air strikes by F-16's and A-10's, helicopter gunships, battlefield rockets, and artillery battered and shattered it; like other coalition forces, the 24th could hardly keep up with the prisoners that surrendered to it.

Through all of this action, air Power proved critical. C-130 airlifters supplied advancing coalition land forces with air-drops of food, water, and ammunition, and evacuated wounded and non-battle casualties, as well as over 600 wounded Iraqi prisoners requiring immediate medical attention. Air strikes continued the devastation of Iraq's remaining military forces. On the first day of the invasion, the E-8A JSTARS detected a blocking force of Iraqis forming to confront the 3rd Egyptian Mechanized Division, moving north and held up by extensive fire trenches. The Egyptians prudently formed defensive positions, and the JSTARS directed air strikes against the Iraqis, breaking up their anticipated counterattack. The entire panoply of Air Force air power operated over the Kuwaiti theater. Air attacks had set the stage for the rout of the Iraqis, and on the second day of the ground operation it began, even as allied ground forces raced through Iraq and across Kuwait, far ahead of schedule.

On the night of G + 2, February 26, JSTARS detected hundreds of vehicles moving towards the Iraqi frontier. The Iraqi III Corps, desperately trying to escape the rapid advance of the I MEF and Joint Forces Command-East, had lost cohesion, become enmeshed with Iraqi occupation forces in Kuwait City, and then, with a panic palpable even on radar, had begun blindly driving towards Basra, heading for a causeway that formed a fatal bottleneck. They had every kind of vehicle imaginable: tanks; armored personnel carriers; school buses; trucks; delivery vans; ambulances; and "confiscated" Mercedes; many stacked high with looted goods--televisions, radios, refrigerators, clothes, jewelry, computers, anything that had caught their fancy. So dense was the road traffic, that the individual radar "hits," which looked like little crosses superimposed on a map readout on the JSTARS moving target display, merged into thick lines, becoming themselves a roadmap of desperation. It

was imperative that these forces not be allowed to retire so that they could regroup and threaten coalition ground forces; air power had to intervene. The JSTARS called in the first air strikes, cutting the causeway. Then Strike Eagles began hammering the road congestion.

Coming unseen out of the night, relying on their LANTIRN pods to turn night into day, flying under miserable weather, the F-15E crews--which had just returned from a series of other long night missions--hit these targets repeatedly with cluster bombs, precision-guided munitions, and general purpose bombs. Other strikers, including Navy and Marine aircraft, continued the attacks by day. They attacked into the morning of the 27th, first the Kuwait City-Basra road, and then other roads that had jammed up as well. When the jams became too great, many Iraqis simply fled away into the desert. To do otherwise, to stay with their vehicles, to fire back, was to risk certain death. Strike video showed this, from the perspective of the aircraft: racing towards vehicles like predatory sharks, the Iraqis running away into the desert and relative safety, and then cannon, rocket, and bomb hits up and down the road, blowing vehicles in half, blasting them off the road entirely, or melting them in their own fuel-fed conflagrations. *Nothing could have more dramatically illustrated just how total air power's victory over the Iraqis had been than this example. Miles of tanks, trucks, and other vehicles abandoned and blasted, their smoking, shattered hulks immobile. American air power had turned the roads out of Kuwait into Iraq into compelling testaments to the overwhelming destructiveness of modern air attack.*

On the morning of February 24, as he recollected after the war, General Schwarzkopf expected that the ground operation would take three weeks. Instead, it took 100 hours, before President George Bush announced a cease-fire. At the end of G + 2, the coalition had taken over 30,000 prisoners. Twenty-six of Iraq's 42 divisions in the KTO had been destroyed or, in the laconic words of the military, "rendered combat ineffective." The remainder--every one--would suffer the same fate over the next day-and-a-half, for there was no way home to Iraq from Kuwait. On the third and fourth days, G + 3

and G + 4, all ' coalition forces advanced ahead of schedule, straddling Highway 8 between Baghdad and Basra, and consolidating their hold on the Tigris and Euphrates valley. The road to Baghdad was open, but coalition forces did not advance toward the Iraqi capital. Offensive operations against Iraq ceased at midnight on G + 4, February 28. By that time, coalition forces had taken approximately 86,230 Iraqi prisoners and detainees into custody.

### **The Bottom Line: Air Power was Decisive**

In the final analysis, in its swiftness, decisiveness, and scope, the coalition's victory came from the wise and appropriate application of air power. Not surprisingly, American casualties were lower than in any previous conflict. Overall, the United States lost 113 personnel killed, and 385 wounded, to enemy fire. Another 35 killed and 73 wounded fell to accidental friendly fire: 24 killed and 58 wounded in ground vs. ground exchanges, and 11 killed and 15 wounded from air-to-ground fire. The loss or injury of any military member is at once tragic and regrettable, but the casualties sustained by the United States in the Gulf War must be considered in light of what they could have been--and what some had predicted they would be, before the war--had the bulk of Saddam Hussein's forces been fit, supplied, intact, and in place, awaiting the onset of the ground operation. That they weren't was primarily due to the success of the air campaign.

Air power found, fixed, fought, and finished the Iraqi military. It dramatically reduced the risk to American forces from the enemy, shattering potential resistance. This was recognized by Secretary of Defense Dick Cheney who remarked, after the war, that "The air campaign was decisive," subsequently stating that Iraq could not fight back "because the air war turned out to be absolutely devastating."<sup>9</sup> Perceptive commentators recognized it as well; a year after the invasion of Kuwait, CBS news analyst Harry Smith stated

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<sup>9</sup> Secretary of Defense Dick Cheney, "Meet the Press," April 14, 1991; Interview of Secretary Dick Cheney by Harry Smith, CBS, August 2, 1991.

that "The Iraqi military machine folded under the pressure of Allied smart bombs and air power."<sup>10</sup> But the final word must be that of President George Bush, speaking at the commencement of the U.S. Air Force Academy on May 29, 1991: "Gulf Lesson One," he said emphatically, "*is the value of air power.*"<sup>11</sup>

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<sup>10</sup> Statement of Harry Smith, CBS, August 2, 1991.

<sup>11</sup> Weekly Compilation of Presidential Documents, 27, 22 (June 3, 1991), pp. 683-686.

### III

#### AN AIR FORCE FOR THE 21st CENTURY

The lessons of the Gulf War are many and profound. Not the least of these is the confirmation that we live in an uncertain world where international crises can arise quickly, demanding unexpected military commitments. As President George Bush has written:

"The collapse of the Communist idea has shown that our vision of individual rights--a vision imbedded in the faith of our Founders--speaks to humanity's enduring hopes and aspirations.

It is this abiding faith in democracy that steels us to deal with a world that, for all our hope, remains a dangerous place--a world of ethnic antagonisms, national rivalries, religious tensions, spreading weaponry, personal ambitions and lingering authoritarianism. For America, there can be no retreat from the world's problems."<sup>12</sup>

Neither can the United States Air Force afford to retreat from its responsibilities to national defense and the pursuit of freedom. *Victory came in the Gulf War in great measure because United States forces were prepared.* The Air Force had the right doctrine, the right systems, the right people, the right leadership. It had all the ingredients for success, but the victory would have been neither so certain nor predictable had not the nation's leadership, over many years, given the support needed to defend the nation. Such support will be required in the years ahead, as the nation faces continuing challenges and evolving foreign threats.

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<sup>12</sup> Executive Office of the President, *National Security Strategy of the United States* (Washington, D.C.: The White House, August 1991), p. v.



Above all else, the Gulf War demonstrated the continuing need for *air superiority*. Without air superiority, no other missions can be accomplished. Today, more than ever before, loss of the skies means loss of the land and sea as well. The nation that loses air superiority now and for the future may well lose its freedom of action. For that reason, the United States Air Force is developing the F-22, an advanced tactical fighter designed to confront any anticipated threat aircraft and to offset the reduction that will take place in Air Force fighter forces as defense spending declines in the 1990's. When it enters service, it will have been almost three decades since the Air Force first took delivery of its current air superiority fighter, the F-15 Eagle. The post-2000 world will be no less complex and challenging than the world of the present. Advanced fighter aircraft will be in service with a variety of nations that may or may not respect the same traditions of liberty and responsibility that we do. In such a challenging world, offsetting numbers of highly sophisticated fighters with smaller numbers of even more sophisticated and stealthy F-22's is not merely desirable, but mandatory, if America is to retain its air superiority edge in the potential combat environments of the future.

The Gulf War illustrated that the precision of modern air attack has revolutionized warfare. Air Force strike aircraft dropping smart conventional munitions inflicted levels of destruction upon Iraq's command, control, and communications (C3) network that, a few years ago, were thought only possible with nuclear weapons. In direct attacks aimed at the Iraqi air force, bunkers designed to withstand nuclear blast overpressures were easily penetrated and destroyed by laser-guided hardened penetrating bombs. Tanks and armored vehicles succumbed to laserguided bombs striking with unerring and frightening precision, time after time. Bomb accuracy, once measured in circular error probable (CEP) distances in the thousands of feet, is now down to less than ten feet.

In particular, the natural partnership of smart weapons and stealth working together gives an attacker unprecedented military leverage. Stealth technology demonstrated its enduring value in the Gulf. As President George

Bush remarked in a speech at the Air Force Academy after the war, "The F-117 proved itself by doing more, doing it better, doing it for less, and targeting soldiers, not civilians. It . . . carried a revolution in warfare on its wings."<sup>13</sup> The F-117 was the only airplane that planners dared risk over downtown Baghdad, and it had a destructive potential and cost-effectiveness that far outweighed any alternative system. During the Gulf War, many telling examples of stealth's value occurred. On one attack against one airfield, 8 attack aircraft striking the airfield were protected by 4 Wild Weasels, 5 radar jammers, and 21 fighters carrying radar-homing missiles. This package of 38 aircraft (and 65 men) was needed to ensure that eight aircraft could hit one target with a good expectation of survival, a ratio of support aircraft to strike aircraft of almost 5 to 1, and an aircraft-to-target ratio of 38 to 1. At the same time, 21 F-117's were striking 37 targets, by themselves.

The survivability offered by stealth, the extraordinary precision of modern conventional weapons, and the innate range capabilities of large aircraft are all powerful arguments for the development of the B-2 stealth bomber. The B-2 stealth bomber can carry *ten times* the payload of an F-117 over *five times* the distance. The B-2 was the one example of a military system that General Horner said he would have wanted had it been available. At several points in the Gulf War, a large payload stealthy bomber was just what the campaign planners needed. Fifty F-117 sorties were flown against very hardened chemical munitions bunkers located in a high threat area effectively closed to conventional attackers; two B-2's with precision weapons could have done the same job. A large "soft" storage and maintenance complex north of Baghdad required F-117 strikes to take down Iraqi air defenses so that B-52's could destroy it; the B-2, even with non-precision munitions, could have begun its devastation from day one. Iraqi nuclear research and development sites, bunkers, and hardened aircraft shelters at Kirkuk, Qayyarah, and Mosul required air superiority so that tankers and the electronic warfare support aircraft to protect the tankers could fly deep into

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<sup>13</sup> Weekly Compilation of Presidential Documents, 27, 22 (June 3, 1991), pp. 683-686.

Iraqi airspace, enabling F-117's to refuel and proceed on to the targets. The B-2's range, stealth, and capability to carry precision-guided Munitions offsets the need for any tankers, fighters, and electronic warfare airplanes, and allowed immediate attacks against these facilities from the onset of the war. The development and deployment of the B-2 is consistent with the essence of *Global Reach*.-*Global Power*.- No matter how disturbed or unsettled the world condition becomes, no matter how dramatically the threats confronting the nation evolve, the B-2 will be a viable multirole system defending *American interests* and those of our allies around the world.

Airlift in the Gulf War was, of course, critical to allied success. None of the other accomplishments of the air campaign, no matter how impressive, would have been as successful without timely and effective strategic and theater airlift, nor would any of the coalition's land and sea forces been able to conduct their own military operations as successfully as they did. Yet America's tired airlift forces, rooted in the technology of the 1950's and 1960's-are aging and badly in need of upgrading. The solution is the C-17, an airlifter of the 1990's ideally suited to the demands of the 21st century. The C-17 offers the potential of direct delivery--flying personnel and cargo from the United States directly to where they are needed--in effect, combining the strategic airlift capabilities of the C-5 and C-141 with the theater airlift capabilities of the C-130. Extraordinary advances in aerodynamics and propulsion enable it to expand the number of airfields open to strategic airlifters, and carry double the cargo of a C-141B and the bulk size now only possible with the C-5 at approximately the same operating cost as a C-141B. As with *airlifters* before it, the C-17 will be a vital national resource both in times of war and in times of natural disaster or other emergency. With this aircraft, the global presence Of the United States will be strengthened, and our capabilities to help friends, alleviate misery, and deter aggression will be remarkably enhanced.

The world of the 21st century will be an uncertain one, but one that we know will witness the growing interdependence of peoples and the continued

need for resolute and responsible American leadership. This leadership challenge demands that we make now the hard planning decisions necessary so that we can confront with confidence and assurance the ever-evolving, ever-changing, ever-dynamic world of the future. No organization can have a greater obligation to excellence than the United States Air Force. It is our special obligation, for we have witnessed many times the sobering fate of nations that have lost control of the air. In an era when we must do more with less, when we must ensure air power in a global aerospace age, the F-22, the B-2, and the C-17 offer extraordinary benefit to the nation and its citizens. They ensure that the men and women of the United States Air Force--including those yet unborn--will be able to furnish *Global Reach--Global Power* for decades to come.