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of the United States Air Force**

AIR PRESS

AIRPOWER

Summer 1997

JOURNAL

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ARTHUR G. B. METCALF

WITH SADNESS, we note the passing of a great friend and benefactor of the Air Force's professional dialogue. Dr. Arthur George Bradford Metcalf was an industrialist and philanthropist, a product of and contributor to great academic institutions, and a certain trumpet for airpower and strong national defense.

Many people knew him as chairman emeritus of Boston University's board of trustees and a teacher at that university, as well as at M.I.T. and Harvard. He founded the corporation that became the Electronics Corporation of America and served as president and chief executive officer until Rockwell International acquired the company in 1986.

Fewer people knew that he was an accomplished aviator and aeronautical engineer who rose to the rank of lieutenant colonel in the Army Air Corps. As a test pilot, he devised advanced aircraft and pioneered the field of aircraft stability and control, designing gyroscopic apparatus for flight-testing the B-18 and XB-19. Additionally, he fashioned the three-component airplane-stability oscillograph, which made possible the objective analysis of flight characteristics. Other accomplishments included developing an instrument for recording gyroscopic rate of roll, used to develop the lateral rolling characteristics of the P-51; conducting early qualitative testing of weightlessness in the T-33 and other fighter aircraft; and advocating use of the single floating tail for longitudinal control, now almost universally adopted in jet and other aircraft.

Over the years, Dr. Metcalf lectured and wrote in the fields of logistics and strategic analyses, publishing numerous articles and papers in mathematical analyses, aerodynamics, stability, aircraft control, military strategy, and

doctrine. His lifelong interest in military strategy and foreign affairs led him to found the United States Strategic Institute (USSI) in 1972. Knowledgeable commentators credit the institute and its quarterly publication, *Strategic Review*, with guiding national opinion in the direction of a strong defense. One has only to examine his latest essay on women in the military in that journal's Spring 1997 edition to understand his brand of hard-hitting, challenging commentary:

It is an issue that the military leadership and, more important, their civilian masters, cannot evade further. Unpalatable as the prospects are, detailed congressional hearings are needed, aimed at the realities of national security and the proper place for women in the military, giving consideration only to creating more austere and more competent armed forces. After all, the purpose of the military is victory on the battlefield and not "gender equality." In the words of the military sociologist Richard A. Gabriel, "it will avail us little if the members of our defeated forces are all equal. History will treat us for what we were: a social curiosity that failed."

Airpower Journal's affiliation with Dr. Metcalf began in 1979, when the editorial staff of its predecessor, *Air University Review*, was searching tirelessly—though fruitlessly—for a benefactor to fund a regular award for the best article published in each issue, as determined by a panel of judges. Approached by the staff, Dr. Metcalf never hesitated, generously endowing the award and naming it for his close friend and compatriot at USSI—Gen Ira C. Eaker. This \$500.00 cash prize remains fully funded by the gracious support of the Arthur G. B. Metcalf Foundation of Winchester, Massachusetts.

I last corresponded with Dr. Metcalf in January, just after his coronary bypass surgery. We

agreed on a proposal from our editorial board to restructure the awarding of the prize to benefit more contributing authors. An announcement in our next edition will explain the new policy. For now, we pause and reflect on how much he has supported

us—the Air Force and the profession of arms—and marvel at the scope of his contributions to the living. The Air Force posthumously awarded Dr. Metcalf the Exceptional Civilian Service Award, its highest civilian honor. Good-bye, friend—rest in peace. □



Net Assessment

Either write something worth reading or do something worth writing.

—Benjamin Franklin

Command Arrangements for Peace Operations by David S. Alberts and Richard E. Hayes. National Defense University Press, Fort Lesley J. McNair, Washington, D.C. 20319-6000, 1995, 136 pages, no price given.

Given the number of ongoing, multinational peacekeeping operations, the topic of command structures—especially among American and international peacekeepers—is both relevant and controversial. The authors argue that the military is neither equipped nor prepared to engage in peacekeeping operations; thus, command arrangements take on increased importance. After analyzing recent coalition and peace operations by the United States (e.g., Somalia, Rwanda, and Bosnia), they conclude that successful peacekeeping operations require the US military to work with a wide variety of institutions and organizations. These include foreign governments, nonnational political actors, and international organizations, as well as private voluntary organizations and foreign military forces that are typically part of a peace operation. The authors use the term *peace operations* throughout the text to

encompass all forms of peacekeeping and enforcement.

Although somewhat dated with regard to Bosnia, *Command Arrangements* is valuable because it explores a variety of arrangements and attempts to pinpoint the ones that troops in the field could use effectively. The first conclusion is that two command structures are required, since peacekeeping involves a political and military problem. Any form of military operation needs to be pre-planned and adapted to the particular situation that might develop. A considerable command and control (C²) capability would have to exist, but such an arrangement is the only realistic way to conduct military actions in peace operations.

The authors make a key point of the use of liaisons, citing Operation Desert Storm, which saw over 150 three- and four-man teams deployed in-theater. Peace operations will require even greater exchanges of liaisons, coupled with communications systems to allow the exchange of information. Simplification of command arrangements in coalition operations is another requirement for successful mission execution. Assignment of missions based on capability, assignment of separate physical space to different commands, use of coordination teams, and exchange of liaison officers should be coupled with the creation of networks that permit



The Balkans Air Campaign Study: Part 1

COL ROBERT C. OWEN, USAF



THIS ARTICLE summarizes and suggests implications of the final report of the Balkans Air Campaign Study (BACS).¹ The deputy commander in chief of United States European Command, Gen James Jamerson, and the commander of Air University, Lt Gen Jay W. Kelley, chartered this study in October 1995. Their specific



charter was to "capture" the planning, execution, and results of Operation DELIBERATE FORCE, the North Atlantic Treaty Organization (NATO) air campaign conducted against the Bosnian Serbs between 30 August and 14 September 1995, as part of a broader international intervention into the Bosnian conflict. Their specific charters were to explore broadly the salient events and im-

plications of this brief but unique air campaign and to gather a comprehensive documentary and oral archive to support later in-depth research. Their intention was that the team would lay out a "mile-wide-and-foot-deep" baseline study of DELIBERATE FORCE, one aimed more at identifying and delineating issues than at putting them to rest.

The BACS team adopted a core research question that highlighted the study's focus on the planning and execution of an air campaign: "How and with what considerations did the planners and executors of DELIBERATE FORCE link military operations with the strategic, political, and diplomatic goals they were charged to attain?" To be useful to a potentially broad audience, the answer to this question required a survey of the geopolitical, sociological, diplomatic, technological, and operational factors influencing this particular air campaign. Thus, the general organization of the study and the chapters of its report were divided into sections that primarily dealt with (1) the political and institutional context of DELIBERATE FORCE planning, (2) the actual planning of the campaign, (3) its execution, and (4) the implications of those experiences. To the extent that the report had a unifying theme, it was an effort to determine to what extent the planners and executors of DELIBERATE FORCE were cognizant of and/or wielded influence over the forces that shaped the form, execution, and effects of the air campaign. In other words, to what extent were they in charge of events, and to what extent were events in charge of them? The answer to that question, as well as others raised and to various extents answered by the BACS team, carries significant implications for the theories and doctrines of airpower strategy and planning.

Political and Institutional Context

In an ideal world, military planners base their work on concise and clear articulations of the political and diplomatic goals set by their political leaders. If they are to organize forces, develop strategies, select intermediate objectives, and execute operations, they need to know those goals and the degree and the nature of the force they can employ in their attainment. Although the truth of this concept likely would be transparent to any

military thinker, most would also agree that the inherent complexity, chaos, and obscurities of wars and conflicts often make clear and lasting articulations of specific political and diplomatic goals difficult to formulate. In the practical world, as a consequence, military planners usually base their work on expressions of goals that are sometimes clear, sometimes obscure, and sometimes unknowable or only assumed. This mix of the knowable and the unknowable was particularly evident in the planning context of DELIBERATE FORCE. In the origins and nature of the conflict, and in the multicoalition structure of the outside intervention into it, there lay a complex and changing web of objectives, commitments, and restraints that shaped military planning, even though some of its strands were perceived only imperfectly by, or were unknown to, the planners involved.

In general terms, the proximal cause of the Bosnian conflict was the economic and political decline of the Yugoslav Federation during the 1980s. The net effect of this prolonged crisis on Yugoslavian national and provincial politics was the breakup of the country. The republics of Slovenia and Croatia left in the summer of 1991, while Bosnia and Macedonia pulled out in the winter of 1991-92. Left behind in a rump state referred to as "the former Yugoslavia" were Serbia, Vojvodina, Montenegro, and Kosovo—all under the domination of Serbia and its president, Slobodan Milosevic. The breakup was not peaceful. The Yugoslavian People's Army (JNA) fought a 10-day war in June and July 1991 to keep Slovenia in the federation, and it fought a much longer and more bitter war to quash the Croatian secession, between August 1991 and January 1992. In cooperation with the JNA, Serbian minority groups in Croatia and Bosnia fought to hold those provinces in the federation and under the pale of Milosevic or, failing that, to carve out their own ethnic enclaves (*krajinas*) for ultimate unification with "greater Serbia." All of these conflicts were characterized by an appalling viciousness on all sides, including massacres of civilians and captured soldiers, mass robbery and rape, and scorched-earth

conquests—all encapsulated in a new international term: *ethnic cleansing*. Dismay and disgust at that violence and its implications for regional stability prompted outside states and international organizations to intervene in the Balkans crisis in general and in Bosnia in particular.

From the perspective of the intervening states and the later planners of DELIBERATE FORCE, knowing that the Bosnian conflict sprang from the collapse of the Yugoslavian Federation provided little foundation for strategic planning. Crudely put, a political breakup, in and of itself, provides few targets against which air strategists may ply their trade. Building air strategy in the case of Bosnia required more detailed understanding of the conflict, beginning with a clear description of its sustaining causes. *Sustaining causes* is a term useful in this discussion to designate the forces and mechanisms that “move” a conflict from its root cause to its ultimate form. Sustaining causes drive the evolution of a conflict, sustain it, and characterize its key features, such as objectives, scope, intensity, and political dynamics. In the present discussion, the sustaining causes of the Bosnian conflict are the things that led the country’s people and leaders to take the course that they did in response to the uncertainties and fears engendered by the collapse of the existing federal political system. They had choices, after all. To resecure its future, the collective Bosnian polity could have chosen to continue the peaceful coexistence of its people in a unitary state, to divide into a Swiss-like confederation of cantons, or some other option to gross interethnic violence. Instead, Bosnians went for each other’s throats, arguably at the instigation of elements of the Serb community. Explanations as to why they did so vary, but most identify some combination of three underlying forces as the predominant cause of their choice: (1) ethnic tension, (2) inflammation of ethnic tension by national and provincial politicians in pursuit of personal power and other political ends, and (3) a military imbalance grossly in favor of one Bosnian ethnic group—the Serbs.²

Ethnic tension may have been historically endemic to Bosnian politics, but interethnic violence was episodic. In their ancient roots in the barbarian invasions of the Roman Empire, the people of Bosnia were all South Slavs. In the latter twentieth century, they still looked like each other, and they spoke dialects of the same root language. But, as was the case for the South Slavs of the Balkans region in general, centuries of the divide-and-rule policies of their Ottoman and Hapsburg overlords, internal migration, dif-

In an ideal world, military planners base their work on concise and clear articulations of the political and diplomatic goals set by their political leaders.

fering religious experiences, and wars had divided Bosnians into distinct—though geographically intermixed—communities of faith and, to a lesser degree, culture. Proportionally, in 1991 the three largest ethnic groups in Bosnia were the Muslim Serbs (referred to in the report as Moslems),³ Orthodox Christian Serbs, and Catholic Croats, who comprised 44 percent, 31 percent, and 18 percent of the population, respectively. Nevertheless, following the creation of Yugoslavia after World War I, these communities generally lived at peace and increasingly intermarried, particularly when times were good and the federal government was strong. But when times were tough and the central government weakened, as was the case during World War II and during the economic and political crisis of the 1980s, ethnic loyalties regained preeminent importance for enough Bosnians to orient political competition and widespread violence along communal—rather than ideological, economic, or class—lines.

That ethnic chauvinism emerged as a predominant theme of Bosnian politics in the latter 1980s was to some degree the consequence of the manipulations of federal and provincial politicians. Indeed, the chronology of the Bosnian conflict has its tangible beginnings in the demagoguery of Slobadan Milosevic. Maneuvering for power, in 1987 he began using his position as president of the Yugoslavian League of Communists as a platform to whip up the ethnic pride and paranoia of the Serb community of Serbia. Milosevic's rhetoric also helped stir up Serbian groups living in the *krajina* of southwestern Croatia and in a number of smaller *krajinas* in Bosnia. By mid-1990, Croatian Serbs were committing acts of defiance and limited violence against the Croatian government. When Croatia declared its independence from Yugoslavia in June 1991, Croatian Serbs cooperated with the JNA in an open war to crush the independence movement or at least to establish Serbian control over the *krajina*. This war ended in January 1992, with the establishment of a tense truce in the *krajina* and creation of a United Nations Protection Force (UNPROFOR) to supervise it. By that time, elements of the Bosnian Serb community, under the general if sometimes very loose leadership of Radovan Karadzic, were preparing to resist a similar declaration of independence by Bosnia. In the early months of 1991, the majority of Croats and Muslims, under the leadership of President Alija Izetbegovic, had voted for independence. Preempting that vote, Karadzic established an independent Serbian Republic. Bosnia formally withdrew from Yugoslavia in March 1992, and heavy fighting followed immediately after. Forces of the Serb Republic, with overt assistance from the JNA, advanced to expand its borders, while the relatively weak Bosnian army fought to preserve the territorial integrity and authority of its newly independent state. Within a few weeks, Serbs controlled almost two-thirds of the territory of Bosnia.

The boldness and success of the Bosnian Serbs' military offensive were consequences to some degree of their great military advan-

tage over the Moslem and Croat factions. During 1991, a number of Serb military and paramilitary units formed in Bosnia and prepared to fight. Their preparations were helped greatly by the JNA, which remained present in the country until after independence. Before and as it withdrew, the JNA opened arsenals to Serb military units and released sympathetic personnel to join it. Meanwhile, the Bosnian government did little to arm itself. In reality, President Izetbegovic had little opportunity to do otherwise. The only significant local source of arms was the JNA, and it gave willingly only to Serbs. Moreover, the United Nations (UN) in September 1991 had imposed an arms embargo that made it difficult and expensive for the Bosnian government to import arms and materiel from the outside. Thus, when the country fractionated, the Bosnian Serbs had the will and overwhelming military power—particularly in a vast preponderance of aircraft and heavy field weapons—to advance around the northern and eastern parts of Bosnia. There they carved out an ethnic state with direct connections to Serbia proper and to the Serbian *krajina* of Croatia. In a matter of weeks, then, the Bosnian government found itself surrounded by unfriendly and mutually supporting Serbian enclaves and states.

By that time, the direct international intervention that eventually would have a crescendo in DELIBERATE FORCE was under way. Concerned with the growing violence and the possibility of intervention by Yugoslavia, several European states and the United States recognized Bosnia in April 1992, and on 20 May the UN Security Council recommended Bosnia for admission to the General Assembly. On 29 June the Security Council resolved to provide peacekeeping forces to protect the flow of humanitarian relief supplies into Sarajevo Airport, under the protection of UNPROFOR, whose charter was extended to include peace operations in Bosnia. NATO airpower became involved in the region at about the same time, in the form of airborne warning and control system (AWACS) aircraft flying in support of

SHARP GUARD, a NATO and Western European Union (WEU) operation to enforce the regional arms embargo and economic sanctions against the former Yugoslavia. Direct cooperation between the UN and NATO began on 16 October, when, by prearrangement, the UN issued United Nations Security Council Resolution (UNSCR) 781, banning all military flight operations over Bosnia, and NATO activated Operation SKY WATCH to observe and report violations of that ban. After observing hundreds of no-fly violations over the next several months, particularly by combat aircraft of the Bosnian Serb faction, the UN and NATO again cooperated to toughen the no-fly ban. On 31 March 1993, the UN issued UNSCR 816, banning *all* flights not authorized by the UN and authorizing member states to take all necessary actions to enforce that ban. Simultaneously, NATO replaced SKY WATCH with Operation DENY FLIGHT to signify the new element of force. Over subsequent months, NATO and the UN added other missions to DENY FLIGHT, including close air support (CAS) to protect UN personnel under attack, offensive air support (OAS) to punish factions violating UNSCRs, and suppression of enemy air defenses (SEAD) to protect NATO aircraft flying the other missions. To coordinate planning and particularly the targets identified for attack in these missions, NATO's North Atlantic Council (NAC) also activated at the start of DENY FLIGHT a joint target coordination board (JTCB), composed of senior NATO and UN tactical commanders concerned with the use of airpower in the region and its consequences. These developments and the planning that went into them constituted an incremental, evolutionary process that laid the foundations of DELIBERATE FORCE, which, technically, was but a phase of DENY FLIGHT.

Intervention air planning evolved for nearly three years, roughly from the early fall of 1992 to the end of August 1995. An important reason for that prolongation was the difficulty experienced by NATO, the UN, and the international community as a whole in reaching consensus on what the conflict

was about. Observable events made it obvious that the principal sustaining elements of the Bosnian war were ethnic tensions, political manipulation of those tensions, and the imbalance of military power. But which sustaining element or elements exerted the most influence on its shape, scope, and virulence? In his research for the second chapter of the BACS, Prof. Karl Mueller identified two distinct schools of thought on this issue, particularly among interventionist governments. One school emphasized ethnic conflict. Somehow, in this view, Slavs were predisposed culturally to slice each other's throats. Bosnia was just a case in point—a place where collapse of the Yugoslav federal system's restraints merely unfettered long-restrained-but-never-forgotten ethnic hatreds in a perennially unstable and violent region. At the beginning of the Bosnian conflict, Mueller argued, this was the official view of most European interventionist governments—importantly, Britain and France—which provided most of the peacekeeping troops for Bosnia. The second school emphasized the political manipulations of Serbian political leaders such as Milosevic and Karadzic. Whatever the inherent instabilities of the region, this school of thought held that the current round of fighting had been sparked and sustained by the venal racism of irresponsible demagogues. This view of the conflict, which reflected the predominant official position of the United States after the spring of 1993, thus held that violence in the region was episodic—not perennial.⁴

DENY FLIGHT planners found little guidance in their manuals and publications.

For air planners, these two views of the sustaining elements of the Bosnian war were directly significant because each implied a different strategy of intervention. If the war were the consequence of endemic cultural

forces, then it had no culprits. All sides were equally guilty and equally innocent—victims of forces beyond their control. If that were the case, then the proper role of an intervention was that of a neutral mediator. To the extent that one used force in such an intervention, one should do so only to protect the innocent, separate the warring factions, and encourage communications and confidence between them. In current US military usage, then, the view that conflict was perennial to Bosnia led to a *peacemaking* strategy aimed at ameliorating suffering and facilitating a cease-fire and political settlement as soon as possible. In contrast, if the war were the consequence of political manipulation, then it had culprits—the politicians exploiting the situation to sustain war for their own interests and those of their constituents. If that were the case, then coercion was also a legitimate role of military intervention, along with relief and confidence building. Assuming that one could identify the risk-benefit calculi of the political culprits, then one might be able to identify military targets that, if attacked or threatened, would shift the balance of their calculations toward peace. Intervention military force could also remediate the consequences of war crimes and territorial conquest by the war's aggressors. In that case, an immediate cessation of fighting might not be appropriate if it denied the interventionists the time required to set or help set things "right." In current US military usage, then, the view that conflict in Bosnia was episodic and opportunistic led in part to a strategy of *peace enforcement* aimed at coercing the appropriate warlords to accept peace and redress wrongs.

These two views of the causes of the war also had indirect significance for air planners, because their contrariety undermined the ability of NATO and the UN, as corporate organizations, to develop consensus between themselves and among their members on what exactly to do about Bosnia. Consensus was a necessary prelude to action because both organizations are voluntary associations of sovereign states. Once stated,

this seems an obvious truth. But in the heat of events, military planners sometimes forget that, compared to the hierarchical order of military organizations, these international organizations operate on a basis akin to institutionalized anarchy. No matter how orderly and cooperative the internal processes of these organizations, their member states are not subordinate to them or the majority will of the other members. Even small states can block corporate actions simply by withholding their support from them. As a consequence, most of the senior diplomats interviewed for the BACS pointed out, explicitly or implicitly, that no general plans or policies for Bosnia, including those related to the use of airpower, had any hope of success unless they were endorsed by all the principal states in the intervention—particularly those in the Security Council and NATO. According to Robert Hunter, the US ambassador throughout DENY FLIGHT, building such consensus support for increasingly robust use of airpower over Bosnia was a difficult and months-long diplomatic process—but an absolute precursor to action.⁵ Little wonder that Mueller described the debate over the sustaining causes of the war as "one of the major obstacles to Western efforts to deal with the crisis."⁶

The slow pace of policy development had one advantage for NATO airmen, including those who eventually put together DELIBERATE FORCE: it gave them time to overcome the institutional and doctrinal impediments they faced in planning and executing sustained air operations over Bosnia. In the third chapter of the BACS, Lt Col Bradley Davis described the organizational structure NATO had in place during DENY FLIGHT.⁷ The Bosnian region fell under the purview of NATO's 5th Allied Tactical Air Force (5 ATAF), with headquarters at the Italian air force's Dal Molino Air Base (AB), Vicenza, Italy. The Italian general commanding 5 ATAF, who at the time of DELIBERATE FORCE was Maj Gen Andrea Fornasiero, reported to the commander of Allied Air Forces Southern Command (AIRSOUTH). From December 1992, the AIRSOUTH commander was Lt Gen

Joseph Ashy, until his replacement by Lt Gen Michael E. Ryan in September 1994. These two United States Air Force officers, in turn, reported to United States Navy admirals commanding Allied Forces Southern Europe (AFSOUTH), also headquartered in Naples, Italy. The commander in chief of AFSOUTH (CINCSOUTH) at the beginning of DENY FLIGHT was Adm Jeremy Boorda, until his replacement by Adm Leighton W. Smith Jr. To complete the chain of command, AFSOUTH reported to the Supreme Allied Commander Europe (SACEUR), also an American four-star commander. SACEUR took his general guidance from the ambassadors sitting on the NAC.

The problem, Davis assessed, was that neither 5 ATAF nor AFSOUTH were organized, manned, or equipped to handle the scale and complexity of an operation like DENY FLIGHT, let alone DELIBERATE FORCE. In late 1992, 5 ATAF was charged to oversee and control indirectly the air defense of Italy. Accordingly, it had modest communications connections with air defense centers and radar sites throughout Italy. But the 5 ATAF headquarters was small, and its control center was equipped with obsolescent equipment. It possessed none of the state-of-the-art automated air planning and information downlink systems that had proven so successful in the 1990-91 Persian Gulf War. Similarly, AIRSOUTH was a small planning headquarters, charged with doing air planning for AFSOUTH and overseeing the activities of 5 ATAF and two other ATAFs based in Greece and Turkey. Neither AIRSOUTH nor AFSOUTH had crisis-planning cells to deal with the rapid onset and fast-paced political and military evolution of something like DENY FLIGHT.⁸ Overall, the established strengths and equipment of the two headquarters fell far short of the likely demands of continual observation and no-fly enforcement operations over Bosnia.

NATO's formal doctrinal foundations for peace operations over Bosnia were also uneven. Since most key commanders and staff planners were Americans, Maj Robert Pollock, in a chapter of the BACS report, exam-

ined the formal body of theories that might have been relevant to planning DELIBERATE FORCE and available to AIRSOUTH planners. He explored three theoretical constructs available in open literature at the time: Robert Pape's denial strategy, John Warden's five-ring paradigm, and the Air Command and Staff College's "systems" approach to air targeting. Despite their markedly different theoretical propositions and planning approaches, Pollock found that these three theories generally produced target sets similar to one another and to the targets actually bombed during DELIBERATE FORCE.⁹ The differences among them were marginal issues of timing and focus. However, for all the potentially useful guidance and reassurance these three concepts could have offered, neither Pollock nor other members of the BACS team uncovered oral evidence that

Until just a few weeks before the actual execution of the campaign, there existed no plan or plan annex called DELIBERATE FORCE.

AIRSOUTH planners had any working knowledge of them.

In his examination of written NATO doctrines, Col Maris McCrabb determined that DENY FLIGHT planners also found little guidance in their manuals and publications. That guidance was particularly spotty for operations other than war (OOTW), of which peace operations are a subset. Summarizing his findings, McCrabb noted that "NATO . . . air planning doctrine . . . focuses on coalition considerations but is largely silent on OOTW, while US joint doctrine, with heavier emphasis on . . . OOTW, does not fully integrate coalition considerations. . . . An additional issue that bedevils both sets of doctrine is the role of airpower in either OOTW or conventional war."¹⁰ These doc-

trinal shortfalls were glaring in relation to the unique and unprecedented relationship of NATO, primarily a regional military alliance, acting in military support of the UN, primarily a global political organization. Notably, established doctrines were largely silent on how airmen could reconcile, in their plans and target lists, the conflicting objectives and restraints that likely would crop up between two powerful organizations in a peacemaking situation in which at least one combatant did not want to make peace. Thus, addressing one of the principal corollary research questions of the BACS, McCrabb concluded that "the question . . . of whether these planners referred to the existing body of doctrine, or just 'winged it,' is

In current US military usage, then, the view that conflict was perennial to Bosnia led to a peacemaking strategy aimed at ameliorating suffering and facilitating a cease-fire and political settlement as soon as possible.

largely moot—there was almost nothing for them to refer to."¹¹

This virtual absence of guidance for conducting multicoalition peace operations was understandable, given the unprecedented nature of the UN-NATO relationship. But it was an important void in the context of NATO air planning because the overall focus of UN strategy and the operational focus of NATO air commanders began to diverge almost at the start of DENY FLIGHT. Under SKY WATCH, the strategic focus of the intervention and NATO flyers was on peacemaking—observe and report, but don't engage. But the decision to activate DENY FLIGHT added peace enforcement as a potential feature of intervention strategy. Though they never challenged the UN's overall commit-

ment to maintaining its position as a neutral peacemaker, General Ashy and other senior NATO commanders immediately recognized that their operational focus would be on peace enforcement.¹² Moreover, since the Bosnian Serbs possessed far and away the largest air arm in Bosnia, DENY FLIGHT clearly was aimed predominantly at them. That focus sharpened in the spring and summer of 1993, when CAS and OAS missions were added to the DENY FLIGHT menu; the UN designated certain cities under the control of the Bosnian government as safe areas and committed itself to protect them. With those developments, NATO was flying in great part to restrict both the Serb faction's employment of a key military advantage and its ability to assail cities held by its enemies. That hardly was an act of peacemaking impartiality, and its contrast with the overall UN mission became a source of frustration for NATO airmen and of strategic debate, particularly within the NAC.

Given all these elements of their planning context, NATO airmen seem to have received their planning and operational responsibilities for DENY FLIGHT under unenviable circumstances. The conflict they were engaging was complicated enough in its origins and convoluted regional politics. But their task was complicated further by the presence of at least two broad interpretations of the conflict at play among their direct and indirect political leaders, and each one of those interpretations spoke to a different approach to the use of airpower. In their formal chain of command, the American flag officers in charge of DENY FLIGHT worked for the NAC, which was acting in support of the UN Security Council. At the beginning of DENY FLIGHT, most of the member governments of both organizations were determined to restrict the intervention to peacemaking operations and, consequently, to avoid any military operations that would appear to favor one Bosnian faction over the other. Yet, in their informal chain of command, these officers were American, and by mid-1993 their government was on record in support of the use of airpower to halt or punish Serb

aggression—a position that AFSOUTH leaders were inclined to agree with. Compounding this strategic issue, AFSOUTH was neither materially nor doctrinally ready for DENY FLIGHT. Consequently, while the strategic debate rolled on and the Bosnian crisis unfolded, these airmen would have to build up their conceptual understanding of the conflict as well as the command infrastructure and force structure required to plan and execute operations against regional combatants of uncertain means and intent to resist. To put it mildly, they faced a great challenge.

Planning

To study the planning of DELIBERATE FORCE is to study DENY FLIGHT. Until just a few weeks before the actual execution of the campaign, there existed no plan or plan annex called *DELIBERATE FORCE*. When the term did appear in text, it seems to have done so first in the title of an AIRSOUTH briefing given in early August 1995—"Air Operations in Bosnia-Herzegovina—DELIBERATE FORCE."¹³ But the briefing did not delineate the theaterwide bombing campaign that DELIBERATE FORCE became. It mainly listed the various contingency air plans thus far developed by AIRSOUTH to execute various aspects of the DENY FLIGHT mission. As a menu of specialized plans to enforce UNSCRs, protect specific safe areas, and suppress Bosnian Serb air defenses, this briefing offered NATO air commanders a foundation for responding to a future crisis, but it did not propose a specific action for a specific crisis. Accordingly, what happened a few weeks later, when the operation since recognized as DELIBERATE FORCE began, was the activation and rapid modification of several plans originally developed under the aegis of DENY FLIGHT. Despite its obvious differences in focus and intensity from the main body of DENY FLIGHT, therefore, DELIBERATE FORCE can be understood only as an evolutionary outgrowth of the preparations and planning that went into the more prolonged operation. Col Chris Campbell

and Lieutenant Colonel Davis detail various aspects of this planning effort in their BACS chapters, which form the foundation for much of what follows here.¹⁴

Deliberate planning for DENY FLIGHT began almost from the beginning of Operation SKY WATCH in mid-October 1992. By mid-November, after observing continued no-fly violations by all Bosnian factions but particularly by Serb combat aircraft, the UN and NATO began developing the details of a more robust enforcement plan. Air planners at the Supreme Headquarters Allied Powers Europe (SHAPE), Mons, Belgium, began developing organizational, operational, and force-structure concepts for such a plan. Among other issues, they suggested that it would be necessary, in accordance with standard NATO practice, to establish a stand-alone combined air operations center (CAOC) to control expanded air operations over the region.¹⁵

This suggestion raised an issue of whether such a CAOC, if established, should be an expansion of the 5 ATAF command and control center at Vicenza or a new and separate creation. Responding to a NATO request to look into the issue, the commander of United States Air Forces Europe (USAFE), Gen Robert C. Oaks, dispatched his Seventeenth Air Force commander, Maj Gen James E. "Bear" Chambers, to visit and assess 5 ATAF's suitability for taking on the expanded responsibilities of the anticipated operation. An experienced air commander who knew airpower as well as the region and who was already running USAFE's part of the PROVIDE PROMISE humanitarian airlift into Sarajevo, Chambers was a logical choice for the task. By December, planning to increase AIRSOUTH's ability to impose a no-fly enforcement regime over Bosnia was proceeding along several tracks.

Lieutenant General Ashy received command of AIRSOUTH at just that time. Literally on the day that he took over, Ashy sat down with Admiral Boorda and did "some serious planning for an air operation in the Balkans . . . to police a no-fly zone."¹⁶ Holding General Chambers in high regard and

wanting to utilize his familiarity with operations at Vicenza, Ashy elected to set up a stand-alone CAOC under Chambers's direction.¹⁷ On paper, this CAOC was to be a subordinate extension of the existing 5 ATAF command center, but in practice General Chambers would report directly to AIRSOUTH. Ashy chose this arrangement over expanding the 5 ATAF facility because he believed it would give him tighter control over what he anticipated was going to be a fast-

The gulf between the views of NATO air commanders and the UN on the proper use and aggressiveness of the use of airpower continued to widen after [the air strikes against the airfield at] Udbina.

paced and politically hypersensitive situation. Ashy also considered either bringing the CAOC down to Naples or moving his own headquarters up to Vicenza, to place both the planning and execution staff functions of the forthcoming operation in one place. After some thought, he decided to accept the physical division of his staff in order to preserve other advantages. Leaving the CAOC in Vicenza had the advantage of preserving at least the form of the existing NATO command structure by keeping the Italian commander of 5 ATAF in the formal chain of command. Keeping his own planning headquarters in Naples would facilitate the daily, face-to-face contact with Admiral Boorda that Ashy felt he needed to do his job.¹⁸

The next order of business was to enhance the staff, planning, and communications capabilities of AIRSOUTH and the CAOC to match the likely demands of DENY FLIGHT. Finding the CAOC operating with "ancient" equipment, Ashy and his staff pressed to bring up-to-date communications and intelligence data terminals into the

CAOC and to connect the center to AIRSOUTH and to the NATO field units and squadrons that were beginning to deploy to bases around Italy. As part of this process, the CAOC received analysts and terminals for NATO's Linked Operations-Intelligence Centers Europe (LOCE) system. AIRSOUTH's intelligence capabilities were strengthened further by the transfer of intelligence personnel from Headquarters Sixteenth Air Force at Aviano AB, Italy, to Naples.¹⁹ Recognizing that the permanently authorized strengths of the AIRSOUTH and CAOC staffs were still too small for the task at hand, Ashy also began to augment them on a rotating basis with personnel coming in on 30-to-90-day assignments. These temporary duty (TDY) personnel soon comprised the overwhelming majority of the CAOC staff and a significant portion of the AIRSOUTH force.

Meanwhile, AIRSOUTH planners began to lay the documentary foundations for DENY FLIGHT and possible combat operations. The focus of their work was CINCSOUTH Operations Plan (OPLAN) 40101, *DENY FLIGHT*, the overall guide for NATO air operations in support of UN peace operations in Bosnia. Much of this document and its iterations remains classified and, consequently, outside the scope of this article. Their details are discussed in greater length in several BACS chapters, particularly Colonel Campbell's. But it is appropriate to say here that OPLAN 40101 started out as a skeletal document laying out rules of engagement and the CINC's concept of operations (CONOPS), and then evolved into a more thorough document that laid out the situation appraisals, strategy choices, coordination procedures, logistics issues, rules of engagement (ROE), and so on that CINCAFSOUTH believed were pertinent to the new, complex operation before his command. Since DENY FLIGHT was primarily an air operation, most of the work on 40101 was done by a few members of the AIRSOUTH staff or by other parts of AF-SOUTH, with the close involvement of General Ashy and his subordinates.²⁰

The first two versions of OPLAN 40101 came out in rapid succession, reflecting the

rapid expansion of the DENY FLIGHT mission in the first half of 1993. The first version, approved by the NAC on 8 April, mainly described how AIRSOUTH would intercept, inspect, and engage aircraft violating the no-fly mandate. The second version came out on 13 August. Its provisions reflected the UN's and NAC's addition of CAS and OAS to the menu of possible NATO air missions.

The addition of OAS to the OPLAN necessitated that AIRSOUTH create and get NAC approval of an appropriate target list. That approval came in the form of an NAC decision statement issued on 8 August, just days before the release of second iteration of OPLAN 40101. This decision statement spelled out three targeting options for offensive air strikes. Option one provided for OAS strikes of limited duration and scope against military forces and weapon systems directly violating UN resolutions or attacking UN peace forces or other personnel. Option-two targets were mechanisms for lifting sieges. Their focus remained on military forces and supporting elements, but their scope expanded to include targets throughout the immediate environs of a besieged safe area. Option-three targets marked out a broader campaign against targets outside the immediate area of a siege.²¹ Over the coming months, AFSOUTH made marginal adjustments to this basic target list, but the three-option categorization remained in effect.

By the time all these organizational and planning events had taken place, the inherent tension between the UN's peacekeeping focus and the peace-enforcement character of DENY FLIGHT was affecting operations profoundly. The establishment and, more to the point, the interpretation of the ROE for the operation provided an early indication of that tension. In his chapter on ROE, Maj Ron Reed explained that these rules are a natural bellwether of problems in a military operation. Their function is to link objectives, strategy, operations, and international law to establish the methods and limits of force usable in a conflict. To be viable, coalition ROE must reflect the views of all mem-

bers and the realities of the situation. If either of those conditions is not met, then disputes will rise quickly, over and around them.²² In the case of Bosnia, NATO officially endorsed the UN's strategic vision. So, in the absence of overt conflict, General Ashy and his staff worked out and got UN and NAC approval for an initial set of ROE by February 1993.²³ The real tension came from what proved to be the UN's greater reluctance, at least compared to the inclination of involved air commanders, actually to act on the ROE. "NATO," Major Reed concluded in his study, "would always view the use of force in terms of compelling the Bosnian Serbs . . . [while] the UN . . . viewed force in a much more limited context of self-defense." Indeed, despite many opportunities to do so, the UN also did not release a CAS attack in defense of peacekeeping forces on the ground until 12 March 1994.²⁴

If the war were the consequence of endemic cultural forces, then it had no culprits. All sides were equally guilty and equally innocent—victims of forces beyond their control.

The fact that UN political leaders exercised such close control of air operations was another manifestation of the internal peacekeeper/peace-enforcer posture of the intervention. In June 1993, NATO and the UN adopted a so-called dual-key procedure for releasing CAS and OAS strikes. Drawing metaphorically on the procedural requirement for two individuals to "turn keys" to release or launch nuclear weapons, the arrangement required appropriate officials in both the UN and NATO to turn their keys before any NATO aircraft could release weapons against a ground target. For NATO, any military commander, from the CAOC director up, could authorize CAS strikes in response to a UN request. CINCAFSOUTH retained release authority for offensive air

strikes. For the UN, the decision thresholds were raised one organizational level. Secretary-General Boutros Boutros-Ghali authorized his special representative, Ambassador Yasushi Akashi, to release CAS strikes, while retaining for himself the authority to release offensive air strikes.²⁵ The dual-key arrangement, thus, was an overt effort to counterbalance UN and NATO control over air operations. As such, it indicated at least a corporate presumption among the member states of each organization that some possibility of misunderstanding or irresponsibility existed in the way one organization or the other might interpret the standing ROE and the immediate circumstances of a proposed strike.

A question arises here: If the corporate membership of both organizations feared the possibility of an irresponsible or ill-advised use of airpower, who did they think would do it? To a large extent, the evidence available to the BACS suggests that the main concern centered around the "Americanization" of the intervention's air option. Since the summer of 1993, and with greater fervor after the following winter, US political leaders were the most outspoken advocates of the punitive use of airpower in the Balkans. From the beginning of DENY FLIGHT, NATO airpower in the Balkans was under the control of American flag officers, albeit ones serving as NATO commanders. Moreover, most of the alliance's offensive air strength resided in a powerful American composite wing based at Aviano AB in northeastern Italy. Several European states, particularly those with lightly armed peacekeeping forces committed on the ground, had fears (whether ill grounded or not) that these circumstances could lead to a unilateral, American use of the air weapon in a manner that might escalate the level of violence in the region or the intervention's role in it. Thus, according to Ambassador Hunter, several members of the NAC proposed the dual-key procedure to both NATO and the UN, in an effort to set up an arrangement that most people believed would preclude any offensive air action.²⁶ US ambassador Richard

Holbrooke shared Hunter's assessment.²⁷ Part of the dual-key arrangement was about controlling a powerful and politically sensitive "weapon" in the coalition's arsenal, and part of it was about controlling the holders of that weapon.

If ROE and the dual-key arrangement reflected the tension between and within the UN and NATO over the proper strategy of intervention in Bosnia, they also helped to increase those tensions on many occasions. This particularly was the case whenever the two organizations actually prepared to use airpower against the Bosnian Serbs. In the press of events, NATO air commanders and American diplomats generally found themselves pushing for aggressive and strong air strikes, while most other intervention partners and the leaders of the UN called for caution and restraint.

The air strike against Udbina Airfield on 21 November 1994 highlighted this tension. NATO and the UN ordered the strike to punish recent violations of the no-fly ban by Bosnian-Serb and *krajina*-Serb aircraft, some of which were based at the airfield. Lieutenant General Ryan, who had taken over AIR-SOUTH only weeks before, anticipated an active defense of the field and requested a comprehensive "takedown" of it, to include strikes against the offending aircraft themselves, the runway and taxiways, and the air defense systems and weapons in the area. Echoing his air commander's approach, Admiral Smith said the proper goal of the attack was "to make a parking lot out of Udbina Airfield."²⁸ Intending to show restraint and to limit Serb casualties, however, Secretary-General Boutros-Ghali approved attacks only against Udbina's runway and taxiways—not against aircraft and local air defense systems, which presumably would be manned during the attack. Among other considerations, the secretary-general hoped to avoid provoking the Bosnian Serbs into taking UN hostages, as they had done once already, in retaliation for a NATO CAS strike near Gorazde the previous April. Viewing the UN's restrictions as rendering the proposed air strikes largely ineffective and increasing

the risks to their aircrews, Smith and Ryan pressured the secretary-general and Ambassador Akashi to put aircraft and defense systems back on the target list. The UN leaders finally agreed to preapprove attacks against defense systems of immediate threat to NATO aircraft only. They continued to bar attacks against Serb aircraft.²⁹ NATO jets struck several anti-aircraft artillery sites and a surface-to-air site in the immediate vicinity of the airfield, but, otherwise, they struck only the runways.³⁰ It was a less-than-convincing demonstration of NATO airpower or resolve, one that left American air commanders and some diplomats very frustrated.³¹

The gulf between the views of NATO air commanders and the UN on the proper purpose and aggressiveness of the use of airpower continued to widen after Udbina. The UN's clear reluctance to employ the weapon came out clearly after the attack, when Ambassador Akashi pointedly drew a line between the UN and the peace-enforcement action just performed by NATO jets. Writing to Radovan Karadzic, he reported that NATO aircraft were under UN control but would act only in defense of UNSCRs and UNPROFOR. Despite the implications of the air attacks on the Serbs, he reported that NATO aircraft were "neither the enemy nor the ally of any combatant."³² NATO commanders increasingly became frustrated with the UN's long decision process in relation to releasing air strikes. This frustration reached a peak in the summer of 1995, Admiral Smith recalled, when UN peacekeepers "protecting" the city of Srebrenica called desperately for CAS. NATO jets were ready for attack within minutes, but the UN refused to turn its "key" for two days, by which time the fall of the city to the Serbs was assured.³³ Reflecting the views of many American leaders involved in Bosnia, Ambassador Holbrooke declared the dual-key arrangement an "unmitigated disaster" that placed the UN and NATO in a stressful and improper relationship of overlapping responsibility and friction.³⁴

The political sensitivity of the airpower issue also influenced DENY FLIGHT plan-

ning activities. Throughout the operation, Generals Ashy and Ryan took pains to ensure that their planning efforts and operations did not undermine the confidence of NATO and UN political leaders in the professionalism and self-control of their command. To that end, all iterations of OPLAN 40101, ending with change four in May 1995, carefully tied anticipated AIRSOUTH operations to the protection of UN forces and the enforcement of specific UNSCRs, whether they were air-to-air, SEAD, CAS, or OAS missions. The OPLAN also admonished NATO airmen to ensure that their strikes, when authorized at all, were "proportional" (i.e., that they avoided unnecessary casualties and collateral damage).³⁵ Also, the three target options listed in AIRSOUTH attack plans offered reassurance that NATO forces were a flexible instrument and tightly under control. According to Ambassador Hunter, the implicit reassurances of these provisions were essential underpinnings of his efforts to garner and maintain support among NAC members for more robust air operations.³⁶

From the inception of DENY FLIGHT, Generals Ashy and Ryan had asked NATO to second non-US colonels and general officers on a permanent basis to fill key command-and-staff billets at AIRSOUTH and the CAOC. Despite their continued requests, on the eve of DELIBERATE FORCE, all major staff positions at the CAOC and most at AIRSOUTH were filled by USAF colonels.³⁷ Most of their subordinates at the CAOC were American junior officers and sergeants. This was an anomalous situation in the NATO command structure, in which commanders and their deputies usually are of different nationalities, as are commanders at succeeding levels of organization. The essentially American manning of the CAOC and the air command structure may have been as much a product of the unease some NAC member states felt about the air weapon, as it was a cause of that unease. Several BACS researchers heard secondary reports that the situation at the CAOC grated the non-US officers there, but the team's letters asking such individuals directly about their perceptions and attitudes

were not answered. Significantly, however, Ambassador Hunter never heard complaints voiced by the national representatives on the NAC, where such complaints would have necessitated corrective action. In his opinion, the willingness of NATO political leaders to accept the arrangement may well have reflected both their unwillingness to have their nationals too closely associated with what might become a politically explosive employment of airpower, and their recognition that USAF personnel were best trained and equipped to handle the anticipated air operations.³⁸ The BACS team found no documentary support for Hunter's perception, but it was shared by most senior air commanders interviewed. Further, there remains the inescapable fact that other NATO states did not offer officers to fill key command positions.

NATO's ambivalence about the potential use of combat airpower in Bosnia also seems to have undermined whatever willingness UN leaders had to allow NATO to use air more freely in defense of their resolutions. As in the case of the use of any military force, a halfhearted or incomplete air operation would be indecisive, politically and diplomatically vulnerable to global criticism, susceptible to breaking up what support there was in the UN and NATO for continued intervention, and, as a consequence of all other effects, likely to do more to stir up the Bosnian hornet's nest than to calm it. Thus, Ambassador Hunter reported, a large measure of Secretary-General Boutros-Ghali's unwillingness to authorize CAS operations in defense of UN troops, let alone to consider a robust OAS campaign against the Serb targets throughout the area, was due to his belief—through the spring of 1995—that NATO did not have the political cohesion or commitment to carry such operations to a successful conclusion. The secretary-general made it clear to Hunter that he would never approve such operations unless he was convinced the UN would stick them out for their full course. Most of Hunter's diplomatic efforts in the NAC during 1994 and 1995, therefore, focused on

building such cohesion and commitment among the other member governments. Until enough or all of them decided to back a robust air operation, he did not expect the UN to release NATO jets to pound the Bosnian Serbs.³⁹

Consensus support for offensive air strikes to protect the safe areas began to build among NATO member states in the spring and early summer of 1995, as a result of several considerations and events. In general, three years of brazen Serbian defiance of UN resolutions and the laws of war had worn the patience of probably most of the governments intervening in Bosnia and had infused the intervention with a sense of desperation. By mid-May 1995, the international press reported that, as a result of the seemingly unstoppable fighting, "the nearly 40,000 UN peacekeepers in the region are descending into a state of ever more irrelevance and danger," that Ambassador Akashi had "become a comic figure," and that there was a "willingness to declare the Contact Group [see below] dead."⁴⁰ Then, to punish the Bosnian Serbs for violating the Sarajevo safe area, NATO jets struck Serb ammunition depots around the city of Pale on 24 May 1995. The Serbs responded by taking 370 UN peacekeepers hostage and chaining some of them to potential targets, thereby paralyzing the intervention. This humiliation, as it played out, led Secretary of Defense William Perry to declare that "the credibility of the international community was at stake."⁴¹ It also moved most interventionist governments nearer to the standing US position that a robust air campaign was needed to force the Serbs to obey UN resolutions.

Support for forceful action grew through June and into mid-July in the face of continued Serb attacks on the safe areas of Zepa, Gorazde, and Srebrenica, and when the Bosnian Serbs shot down a US F-16. Finally, after the UN rejected an AFSOUTH request of 20 June for air strikes to punish Serb violations of the no-fly edict, after Srebrenica fell to brutal assault on 11 July, and with Zepa apparently next on the list for Serbian conquest, the foreign ministers of 16

intervening states met at London during 21–25 July, largely at the prodding of Secretary of State Warren Christopher. The purpose of the meeting was to prepare the way for and lay out the form of a more forceful intervention in the Bosnian conflict. The weapon of necessity, as every diplomat probably understood at that time, would have to be NATO airpower.⁴²

By the time the foreign ministers gathered at London, NATO air planners had amassed a comprehensive set of plans to offer the ministers for dealing with specific aspects of the Bosnian conflict, along with a clear idea of how they wanted to apply those plans. All of these plans were subelements of the basic OPLAN 40101, though most had been initiated after General Ryan took over AIRSOUTH in October 1994. Standing out among these plans was DEAD EYE, the SEAD plan initiated by General Ryan, following the strikes on Udbina Airfield. DEAD EYE's purpose was to provide protection for NATO aircraft from Bosnian Serb air defenses as they flew in protection of the safe areas or on other missions. A salient feature of DEAD EYE, one that set it apart from the geographic restrictions placed on CAS and OAS strikes, was that it provided for comprehensive attacks against integrated air defense system (IADS) targets throughout Bosnia, if necessary. In early 1995, as the plan evolved in detail, it incorporated a division of Bosnia into southeast and northwest zones of action (ZOA), based on the Sarajevo and Banja-Luka areas, respectively. As described by Col Daniel R. Zoerb, director of the AIRSOUTH DENY FLIGHT operations cell, Maj Kieth Kiger of his staff proposed these ZOAs "to facilitate deconfliction of planned simultaneous fighter attacks on the IADS," but they did not imply any restrictions of the overall freedom of NATO airmen to attack elements of the IADS throughout Bosnia to defend themselves. If his aircraft flew in defense of a city in either ZOA, General Ryan expected to launch attacks against air defenses throughout the embattled country.⁴³

On an ongoing basis, AIRSOUTH planners also created plans to protect specific safe ar-

reas and updated them as necessary. Following the Pale bombings at the end of May 1995, General Ryan's planners developed a briefing called "NATO Air Operations in Bosnia-Herzegovina," which mainly listed and described the various attack options available, but not DEAD EYE. During July and early August, this briefing expanded to include a CONOPS suggesting that ground-attack plans to defend Bosnian cities be based on the ZOA boundaries laid out for DEAD EYE. Under existing arrangements, NATO aircraft striking in defense of a safe area were limited to hitting targets within the 20- or 30-kilometer exclusion zone around it. What AFSOUTH planners were calling for was the freedom to strike a broader array of targets throughout any ZOA in which a besieged city was located. Thus, by the time the London conference convened, NATO air planners in AFSOUTH were thinking in terms of broad-ranging ground attacks, supported by a theaterwide SEAD campaign in defense of Bosnian cities rather than the halting and piecemeal applications that had characterized the use of air to that point.

From the American perspective, London began as an effort to issue a powerful threat of air strikes against the Serbs for what Secretary Christopher called their "outrageous aggression."⁴⁴ At the end of the conference's first day, Christopher asserted that the ministers had agreed that "an attack against Gorazde will be met by decisive and substantial air power."⁴⁵ Moreover, he announced that "existing command-and-control arrangements for the use of NATO air power will be adjusted to ensure that responsiveness and unity are achieved." By this he meant that the United States expected the UN's role in tactical decision making to diminish, perhaps by ending the dual-key procedure.⁴⁶ Last, Christopher asserted that the gathered ministers agreed that "the taking of hostages will no longer be allowed to prevent implementation of our policies." All this, he stated, reflected a general belief that "so long as the Bosnian Serb aggression continues, any political process [for peace] is doomed to failure."⁴⁷ In sum, Christopher was fore-

casting an intervention strategy in which airpower would force the Serbs to halt their attacks on Bosnian cities and which would thereby open the way to productive peace negotiations.

Most of the senior diplomats interviewed for the BACS pointed out, explicitly or implicitly, that no general plans or policies for Bosnia, including those related to the use of airpower, had any hope of success unless they were endorsed by all the principal states in the intervention.

In contrast to Secretary Christopher's confident predictions, however, other events at the London conference indicated that the gathered ministers were not all fully behind the American proposal to unleash a determined air assault. British foreign secretary Malcolm Rifkind announced that "although there was strong support for airpower, there were also reservations . . . [and] it would be used only if it was felt necessary."⁴⁸ In a similar vein of caution, the French delegation reconfirmed a demand that any bombing operations be preceded by ground reinforcements, particularly to the endangered city of Gorazde.⁴⁹ As a consequence of these reservations, the conference's declaration actually extended the threat of air strikes only in protection of Gorazde, a limitation that prompted the Bosnian prime minister, Haris Silajdzic, to declare it a "green light" to attacks everywhere else. Publicly at least, Bosnian Serb leaders also were not intimidated by the London conference's threats, as evidenced by the Bosnian Serb army's continued attacks on UN protected cities.⁵⁰

Meanwhile, at NATO headquarters, Ambassador Hunter, Secretary-General Willie Claes, and other leaders were orchestrating events in the NAC to give some credence to

the London conference's threat of decisive air action. Following an NAC meeting on 25 July, the day the conference ended, Claes announced that the NAC had approved "the necessary planning to ensure that NATO air power would be used in a timely and effective way should the Bosnian Serbs threaten or attack Gorazde." The secretary-general also indicated that planning would begin to protect the other safe areas, and he warned that "such operations, once they are launched will not likely be discontinued."⁵¹ Not included in Secretary-General Claes's press release were the operational details settled by the NAC. These included adoption of the so-called trigger events that, if they occurred, would prompt the start of bombing. Also, the NAC approved AFSOUTH's plan to defend each Bosnian city by striking Serb targets throughout the ZOA in which that city was located.⁵² Finally, NATO sent three air commanders to Bosnia to convince the Bosnian Serb military commander, Gen Ratko Mladic, of the alliance's determination to carry out its threats.⁵³

All of these events were welcome news for General Ryan and Admiral Smith. They were particularly pleased by the NAC's clearance to strike throughout a given ZOA in defense of a city within it. Had they been held to hitting only targets in the military exclusion zones surrounding the safe areas, they believed that their sorties would be expended against hard-to-find-and-attack tactical targets, such as artillery pieces and armored vehicles. The two commanders anticipated that air attacks against those kinds of "direct" targets would be slow to inflict enough "pain" on the Serbs to force them to comply with UN demands. Consequently, they welcomed the opportunity to plan against a wider range of "indirect" targets, such as bridges, command facilities, supply dumps, and so on, that they also knew would be easier to find and destroy. Moreover, Ryan and Smith anticipated that, sortie-per-sortie, such a campaign would inflict more coercive pain on the Serbs, and at less cost in blood and time than would one focused on direct targets.⁵⁴ Blood and time would be their great-

est concern, Smith and Ryan believed, because they anticipated that public support for the campaign would quickly dwindle, particularly if NATO bombs began to kill civilians—or even Bosnian Serb soldiers.⁵⁵

In addition to broadening AFSOUTH's planning leeway, the NAC's actions on 25 July also opened the way for UN leaders to drop their resistance to a heavy campaign of offensive air strikes. As public and strong statements of intent to punish Serb attacks on the safe areas, the NAC's decisions went a long way toward showing the UN secretary-general that most, if not all, NATO member states had found the commitment and domestic political stamina to initiate and stay with an air campaign long enough to have an effect on Serbian actions and policy. In response, the secretary-general on that same day transferred the UN "keys" for approving offensive air strikes and CAS from his hands and those of Ambassador Akashi, respectively, to those of Gen Bernard Janvier, the UNPROFOR commander.⁵⁶ The power to launch strikes against the Serbs now lay in the hands of military commanders on the scene.

As Colonel Campbell describes in his BACS chapter, General Ryan responded to these rapid shifts in the political and diplomatic environment of the intervention by accelerating the ongoing air planning effort.⁵⁷ His staff continued to refine individual safe-area plans and DEAD EYE. Exploiting the freedom to plan attacks across a ZOA, AIRSOUTH staffers also produced a plan called VULCAN, which postulated wide-ranging strikes in the southeastern ZOA to protect Sarajevo. Another new briefing titled "Graduated Air Operations" proposed a step-wise escalation of attacks across a ZOA to force the Serbs to back away from one or more safe areas. By 3 August these planning actions had reached a point that Admiral Smith and General Ryan could brief Secretary-General Claes and Gen George Joulwan, SACEUR, on how they intended to apply offensive air strikes in the Balkans. With the endorsements of these leaders in hand, Admiral Smith signed a memorandum on 10

August with General Janvier and his deputy in Sarajevo, British lieutenant general Rupert Smith, that clarified the "over arching purpose," "phasing," "assumptions," and so on to guide the looming air campaign.⁵⁸ At the same time, AIRSOUTH worked out further air-ground coordination arrangements and target lists with UN ground commanders and with British major general David Pennyfather, chief of staff of the NATO Rapid Reaction Force, which had been deploying into Sarajevo for several weeks.⁵⁹ By the third week of August, then, General Ryan had at least the plans in place to fight on behalf of the UN.

Also, as the summer passed, General Ryan took advantage of the relaxed diplomatic restraints on planning large-scale offensive operations by expanding the CAOC's manning and equipment as quickly as possible. Guided and underpinned, in part, by the recommendations of a Pentagon study team that assessed the CAOC's readiness for expanded air operations in late July, Ryan drew heavily on US manpower and equipment to expand the CAOC's capabilities.⁶⁰ Several hundred TDY augmentees began flowing in from US bases everywhere, along with a flood of state-of-the-art communications, intelligence, and automated planning systems. Perhaps most importantly, elements of a USAF Contingency Theater Air Planning System (CTAPS) began to arrive, which, when fully assembled and operating, would vastly enhance the CAOC's ability to plan, monitor, and control high-intensity air operations in near real time.

Taken together, these actions pretty much completed the effective "Americanization" of the CAOC, but that was a price Ryan and Lt Gen Hal Hornburg felt ready to pay in the rush to get ready. Politics had for months restrained their ability to prepare for an enlarged air war, and now politics had suddenly presented them with the likelihood of just such a war, much faster than they could adjust their forces to accommodate.⁶¹ Nevertheless, despite the fact that the vast majority of their CAOC personnel had been in Italy for less than a few weeks or even days, and de-

spite the piles of unopened CTAPS equipment boxes lying around, Admiral Smith, General Ryan, General Hornburg (the director of the CAOC), and Hornburg's deputy, Brig Gen David A. Sawyer (who doubled as

the 5 ATAF deputy commander), were ready for a fight by the third week of August—about a week before they found themselves in the middle of one. *To be continued in the Fall 1997 issue.*

Notes

1. Col Robert C. Owen, ed., *DELIBERATE FORCE: A Case Study in Air Campaigning: Report of the Air University Balkans Air Campaign Study*, unpublished. At the time of the printing of this "Summary," the main report was in the final stage of revision at Air University, and on file in the Air Force Historical Research Agency at Maxwell AFB, Ala. [hereinafter AFHRA] Its classified final version should be available for official use by January 1998, with a declassified version available sometime in the summer. The total report currently consists of 13 chapters written by 11 different authors:

- Chapter 1: "Preface," Col Robert C. Owen
- Chapter 2: "The Demise of Yugoslavia and the Destruction of Bosnia," Karl Mueller
- Chapter 3: "The Planning Background," Lt Col Bradley S. Davis
- Chapter 4: "US and NATO Doctrine for Campaign Planning," Col Maris McCrabb
- Chapter 5: "The DELIBERATE FORCE Air Campaign Plan," Col Christopher Campbell
- Chapter 6: "Executing DELIBERATE FORCE," Maj Mark Conversino
- Chapter 7: "Combat Assessment," Maj Mark C. McLaughlin
- Chapter 8: "Assessing the Effectiveness of DELIBERATE FORCE: Harnessing the Political-Military Connection," Maj Mark C. McLaughlin
- Chapter 9: "Weapons and Tactics," Lt Col Richard L. Sargent
- Chapter 10: "Leaders and Followers—The Human Factor," Maj John C. Orndorff
- Chapter 11: "Chariots of Fire: Rules of Engagement in Operation DELIBERATE FORCE," Maj Ronald M. Reed
- Chapter 12: "Roads Not Taken—Theoretical Approaches to Operation DELIBERATE FORCE," Maj Robert D. Pollock
- Chapter 13: "Summary," Col Robert C. Owen

NOTE: Since these chapters remain in draft and under revision, they are cited hereinafter without pagination.

2. Some important analysts of this conflict would add a fourth sustaining cause: the misguided intervention of outside states and organizations in the conflict. In their view, the collapse of Yugoslavia created a constitutional crisis delineated by those who wanted to preserve a multiethnic federal state, where individual rights and economic opportunities were protected by law, and those who sought security and opportunity in the creation of ethnic-based nation-states, carved out of the existing republics of the Federation. In this view, individual European states, notably Germany, strengthened the nationalist position and assured the breakup of Yugoslavia by recognizing the independence of Slovenia and Croatia. Similarly, war became inevitable in Bosnia, when the United States successfully pressured the UN and the European Community into recognizing its independence in March and April 1992. This is an important argu-

ment that relates directly to the effects of DELIBERATE FORCE. But the gross effect of the intervention on Bosnian politics was not a strategy consideration for NATO air planners. They were not asked if they should intervene—they were simply given the parameters of their part of the intervention and told to do it. Thus, this particular issue is not included in the list of sustaining causes in this study of air planning, though it no doubt is a critical consideration—particularly at the level of grand strategy. For the details of this case, see Susan L. Woodward, *Balkan Tragedy: Chaos and Dissolution after the Cold War* (Washington, D.C.: Brookings, 1995); and Christopher Bennett, *Yugoslavia's Bloody Collapse: Causes, Course, and Consequences* (New York: New York University Press, 1995).

3. Terminology for describing the Moslem-Serb community is a problem. Some analysts use *Bosniaks*, apparently to give them a nonreligious label, like *Serbs* and *Croats*. The problem with that term is that it implies a closer link between the Moslem community and the cause of preserving the multiethnic unity and territorial integrity of Bosnia than it does for Serbs and Croats. With many individual exceptions, such may have been the case at the start of the Bosnian conflict, but in the pressure cooker of war, Moslem leaders adopted increasingly "ethnic" political objectives and rhetoric. So this chapter refers to Moslems as such, when appropriate, and refers to the national government or cause as *Bosnian*.

- 4. Chap. 2.
- 5. Robert A. Hunter, tape-recorded interview by author, 23 July 1996, tape 1, side A, index 50.
- 6. Chap. 2.
- 7. Chap. 3.
- 8. Lt Col R. Boyd, Headquarters AIRSOUTH, Naples, Italy, interviewed by author, 6 December 1995.
- 9. Chap. 12.
- 10. Chap. 4.
- 11. *Ibid.*
- 12. Gen Joseph W. Ashy, commander, US Space Command, transcript of interview by author, 29 April 1996, 10; and Adm Leighton Smith, "NATO Operations in Bosnia-Herzegovina: DELIBERATE FORCE, 29 August–14 September 1995," presentation to Air War College, 9 November 1995, videotape, index 1046, AFHRA, Bosnia Air Campaign Study (BACS) file Misc-19.
- 13. Briefing, "NATO Air Operations in Bosnia-Herzegovina—DELIBERATE FORCE" (U), c. 1 August 1995. (NATO Secret) Information extracted is unclassified.
- 14. Chaps. 3 and 5.
- 15. The military and civilian issues related to setting up the CAOC were complex. As Gen Joseph Ashy pointed out in comments to this draft, NATO was contemplating its first out-of-area, offensive military commitment in a region where some members, notably Britain and France, already had troops committed under the UN banner. Also, the whole question of DENY FLIGHT command arrangements had implications for a broader question of the future shape of AFSOUTH arrangements, including whether or not it should remain under an American commander. However, because the detailed origins of the CAOC were not central to the DELIBERATE FORCE planning effort, the BACS team did not explore them deeply, other than to come to

grips with the influence that the ultimate location and organizational nature of the CAOC wielded on events. Here again is another rich area for additional research. See Robert C. Owen, memorandum for record, subject: General Ashy's Telephone Comments to Second Draft of BACS, 20 July, AFHRA; and Col Larry Bickel, discussion with author, Ramstein Air Base, Germany, 24 August 1996. At the time of this discussion, Bickel was assigned to Headquarters United States Air Forces Europe (USAFE), but in the fall of 1992, he served at SHAPE as a Balkans-region air planner. He (probably along with others) suggested the initial term CAOC, in conformity with NATO terminology and practice.

16. Ashy interview, 4.
 17. *Ibid.*, 6.
 18. *Ibid.*, 25-57.
 19. *Ibid.*, 28-32; and Lt Col Lowell R. Boyd, AIRSOUTH planner, Headquarters AIRSOUTH, Naples, Italy, transcript of interview by author, 6 December 1995, 12-13.

20. Boyd interview, 6. Throughout the period under discussion, Lieutenant Colonel Boyd acted as one of General Ashy's principal planners, and he was particularly responsible for ROE development. Boyd also mentions that Maj Richard Corzine was involved in AFSOUTH ROE development in the early phases of DENY FLIGHT.

21. Memorandum for the NATO secretary-general, NAC Decision Statement, MCM-KAD-084-93, subject: Operational Options for Air Strikes in Bosnia-Herzegovina, 8 August 1993.

22. Chap. 11.
 23. Ashy interview, 36.
 24. Chap. 11.

25. Smith presentation, index 865-900. It is important to be reminded here that the dual-key arrangement did not apply to air action against aircraft violating the no-fly resolution. It only applied to air-to-ground CAS and OAS strikes. Under the provisions of the UN-NATO ROE, the decision to attack offending aircraft resided in NATO channels, from the director of the CAOC up. What seems fair to say, however, is that the dual-key reflected a pervasive caution in the UN and NATO over the use of any military force that, in turn, also made leaders in both organizations cautious about enforcing the no-fly edict, particularly against noncombat aircraft, such as helicopters, that might have noncombat or nonmilitary personnel aboard. But when NATO pilots observed Serbian strike aircraft in the act of bombing Bosnian targets on 28 February 1994, the reaction was swift and sure, resulting in the shootdown of four aircraft.

26. Hunter interview, tape 1, side A, index 350-450.

27. Ambassador Richard Holbrooke, tape-recorded interview by Maj Mark McLaughlin and Dr. Karl Mueller, 24 May 1996, side A, index 584. BACS researchers also heard statements that the dual-key setup also may have been a way of giving the French an indirect veto over NATO air operations. With lightly armed peacekeeping forces on the ground, the French had reason to be concerned over any action that might prompt attacks on them. Without a chair on the NAC, however, the French had no direct say in the use of NATO airpower. But through its permanent seat on the UN Security Council, the French government could influence those operations through the UN "key." The BACS team uncovered no documentary or direct oral evidence that French concerns influenced NATO's decision to propose the dual-key setup, but the idea seems plausible. Clearly, this is an attractive area for further research.

28. Smith presentation, index 1280.

29. *Ibid.*, index 1270-1330.

30. Maj Scott G. Walker, Maxwell AFB, Ala., interviewed by author, 28 February 1997. Walker was the deputy mission commander of the Udbina air attack. See also "NATO Jets Knock Out Base for Serb Planes," *The Stars and Stripes*, 22 November 1994, 1-2.

31. Holbrooke interview, side A, index 567.

32. Yasushi Akashi to Radovan Karadzic, letter, 10 December 1994.

33. Smith presentation, index 1080-1105.

34. Holbrooke interview, side A, index 029-040.

35. Headquarters Allied Forces Southern Europe, CINCSOUTH OPLAN 40101, *DENY FLIGHT* (U), change four, 3 May 1993 (SECRET). Information extracted is unclassified. Also, it is important to note that the term "proportional" was a bone of contention between NATO air planners and the UN, since the planners thought of it as meaning an appropriate level of response, while prior to the Pale bombing, UN planners and leaders took the term as meaning "tit for tat" (i.e., attacking "smoking guns"). See Col Daniel R. Zoerb, "Comments to second Draft of the BACS," fax message to Col Robert C. Owen, 16 July 1997, AFHRA, 10.

36. Hunter interview, tape 1, side B, index 035; and tape 2, side A, index 2835.

37. Briefing, Lt Gen Hal Hornburg to BACS team, Air Force Wargaming Institute, Maxwell AFB, Ala., 14 March 1996. General Hornburg was deputy director of the CAOC at the time of DELIBERATE FORCE.

38. Hunter interview, tape 2, side A, index 949.

39. *Ibid.*, tape 1, side A, index 1157-1559.

40. James L. Graff, "A Good Season for War," *Time Magazine*, 15 May 1995, 48-49.

41. Quoted in "Pity the Peacekeepers," *Time Magazine*, 5 June 1995, 39.

42. In November 1995 Adm Leighton Smith reported that the brutality of the Serbian conquest of Srebrenica was the decisive event in bringing the foreign ministers to London. Smith presentation, index 1570.

43. The details of this phase of planning, many of which remain classified, are discussed at length in chap. 4. See also Zoerb.

44. For impressions and reportage on the conference, see Michael Evans's two articles in the *London Times* of 22 July 1995: "Muted Threat Falls Short of Summit Hopes" and "American Deal Sours over Dinner." See also text of Secretary Christopher's speech of 22 July: "The International Conference on Bosnia: Now We Must Act," *U.S. Department of State Dispatch*, 24 July 1995, 583-84.

45. Christopher, 583.

46. This reflects Michael Evans's view in "American Deal Sours."

47. Christopher, 584.

48. Evans, "Muted Threat."

49. Evans, "American Deal Sours."

50. Evans, "Muted Threat."

51. NATO, "Press Statement by the Secretary General Following North Atlantic Meeting on 25 July 1995."

52. Gen George Joulwan, SACEUR, SHAPE, Casteau, Belgium, tape-recorded interview by Jerry McGinn, 24 July 1996, tape 1, side A, index 832-1128.

53. Gen James L. Jamerson, deputy commander in chief, US European Command, interviewed by author, 23 July 1996. General Jamerson was one of the officers sent.

54. Smith presentation, index 1950-2065.

55. Lt Gen Michael Ryan, Headquarters AIRSOUTH, Naples, Italy, interviewed by Maj Tim Reagan, Air Force Studies and Analysis Agency (AFSAA), and Dr. Wayne Thompson, Center for Air Force History, 18 October 1995.

56. Boutros Boutros-Ghali, UN secretary-general, to Willie Claes, NATO secretary-general, letter, 26 July 1995.

57. Chap. 5.

58. Adm Leighton W. Smith Jr., CINCSOUTH, memorandum of understanding with Gen Bernard Janvier, commander,

UNPROFOR, subject: NAC Decisions of 25 July and the Direction of the UN Secretary-General, 10 August 1995.

59. AIRSOUTH, Operation DELIBERATE FORCE Fact Sheet, n.d., 2.

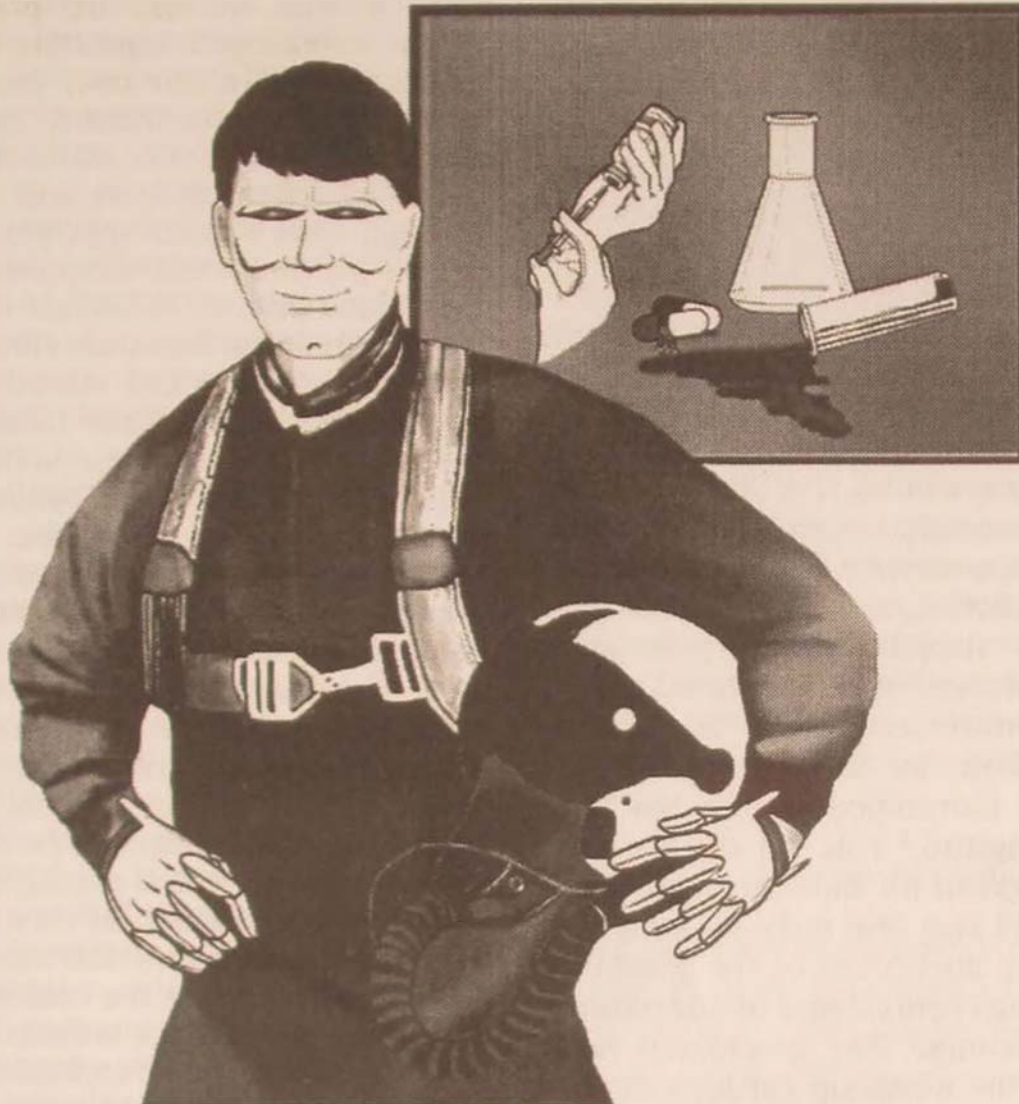
60. For the study, see Col John R. Baker, deputy director of current operations, Headquarters USAF, "Report of Assistance Visit to Operation DENY FLIGHT Combined Air Operations Center (CAOC), Vicenza, Italy, 24-30 July 1995."

61. CAOC organization charts exist in several documents collected by the BACS team. One easily accessible one, with names, is found in "USAFE's Response to the Balkans Crisis: A Brief History of Operations PROVIDE PROMISE and DENY FLIGHT," August 1995, AFHRA, BACS file CAOC-24, folder B-1b(2)-3.

You're apt to get so tied up in administrative processes in peacetime that you forget exactly what you're in business for. The emphasis is on something else.

—Gen Curtis E. LeMay

FOOLING MOTHER NATURE



An Ethical Analysis of and Recommendations for Oversight of Human-Performance Enhancements in the Armed Forces

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*The ideas and opinions expressed in this article are those of the authors only and do not represent any position or policy of any federal agency, academic institution, Toffler Associates, or any other institution or organization with which they are affiliated. The authors would like to thank Christine Grady, RN, PhD, acting director, Department of Clinical Ethics, National Institutes of Health; Steve Kenney; and Jonathan Moreno, PhD, professor of pediatrics and of medicine, director of the Division of Humanities in Medicine, State University of New York (SUNY) Health Science Center at Brooklyn, for their thoughtful and constructive reviews of previous drafts of this paper.

HOW WOULD the armed forces use a drug that allowed a soldier to remain awake and alert for 72 consecutive hours? What if there were an implantable device that improved the eyesight and short-term memory of pilots? Would techniques allowing fatigued or wounded military personnel to produce naturally occurring substances, such as endorphins, be useful to the armed forces? What if biotechnology could help the armed forces of the next century develop ways to disperse forces without feelings of loneliness and isolation affecting these soldiers—a situation that could virtually create an empty battlefield? Like the advances in physics that yielded the ability to split the atom, advances in biotechnology may soon yield these or many other capabilities. One possible characteristic of the revolution in military affairs could well be a revolution in human performance by the judicious use of new technologies. But “can” and “should” are often poles apart. One can fool Mother Nature, but should one?

So far, the answer seems to be “no.” The reaction throughout the literature on the enhancement of human-performance has been consistently negative.¹ This was also the reaction of members of the Biotechnology Workshop 2020, held May 1996 at the US Army War College, during discussions of the possibility of using human-performance enhancements in military settings.² The generalized resistance among the workshop participants centered, as elsewhere, on ethical considerations of risk of harm and concerns regarding justice.³ Then, as now, the authors, who were participants, disagree with the majority’s perspective. We maintain that, since human-performance enhancements are already a part of our daily lives, futuristic ones such as enhanced neural network functions or biosensors are different only in degree and not in kind. Thus, rather than stick our heads in the sand and pretend that human-performance enhancement is forbidden, we need to be intellectually honest with ourselves and acknowledge that some use is already well established and that the prospect for the

development and utilization of more sophisticated techniques is well on its way.

The existence of such use is not the same as advocating that this use ought to be perpetuated or expanded. Nor are we calling for such. Instead, we take the pragmatic view that as technological capabilities in this arena advance—both in our own country and in other nations—a continued, heedless resistance will prevent the establishment of an oversight system that we will need to sort through what may be appropriate, and then decide which specific advances to utilize as they come on-line. A blanket opposition to using human-performance enhancements is both theoretically and ethically insupportable as well as practically indefensible. Further, there are conditions under which the application of human-performance enhancements is ethically permissible. The utilization of such technologies must be considered systematically within the context of an organized review structure.

This article analyzes several philosophical arguments against the use of human-performance enhancements and then applies analogies to the military setting. We conclude by advocating the establishment of procedures in the armed forces for ethical oversight of the development and utilization of these technologies. The implementation of this recommendation is imperative because the commercial inducements for performance enhancers, as well as the increasing scientific sophistication of other nations, make their emergence inescapable. Since the capabilities will become available, the systems necessary to analyze their implications and plan their appropriate implementation must be created before their use is upon us. We need to relearn the lesson of Hiroshima—don’t develop deadly, world-altering technologies in a moral and ethical vacuum.

Everyday Use of Human-Performance Enhancements

Pacemakers, portable oxygen tanks, and artificial limbs are all examples of perform-

ance-enhancing technologies. We do not spurn such technologies because they bring people who would otherwise function at a deficit up to normal levels. We are not considering those agents or devices used to correct human physiologic or psychological deficits. Here, the focus is on those human-performance enhancements designed to improve the performance of healthy, normal adult humans. The only kinds of performance-enhancing technologies this article addresses are those designed to augment normal or peak performance. And, although we are directing the readers' attention to the expected advent of what now may be viewed as exotic human-performance enhancers, we must remember that the use of performance enhancements to extend normal, healthy function is already part and parcel of our daily lives.

For example, caffeine is a human-performance enhancer. To illustrate, in 1991 Michael H. Shapiro opened a talk on the ethics of human-performance enhancement by telling the following story: "I saw a colleague walking toward me in the hallway. He carried two paper cups filled with brown liquid. 'Two cups of coffee?' I said. 'Gotta be sharp,' he replied."⁴ Drinking caffeine to keep alert and awake is nearly ubiquitous and, therefore, is easily overlooked in deliberations about more high-tech human-performance enhancements. Nevertheless, caffeine's performance-enhancing properties are sufficiently well recognized to have come under scientific scrutiny. There has already been discussion about adding caffeine to the list of substances banned in sports—a clear recognition of its stimulant properties.⁵

Another example is contact lenses worn to intensify or alter eye color. Such lenses, perhaps as well as any commonly used performance-enhancing item, exemplify the confused and confusing concerns elicited in discussions of more esoteric enhancements. But contact lenses are unnatural and artificial. They can alter our God-given identities. They may damage our eyes. They may give some people an appearance advantage over others. This may lead to advantages in opportunity and resources. Merit evaluations

may be differentially affected by such advantages. These same arguments are used to prove the moral unacceptability of other kinds of human-performance enhancements. Why do we cling to these kinds of arguments for some human-performance enhancements but barely acknowledge their applicability to others? It would seem that we are making intuitive distinctions. Although it is quite possible that these intuitive distinctions do indeed represent morally relevant differences, such differences will not be sorted out if the structures necessary for thorough debate go uncreated. What are the arguments for and against the use of performance enhancers?

For and Against

The ethics literature on human-performance enhancements is concentrated in the fields of sports and genetics. In both, ethical arguments for and against their use fall into four separable, but sometimes overlapping, categories: (1) harm and coercion, (2) moral boundaries, (3) coherence, and (4) normative systems.

One possible characteristic of the revolution in military affairs could well be a revolution in human-performance by the judicious use of new technologies.

The harm and coercion arguments are straightforward. Grounded in consequentialist theories, they posit that human-performance enhancements create the potential for unacceptable risks of harm. Tolerance of their use is coercive because it may force others to undertake risks they otherwise would not, merely to assure their competitive capabilities. In the military context, this line of thinking is analogous to the worry that individual soldiers might agree to use human-performance enhancements because of an

anxiety that, if they did not, they would receive less favorable performance evaluations.

The moral-boundary argument focuses on establishing frameworks or setting limits for appropriate conduct. Considerations focus on the boundaries of internal versus external change and natural versus unnatural properties. Thus, this argument suggests that caffeine may be allowable but that amphetamines are not. Amphetamines or opiates may be allowable under some conditions, but hallucinogens are never allowed under any circumstance.

Coherence arguments address issues of whether or not an action is consistent with our idea or understanding of the essence of an endeavor or phenomenon. Thus, can a performance-enhanced soldier be a good soldier? Can we enhance the performance of combatants and still adhere to war rules that are just? Does genetic alteration of human traits or characteristics alter our understanding of what it means to be human? Is a soldier still a soldier if his/her heart rate is mechanically altered to increase brain oxygenation in order to sharpen thinking?

Normative-systemic arguments point to the moral rules which exist in a society and ask if the action or phenomenon under consideration strengthens or weakens faithfulness to these moral beliefs. For example, a norm or rule our society upholds is that it is important to protect the safety of our nation's citizens. Here, a relevant question might be whether or not the use of human-performance enhancements in a military setting can be expected to maximize aggregated good outcomes for citizen safety. Or, for example, if soldiers can go without sleep with no loss of function or if pilots can see better than they have ever seen before, will the course and outcome of fighting be better for our side—or worse? What of the notion of military honor? Can honor, so integral to our understanding of what it means to be part of the armed forces, be just as honorable if it is fortified pharmacologically? If sense of commitment, honor, and loyalty could be fortified through biology, is its

quality or importance lessened or devalued in some way?

Considerations of justice suggest that we ask if performance enhancements undercut our notions of fairness and equity. For example, how might the use of performance enhancements reduce gender inequities? If the practice of excluding women from certain military activities is truly based on concerns about disparities between men and women in terms of characteristics such as strength, size, and aggressiveness, then human-performance enhancers could bring greater gender equity to military practices. More broadly, concerns about justice require thoughtful and thorough discussion about how implementation of human-performance enhancements might impact procedures for, say, promotion and advancement. But what of the arguments against the use of human-performance enhancements in military settings? Can they ever be ethically permissible?

Harm and Coercion

The most common arguments against the use of human-performance enhancements are that they pose too great a risk of harm and that they create an environment which coerces others into taking on similarly excessive risks. The literature of the philosophy of sport, Wellington's "playing fields of Eaton," has thoughtfully explored this concern.⁶ Yet, after almost 20 years of abundant debate, there seems to be no consensus. Why?

In sports, the primary focus has been on anabolic steroids, taken to increase strength and, to a lesser degree, aggression. The opposition to their use has been based on concerns about harm to the individual and to others. Because it is likely that athletes are taking steroids at doses far beyond medically acceptable levels, presumptions about potentially high risks of physical harm seem prudent.⁷ Prohibition of abuse is necessary. It does not follow, however, that the use of performance-enhancing drugs administered under controlled conditions poses any greater risk of harm than do other methods of high-intensity training. Nor is it clear why phar-

macologically manufactured substances such as steroids might pose potential harms that are qualitatively or morally different from those produced by other substances, such as excessive consumption of vitamins and minerals or special diets.

Medical practice on a basketball court, however, is not the same thing as battlefield medicine.

Many instances of human-performance enhancement are considered safe and effective in other contexts—for example, blood doping versus apheresis. Blood doping is used to provide extra energy by removing, storing, and then reinfusing one's own red blood cells. A similar procedure, apheresis, is performed routinely and safely in hospitals and medical research centers to obtain plasma for banking and transfusion. This brings into doubt the premise that blood doping ought to be prohibited on the grounds that it presents undue risk of physical harm.

The use of analgesics presents another kind of concern about harm and another example of confused thinking. The question of analgesics often comes up in sports literature in discussions of the conceptual distinction between restorative and additive enhancements.⁸ Although the following story demonstrates the difficulties in drawing restorative versus additive distinctions, it also clearly illustrates what may be a crucial distinction in considering how the risk of harm in military settings may be morally different from the risk of harm in sports: "Bill Walton, formerly a star for the Portland Trailblazers, sued the team on the ground that its doctor concealed the hazards of playing on a fractured foot. The doctor, evidently complying with management's preference, prescribed analgesics. Walton's foot was further damaged."⁹ To subject a player to the risk of increased physical harm simply be-

cause doing so allows the fans greater viewing pleasure may be morally questionable, if not ethically impermissible.

Medical practice on a basketball court, however, is not the same thing as battlefield medicine. Dosing Bill Walton to allow him to go back and play another quarter or two is very different in purpose from patching up soldiers so they can return to their battlefield positions. In the military setting, the equation may be calculated quite differently, arriving at a different risk/benefit ratio. What is an acceptable risk for the military may thus be at a much higher level than what would be considered morally acceptable in a civilian setting. In his article "The Military Ethic in an Age of Nihilism," Dr. James Toner asked, "What values or morals govern or are distinctive of a professional military group?" After citing several that he felt the military professional has in common with other public servants—such as a sense of honor and duty, willingness to be self-sacrificing, and showing loyalty to superiors and subordinates—he offered one set of values specific only to the military: "I venture to say, with Gen Sir John Hackett, that what finally segregates you from so many others with whom, in many other ways, you might share high values is precisely this: you guard our country and our way of life, you are also prepared, either directly or indirectly, to kill in our defense. Yours is a contract conceivably involving death—either yours or our country's enemies."¹⁰ This is a distinction that raises the stakes for the kinds of risks one might be willing to take—indeed, must be willing to take and to order in a combat setting.

Being willing and being coerced, however, are two different things. In sports, the concern about coercion follows the line of thinking that athletes do not function in isolation. Competition, by its very nature, is a social endeavor. If one athlete uses performance enhancements, others will be coerced into doing so, simply to retain their competitive edge. Track coach Fred Dwyer summed up the problem this way: "The result is that athletes—none of whom under-

standingly, are willing to settle for second place—feel that ‘if my opponent is going to get for himself that little extra, then I’m a fool not to.’”¹¹ But here, perhaps more than anywhere else, the analogy to sports falls short. Unlike athletic competition, military activities do not pit one soldier against the other, but nation against nation. Thus, in the military context, competition is qualitatively different than in sports because the stakes are not only “higher” but they are inherently and absolutely incomparable. In sports, competitors want to win for personal fame, wealth, and personal satisfaction. In military competition, winning is necessary to reduce or avoid loss of life, assure the freedom of citizen populations, and protect national interests.

Can honor, so integral to our understanding of what it means to be part of the armed forces, be just as honorable if it is fortified pharmacologically?

The military’s purpose of protecting the nation’s interests—human, economic, political, and territorial—results in the requirement that it endeavor to keep the nation superior to those nations that pose a threat. Military preparedness has always utilized appropriate modern technologies to do so. It is this need, rather than something inherently coercive about the technologies themselves, that creates the pressure to push their development and utilization—whether it be human-performance enhancements or missile-detection systems.

Nevertheless, since war and military preparedness are inherently competitive, the issue of voluntariness presents thorny ethical concerns. The coercion may not emanate from a choice to compete, but from superior officers. While there are coaches who turn a blind eye to drug use and there are physicians who knowingly give athletes easily

abused prescriptions, this is not the moral equivalent of being in a closed system where a person might be ordered to use performance enhancements. Although it is true that the freedoms of the competent, consenting civilian often do not apply in the military, some choice remains. For example, participation in the Army Rangers, Marine Force Recon, Navy SEALs, and other special-forces units is voluntary. Indeed, in an “all volunteer force” it can be argued that the freedom either to volunteer or not is also the choice between fewer or greater individual freedoms. Volunteers choose to relinquish many more freedoms than do nonvolunteers. Although this may not seem to be coercive on its face, the expanding potential of a wide array of biotechnology-driven human-performance enhancers presents marked complexities for our understanding of just what is coercion, and demands open as well as systematic discussion of when voluntariness needs to be protected and assured.

Moral Boundaries

Moral-boundary arguments seek to create frameworks or set limits for ethically justifiable behavior. Two such boundaries that regularly surface in discussions of the moral aspects of human-performance enhancements are internal versus external methods for increasing performance and natural versus unnatural properties. These boundaries, however, are often difficult to draw with precision and even more difficult to maintain in practice.

For example, it is fairly easy to categorize steroid use to increase aggressiveness in athletic training as an external enhancement. But what of psychological interventions such as psychotherapy or imaging techniques? In substantive ways, the pharmacological intervention is no different than the psychological one, but the drug use is commonly thought of as external in a way that use of psychological techniques is not.

Two military studies conducted more than a decade ago specifically demonstrate this conceptual confusion. Both examined

the effects of incentives on performance under conditions of sleep deprivation.¹² One, conducted by J. A. Horne and A. N. Pettitt, explored the theory that the provision of a monetary incentive could improve performance.¹³ The other, conducted by Diana R. Haslam, also tested for improved performance but used the knowledge that the sleep-deprived subject would soon be allowed to nap as the incentive.¹⁴ In the first, the experimental human-performance enhancer was the incentive to obtain money, an easily identified external instrumental incentive. In the second, the enhancer was the incentive provided by the knowledge of future relief. Both interventions were externally obtained—one was instrumental, the other psychological. Although the monetary incentive is more clearly external than the information that a nap is forthcoming, both had effects only because of the way in which the incentive was processed cognitively (i.e., internally) by the subjects.

The most common arguments against the use of human-performance enhancements are that they pose too great a risk of harm and that they create an environment which coerces others into taking on similarly excessive risks.

It is necessary here to acknowledge the morally relevant distinction between human-performance enhancements, such as the administration of substances or the implantation of devices, and those performance-enhancing interventions, such as incentives, that act on cognitive processes without other additives. But as we think about future possibilities, such as those contemplated during discussions at the Biotechnology Workshop 2020, the lines separating enhancements from incentives become less morally relevant.¹⁵ The intent of the incentive studies just cited was to manipulate cognitive pro-

cesses. That they did so without resorting to invasive experimental procedures may be more a function of the state of the art than any consideration of the ethics associated with research on human subjects. For example, the goals of expanding our understanding of neural networks is the same—that is, we are seeking ways to improve performance, mediated by cognitive function. This natural/unnatural distinction is equally difficult to draw and sustain. This discussion has been most vigorous in the field of genetics.¹⁶ Inherent in the question “What does it mean to be human?” are our deepest yearnings to understand our humanity. Overlapping considerations about coherence and the setting of moral boundaries on what is natural and unnatural human behavior pose unanswerable questions. On first blush, we think we can make these distinctions. But a closer examination only serves to illuminate the complexities.

We prize what we view as natural—vigor, courage, native intelligence, and so forth. We loathe what we see as unnatural—steroids to increase strength, brainwashing to produce automatic behaviors, or Hollywood’s image of robotic police officers. But we see through a glass darkly, and our discrimination between what is natural and unnatural is subject to change. “What other tribe on the planet,” one of the Biotechnology Workshop attendees asked in debate, “surgically implants sand in the human chest in the belief that sand makes one more attractive to others in the tribe?”¹⁷ For example, consider how we have changed our views on the “naturalness” of alcoholism. Today’s thinking emphasizes a genetic (i.e., natural) basis for alcoholism as the most reasonable explanation. Thus, instead of viewing alcoholism as simply a matter of weak will and as an unnatural and perverse psychological problem, we now give credence to a more nuanced understanding of the genetic components of the disorder. Another example is today’s treatment response to neurologically disturbed children. Instead of beating them for misbehavior, they are often successfully treated pharmacologically. Although a repeti-

tion of the Salem witch trials is unthinkable, it is worth keeping in mind how easy it is to make mistakes as we muddle through the difficult problem of figuring out what humanity is all about. In short, as we learn more about who we are and how our bodies and minds work, we are constantly recreating and redrawing our boundaries between natural and unnatural and perfecting our understanding of what it means to be human.

Coherence

Coherence arguments analyze whether or not some action or behavior is consistent with our idea or understanding of the essence of an endeavor or phenomenon. The previous discussion focused on whether or not we can think of actions conducted by persons utilizing performance enhancements as actions performed by persons as we know them, instead of viewing them as movielike robotic hybrids. In sport, much writing articulates what is integral to our appreciation of what it means to play games and to be engaged in athletic competition.¹⁸ Thus, a coherence analysis asks if drug-enhanced athletic performance is consistent with our notions of what it means to engage in sports. According to some observers, sports can be defined as a mutual search for excellence through competition that is designed to bring out the best in each competitor.¹⁹ Given this definition, the argument follows that "drugs circumvent this ideal by showing only whose body responded best to performance enhancers."²⁰ But what if professional sports are more about entertainment than sport? In today's world of multimillion-dollar player contracts and basketball stars with orange hair, it is difficult to say with certainty that the essence of sport is only competition.

Therefore, coherence analysis would ask, in the military context, whether the utilization of human-performance enhancements is consistent with the essence of military service? If, for example, honor, loyalty, and willingness to give one's life for one's coun-

try are essential aspects of military service, how might biotechnologically derived means used to intensify these urges be morally different than the conventional training methods now employed by the military to accomplish the same end? If there are morally relevant distinctions to be made among various means for achieving the same ends, as there usually are, we must ask how new methods will be evaluated and compared to others that are presently considered ethically acceptable.

Normative Systems Arguments

Normative-systemic arguments focus on the moral rules that exist in a society and analyze whether or not a particular action or phenomenon strengthens or weakens adherence to these moral norms. In the case of human-performance enhancements in a military setting, the question is, Can their use be expected to strengthen or weaken adherence to military ideals? Is it the "three o'clock in the morning" kind of self-induced courage that fortifies a sentry, or is it the sentry's blood and brain responding to a drug taken at the beginning of the watch? Does the sentry serve the system by having drugless courage or by being an alert sentry?

What of human-performance enhancements and military justice? The norms of justice and fairness are central to military service. Amidst the cries of gender inequities which plague today's armed services, the prudent use of human-performance enhancements might well serve the ends of justice, if extrapolations from sports are at all applicable.²¹ Rules of fair play and equity define modern warfare and, at least ostensibly, modern military service. If performance-enhancing interventions could be appropriately applied to actually reduce the inequities between men and women in our armed forces, should not such a prospect be thoroughly and openly discussed and considered? Nor should the implementation of human-performance enhancements necessarily jeopardize equity in existing systems of evaluation and promotion for both genders.

Rather, as with the advent of any new technology, adjustments to the existing ways of doing business are often required, and—although such adjustments may require marked effort—appropriate changes can be expected to strengthen an existing system.

Summary

On the basis of ethical considerations, blanket prohibition of human-performance enhancements in military settings cannot be sustained. While sound moral arguments can be advanced against the use of some kinds of human-performance enhancements in military settings, such arguments cannot be sustained across the full spectrum of conceivable performance-enhancing technologies. At the same time, convincing ethical arguments can be raised in support of their use under certain conditions. What is needed, however, is a nuanced approach to their consideration through a well-organized and coordinated system for review and oversight. Jonathan Glover's perceptive but more generalized concerns raised over 20 years ago in *What Sort of People Should There Be?* still applies to our society at large and specifically to the military setting:

Many people, when thinking of such possibilities as genetic engineering or techniques for controlling behavior, have a reaction of rather inarticulate horror or revulsion. It is much easier to feel disturbed and repelled by these enterprises than it is to give a coherent account of precisely what the objections are. If we stay inarticulate, events will perhaps take one of two courses. The first is that the techniques will be adopted, in a piecemeal way, a little at a time. The advocates will at each stage be able to offer some specifiable gain . . . and each time this may seem more compelling than rather vaguely formulated objections on principle. By easy stages, we could move to a world which none of us would choose if we could see it as a whole from the start. Another possibility is that our resistance will prove too deeply rooted for all this, and that these techniques will fall under some general and indiscriminating ban. This

will be a less disturbing outcome from our point of view, as the world will remain more as it is now. But the result may be that future generations will lose things they would have found of great value. Leaving the objections at the level of inarticulate opposition excludes the possibility of discriminating between desirable and undesirable applications of the new technologies.²²

The Army's Biotechnology Workshop 2020 calls for renewed attention to Glover's predictions, the occurrence of which should be avoided.²³ With the establishment of an organized system for reviewing and providing oversight of the development and utilization of performance-enhancing technologies in military settings, an important and needed step towards averting either prediction's realization will be taken.

Recommendations for Review and Oversight

The design of a system to review and monitor the development and use of human-performance enhancements in the US armed forces should draw upon a prototype already well established in the medical-research community. A military system which adapts the models of that community's Institutional Review Board (IRB) system,²⁴ the Recombinant DNA Advisory Committee (RAC),²⁵ and the presidential bioethics commissions, could well serve the need to create the necessary mechanisms to protect military personnel as well as civilian populations, while also allowing the US military to develop and utilize these new technologies.²⁶

Systematic, diversified, public oversight of biomedical investigation is a recent phenomenon. The IRB is a statutory innovation resulting from the regulatory implementation of the work of the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. The need for independent, broadly multidisciplinary, and public oversight of human-subjects research has grown out of the history of atrocities in human-subjects research.²⁷ In

brief, the international codification of research ethics, beginning in the Nuremberg Code of 1947, followed by the Declaration of Helsinki in 1964 and the 1993 guidelines of the Council for International Organizations of Medical Science (CIOMS), along with the US regulations,²⁸ governs human-subject research for most federally funded studies. These are a demonstration of the need for systematic review of the involvement of humans in scientific progress. Experience has taught us that those who create new technologies ought not be solely responsible for the testing and utilization of such technologies. The enthusiasm of the creator must be tempered and moderated by more objective minds.

How might the use of performance enhancements reduce gender inequities?

The IRB, the RAC, and the newest presidential commission—the National Bioethics Advisory Commission (NBAC)—all share the virtues of diversity and public membership in composition.²⁹ This diversity and public participation is clearly articulated in the regulatory language establishing IRBs—committees composed of a diversified group of persons and charged with the ethical review and ongoing monitoring of human-subjects research. It includes at least five members “with varying backgrounds to promote complete and adequate” consideration of the ethical appropriateness of a research study.³⁰ The regulations further provide the following:

46.107 (a): The IRB shall be sufficiently qualified through the experience and expertise of its members, and the diversity of the members, including considerations of race, gender, and cultural backgrounds and sensitivity to such issues as community attitudes. . . .

(c) Each IRB shall include at least one member whose primary concerns are in scientific areas and at least one member whose primary concerns are in non-scientific areas.

(d) Each IRB shall include at least one member who is not otherwise affiliated with the institution and who is not part of the immediate family of a person who is affiliated with the institution.³¹

These and other relevant regulations are designed to assure that research studies are reviewed objectively. Thus, the IRB system is a manifestation of the lesson learned at Nuremberg. Someone besides the fox needs to watch the chicken coop. The utilization of human-performance enhancements within the US armed forces presents the same kinds of challenge to protect humans as does biomedical research. Similarly, just as war is too important to be left to the generals, so are the ethical and moral considerations of human-performance enhancers for members of our armed forces just too serious to be left in the hands of military medicine and researchers.

As these technologies come on-line—especially if they are ready for human testing at a time when US military personnel are about to become involved in a conflict—the lure to maximize every possible advantage to the troops will become compelling. At such a time, the efforts of an IRB-like committee will be crucial. Such a committee, composed of military and nonmilitary members—people of diversified rank, occupation, and social perspective—will bring a strengthened objectivity to its deliberations. Further, as in the present IRB system, the local nature of the committee will serve to promote local values and will be well situated to appreciate the conditions specific to the *local* environment that may affect utilization of the particular performance enhancement under review. (In the medical setting, the term *local* refers to an IRB established at the university or research center where the research is being conducted.) By having such committees review research being performed

in their environment, the committee's composition can be expected to reflect local cultural norms. Although this blueprint would require some adjustment to the particularities of the military setting, similarity of intent can be preserved.

But for military purposes, the oversight by local IRB-like committees will not be enough. Even in the medical-research community, strong voices have long questioned the ability of IRBs to provide all the protections necessary, and there is a growing body of evidence that this concern is warranted.³² Congress, the president, and the public, as well as the military, would be best served if the creation of a web of IRB-like committees is augmented with a more centralized, national review body. Here, the models provided by both the RAC and such presidential bioethics commissions as the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research or the newly created NBAC are models of ways in which broader public input and concentrated ethical analysis can be obtained.³³

We believe that such an integrated system is necessary to oversee what is surely going to occur. At some point, the science of human-performance enhancements will progress to a

stage at which it will be too attractive not to use it. Congress and the secretary of defense need a system before time overtakes our ability to lucidly consider the ethical implications of using these technologies.

The explosive progress in biosciences will allow for dramatic discoveries in biology, chemistry, and medicine in the years ahead. Development of human-performance enhancers is just around the corner, yet the implications of their emergence on the armed forces are not discussed in any war-college curriculum, under either the heading of future technologies or of ethics. The military, always one step behind the truly novel, should put in place a system for analyzing the problems and prospects coming out of the biotechnology fields.

We hope we have stimulated and informed the debate. In the absence of public debate, it seems that human-performance enhancers will arrive and be employed by the armed forces—not necessarily our armed forces—with a thoughtless enthusiasm comparable to that which accompanied the atomic bomb. That would be a tragedy, and we hope to prevent it. If we intend to fool Mother Nature, then we certainly ought to consider the “hows and whys” in advance.

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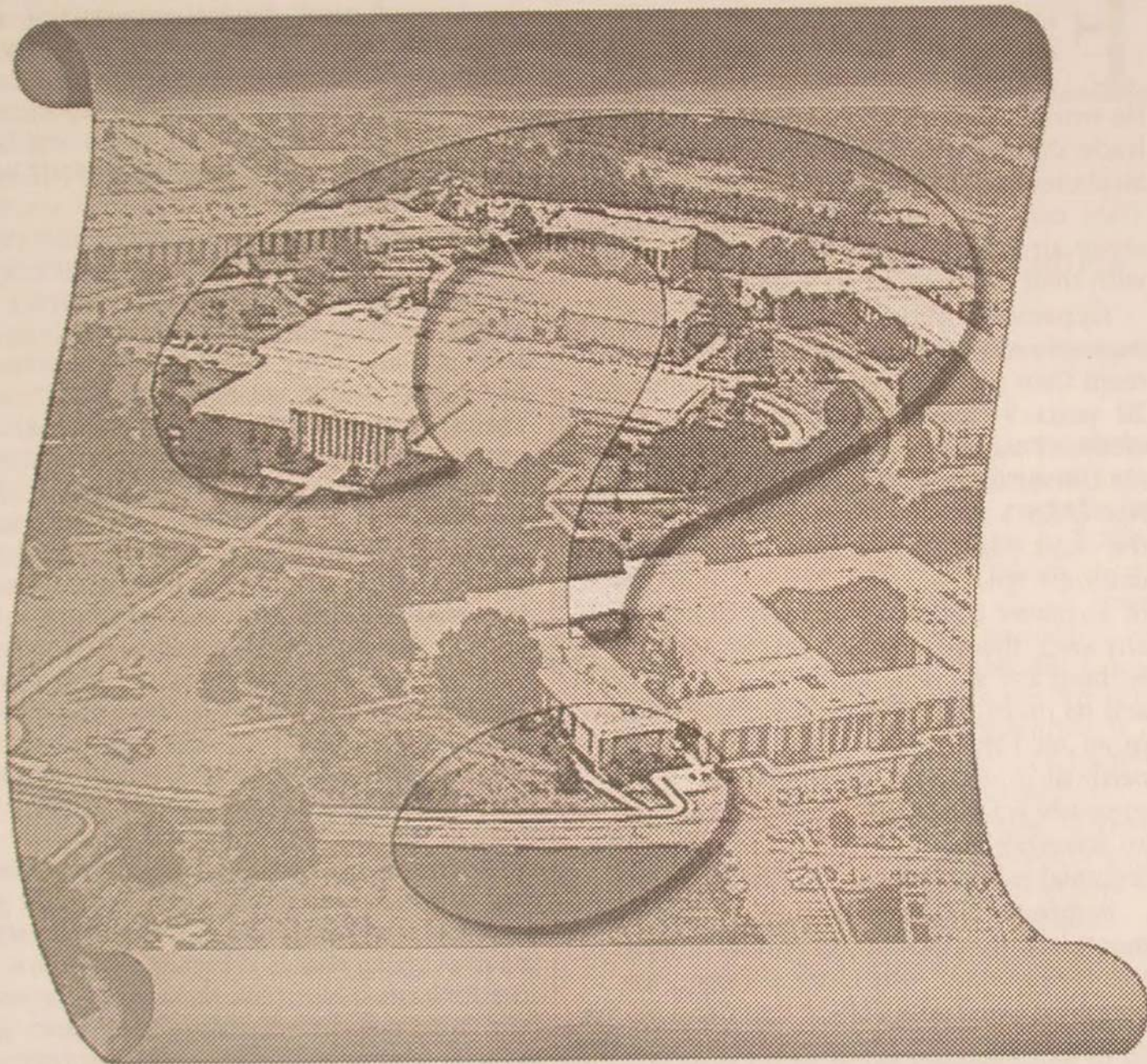
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EDUCATING AIR FORCE OFFICERS



Observations after 20 Years at Air University

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Author's Note: The year 1997 marks the 50th anniversary of the US Air Force and my 20th continuous year at Air University both in and out of uniform. Such "round" anniversaries lead to the personal retrospection that was the genesis of this article.

FORMER Air Force chief of staff Gen Michael Dugan once commented to me that the Air Force is producing a generation of illiterate truck drivers. He worried that officers who aspire to senior leadership positions know a great deal about airplanes and precious little about airpower. They can skillfully talk with their hands about air tactics but are ill prepared to think with their heads about air strategy.

Hyperbole? Perhaps a bit, but there is more ground truth in General Dugan's statement than any of us would like to admit. For 20 years I have watched the crème de la crème of the Air Force officer corps come to Air University's Air Command and Staff College (ACSC) and Air War College (AWC). For the most part, these officers have been appallingly ignorant of the bedrock foundation of airpower thinking, virtually oblivious to airpower theory and its development, and without any appreciation of airpower history and its meaning.¹ These officers are products of an Air Force system that does not reward personal professional development, promotes irrelevant academic education, and thus places an insupportable burden on the formal professional military education (PME) system.

Before getting into the meat of this argument, it is worthwhile to consider why all of this is important, why General Dugan was so concerned, and why I share that concern. We should begin with the proposition that the next generation of Air Force leaders should be more capable than the current generation. If they are not, we will have failed in one of our most important duties—preparing those who will follow in our footsteps. We will have failed to pass along the accumulated wisdom of the past and our own contributions to that wisdom. Every generation of Air

Force leadership should be better than its predecessors.

In my judgment, the recipe that produces superior military leaders has three key ingredients—training, experience, and education. The need for training and experience is obvious. Training provides mental and physical skills and disciplines required to succeed in the face of great danger, uncertainty, and confusion. Experience develops maturity of judgment by testing and tempering both body and soul and by providing exposure to leadership role models both good and bad. But what about professional education? Why is it such a key element?

In a sense, education is concentrated experience that can broaden an individual's experience base. Our personal experience is always narrow, limited to those things we have actually done, places we have actually been, and people we have actually known. Professional education allows us to vicariously take part in the experiences of others in different times and far-off places. Understanding what Billy Mitchell went through trying to sell airpower to a hidebound Army, or how Ira Eaker coped with the disastrous losses of the Schweinfurt-Regensburg raids, or why Tooey Spaatz argued so vehemently with Dwight Eisenhower about the pre-D-Day use of heavy bombers—these and a thousand other subjects professional education should address—can create context, perspective, and insight for our narrow, personal experience.

Education provides the luxury of dissecting and analyzing experience without the exigencies of the event—and it is the analysis of experience that is critically important. As the Prussian soldier-philosopher-king Frederick the Great noted over two hundred years ago, it is the ability to analyze and learn from experience that separates those who will be great leaders from those who will be "occupied with trifling matters and rusted by gross ignorance."² Reasoned analysis fosters the ability to think broadly, deeply, and critically. It nurtures the drive to analyze honestly, fairly, and thoroughly. It demands logical yet creative synthesis.

Education for our officer corps comes in three varieties. First, there are informal, career-long, personal professional-development efforts—reading journals and books, attending conferences, and so forth—the kinds of personal-development activities that lie at the heart of all traditional “professions.” Second is formal academic education. An undergraduate degree has long been a prerequisite for receiving an Air Force officer’s commission, and graduate-level education is nearly a necessity for promotion to and above field-grade levels. Finally, there is formal PME, which for Air Force field-grade officers is centered at Air University’s ACSC and AWC.³ The remainder of this analysis will examine these three educational modes.

Air Force efforts to promote informal, personal, career-long professional development have been very limited and largely ineffective. There are no carrots, no special rewards or recognition for officers who independently pursue professional knowledge. Officer evaluation forms provide no block to check and no rating standard for officers who have read a good professional book. Promotion recommendation forms provide no recognition, nor does the Air Force give any special consideration to officers who have taken it upon themselves to study the art of war. It would be nice if we needed no carrots. In an ideal Air Force, officers would work hard to increase their knowledge simply because it is the professional thing to do. Unfortunately, downsized forces without downsized responsibilities, increased operating tempos in the New World Order, and other such temporal tyrannies require officers to weigh the costs and benefits of every competing demand for their time. Without any tangible carrots, personal professional development can easily drop off the priority screen.

Lack of carrots may explain the demise of Project Warrior, which was, in part, an innovative attempt to encourage airmen to study airpower theory and history. The program widely distributed a remarkable library of airpower-related books including reprints of classic texts such as Giulio Douhet’s *The*

Command of the Air and George C. Kenney’s *General Kenney Reports* as well as original works developed specifically for Project Warrior. The program began in the early 1980s with considerable fanfare and the support of then chief of staff Gen Lew Allen. It ended ignominiously in the early 1990s, suffering from lack of interest, lack of results and, ultimately, lack of money.

Former Air Force chief of staff Gen Michael Dugan once commented to me that the Air Force is producing a generation of illiterate truck drivers.

Although there are no tangible carrots for informal professional-development efforts, the Air Force provides many rewards for those who obtain graduate degrees in formal academic-education programs. The most important of these carrots is that the Air Force records, graduate degrees on personnel records where they can be an important (some would argue crucial) consideration for promotion boards. With such an incentive, it is no wonder that about 50 percent of all active duty officers possess a graduate-level degree.⁴ Many, if not most, of those degrees have come through civilian university programs recruited by local education offices to provide a variety of graduate programs on nearly every Air Force installation around the world.

But what kinds of degrees? The most recent data available to me indicates that of the 322 on-base master’s-degree-granting programs at 133 Air Force locations, exactly two—let me repeat that—exactly two of those programs directly concern the art of war (one program in national security studies and one program in military history). Another group of 19 programs had tangential relationships to the art of war (degrees in in-

ternational relations and international policy). By far the most common degree programs offered on Air Force bases are business related (business administration, human resources management, etc.).⁵ Thus, the Air Force is in the paradoxical position of putting a high value on graduate-level education that is largely irrelevant to its *raison d'être*. The Air Force seems unable or unwilling to distinguish the value of a graduate degree in business from the value of a graduate degree in national security studies or military history. This is not to denigrate business administration degrees but to point out that some fields of study are more germane to the art of war. Perhaps we need to remind ourselves that our business is not business. Our business is war.

In my judgment, the recipe that produces superior military leaders has three key ingredients—training, experience, and education.

With no carrots for personal professional development and with academic education that is likely to be irrelevant, it is no wonder that students arrive at ACSC and AWC in a condition reminding General Dugan of illiterate truck drivers. By accident or by design, we have come to rely almost entirely on the formal PME system to teach the fundamentals of the art of aerial warfare. This is a very sad situation because even in ideal circumstances, there is no way that two 10-month visits to Air University can adequately replace career-long, personal professional development and relevant academic education. Unfortunately, circumstances at ACSC and AWC are not ideal. From the earliest days of Air University, ACSC and AWC have been beset by major interrelated problems. Among the most vexing of these problems are lack of consensus about curricula and rapid turnover of senior leadership.

Over the entire history of Air University, there has never been a broad, let alone lasting, consensus about the proper curricula for ACSC and AWC. Guidance and advice from the most senior command levels, congressional committees, boards of visitors, and special panels have often been nebulous, conflicting, or both. Lack of lasting consensus led ACSC and AWC to implement nine major shifts in curricula emphasis—on average a major shift every five years—from the time of their founding through the mid-1990s. Even more interesting, the shifts at ACSC and AWC did not mesh with each other, either in terms of timing or areas of emphasis. Such uncoordinated changes suggest curricula more influenced by current whim than by a well-thought-out educational doctrine.⁶ Frequent injection of “hot topics” (some would call them fads) into already crowded and rapidly changing curricula further complicates the situation.⁷

Although curricula often have changed, there have been identifiable trends. In broad terms, ACSC and AWC have divided their curricula (the proportions have varied) between those subjects most closely related to airpower employment (theory, doctrine, strategy, history, etc.) and those subjects more closely related to the management of a peacetime Air Force (planning, programming, budgeting, personnel management, etc.). Both areas are worthy of study, and each could profitably fill a rigorous, year-long curriculum. Taken together, however, the split curricula gave credence to the most oft-mentioned criticism of both schools (i.e., curricula a mile wide and an inch deep). There simply is not enough time to explore both areas in depth.

This observer has long championed warfighting curricula for a very straightforward reason. Civilian schools can and do teach management, government operations, and the like. Only military schools can specialize in the art of war, and more specifically in the art of aerial warfare. My guess is that the American taxpayers did not found our PME institutions in order to mirror academic programs at civilian universities. The public has

a right to expect our PME schools to produce experts on warfare, not peacetime bureaucrats in uniform.

Some would argue that curricula focused on war fighting are well and good for those students whose specialties deal directly with operations (flyers, missileers, intelligence officers, maintenance officers, etc.) but are of little constructive consequence to officers toiling in support functions (personnel, finance, contracting, procurement, etc.). Nothing could be farther from the truth. It is time we recognize that one of the principal differences between a first- and second-class military force is the quality of the supporting infrastructure—how well we train, educate, motivate, pay, feed, and house the force. Those who will lead the infrastructure supporting our Air Force in the future must understand the connection between what they do and the ultimate mission of the Air Force. They must understand that much of what they do ultimately affects combat capability. Further, they must understand that circumstances might require their supporting function to operate in a difficult combat environment.

A classic example of the kind of disconnects that can develop between support and combat operations was illustrated in a study done more than a decade ago at the Airpower Research Institute. The study revealed that the automated and computerized military pay system, so efficient in a stateside environment, had, at that time, left the Air Force without the ability to handle even routine pay matters in hostile environments. With all good intentions and obvious ignorance of the real world of military operations, the system designers had focused on peacetime efficiency rather than wartime effectiveness. The result of the study was a multimillion-dollar effort to correct the situation.⁸ The point is that there must be a solid connection between the point and the shaft of the spear. Understanding aerial warfare is not just a necessity for the operators. Those who support airpower must also understand what it is they are supporting, what is required of them, and under what circumstances they

must perform. PME curricula focused on war fighting is essential for the entire force, not just for the operators.

Turbulence, confusion, and lack of consensus in curricula have been accompanied by—or perhaps caused by—leadership turbulence in both ACSC and AWC. In the half century since their founding, ACSC has had 34 commandants and AWC 25. The average tenure for ACSC commandants has been only 18 months; at AWC, commandant tenure has been just slightly longer, averaging 24 months. My contacts in civilian academia tell me that it typically requires five years to diagnose what needs to be done, design and put programs in place, and then evaluate and fine-tune these programs. Even if one assumes that the hierarchical and highly disciplined nature of the military environment could drastically shorten the civilian “five year rule,” the tenure of a typical commandant at ACSC and AWC still would seem insufficient to complete the curricula change cycle.

Air Force efforts to promote informal, personal, career-long professional development have been very limited and largely ineffective.

The fact that virtually none of the commandants have had any experience in academia other than being a student exacerbates the short-tenure problem. I reviewed the backgrounds of all 21 of ACSC and AWC commandants who served during my 20 years at Air University and found only one with any real leadership experience in an academic environment. It strikes me as odd that although the Air Force would never put a nonflyer in command of a fighter or bomber squadron, it routinely places neophytes in command of the schools upon which it totally depends to educate its future senior leaders.

None of this is to say that these short-duration commandants have been ineffective. Quite the contrary, some of them have been responsible for considerable progress over the past 20 years, progress made all the more remarkable considering the tenure and experience handicaps under which they operated. Of particular importance have been efforts to significantly improve faculty academic qualifications and a gradual movement toward curricula focused on warfare at both colleges. Both of these trends are, in my opinion, very encouraging and important to the continued success of American airpower.

By far the most common degree programs offered on Air Force bases are business related. Thus the Air Force is in the paradoxical position of putting a high value on graduate-level education that is largely irrelevant to its raison d'être.

Progress during the past two decades has not always been smooth, and not all of the commandants have been enlightened. For example, over the years, two school commandants told me that highly qualified faculty members were unimportant because students teach themselves. Another wondered why his students needed to understand military and airpower history "since they had lived it for 15 years." Such troglodytic opinions from senior officers would seem to lend credence to what many have said over the years (i.e., the Air Force has an anti-intellectual bent). As far back as 1947, Col Noel Parrish noted in an *Air University Quarterly Review* article that "air activities have most often attracted men of active rather than literary leanings. . . . The Air Force has never boasted a high percentage of scholars."⁹

Perhaps Colonel Parrish was right. Perhaps the basic problem in educating Air Force officers is cultural. Airmen are "doers," men and

women of action rather than introspection. Flyers glory in the romantic tradition of scarves blowing in the prop wash, valiant knights of the air going forth to confront the enemy in mortal combat. Nonflyers tend to be technicians, consumed by the arcane complexities of their specialties. Both flyers and nonflyers worship more often at the altar of superior technology than at the shrine of superior strategy.

Activist and technocratic traditions often, but not always, served us well during times of plenty, when we operated from a position of great strength and relied on the superiority of our resources to overwhelm our enemies. Will such traditions serve us well during the lean times, when every sortie is critically important and we can ill afford to squander our rapidly dwindling resources? If you have "wall-to-wall" airpower, superior ideas about how to use it seem somehow less important. Outthinking the enemy becomes a necessity when you can no longer drown your adversary in a sea of military plenty.¹⁰

The dilemma is that we need to reshape our culture without destroying traditions that have served us well in the past. Somehow, we must make it culturally acceptable and professionally imperative to be air warriors well schooled in the theory, doctrine, and history of aerial warfare. Warriors must understand airpower as well as airplanes. We need to develop synergies between scarves in the prop wash and books in the classroom. Reshaping our culture without destroying our traditions is the key to making the next generation of Air Force leadership better than this generation.

How do we effect such a monumental cultural shift? In this observer's opinion, it must begin at the top, at the most senior levels of command. It must start with attitudes and policies that go beyond simply encouraging intellectual development. Being well schooled in the art of war must become a necessity, an absolute requirement for leadership positions at field-grade level and above. Personal professional-intellectual development must become a requirement for every officer.

What specific actions might we take? Consider the following possibilities:

1. Promote relevant graduate academic education. Instruct local education offices to recruit for their bases at least one graduate-level program directly related to the art of war.

2. Reemphasize career-long, personal professional development.

- Reconstruct the nonresident versions of PME into a continuous, career-long professional development system designed to provide a time-phased baseline of knowledge that all officers need. Incorporate a rigorous programmed professional reading program into the system.
- Document individual professional development on officer performance reports.
- Document how successfully supervisors and commanders encourage professional development on their officer performance reports.
- Require remarks attesting to professional development progress on promotion recommendation forms.
- Instruct promotion boards to give increased value to professional development.

3. Upgrade PME.

- Develop and implement a formal Air Force PME doctrine that, at a minimum, addresses curriculum guidelines and faculty quality.
- Use the reconstructed nonresident PME program as the basis for in-residence PME entrance requirements.
- Upgrade in-residence PME curricula to take advantage of standard minimum in-residence PME entrance expertise.

- Extend and stabilize the duty tours of ACSC and AWC commandants and other senior PME leaders.

Some of these actions would meet with great resistance. For example, within these suggestions there would be no nonresident equivalent to in-residence PME. Those not selected to attend ACSC and AWC in residence would argue that such a system would be unfair. I would counterargue that the equivalency of resident and nonresident programs has always been a convenient fiction.¹¹ Further, I would argue that fairness is irrelevant. The Air Force is not and must not become an egalitarian organization. Rather, it is and should be a meritocracy.

The public has a right to expect our PME schools to produce experts on warfare, not peacetime bureaucrats in uniform.

On the positive side of the equation, these actions would create a reasonable, sustainable, and organized approach to career-long personal professional development. They would ensure that efforts to become a smarter warrior would enhance one's career prospects, and they would provide top-down motivation for personal professional development. Such actions would also do wonders for the formal PME system. For example, a much higher baseline of knowledge among incoming students would allow our PME schools to tailor their curricula and teaching techniques to attain much higher levels of academic achievement.

Even if General Dugan is only partially correct about a generation of illiterate truck drivers, we must take strong, positive actions if we expect the next generation of Air Force leaders to be better than this generation. We cannot afford to tolerate an anti-intellectual culture among airmen. Our future leaders will have to be very smart and very well educated to fully exploit the almost limitless op-

tions airpower provides and to deal with the almost limitless demands on our dwindling airpower assets. Our future leaders will have to be both very smart and mentally disciplined to deal effectively with the uncertainties and demands airmen will face in the "new world disorder." Our future leaders must understand airpower—not just airplanes. They must be able to think critically,

analyze thoroughly, and synthesize logically.

It will be no mean feat to produce the kinds of leaders we will need in the future. They will require stellar training and broad experience. Most importantly, they will require superior personal professional development, relevant academic education, and outstanding professional military education.

Notes

1. It is fair to ask what I mean by "for the most part." My best estimates, based on years of observation, conversation, and teaching, are that 80 to 90 percent of the officers entering ACSC and 50 to 60 percent of the officers entering AWC are essentially ignorant of the intellectual foundations of their profession.

2. As an illustration that experience alone is not enough, Frederick said, "A mule who has carried a pack for ten campaigns . . . will be no better a tactician for it." *Frederick the Great on the Art of War*, ed. and trans. Jay Luvaas (New York: Free Press, 1966), 47.

3. Squadron Officer School (SOS) is also considered to be PME, but the professional education of company-grade officers uses very different techniques to achieve the unique outcomes it seeks. Therefore, I will not focus on SOS in this article.

4. As of 30 September 1995, 49.5 percent of all active duty line officers possessed a master's degree, and another 1.43 percent possessed a doctoral degree. *Air Force Magazine*, May 1996, 40.

5. Air Force Pamphlet (AFP) 213-2, *Educational Opportunities on Air Force Bases*, 1 April 1987. Purportedly, there is an updated version of this manual, but it was unavailable to me. I strongly suspect that although the absolute numbers may change in an updated version of this pamphlet, the relative proportions would remain quite stable.

6. Lt Col Harvey J. Crawford et al., "CADRE Officer Professional Military Education Study," Maxwell AFB, Ala.: Airpower Research Institute, Center for Aerospace Doctrine, Research, and Education, June 1988). This study remains unpublished, but several copies exist, including two copies in the author's possession. To my knowledge, it remains the only comprehensive study ever done on Air Force PME, and certainly the only study based almost entirely on primary-source documentation.

7. One of the most recent examples of what the author con-

siders to be a "fad" is the insertion into ACSC and AWC curricula of an inordinate amount of instruction concerning the "quality" movement—the latest in a long line of civilian management techniques adopted by the military in spite of their often dubious relevance. Other examples of this genre stretching back to the early 1960s include Zero Defects, PRIDE, Zero Based Budgeting, and Management by Objectives.

8. Lt Col Bill D. Brogdon, *Support the Troops! Paying Our People in Hostile Forward Areas*, Report no. AU-ARI-88-5 (Maxwell AFB, Ala.: Air University Press, December 1988).

9. Col Noel F. Parrish, "New Responsibilities of Air Force Officers," *Air University Quarterly Review*, Spring 1947, 29-42.

10. One can always find exceptions that test the rule. For example, the activist technocratic tradition did not serve us particularly well in Vietnam, where, for a variety of contentious reasons, we were unable to turn overwhelming materiel superiority into final victory. Conversely, in the Southwest Pacific during World War II, General Kenney demonstrated that American airmen can outsmart and defeat their adversaries even when operating on a logistical "shoestring."

11. If one argues that nonresident PME programs are the equivalent of resident programs, then one must ask why we should have the much more expensive resident programs. At this juncture, I do not believe that anyone seriously thinks resident and nonresident programs are of equal educational value. Face-to-face interaction and idea exchange with skilled faculty, distinguished guest speakers, and student peers are central to higher levels of learning and thus crucial to quality, graduate-level education. They cannot, at this point, be duplicated in a nonresident format. However, the march of technology, particularly our ability to interconnect in real time, may mean that in the future, resident programs will have few if any advantages over nonresident programs.

Bureaucracy is a giant mechanism operated by pygmies.

—Honoré de Balzac

Russia's Military Aviation Industry

Strategy for Survival

MAJ DAVID R. JOHNSON, USAF



AT THE 1996 Farnborough Air Show, Sukhoi's SU-37 astounded international observers with maneuverability previously unseen in a combat aircraft. The thrust-vectoring SU-27 variant stole show headlines with flight demonstrations widely described in the aviation press as "spectacular."¹ One air show reporter opined that the SU-37 shows that the Russian aviation industry "is still alive." Sukhoi's new aircraft is convincing reaffirmation of the world-class and, in some areas, unique capabilities of Russia's military aviation industry. However, though still "alive," Russia's military aviation industry is struggling for survival.

The situation is serious enough that a committee of the Russian legislature examining the problem in 1995 concluded that the aviation industry could collapse by the turn of the century if energetic action to reverse current trends were not taken.² The main source of the industry's problems is easy to find: orders from the Russian Federation Air Force (RFAF) are down to almost zero. The same is true of orders from former Warsaw

Pact nations. Because RFAF purchases have nearly ceased, production lines have gone idle, and workers are laid off or unpaid. A related problem, which may have greater long-term impact than the closure of some production lines, is a steady decline in the number of new scientists and engineers beginning work in the military-industrial complex. The trend points toward a future shortage of trained specialists in the science-intensive aviation industry.

It appeared during the first several years after the Soviet collapse that the government had no coherent policy on how to reform and preserve the military aviation industry. The evidence now suggests that Russia's federal government and senior military leadership are not blind to the problems of the military-industrial complex as a whole and have outlined a policy for preserving its high-tech components through the country's economic crisis. Because of its high-tech orientation and its importance to national security, aviation is given priority consideration in the new policy.



A Stalin-era aviation poster showing a Red Square parade. Aviation was a top priority of the Soviet Union. The poster caption reads "Long Live the Mighty Aviation of the Socialist Countries!"

The emerging government-military policy on the military aviation industry and its scientific-technical base is part of a developing policy on the military-industrial complex as a whole. The overall policy is aimed at slowing and reorienting defense conversion, clearly identifying what elements of the military-industrial complex are necessary to Russia's national security, and supporting high-tech dual-use industries which can be profitably sold abroad or can attract investment in the near term and can provide the technical base for a modernized military once Russia has weathered its economic crisis.

The policy pertinent to the military aviation industry has two key elements. The first is an apparent decision for the RFAF to forgo near-term aircraft and weapons acquisition so that sufficient funding can be channeled to aircraft and weapon-development projects to keep advanced-technology capabilities alive. The second is to continue aggressively marketing advanced aircraft and aviation-production capabilities abroad and to use profits from foreign sales to sustain advanced aircraft-development projects and production capabilities. The result will be increased competition on the world military aviation market, the appearance of Russian advanced fourth- and so-called fourth-and-one-half-generation aircraft around the world, despite their not having entered service in the RFAF, and the proliferation of aviation-production technology.



The entrance to the test-pilot school at Gromov Flight Research Institute. In 1995 Russia's test-pilot school graduated only three new test pilots.

The Russian Federation Air Force: Wishes and Reality

The SU-37 shows that in some quarters the creativity of Russia's aircraft designers is unabated. Nevertheless, Russia's military budget has been hard hit by the country's economic crisis, and this has translated to severe reductions in aircraft orders. Consequently, neither the SU-37 nor any other new aircraft will enter service in the RFAF in substantial numbers in the foreseeable future. In 1995 the RFAF's chief financial officer described the status of pay for aviation production as catastrophic. According to his figures, the Ministry of Defense (MOD) budget in recent years has supplied no more than 35 percent of requirements for purchase of new weapons, research, design, and testing.³ This translated to the purchase of just 32 aircraft for the RFAF in 1994, and the 1995 budget provided for no new aircraft purchases.⁴ By 1996 the RFAF leadership asserted that the defense budget was meeting only 30 percent of its actual budget requirement.⁵ This low funding has forced the RFAF to allocate its scant resources toward minimum operational requirements and bare survival, leaving little for purchase of replacement aircraft or development of new aircraft types. The effect on the RFAF is obvious, and the devastating effect on Russia's military aviation industry is also increasingly clear: design bureaus and production facilities are largely idle, their employees laid off or unpaid.

The RFAF's curtailment of combat-aircraft purchases has been forced by a lack of funds, not for lack of a requirements road map. Gen Pyotr Deynekin, RFAF commander-in-chief (CINC), has clearly outlined force requirements for the next 10 to 15 years. These include a new next-generation fighter, a new frontal-aviation bomber, a new theater bomber, and substantial transport acquisitions. Deynekin and other RFAF senior officers have been equally frank in admitting the financial problems which prevent timely enactment of the modernization and acquisition plan. The domino effect of the RFAF's



The new MiG-AT. MiG has high hopes for domestic and foreign sales of its new trainer. (Photo by Artur Sarkisyan.)

woes on the military aviation industry is increasingly clear.⁶

The Military Aviation Industry and Its Scientific-Technical Base

The aviation industry's externally driven problems are compounded by its own lack of purposeful reform, which has left its development, testing, and production complex nearly as large and disjointed as it was in Soviet times, despite the steep decline in state orders. An individual who had closely observed the Soviet aviation industry from 1945 to 1991 and then had taken a five-year sabbatical would find the Russian aviation industry comfortably familiar. Russia inherited 85 percent of the Soviet Union's aviation industry. All the familiar design bureaus, MiG, Sukhoy, Yakovlev, Tupolev, and Ilyushin continue, at least nominally, to function in Russia. The associated engine and radar-design bureaus and component manufactures also remain in operation. All



A SU-30MK. Sukhoi has enjoyed a major success with the sale of this aircraft to India. Future versions will include thrust-vectoring engines.

told, the military component of the aviation industry comprises half the country's vast military-industrial complex of seventeen hundred industrial enterprises and research institutes and their 3 million employees.⁷ In Soviet times, they were subordinate to the Ministry of Aviation and now answer to its successor, the Department of Aviation in the Ministry of Defense Industry.

Russia probably inherited an even greater percentage of former Soviet aviation test facilities and research institutes since that component of the industry was heavily concentrated in the Moscow and Leningrad (Saint Petersburg) regions. Certainly, the core group of State Scientific Centers which oversee various aspects of development and testing remained in Russia. The six institutes primarily associated with aircraft development are the Central Aerohydrodynamics Institute (TsAGI), the Central Institute of Aircraft Engine Building (TsIAM), the All-Russia Institute of Aviation Systems (GosNIIAS), the Gromov Flight Research Institute (LII), the All-Russia Institute of Aviation Ma-

terials (VIAM), and the Siberian Aeronautical Research Institute (SibNA). They conduct fundamental research in aerodynamics, strength, flight dynamics, aircraft stability and controllability, navigation, guidance and control systems, aeroelasticity, gas dynamics, aviation materials, durability, and testing methods.⁸ These are joined by a large cadre of institutes engaged in advanced research that ultimately contributes to aviation development.

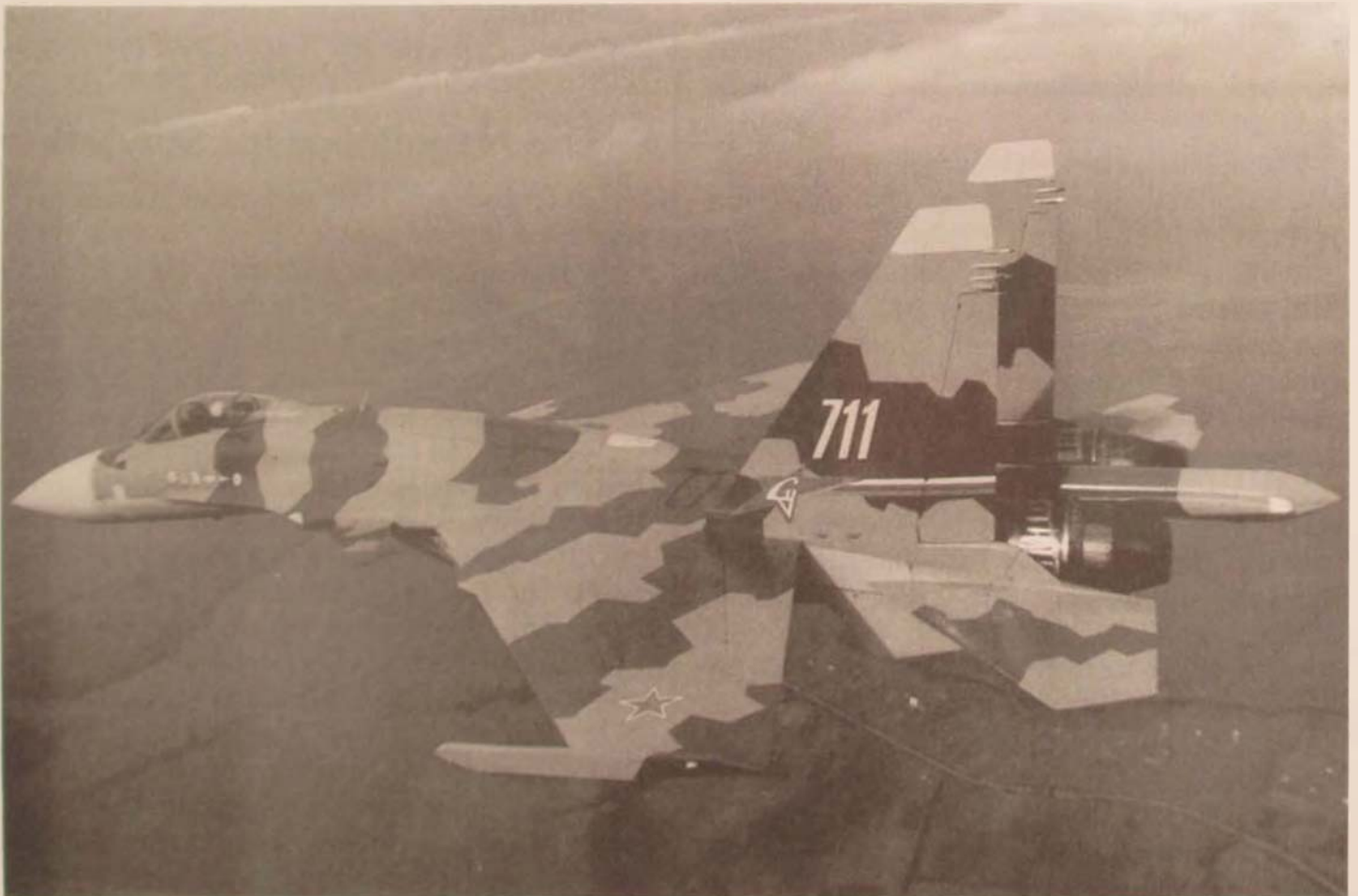
Though the aviation industry retained its massive size, aircraft orders have declined drastically. In January of 1996, industry output showed a 33.7 percent decline compared to January 1995 levels—the sharpest decline for any sector of the military-industrial complex. Eight months later, industry figures for August showed production at 61.8 percent of production in August 1995.⁹ Overall, aviation production in 1994–1995 showed a 60–70 percent drop compared to output in the mid-1980s. The resulting situation at the Komsomolsk-Na-Amur production plant, which produces Sukhoi fighters, was typical

of the aviation industry throughout the country.¹⁰ The plant's three thousand aircraft workers suffered a six-month layoff in early 1995. Even workers engaged in the plant's defense conversion program producing color televisions worked only part-time in the first half of 1995.¹¹

The industry's financial problems are compounded by government nonpayment for some of the few orders which are placed. RFAF debt for unpaid 1994 orders amounted to 500 billion rubles (the 1996 exchange rate was approximately 5,550 rubles to the dollar). Interest payments ate into the 1995 RFAF budget and still the debt rose to 765 billion rubles by mid-1995. Not surprisingly, some enterprises began to refuse to fill orders under such conditions. In 1995 the Perm Motor Company refused to fill further orders from its biggest debtor, the MOD, for MiG-31 engines. The plant was forced to lay off one thousand employees and go to a three-day work week.¹²

The scientific-technical base of the aviation industry—its design bureaus, test facilities, and research institutes—has suffered as well. One telling sign of significant decline in their funding was the reported graduation of the 32d class of test pilots by the Gromov Flight Research Center's test-pilot school in mid-1995. The class comprised just three pilots. By comparison, the school used to graduate classes of 11–13 test pilots on average. With design bureaus and production facilities occupied at a fraction of their capacity, funding for test-pilot training has dropped as well.¹³ As a result of the precipitous decline of aviation production, the volume of work at scientific and test facilities has been reduced to critically low levels—one-twelfth of pre-1991 activity.¹⁴

In addition to the aviation design bureaus, production plants, and five main test research facilities, hundreds more institutes engage in fundamental, advanced, and applied research contributing to the advance-



The SU-37. Sukhoi's thrust-vectoring fighter created a sensation at its debut during the 1996 Farnborough Air Show.

ment of aviation. These organizations have found themselves in even more serious financial difficulties than have the core aviation enterprises.¹⁵ Work is at a near standstill, and pay was several months in arrears by October 1996 before large protests forced government action. Hunger strikes by prominent scientists protesting pay arrears have further underscored the problems in Russia's scientific community.

The Ministry of Defense (MOD) budget in recent years has supplied no more than 35 percent of requirements for purchase of new weapons, research, design, and testing. This translated to the purchase of just 32 aircraft for the RFAF in 1994, and the 1995 budget provided for no new aircraft purchases.

The apparent lack of opportunity in scientific work and the strong financial attraction of Russia's developing business sector are creating a problem which could have long-term effects on the aviation industry. Fewer and fewer young people are choosing to go into science, opting instead for more lucrative fields. According to statistics published by Russia's Science Ministry, 61 percent of people working in scientific research are 40 years of age or older. Twenty-five percent of scientific researchers are between 31 and 39, and only 13 percent are under 30. Meanwhile, Science Ministry statistics show a steady decline in output of new scientists by Russia's universities and scientific institutes. Other figures also appear to indicate that people with less than Russia's most advanced degrees (and hence less time invested in their field) are abandoning scientific work.¹⁶ The trend indicates that the scientific fields supporting the aviation industry and the scientist-and-engineer-dependent design bureaus,

where average salaries are half the national average and one-tenth the salaries in some developing commercial fields, will have an increasingly difficult time attracting the best and the brightest of Russia's youth.¹⁷ The qualitative aspect of this problem would be difficult or impossible to measure. However, the quantitative problem is straightforward in a country where the average male life span is down to 57 years. If the trend continues, a large percentage of the aviation industry's professional cadre will soon reach the end of its productive life without a cohort of young replacements. The supply of new scientists and engineers needs to adjust to a shrinking aviation industry. However, current trends seem more in line with collapse than contraction. Furthermore, the qualitative question may prove more severe than the quantitative one as bright youths with initiative are forced to choose between the relatively lucrative business professions and life in Russia's struggling scientific-technical community.

The New Policy for Survival

Given the facts outlined above, unanimity regarding the critical state of Russia's military aviation industry formed early in government, military, and industry circles. Less easy to arrive at was a consensus view of how to deal with the problem. Most efforts fell roughly under the catchall phrase "defense conversion." In most cases, this amounted to some easing of government control on aviation enterprise facilities and uncoordinated efforts on their part to produce consumer goods for the domestic and export market. Television production by the Komsomolsk-Na-Amur aircraft-production plant is one example of this policy in action.

It is now clear that a new policy of key importance to the future of Russia's military aviation industry emerged during 1996. The new policy is based on recognition early in 1996 of the failure of existing defense-conversion policy and the resulting desperate state of the military-industrial complex. The

policy represents the consensus view of key government, military, and military-industrial leaders of the long-term importance to Russia's national security of the "science intensive" advanced-technology sectors of the military-industrial complex. It also recognizes the marketability of high-tech military capabilities in the near term. The importance of the military aviation industry and its scientific base to national security and the importance of nursing its capacity through Russia's economic crisis are a major component of the policy.

Several events during 1996 appear to have contributed to the evolution of this policy. First, an expanded session of the air force's military council was held in February. RFAF commander Deynekin, other senior officers of the air force, Air Defense Aviation, and Naval Aviation participated, as well as leaders of the aviation industry and representatives of the State Committee of Defense Industry. Nikolai Yegorov, President Boris Yeltsin's chief of staff, also attended. A broad range of issues was discussed at the meeting, but press reports make clear that the problems of the military aviation industry were at the forefront. The three main questions relating to the aviation industry and its scientific-technical base included: preserving design, research, and production capabilities despite funding cuts; choosing areas to which the air force and the aviation industry should give priority; and determining Russia's aviation export policy.

It appears that during this council session the decision was made to forgo substantial purchases of existing aircraft in the near to midterm in favor of supporting the scientific-technical base and new aircraft development. The council also reached the conclusion that the critical period for the survival of the aviation industry and its scientific-technical base is the nine-year period from 1996 to 2005. This is based in part on the anticipated service life of the RFAF's fourth-generation fighters—the MiG-29 and SU-27—to which the council specifically referred. The council concluded that the aviation industry's downward trend would mean that in 10 years no

capacity would remain to equip the RFAF with modern aircraft, even if acquisition funding returned to normal levels.¹⁸

Sukhoy's new aircraft [the SU-37] is convincing reaffirmation of the world-class and, in some areas, unique capabilities of Russia's military aviation industry.

Press statements by the council indicated that one aim of the meeting was to inform the government, MOD, and State Committee for Defense Industries of the need to preserve the aviation industry. In fact, subsequent events during 1996 indicated that the concerns raised at the February council meeting resonated with government leaders. First, apparently in response to widespread dissatisfaction in the government and the military-industrial complex with the course of defense conversion, President Yeltsin issued a decree on 8 May turning the State Committee on Defense Industry (GosKomOboronProm) into the Ministry of Defense Industry.¹⁹ The decree put Zinoviy Pak, then chairman of GosKomOboronProm into the cabinet as minister of defense industry and expanded his organization's authority.

The move, taken during the run-up to Russia's presidential elections, signaled government concern for the state of the defense industry and its millions of workers but was scoffed at in some quarters as electioneering. However, it soon became clear that the decree creating the new ministry was more than political window dressing. In a series of interviews subsequent to his appointment as minister of defense industry, Pak indicated that the creation of his ministry was part of a government plan to reorient defense-conversion policy. Significantly for the military aviation industry, Pak immediately made clear that a major part of the policy reorientation was renewed emphasis on preservation of the "science intensive" and

advanced-technology sectors of the military-industrial complex. He also reported that, since the official adoption of a post-Soviet military doctrine in 1993, the first time the Economic Ministry, MOD, and the State Committee on Defense Industry presented a coordinated weapons development plan to the government was early 1996—the time frame of the RFAF council session outlining air force and aviation industry priorities.²⁰

Pak has outlined a policy which will reorient the course of Russian military-industrial conversion if he succeeds in putting it into practice. He has said that his first priority is identifying which of seventeen thousand military-industrial enterprises remain necessary to fill state defense orders. Those enterprises that do meet state defense acquisition requirements will be separated into two groups: enterprises so heavily specialized in defense work that they will remain purely government owned, and those which can be partially privatized due to the dual civil and military nature of their production. What Pak calls the government's former policy of unnaturally cultivating defense industry privatization will be halted. Pak frankly states that a third category of enterprise, those which are found to be obsolete or unnecessary for defense acquisition needs, will be left to sink or swim on their own. In his opinion, the eventual evolution of Russia's military-industrial complex to a mix of a limited number of very large state-owned enterprises supplemented by a cadre of military-industrial commercial firms would best serve the country's defense needs. Significantly for the military aviation industry, he has singled out as effective models for this policy the *Voенно-Промышленныи Комплекс МАПО* (the conglomerate now producing MiG aircraft) and the *Sukhoi OKB* (design bureau), which have both moved toward consolidation of design and production facilities but along different organizational principles.²¹

The views Pak has expressed closely agree with those of First Deputy Defense Minister Andrey Kokoshin, whose portfolio includes military-technical policy. Kokoshin is a long-

time advocate of finding ways to preserve advanced technical capabilities through the current economic crisis. He also weighed in during 1996 in favor of short-term-acquisition belt tightening for the sake of preserving the military's scientific-technical base, saying that the MOD's main budget focus would be on creation of "future weapons" and defense scientific-research test and design work.²²

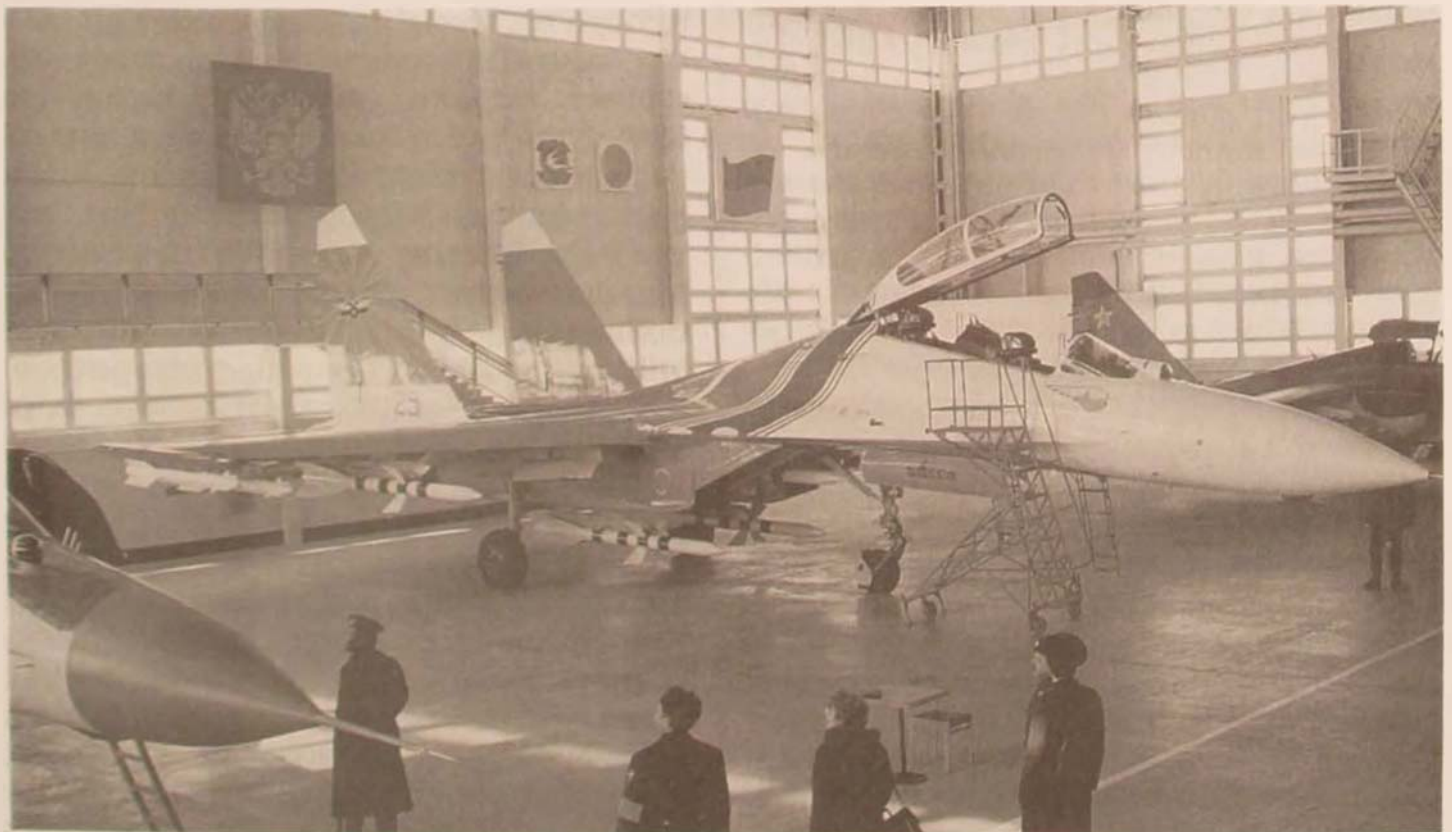
The government validated the policy advocated by Pak and Kokoshin in a resolution issued during August 1996 on "The National Technical Base." The resolution was reissued as a presidential decree the following October. A key element of the resolution/decreed was the conclusion that defense conversion had failed because it was based on obsolete technology. The document directs a reorientation of conversion to exploit modern dual-use technology. It defines dual-use technology as suitable to equip the military with the most modern equipment and also to use in high-tech civilian products that can compete on the world market.²³

Key government figures voiced support for the "National Technical Base Policy" in the critical period of legislative consideration of the 1997 federal budget. Yakov Urinson, Russia's deputy minister of economics, laid out his ministry's rationale for husbanding scarce resources in order to support high-tech military-industrial enterprises. Like other important figures involved in formulating the policy, he singled out aviation as one of the priority defense-industry sectors. During the same period when the budget was being considered by a reconciliation committee, Prime Minister Viktor Chernomyrdin also supported increased funding for scientific research and development and increased government support for enterprises producing high-tech goods able to compete on the world market.²⁴

With the Russian government struggling to meet huge needs with a very limited budget, the 1997 budget debate was contentious. Despite this, the air of unanimity among key government and military leaders on preserving the scientific-technical base of



The Russian air force plans to rely on the MiG-29 and SU-27 until at least 2005. The slogan on the wall behind the aircraft reads, "In war, he who has the most powerful equipment and best machines wins." Above, a MiG-29; below, an SU-27.



high-tech industries seemed to carry the day. Increased funding for scientific-technical and design work was announced as the budget debates drew to a close. The budget figures also made it equally clear that the RFAF's budget problems and long dry spell of new aircraft acquisition would continue. However, the key policy issue for the MOD and RFAF during 1996—the preservation of its high-tech capabilities by submitting to current realities in the hope of a brighter future—seemed to have been resolved.

The quantitative problem is straightforward in a country where the average male life span is down to 57 years.

Gen-Lt Yuriy Klishin, RFAF deputy commander for weapons, may have best summed up the new funding priority and its motivating factor in an August 1996 interview:

The greatest danger is not the reduction of deliveries of combat aircraft to units. We rely today on the MiG-29 and SU-27, which are considered to have thirty year service lives and so have another ten years of service left. *The worse [sic] possibility is the loss of advanced aviation technology, the total suspension of development of priority items of future aviation equipment and weaponry including a long-range bomber, fifth generation fighter, a tactical reconnaissance aircraft, and other aircraft with characteristics which, by our estimates, will not be exceeded in the next decade and a half.* (Emphasis added)²⁵

Export—The Means to Survival

Considering the events of 1996, it is clear that leaders of Russia's government and military-industrial complex have agreed on a program to preserve priority elements of the military aviation industry. However, simply diverting the RFAF's meager acquisition

funds to support scientific research test-and-design work (NIOKR) is not equal to the task. The only substantial source of money for this is foreign sales. One of the so-called nonbudget income sources, foreign sales is, according to RFAF commander Deynekin, the main supplement to MOD and RFAF development funds.²⁶ In this sense, the government policy outlined above appears to formalize practices which have been developing over the last several years and also seems aimed at funneling more of the benefits of foreign sales to development programs. The policy will mean that large numbers of modern Russian-made fighter aircraft will appear in various world regions during the same period that RFAF fighter purchases are suspended.

The export side of the policy will be supported by a large and effective arms-export complex which developed in post-Soviet Russia well before the coalescence of the policy of supporting future development programs at the expense of current acquisitions. Its activities are sufficiently important to merit the direct attention of President Yeltsin, who takes "strategic decisions on weapons export policy" and handles them through his special assistant for foreign military-industrial cooperation, Boris Kuzik. Executive decisions on export policy are formulated by Kuzik's office in the presidential administration; the government, under Prime Minister Chernomyrdin and First Deputy Prime Minister Aleksey Bol'shakov (who has the industry portfolio); and the State Committee on Military Technical Policy. The Military-Industrial Council, composed of representatives of the major enterprises of Russia's military-industrial complex, reviews applications for export licenses. Weapons-export policy is executed by Rosvooruzhenie, the large and growing state-owned weapons-export corporation, and a handful of other weapons producers licensed for export—most notably the VPK MAPO financial industrial group (FIG), which produces MiG fighters. Despite the apparent success of this system, there has been grumbling over Rosvooruzhenie's 12 percent commission on

sales and its apparent disinterest in marketing parts and components. Minister of Defense Industry Pak has indicated he might support expanding the list of enterprises licensed for export of weapons and weapon components.²⁷ The existing system was put in place in 1994; since then, Russia's weapons exports have grown from \$1.7 billion in that year to \$2.7 billion in 1995, with sales for 1996 projected to be \$3.3 to 3.5 billion.²⁸

It is now clear that a new policy of key importance to the future of Russia's military aviation industry emerged during 1996.

Half the 1996 sales were in aviation equipment.²⁹ In fact, exports have been the one bright spot in the last several years for the struggling military aviation industry. Russian fighters have had a surprising string of successes in a shrinking and highly competitive world aviation market. Asia has been an especially lucrative region for Russian manufacturers. MiG had a major success with its MiG-29 Fulcrum sale to Malaysia in competition against British, French, and US fighters. Sukhoy has had two very significant sales in Asia, first with the sale of some 40 Flankers to China in 1992 and then in 1996 a subsequent sale of another 40 SU-27s and an agreement for licensed construction of the fighters by China.³⁰ The China deal was followed within the year by India's purchase of 40 of Sukhoy's SU-30MK, reportedly of the latest thrust-vectoring type—if true, the first foreign sale of Sukhoy's thrust-vectoring technology. This sale, according to one report worth \$1.8 billion over five years, is also expected to include future production rights for India.³¹ Russia's ambitions for foreign sales are not limited to China and India, as made evident by the ubiquitous presence of Russian fighters at every major international air show during 1995–96 from Santiago, Chile, to Seoul, Korea, and culminating

with the SU-37's debut at Farnborough. Russian military aviation will try to lengthen its list of buyers in Latin America and has expressed willingness to go head-to-head with US aviation companies in the South Korean market.³² Leaving no doubt as to Russia's future export policy, Rosvooruzhenie general director Aleksandr Kotelkin has said that Sukhoy aircraft will soon become the most purchased in the world.³³

Present Trends and Future Impact

One clear-eyed representative of Russia's military aviation industry said of the sale of SU-27s to China, "It won't save the industry but it will keep the Novosibirsk, Komso-molsk-Na-Amur, and Irkutsk plants and a couple of hundred of their parts suppliers in production for the near term."³⁴ It does seem highly doubtful that foreign sales alone could sustain a world-class military aviation industry indefinitely. However, it is clear now that Russia's military-industrial policy takes this into account and has a more limited aim for foreign aircraft sales. Defense Industry Minister Pak has made clear that government policy is no longer aimed at preserving the status quo in the VPK but at judiciously trimming away the old and obsolete while targeting limited funds at the "science intensive" industries and research base, such as aviation, which can compete on the world market and which will form the basis of a smaller, modern, automated military. Confirming this view, the RFAF leadership, along with the key design bureaus, has stated its support for channeling profits from foreign sales toward development of future aircraft at the expense of near-term and midterm fighter purchases.

The policy will clearly have a painful impact on large sectors of the military aviation industry. Defense Industry Minister Pak has been fairly explicit in identifying the MiG and Sukhoy design bureaus and their associated production facilities as key players in

policy. Their status is made even clearer by the RFAF leadership's repeated statement of priority fighter projects, which lean heavily on Sukhoy products and, to a lesser extent, on MiG. Other long-familiar names in Russian aviation have not been as clearly singled out for government support and apparently face a difficult future under Pak's "sink or swim" policy. The pain, in human terms, of this industrial contraction will be compounded by economic and cultural factors. People who will be displaced will find few opportunities for new employment in Russia's struggling economy. Also, even in the few cases when there might be opportunity elsewhere, Russian society has not yet adapted to a mobile lifestyle. An oft-repeated phrase describes the mind-set: "Where you are born, there you'll die."

In terms of military aviation, the 10-year plan adopted by the air force military council points toward delay of significant aircraft purchases until 2005. Nevertheless, some new modifications and entirely new aircraft are likely to appear during this period. There will be several reasons for continued development. First, the main stated goal of the policy is to preserve the scientific-technical capability to design and build new aircraft. Second, exports will rely on keeping competitive modern aircraft available for sale. Last, production of new aircraft, even in quantities so small as to be only technology demonstrators, can be used to boost the industry and promote foreign sales. This pattern has been established in the last several years by Sukhoy, with its family of SU-27 variants, and by MiG, with the MiG-29M and MiG-AT trainer.

Obviously, a 10-year near suspension of aircraft purchases indicates that a serious contraction of Russia's aviation industry is in the offing. The process is likely to be accompanied by the continued trend of formations of FIGs uniting design bureaus, their associated production facilities, and a financial partner. In terms of fighter aircraft, the latest statements and marketplace developments point toward a future with Sukhoy and VPK MAPO (MiG) emerging as the government

contractors of choice and perhaps the two main combat aircraft designers in a very small circle of competitors. The consolidation trend appeared to be gaining even more momentum in late 1996, when Sukhoy, Tupolev, Beriev, and Yak were reported to be forming a FIG.³⁵

In terms of stability, the policy seems to indicate satisfaction with and support for the current structure of the scientific-technical base that supports Russia's aviation industry. The policy indicates that, to the extent possible, the six core aviation research-and-development institutes will be preserved. The policy also aims to tackle perhaps the most difficult long-term problem facing Russia's aviation industry—preserving its scientific-technical cadre.³⁶

With the consensus support that developed for the policy during 1996, it is likely that budget priority for the policy can be sustained at some level during the next several years. However, it is clear that the government funds available will remain very limited and that financial support for the program will continue to come primarily from foreign sales. Russia's already aggressive program for marketing weapons abroad, based largely on a powerful profit incentive, has combined with an equally powerful survival instinct. The result is fairly clear in the announced sale of thrust-vectoring SU-30s to India. The most modern series aircraft, what RFAF commander Deynekin has described as generation four-and-one-half fighters, will be sold abroad for the sake of funding development of their successors to equip the RFAF. As the Sukhoy-licensed production deals with China and India show, any nations that hope not only to buy aircraft but also to build their own military aviation industries will find willing sellers in Russia. The policy will therefore help create much sharper competition on the international fighter market, drive the spread of advanced fighter aircraft in several regions of the globe, and accelerate the proliferation of advanced aviation-development technology.

The new government-military policy on Russia's military-industrial complex and its

military aviation industry defines the problem, sets a period for its solution, and outlines a method to solve it. The elements for some degree of success are present if government stability can be maintained and commitment to the plan can be sustained for the

long term. If the new policy is adhered to and if it is the beginning of a hard-nosed reform policy and not just another in a series of unimplemented decrees, Russia will emerge from its economic crisis with a much altered but significant military-aviation industry.

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“HANDMAID” OF THE ARMY?

The American Perception of German Bombardment Doctrine prior to the Battle of Britain*

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*I would like to offer my thanks to Prof. John H. Morrow for his guidance and support in writing this paper and to Prof. William M. Leary Jr. for his comments and suggestions. Additionally, I would like to thank the United States Air Force for affording me the opportunity to complete this study.

Strategy, the use of engagements for the object of war.

—Carl von Clausewitz

The objective sought—an effect on the war as a whole—determines if a target or attack is strategic. Similarly, the enemy reaction determines whether an attack has strategic results.

—Air Force Manual (AFM)1-1,
*Basic Aerospace Doctrine
of the United States Air Force,
(1992)*



IN THE YEARS since the end of World War II, American airmen have justified their independence largely by emphasizing the mission of strategic bombardment. They argued that only the resources and flexibility inherent in an independent service could mass the requisite force to defeat an enemy without recourse to ground troops. Unfortunately, this zealous advocacy of Douhet-style airpower has caused a misunderstanding among many Air Force professionals as to the true nature of aerial strategy. We have truncated the definition of strategic airpower to such a degree that to many people it now equates to strategic bombardment, whether that concept implies the mass destruction of German and Japanese cities in World War II, or the more recent surgical attacks on Iraq during the Gulf War. In either case, limiting our definition of strategic airpower to bombardment missions prevents us from fully exploiting the vast range of alternatives available in aerial combat. To take advantage of these opportunities, we must redefine strategic airpower in terms of what an air force contributes to the overall war effort. The Luftwaffe and the US Army Air Corps (USAAC) of early World War II each offer an example of an air force which accepted and appreciated this broader context.

Few airmen or historians have recognized the strategic nature of the Luftwaffe's World War II doctrine. Fewer still have allowed that

contemporary USAAC officers appreciated this doctrine. Instead, most postwar historians noted the conspicuous absence of a heavy bomber fleet in the Luftwaffe's inventory and concluded that it had been equipped primarily for use in a tactical and close air support role.¹ In a similar vein, independence-minded American airmen pointed to their own successes with aerial bombardment and condemned Luftwaffe officers for their lack of vision.

In actuality, although Luftwaffe strategists appreciated the merits of aerial attacks against centers of population and production, they tempered their zeal for strategic bombing with a sophisticated understanding of their country's overall strategic situation. This insight allowed them to develop a flexible doctrine that enabled them to devise operational plans with several different and complementary aerial missions throughout the first year of World War II. Although these missions did not necessarily correspond to the prewar American concept of strategic attack, USAAC officers recognized that they did have a profoundly strategic effect on the outcome of the fighting.

When war broke out in Europe in 1939, the USAAC scrambled to collect as much information as possible regarding the tactics and technology of the belligerents. In particular, the USAAC wanted to know what missions had been assigned to the Luftwaffe, how it carried out these missions, and how the Third Reich executed the command and



Doctrinal disputes over the proper employment of the Junkers Ju.87 (Stuka) divided the Luftwaffe's general staff during 1938–39.

control of its air forces. This scrutiny resulted in a number of reports on the organization and doctrine of the Luftwaffe. Evaluating these estimates illuminates the nature of this doctrine during the opening stages of the war and provides a clearer understanding of the basis of American opinions of it.

One valuable piece of operational intelligence possessed by the USAAC was Luftwaffe Manual 16, *The Conduct of Aerial Warfare*. Published in 1936, this regulation provided American officers a synopsis of the interwar Luftwaffe's employment theories. Although some observers have interpreted this manual as evidence of an "overwhelming emphasis on tactical rather than strategic bombing,"² its authors obviously intended to highlight the flexibility of airpower.

The manual began with an unequivocal statement: "Air power carries the war right into the heart of enemy country from the moment war breaks out. It strikes at the very root of the enemy's fighting power and of the people's will to resist."³ Still, the manual did not call for the exclusive use of strategic bombardment. Consistent with the German military's traditional emphasis on adaptation, it stated that "the nature of the enemy, the time of year, the structure of his land, the character of his people as well as one's own military capabilities"⁴ should dictate the use of airpower. Their country's geographical position in the heart of Europe was historically a paramount concern to German strategic planners. Consequently, the Luftwaffe did not subscribe to the theory of strategic bombing that advocated the exclusive use of aerial bombardment against an en-

emy's homeland.⁵ Such a strategy would doom Germany to defeat at the hands of an enemy land army long before the air offensive had any effect.⁶

Nonetheless, the Luftwaffe continued to support strategic bombing operations, although not to the exclusion of other missions. In 1937, for example, the Luftwaffe began work on a new two-engine bomber, the Heinkel He.177, thinking that it would have the requisite operational radius to fill the gap in force structure created by the lack of long-range bombardment aircraft in the early 1940s.⁷ Doctrinal disputes over the proper employment of the Junkers Ju.87 (Stuka) divided the Luftwaffe's general staff during 1938–39. Officers argued over whether the air force should use the Stuka against tactical or strategic targets. Eventually they compromised, deciding that, despite its limited range and bomb load, the dive-bomber could perform missions of either type.⁸

As the Luftwaffe's capabilities grew, Third Reich officials found in it an extremely intimidating saber that they did not hesitate to rattle in order to reinforce their diplomacy. A carefully staged plan of strategic deception created in the minds of the world a vision of the Luftwaffe as an omnipotent force capable of striking anywhere in Europe.⁹ Coupled with the aggressive nature of the Third Reich's foreign policy during the 1930s, it caused considerable concern among American military officers. In an effort to evaluate the threat posed by German airpower, the USAAC began a series of annual air reports covering all aspects of the Luftwaffe's capabilities.¹⁰

The 1939 air report was completed before the German invasion of Poland. Based primarily on compilations of air attaché notes, this document accurately described the German air force's doctrine. The section devoted to operations began with an affirmation of the Luftwaffe's status: "The German war doctrine is predicated on the possession of an independent Air Force." The report then outlined the categories of air operations for which the Luftwaffe had prepared. Signifi-

cantly, the authors chose to "us[e] the German terminology" when listing these missions. In addition to planes fitted for service as reconnaissance, dive-bombing, and pursuit, they noted that the Luftwaffe possessed aircraft for both "medium attack (fast bombers)" and "heavy attack (night bombers)."¹¹

The Luftwaffe emphasized operations independent of the army, including the destruction of the enemy air force, interdiction of lines of supply and communications, and strategic bombardment.

The Air Corps needed the parenthetical clarification due to the lack of dedicated attack aircraft in its own inventory. However, this dual categorization also reflects the inherent flexibility of 1939 Luftwaffe air doctrine. Recognition of this pliability emerged throughout the remainder of the report. "The [German] Air Force is prepared and designed to provide army and navy cooperation units" in the form of ground-attack aircraft, including both the Junkers Ju.87 Stuka and two-engine bombers—specifically, the Junkers Ju.88 and the Dornier Do.17.¹² In addition, the report noted that the Luftwaffe emphasized operations independent of the army, including the destruction of the enemy air force, interdiction of lines of supply and communications, and strategic bombardment. Specific targets included "all the enemy establishments and equipment of importance to the conduct of war, especially airplane fields and aircraft on the ground . . . military supply centers, road and railway constructions, centers of traffic and communications . . . [and the] armament and aircraft industry."¹³

According to the report, the Luftwaffe anticipated using three methods of bombardment to achieve these objectives: high-altitude horizontal, low-altitude horizontal,

and dive-bombing. The report however, did recognize that "the German viewpoint holds the low altitude generally more effective than the high altitude horizontal bombing. Greater accuracy, at the expense of reduced bomb penetration, is claimed." Luftwaffe doctrine favored using dive-bombing "against concentrated or small, important objectives." Additionally, it recognized that although the Germans considered night bombardment, they agreed with the American opinion that it had at best, a limited effect. "[T]he night attack [is] being considered [by the Luftwaffe] primarily as a disrupting operation for complementary use with day attacks."¹⁴

The USAAC realized that the Spanish Civil War had "provided [the Luftwaffe] a practical school of training of inestimable value." Indeed, Wolfram von Richthofen—com-

mander of the Legion Condor, sent by the Third Reich to Gen Francisco Franco's aid—quickly realized the inadequacy of the Luftwaffe's training manuals with regard to air-support missions. In March 1937, for the first time, single-seat, single-engine Heinkel He.51s were used in a ground-support role. The success of this raid, which effectively paralyzed the ground troops it targeted, caught Richthofen's attention. He soon devised a primitive system of air-ground support reminiscent of his background experience in World War I. Despite initial skepticism on the part of the Luftwaffe High Command,¹⁵ Richthofen's operations "proved that bombers were extremely effective when used against enemy troop concentrations, strong-points, and lines of communication."¹⁶ This experience led directly to the creation of air divisions within the *Luftflotten*. Although the air



During the ground-support phase of operations, the Luftwaffe concentrated on interdicting enemy supply and communications.

fleets remained attached to a particular land-based area of responsibility, "these changes have been designed to increase the mobility of the Air Force and reduce its ties to fixed geographical or administrative commands."¹⁷

Observations in the report clearly corroborate the thesis that USAAC officers recognized the validity of most of the Luftwaffe's doctrinal concepts. For instance, a remarkable degree of congruence existed between the Luftwaffe's and the USAAC's perceptions of night bombing. The report also noted the fundamental nature of the Luftwaffe's independent status to its operations. It identified only two German weaknesses: "relatively inadequate numbers of trained personnel . . . and the questionable adequacy of necessary material stocks for wartime support of the armed forces."¹⁸ To American air officers, neither of these weaknesses indicated anything amiss in the Luftwaffe's conception of aerial warfare.

Then, on 1 September 1939, Germany launched its attack against Poland. The Luftwaffe entered the fray with all of its dive-bombers, 70 percent of its bombers, and 50 percent of its fighters.¹⁹ Two geographically based air fleets, *Luftflotten* 1 and 4, participated in the offensive. During the initial stages of the attack, the Luftwaffe directed most of its operations against Polish airfields. On 3 September, the emphasis shifted to the aircraft and munitions industries. Only after these two missions had been completed did the Luftwaffe turn its attention to close air support of the Wehrmacht.²⁰ Albert Kesselring, then commander of *Luftflotte* 1, later noted that doctrinal considerations dictated this order of operations: "According to the operation principle governing the Luftwaffe, the enemy air force and the aircraft factories in the immediate vicinity of the airfields were to be attacked."²¹

During the ground-support phase of operations, the Luftwaffe concentrated on interdicting enemy supply and communications. Other targets included masses of reserve troops and the retreating Polish forces. Few reports exist which recount *direct* support of army operations or the use of the Luftwaffe as aerial artil-

lery. On trial at Nuremberg, Field Marshal Kesselring insisted that operations such as the bombing of Warsaw, although "severe measures," were "army action[s],"²² conducted only at the army's request and then for tactical purposes.²³ In fact, Luftwaffe doctrine proscribed the use of terror bombing, and "very detailed instructions were published by the Oberkommando der Wehrmacht (OKW) that only these military targets should be bombed."²⁴

Although German aircraft did undertake missions in direct support of ground troops, the bulk of their operations was directed against the Polish air force, vital industries, and lines of support and communication.

By no means does this constraint towards the bombing of civilian populations imply that the Luftwaffe espoused any less a commitment to strategic operations. Although German aircraft did undertake missions in direct support of ground troops, the bulk of their operations was directed against the Polish air force, vital industries, and lines of support and communication. Indeed, only poor weather conditions had prevented the Germans from "launching a massive, all-out attack on the military installations and armament factories of Warsaw to break Polish resistance at the start of the campaign."²⁵

Moreover, the commanders of the *Luftflotten* attributed the campaign's success to the Luftwaffe's independence. Alexander Loehr, *Luftflotte* 4's commander, stated that "the Air Force was to operate for the first time in world history as an independent arm. Thereby it was to open up new aspects of a strategy which in its principles had remained unaltered throughout the course of history."²⁶ Field Marshal Kesselring seconded his comrade: "The Polish campaign was the

touchstone of the potentialities of the German Air Force."²⁷

Few airmen or historians have recognized the strategic nature of the Luftwaffe's World War II doctrine.

The Luftwaffe's operations against Poland reflected the successful use of an airpower doctrine emphasizing the independent nature of air forces, the priority of gaining air superiority, and attacks against strategic objectives. Direct support of ground forces proceeded only after, or in conjunction with, the successful accomplishment of the other missions. The unique characteristics of their Polish enemies dictated the Germans' strategy, and Luftwaffe doctrine flexed to accommodate it. The effect of this employment scheme on the outcome of the campaign betrays its strategic nature. American observers recognized and appreciated the Luftwaffe's strategy. The USAAC, and Gen Henry H. Arnold in particular, were reassured that American "tactical school theories seemed to be generally in accord with German tactics."²⁸

On 10 May 1940, this aerial strategy changed subtly with the launching of the offensive against France.²⁹ Although the Luftwaffe's immediate goal was the same as in Poland—the defeat of the enemy's air forces—this time its aircraft would also be used from the outset in direct support of ground operations.³⁰ Direct support of ground forces remained a high priority throughout the western offensive. On 11 May, the enormous number of German bombers needed for attacks against columns of French ground troops prevented their employment in other missions.³¹ When the Luftwaffe focused its attacks on ground units, it emphasized concentration at critical points. For example, on 20 May, ground commanders called in the Luftwaffe for a mission against enemy troops in order to en-

large the bridgehead over the Somme River.³² Later in the campaign, the German commander requested attacks against enemy rail and communication lines between Rheims and Paris.³³ Despite the ground-support character of these missions, they had a profoundly strategic effect. Marc Bloch, a French army officer who became a partisan after the fall of France, recorded his impression following an attack by the Luftwaffe's dive-bombers on 22 May: "the effect of bombing on the nerves is far-reaching, and can break the potential of resistance over a large area. It was doubtless with that end in view that the enemy High Command sent wave after wave of bombers to attack us. The result came up only too well to their expectations."³⁴

The Luftwaffe's increased number of direct-support missions, however, did not preempt all independent operations. In mid-May, in a show of force inspired by Herman Göring, the Luftwaffe bombed the downtown area of Rotterdam, the capital of Holland.³⁵ This attack contributed significantly to the surrender of the Dutch after only five days of combat.³⁶ At the Nuremberg trials, Field Marshal Kesselring conceded the strategic nature of the attack: "This one attack brought immediate peace to Holland."³⁷ Early in the afternoon of 3 June, the Luftwaffe launched another largely strategic attack—Operation Paula. Lasting for two days, it was a series of aerial strikes against the aerodromes and aircraft factories on the outskirts of Paris. The Luftwaffe anticipated that this attack might, like the one on Rotterdam, produce a worthwhile despondency among France's civilian population.³⁸ Overall, the Luftwaffe's operations, whether in support of the army or carried out independently, had the desired impact—on 24 June, under the combined weight of the German air and ground offensives, French resolve collapsed.³⁹

During the course of the western offensive, American military attachés reported constantly to the War Department in Washington, D.C., on what was transpiring. As early as 29 May 1940, the military attaché in



By 1939, the Luftwaffe was prepared and designed to provide army and navy cooperation units in the form of ground-attack aircraft, including two-engine bombers, such as this Junkers Ju.88.

Paris, Capt John Sterling, dispatched his first major effort to synthesize developments in the aerial battle. The report noted that many of the Luftwaffe's missions had been in direct support of ground forces. "The German air offensive over French territory has consisted primarily of operations in close support of mechanized ground troops, use of aerial bombardment against fortifications prior to and during attack, [and] machine gunning of enemy troops prior to and during attack."⁴⁰ Nonetheless, the attaché pointed out that "independent missions have daily attacked airdromes, [and] railway yards and stations scattered over almost all of France."⁴¹ Regarding specific bombardment techniques, the dispatch declined to undertake a detailed analysis. "Tactics employed by German bombers have varied considerably; bombing has been conducted from all

altitudes, both horizontal and vertical [dive-bombing]."⁴²

Subsequent reports took a more critical stance with regard to bombardment. Although the attachés continued to stress the effectiveness of missions supporting German ground forces, independent operations received less praise. One report noted that "Germany . . . concluded early in the war that low altitude dive bombing was most effective and comparatively few high altitude attacks have been made."⁴³ A subsequent dispatch proclaimed that "the Germans have been very much surprised at their low efficiency [in bombardment] and will find ways of improving as soon as the present job [of defeating France] is finished."⁴⁴ American intelligence officers understood that the Luftwaffe had engaged significant elements in ground-support operations and had increased its reliance on dive-bombers. They

did not, however, believe that either of these phenomena signaled either a rejection of independent strategic operations or the Luftwaffe's subservience to the Wehrmacht. Indeed, USAAC analysts fully expected the Luftwaffe to redouble its efforts to perfect bombing techniques in light of these setbacks.

Despite the Luftwaffe's lack of a dedicated strategic bombardment aircraft, attempts to belittle the strategic dimensions of Luftwaffe doctrine must inevitably founder.

Nonetheless, the attachés acknowledged the importance of effective coordination between ground and air forces to Germany's success.⁴⁵ War Department studies reveal a further appreciation of the Luftwaffe's doctrine, especially in regards to the coordination of operations with ground forces. The German success was attributed to unity of command by an intelligence memorandum of 12 June 1940. "The efforts of the land, sea and air forces are subordinated and directed to the task at hand. For the nation as a whole these efforts are coordinated by the German High Command and the Supreme General Staff." This, however, did not imply that the Luftwaffe was viewed as an extension of the army. The memorandum noted that only observation and reconnaissance aircraft were assigned to ground forces. "In general, pursuit aviation is not allotted to army units. . . . There is no known instance of the assignment of bombardment aviation to army units." Even in direct ground support, the Luftwaffe insisted on centralized control to maximize flexibility. "Bombardment units are controlled by the supreme commander of the particular operation, and . . . they may often be transferred from one operation to another by the German High Command."⁴⁶

A month later, on 2 July 1940, just one week after the fall of France, a memorandum to General Arnold noted that despite the high degree of coordination between the German armed forces, all three services were "free to develop their peculiar powers and no one of the armed forces is subordinated to the needs of another." The Luftwaffe's effectiveness stemmed not only from its autonomous status under OKW, but also from "mandatory lateral coordination." The report quickly added that OKW enforced this mandatory coordination "through the normal chain of command of each of the armed forces, rather than by attaching subordinate units of one of the armed forces to a subordinate unit of another."⁴⁷

The Luftwaffe's doctrine also received attention from the War Department. An intelligence section memorandum of 6 July 1940 observed that initially the majority of Luftwaffe units were assigned to the destruction of the French air force. "When this objective was accomplished, and when the hostile rear area was sufficiently disrupted, then close support came into the picture." Thus, even the War Department found that the Luftwaffe's priorities remained air superiority, interdiction, and close air support.⁴⁸

The Luftwaffe accomplished its basic mission of "eliminat[ing] effective hostile air power from the decisive area . . . by attacking factories and airdromes, by air combat and by antiaircraft fire." Once this task was finished, it then directed the "main weight of [the] attack . . . against objectives in the rear of the front line troops." The main goals of this phase of operations were "to paralyze Allied communications" and interdict lines of supply. In the final phase of air operations—close air support—"Germany had remarkable teamwork between its air force units and its fast moving land units."⁴⁹

American officers understood that this "teamwork" did not come at the expense of Luftwaffe independence. "Except for observation the Germans employed their air force as a Theatre of Operations weapon. . . . The air force was employed in mass." While noting that "the German conception of air

power is to retain a maximum of flexibility of employment," the report cautioned that "the Germans obtained timely close support of their armored units without attaching bombardment or pursuit to these ground forces."⁵⁰

The War Department's intelligence reports during and immediately after the Battle of France clearly presented an accurate assessment of the Luftwaffe's doctrine. A 1940 revision of Luftwaffe Manual 16 reiterated the doctrine developed during the interwar years and employed since September 1939. The section of the manual devoted to operations began with a passage on the importance of gaining air superiority: "The enemy air force will be combated from the beginning of the war." To accomplish this, the manual advised attacks against an enemy's air force in the air, at the aerodromes, and at the production and supply facilities.⁵¹ The manual stressed flexibility when discussing ground-support operations: "Depending on the situation, the time, the type of target, manner of operation, terrain, and our own strength, the manner and extent of cooperation with the army will be determined. There is no modeled pattern."⁵² The vital importance of interdiction was also recognized: "Attacks carried out in the rear echelon of the zone of operations will hamper the supply of the battle zone and lead to considerable difficulties in prompt supply of units, particularly in critical situations."⁵³

However, the revised manual devoted more space to strategic bombardment than to any other mission. There were separate sections describing the rationale and methods for attacking production, food, imports, the power grid, and government centers.⁵⁴ It also devoted a section to the reasons and methods for attacks against civilian population centers. Under normal conditions, such operations would not be allowed. "Attacks upon cities for [the] purpose of terrorizing the population will not be carried out." However, if the enemy attacked civilian populations first, then "retaliation attacks' can be the sole means of dissuading the enemy from such acts of brutal aerial warfare."

The manual cautioned that random missions against population centers could backfire: "At wrong moments, and at false estimations of desired effect on the enemy, a stiffening will of resistance—instead of shock—may be the consequence."⁵⁵

We have truncated the definition of strategic airpower to such a degree that to many people it now equates to strategic bombardment.

The Luftwaffe of 1940 was dedicated to the concept of independent operations. This took several forms, from gaining air superiority, through the centralized control of ground-support aircraft, to interdiction and strategic bombing operations (which could—under certain conditions—include missions against the enemy population). Resource scarcity partially explains the apparent lack of emphasis on the bombardment aspects of this doctrine. In his examination of the reasons for the Luftwaffe's defeat, Williamson Murray argued that "pre-war period Germany was never in a position to build a 'strategic' bombing force."⁵⁶ In addition, Murray asserts that a geographic vulnerability contributed to Germany's concentration on territorial advances: "It would pay the Reich little benefit to launch 'strategic' bombing attacks against Paris, Warsaw or Prague at the same time that enemy ground forces seized the Rhineland or Silesia."⁵⁷

Despite the Luftwaffe's lack of a dedicated strategic bombardment aircraft, attempts to belittle the strategic dimensions of Luftwaffe doctrine must inevitably founder. The claim that "the [German] bomber force had been used [during the western offensive] solely as a tactical air arm, with a single exception of four days' strategic employment in France"⁵⁸ displays a misunderstanding of the distinctions between categories of air operations. More tenable is the position that "the Luftwaffe's support of the ground forces during

campaigns was on such a scale that it cannot be described as 'tactical.'⁵⁹ Additionally, operational flexibility, so crucial to the stunning success of the Luftwaffe through June 1940, existed largely because of the air arm's independent status.

War Department queries into Luftwaffe doctrine during the first 10 months of World War II resulted in a surprisingly accurate assessment of the German air force's operations, organization, and degree of autonomy. American air officers understood that the Luftwaffe valued strategic bombardment—but not to the exclusion of other missions, such as centrally controlled ground support and deep interdiction. Indeed, the record reveals that the USAAC tacitly understood that the flexible nature of German doctrine afforded the Luftwaffe a greater strategic impact than massive bombardment alone.⁶⁰

During the latter half of 1940, this perception changed radically as the Luftwaffe's deficiencies became more obvious. The first demonstration of fallibility occurred over Dunkirk in June 1940. Although Göring assured Hitler that the Luftwaffe could turn the British evacuation effort into another Warsaw or Rotterdam, the Royal Air Force inflicted such heavy losses that the Luftwaffe ceased operations against Dunkirk by 2 June.⁶¹

That autumn, the Luftwaffe's shortcomings became even more apparent. On 13 August, the Luftwaffe launched an offensive against the British Isles in preparation for an amphibious invasion by the Wehrmacht. Hitler issued his Operational Directive #17 prior to the commencement of these operations: "The German Air Force must with all means in their power and as quickly as possible destroy the English air force. The attacks must in the first instance be directed against

flying formations, their ground organisations, and their supply organisations, and in the second against aircraft production industry and the industries engaged in production of anti-aircraft equipment."⁶²

Despite the fact that the Führer had defined the Luftwaffe's mission in precisely the same terms as the earlier Continental offensives, Germany failed in its attempts to subdue Britain. The lack of long-range bombardment aircraft generated a feeling among Allied military leaders that the Luftwaffe did not appreciate the importance of independent and strategic operations.⁶³ From that stance, it was not too great a step to the postwar conclusion that the Luftwaffe "was in effect the hand-maid of the German Army."⁶⁴

The sagacious and sophisticated view of air strategy held by many German airmen—and appreciated by their American counterparts prior to the Battle of Britain—speaks to the situation in which the US Air Force finds itself today. As the changing world situation continues to de-emphasize the classic mission of strategic bombardment, the Air Force must recognize the truly strategic importance of other missions. Other missions such as deep interdiction, close air support, and military airlift also meet the test of Carl von Clausewitz's definition of strategy: to have an effect on "the object of war."⁶⁵ Not only massive aerial bombardment but any mission which has "an effect on the war as a whole" qualifies as a strategic effort.⁶⁶ The American airmen observing the Luftwaffe's operations in 1939 and 1940 clearly understood the nuances of airpower doctrine—and we would do well to reflect on their example. □

Notes

1. More recent scholarship, however, recognizes that during the interwar years, some people in the Luftwaffe had a significant appreciation of strategic bombardment. The oft-cited example of the ground-support interpretation of the World War II Luftwaffe is that of Denis Richards in *Royal Air Force, 1939-1945*, vol. 1 (London:

Her Majesty's Stationery Office, 1953). Recent works that continue this tradition include James S. Corum, *The Roots of Blitzkrieg: Hans von Seeckt and German Military Reform* (Lawrence, Kans.: University Press of Kansas, 1992); and Matthew Cooper, *The German Air Force, 1933-1945* (London: Jane's, 1981). For the argu-

ments of people who contend that the World War II Luftwaffe did have strategic doctrine and designs, see Edward L. Homze, *Arming the Luftwaffe: The Reich Air Ministry and the German Aircraft Industry, 1919-1939* (Lincoln, Nebr.: University of Nebraska Press, 1976); and Williamson Murray, *Luftwaffe* (Baltimore, Md.: The Nautical and Aviation Publishing Company of America, 1985). An excellent and more comprehensive guide to the scholarship on both sides of the argument is the annotated bibliography of Murray's "The Luftwaffe Experience," in B. Franklin Cooling, ed., *Close Air Support* (Washington, D.C.: Office of Air Force History, 1990).

2. Homze, 131-32. See also Corum, 168.

3. Williamson Murray, "The Luftwaffe before the Second World War: A Mission, a Strategy?" *Journal of Strategic Studies* 4 (September 1981): 264.

4. Ibid.

5. Horst Boog, "Higher Command and Leadership in the German Luftwaffe," in Alfred F. Hurley and Robert C. Ehrhart, eds., *Air Power and Warfare: Proceedings of the 8th Military History Symposium* (Washington, D.C.: Office of Air Force History and United States Air Force Academy, 1979), 135.

6. Murray, *Luftwaffe*, 1.

7. Murray, 10.

8. W. H. Tantum IV and E. J. Hoffschmidt, *The Rise and Fall of the German Air Force, 1933-1945* (Old Greenwich, Conn.: WE Inc., 1969), 43.

9. "The German Propaganda Ministry had been busily and successfully sowing a belief in the world that the German Air Force was so mighty as to be capable of crushing any country it pleased by massed bombing." Michael Mihalka, *German Strategic Deception in the 1930s* Rand Note N-1557-NA (Santa Monica, Calif.: RAND, July 1980), 19, 100.

10. The Luftwaffe was not the only air force subject to these reports. The USAAC completed annual studies on the French and Royal air forces as well. See Air Force Historical Research Agency (hereinafter AFHRA), Maxwell AFB, Ala., file no. 248.501-53.

11. "GERMANY: Annual Air Report," AFHRA file no. 170.2278-4F. Although the report is undated, internal evidence indicates clearly that the USAAC completed it prior to the war-time engagement of the Luftwaffe.

12. Ibid.

13. Ibid.

14. Ibid.

15. Tantum and Hoffschmidt, 13-14.

16. Cooper, 59-60. He argues that this merely confirmed German doctrine from before the war, but the evidence suggests otherwise.

17. "GERMANY: Annual Air Report."

18. Ibid.

19. Maj Robert M. Kennedy, *The German Campaign in Poland (1939)* (Washington, D.C.: Department of the Army, April 1956), 69.

20. Tantum and Hoffschmidt, 54. See also Kennedy, 69-70.

21. Allied Control Authority for Germany, *Trial of the Major War Criminals before the International Military Tribunal*, vol. 9 (Nuremberg, 1947-1949), 175.

22. Ibid. See also John Killen, *A History of the Luftwaffe* (Garden City, N.Y.: Doubleday, 1968), 194.

23. *Trial of the Major War Criminals*, vol. 9, 214.

24. Ibid., 218. Of course, one must take into account the fact that Kesselring made these statements at Nuremberg, on trial for crimes against humanity. Still, one finds little reason to doubt his sincerity.

25. Murray, "The Luftwaffe before the Second World War," 266.

26. Tantum and Hoffschmidt, 57.

27. Ibid.

28. Henry H. Arnold, *Global Mission* (New York: Harper and Brothers, 1949), 199.

29. Charles Christienne and Pierre Lissarague, *A History of French Military Aviation*, trans. Francis Kianka (Washington, D.C.: Smithsonian Institution Press, 1986), 345.

30. Murray, "The Luftwaffe Experience," 87.

31. Christienne and Lissarague, 346.

32. Tantum and Hoffschmidt, 70.

33. Ibid.

34. Marc Bloch, *Strange Defeat*, trans. Gerard Hopkins (New York: Octagon Books, Inc., 1968), 54-55.

35. Killen, 115.

36. Tantum and Hoffschmidt, 69.

37. *Trial of the Major War Criminals*, vol. 9, 213.

38. Killen, 123; and Christienne and Lissarague, 353.

39. Christienne and Lissarague, 360.

40. Capt John M. Sterling, military attaché, Paris, memorandum to G-2, subject: Major Air Operations (Theory of Combat Exemplified by Air Operations), 29 May 1940, AFHRA file no. 248.501-56, 1938-40.

41. Ibid.

42. Ibid.

43. Lt Col Grandison Gardner, military attaché, Paris, memorandum to G-2, subject: Major Air Operations (Detailed Reports on Bombing Raids), c. 29 May and 6 June 1940; and *ibid.*

44. Ibid.

45. Col H. H. Fuller, military attaché, Paris, memorandum to G-2, subject: Tactical Doctrines: German Tactics during the Early Weeks of the War, 6 June 1940, AFHRA file no. 248.501-56, 1938-40.

46. G-2 memorandum to G-3, subject: Unity of Command in the German Armed Forces, 12 June 1940, AFHRA file no. 142.042-1.

47. Col R. C. Candee, chief of the Information Division, memorandum to chief of the Air Corps, General Arnold, subject: Unity of Command as Exercised by the Belligerents in the Present European War, 2 July 1940, AFHRA file no. 142.042-1.

48. Brig Gen Sherman Miles, G-2, memorandum to assistant chief of staff, War Planning Division, subject: Foreign Air Doctrines, 6 July 1940, AFHRA file no. 142.042-2.

49. Ibid.

50. Ibid.

51. *L. Dv. 16: The Conduct of Aerial Warfare* (L.F.) (Berlin: Ernst Siegfried Mittler and Son Publishing House, March 1940), 27, AFHRA file no. 248.501-57N. This is a translation of the manual, prepared for the USAAC during World War II.

52. Ibid., 33.

53. Ibid., 42.

54. Ibid., 38-49.

55. Ibid., 48.

56. Murray, "The Luftwaffe before the Second World War," 262.

57. Ibid., 268. See also Cooper, 36-37; and Boog, 135.

58. Tantum and Hoffschmidt, 73.

59. Cooper, 43. See also Edward L. Homze, "The Continental Experience," in Hurley and Ehrhart, 47.

60. Indeed, later in the war, American tactical operations would mirror the Luftwaffe's early campaigns. For a summary of American close air support operations in 1944, see W. A. Jacobs, "The Battle for France," in Cooling, 237-93.

61. Killen, 120-22.

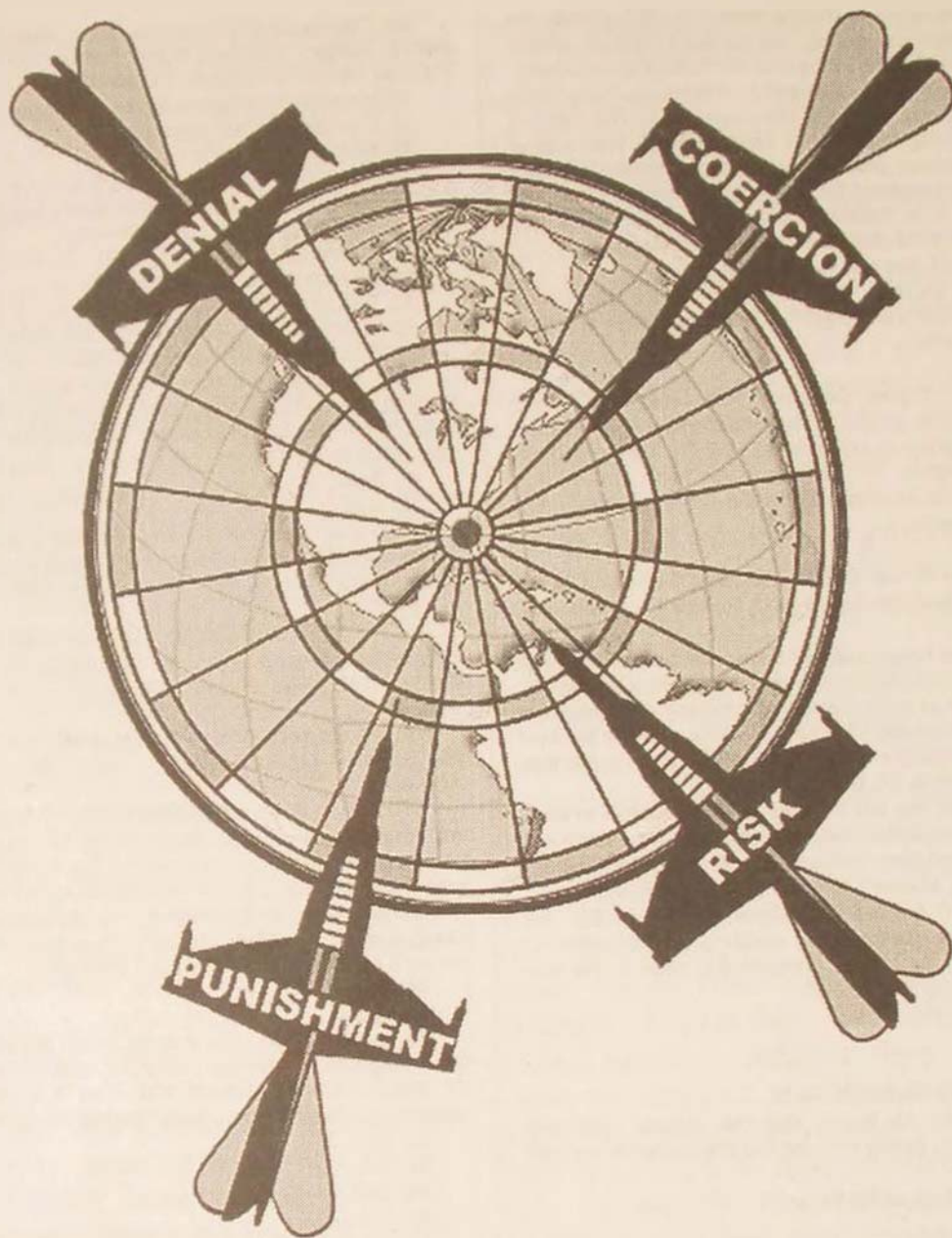
62. Ibid., 129.

63. G-2 Report, subject: Semi-Annual Air Report, 1939-1940, AFHRA file no. 170.2278-4E.

64. Richards, 19.

65. Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton, N.J.: Princeton University Press, 1984), 128.

66. AFM 1-1, *Basic Aerospace Doctrine of the United States Air Force*, vol. 2, March 1992, 152.



A Unified Field Theory of Coercive Airpower

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*I would like to thank Dr. Karl Mueller, of the School for Advanced Airpower Studies, Maxwell AFB, Ala., for his invaluable assistance in developing this article.

Flexibility is the key to victory, and airpower is the key to flexibility.

—Unknown

It depends.

—Weapons School unofficial standard answer

AIRPOWER is neither inherently strategic nor tactical in nature, but it is inherently flexible. This is the key to coercing our enemies through airpower, and failure to recognize this fundamental truth has led many airpower theorists astray. Airpower is but one of the tools available to the military commander, and that tool may be applied in different ways at several different levels of war. To proclaim that a single approach against a certain target set will always succeed, ignores the fact that circumstances surrounding different conflicts can be vastly dissimilar. This article shows the linkages between the various accepted types of coercive strategy and the ways they are more described as points along a single continuum of military options rather than as separate, isolated strategies. The decision as to which portion of that continuum to employ—and at what level of war—can be made only after examining the context within which a *particular* conflict exists.

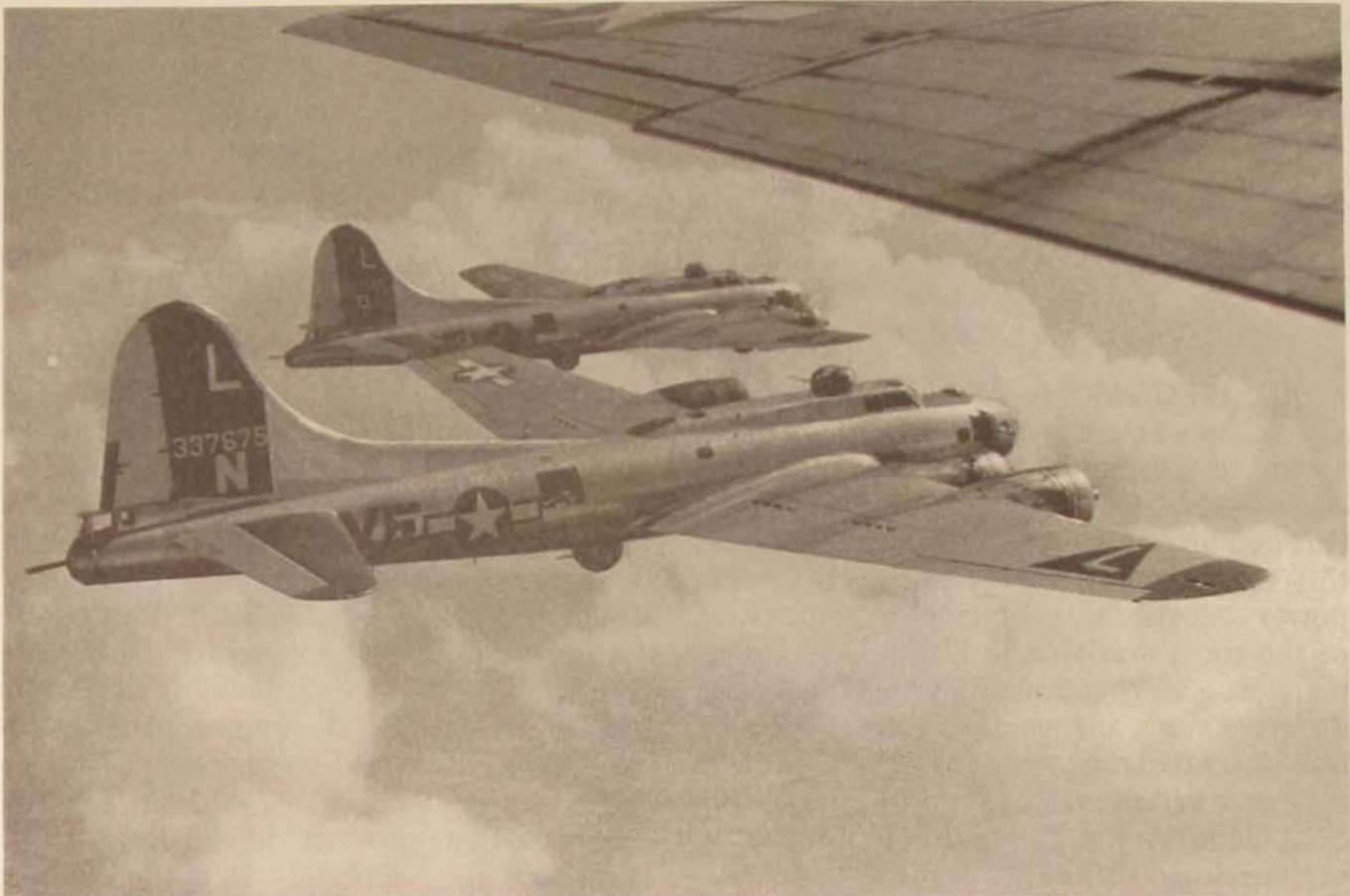
Terms Defined

To set the stage, I must first give my own definitions of several key terms. Most of these resemble the definitions used by such theorists as Thomas Schelling¹ and Robert Pape,² but to avoid confusion, I will give the reader my exact meaning.

Coercion is the use of force either to compel the enemy to cease an action or to deter him from starting one. The alternative to co-

ercion is brute force, which is described as the straightforward destruction of an enemy's capability to resist, leaving him no choice other than unconditional surrender. Coercion requires that the enemy make a conscious decision to quit, prior to complete military defeat, while he still has an option to continue military resistance.³ Of the two types of coercion, compellence is more difficult to achieve than deterrence, partially due to inertia within the enemy system. This inertia is a key concept in Graham Allison's "organizational process" model, in which institutions have difficulty accepting coerced change to actions they have put in motion.⁴

The *levels of war* are commonly defined as strategic, operational, and tactical. As defined in current joint doctrine,⁵ the strategic level is that level at which a nation or coalition determines security objectives and guidance. Operational art, working at the operational level of war, "links the tactical employment of forces to the strategic objectives."⁶ Operational art governs the organization, deployment, integration, and conduct of major campaigns and operations. Proper leadership at this level guides the direction and coordination of tactical forces within the theater. Tactical doctrine (tactics) provides detailed guidance to combat units for winning individual engagements. Describing airpower, as used to target the enemy, we can further refine each of the levels of war. At the strategic level lies the determination of what military objective(s) we wish to achieve by targeting the enemy. Decisions at this level of war are concerned with large-scale systemic effects on the enemy and are directly influenced by national policy. At the opera-



The B-17 was perhaps the definitive strategic bomber, but in World War II it was used many times in the tactical ground-support role.

tional level, we decide which targets to attack, from which platforms, and how to coordinate those platforms in order to achieve our military objectives. The operational level bridges the gap between getting "bombs on target" and influencing enemy policy. In current airpower doctrine, the joint force air component commander (JFACC) acts at the operational level through devices such as the air tasking order (ATO). At the bottom is the tactical level, which is concerned with how best to attack each aim point while avoiding enemy threats. Too often we tend to concentrate most of our intelligence at the tactical level, rather than looking for high-level system effects and indicators that the enemy is adjusting his policy in response to our attacks; it is much easier to count bomb craters than to analyze political reactions. Another factor seems to be that strategic-level results take much longer to achieve than tactical-

level effects, so time must be included in the decision as to which level to influence directly.

Airpower, to a much greater extent than surface forces, has the capability to attack at any of the three levels of war—this is what I mean by stating that airpower is inherently flexible. We can easily become confused, however, between the level of war at which we are operating and the level the target occupies. For example, we would consider a strike by a flight of four fighters to be a tactical operation since they are operating at our tactical level of war. The same four fighters, however, could be targeted against enemy troops in the field (enemy's tactical level), enemy theater headquarters (enemy's operational level), or enemy industrial facilities (enemy's strategic level). Indeed, the essence of the recent USAF integration of Strategic Air Command and Tactical Air Command



Destruction of Republican Guard units during the Gulf War represents a combined denial / punishment strategy.

into a single Air Combat Command was the concept that there are no tactical or strategic delivery platforms—only tactical or strategic targets. The primary discriminator of which level the target occupies is based on the desired *direct* effect of hitting that target. Since all targets are attacked with the ultimate strategic goal of winning the war, it is this first-order direct effect that determines the target's level of war. I have used air-to-ground targeting as an example because it clearly illustrates the process; other aspects of airpower such as air superiority and airlift operations can have their primary impact at various levels as well.

Denial is a form of coercion that relies on reducing or eliminating the enemy's ability to resist. It can stem either from a direct assault on the enemy's fielded forces or from an attack on some critical area that cripples the enemy strategy. Denial targets tend to be located close to the front lines and are nor-

mally attacked using close air support or interdiction methods. Deep attack can also be denial, especially when the targets are military in nature, such as command and control (C²) centers. Denial strategy leads to change in the enemy policy through his physical inability to continue employing that policy.⁷

My definition for *punishment* is a strategy that uses destruction of those things the enemy values most as the mechanism for achieving coercion. This could be pain and suffering inflicted on his civilian population, destruction of production capacity critical to his economic well-being, or anything else that he values highly. Punishment achieves policy change through moral mechanisms; either the enemy government is overthrown by a revolt or coup or the enemy government itself finds that it cannot bear the punishment and agrees to change its course of action.⁸



Although the designation "fighter" indicates a tactical orientation, the F-117 was primarily used against operational and strategic targets during the Gulf War.

Risk strategy is a variation of punishment strategy, differing mainly in the timing and tempo of employment. With a risk approach, a short, measured attack is made on enemy high-value targets, followed by a pause for the enemy to reflect on what continuing the war is likely to cost him. If no policy adjustment is forthcoming, renewed attacks are made that escalate the level of destruction. The primary mechanism at work is not the high level of punishment already received, but fear of what continuing the war will cost the enemy in the future.⁹ For a risk strategy to succeed, there must be enough high-value targets left to the enemy for future costs to be coercive. This fact, coupled with the requirement for slow escalation with periodic breaks in the violence, tends to keep risk strategy from reaching the same levels of violence associated with either denial or punishment.

Decapitation strategy is different from the others in that it is defined not by the coercive mechanism, but by the target set we must attack to influence the enemy. This method targets the enemy leadership and C² command apparatus and may include direct attack aimed at killing the leadership of an enemy nation.¹⁰ The mechanism may be either denial or punishment in nature.¹¹ By destroying the enemy C² network, we may deny him the ability to control his military units or provide them intelligence, resulting in an easy victory for our fielded forces. Additionally, most leaders place high value on their personal survival, even if capable successors exist. The new dictator, whose predecessor was turned into a smoking hole by a laser-guided bomb, may quickly adjust his personal cost/benefit analysis of continuing the war. This allows decapitation to work through a risk mechanism as well, since the



Although originally designed as a global strategic bomber, the B-52 has been used in close air support of ground forces with excellent results.

new leader is likely deterred by fear of future cost to his own life. It should be noted here that many nations adhere to a policy of not targeting specific individual leaders; this was the stated policy of the United States during the Gulf War.¹²

Problems with Single-Focus Strategies

With these definitions in mind, let us examine some of the difficulties associated with trying to keep the various theoretical strategies separated. The typical distinction between denial and punishment is that the first is counterforce while the second is

countervalue. This separation fails if we attack an enemy who highly values his fielded forces. One can argue that in the Gulf War, Saddam's Republican Guard mattered more to him than the safety and comfort of his own civilians, given the repressive nature of his regime and the key role the Republican Guard played (and still plays, unfortunately) in that repression. In this context, it appears that targeting the Republican Guard represented both denial and punishment, since with one blow we would have denied Saddam the use of his best fighting forces and destroyed one of his most valued possessions.¹³

Separating risk and punishment strategies can also be difficult, if not impossible. When

one looks at the mechanisms at work, it seems that each strategy employs portions of the other, and the difference is really just a matter of degree. Since the main operational difference is timing and tempo, who is to say that all enemy nations will see the same strategy as gradual or quick? Punishment strategy emphasizes damage already caused, but there must be some threat of damage to come, or there would be no coercive value. If an enemy took a terrible beating but knew that tomorrow would bring no further attacks or suffering, he would not be likely to give in. Likewise, risk strategy relies on damage and suffering already caused to show the enemy what the future will hold if he doesn't adjust his actions. Both strategies, therefore, rely on the combination of damage already caused and the threat of future damage if they are to have any effect. The questions of past versus future and tempo of operations are really just shades of gray.

Greater problems in keeping the various strategies separated arise when the levels of war are viewed as a synergistic whole. Well-known airpower theorists such as Giulio Douhet,¹⁴ Alexander de Seversky,¹⁵ Pape, and John Warden all propose a single strategy that appears to work in a similar fashion at all levels of war. But is that really the case? For example, can we not employ a decapitation strategy at the tactical level and achieve the indirect effect of denial at the operational level? Classic punishment theorists such as Douhet focused exclusively on the use of punishment at the strategic level, ignoring the oftentimes more effective use of punishment at the tactical level by attacking enemy fielded forces.

Modern examples exist as well. Results from the Gulf War show strong evidence that many Iraqi troops defected or were made ineffective by coalition bombing.¹⁶ This had the indirect effect of denial at the operational level, since those forces which had been "punished" at the tactical level were no longer capable of fighting for Saddam. Likewise, denial at the tactical level may lead to risk effects at higher levels, as seems to have

been the case in Bosnia after Operation Deliberate Force. By incapacitating their heavy forces through a denial campaign, we placed the Bosnian Serbs in what appears to have been a situation of unacceptable risk from the combined Croat/Muslim ground offensive, and they agreed to respect the remaining safe havens and attend a settlement conference.¹⁷

The bottom line is that we cannot focus on a single type of strategy and hope to employ it alone to achieve our goals. We must examine each of the levels of war for the desired outcome and look at how the indirect effects cascade through the system. All of the various mechanisms for coercion may come into play, and the resulting opportunities will be missed if not foreseen.

The Unified Approach

Instead of trying to distinguish separate strategies, with all of the difficulty associated with that task, I propose that coercive airpower is best employed through a single all-encompassing strategy that I term the *unified approach*. This recognizes that various factors will affect the decision as to which targets to attack, and at what level of intensity and duration, while the direct and indirect results will often be obtained through several mechanisms. The inherently flexible nature of airpower allows for this, and does not demand that we set our favorite target set down on stone tablets for the ages. Carl von Clausewitz rightly saw critical analysis as the fundamental key to military success, and the ability to identify correctly the enemy's center of gravity in no way implies that all enemies, in all wars, must have the *same* center of gravity. It is just as ludicrous to suggest that airpower can always be successful by bombing civilians, leadership, or fielded forces (or any other "pet" target set). The following matrix displays the various classical strategies and the location where "single focus" theorists maintain that the proper application of airpower lies. Some theorists predict success by employment at more than one level of war:

	Denial	Decapitation	Punishment	Risk
Strategic		<i>Warden</i>	<i>Douhet, de Seversky</i>	<i>Schelling</i>
Operational Level	<i>Pape</i>	<i>Warden</i>		
Tactical Level	<i>Pape</i>			

A unified approach would be to step back and take in the *entire* matrix first and then focus on where a particular conflict's best application of airpower lies.

I believe that the unified approach fits well with the theories of airpower espoused by Sir John Slessor¹⁸ and William Sherman,¹⁹ two air theorists who have not received the same level of exposure as Douhet, Warden, or Pape. They both took a more balanced view of the use of airpower

to coerce an enemy, allowing for tactical or strategic applications against different targets as needed. This view also embraces the idea of joint operations and does not attempt to place airpower on the pedestal of single-handedly winning all future wars. Instead of focusing on a single block in the strategy/levels of war matrix, these theorists advocated viewing the entire picture and shifting from block to block as conditions dictated.



Flexible employment in the Gulf War fostered new and effective tactics, such as the F-111 / laser-guided bomb combination against enemy armor.

Analytical Framework versus Preordained Strategy

The key to proper use of coercive airpower lies not in an isolated, world-beating strategy, but in the analytical framework used to decide which mechanism(s) to employ. Airpower commanders and planners must examine each case for those areas the enemy values most, the location of his physical weak points, political constraints that will affect employment, types of expected feedback, the amount of time the strategy has before results must be seen, and a host of other factors that directly affect the decision. Due to the inherent limitations of military intelligence, a realistic approach must be

Too often we tend to concentrate most of our intelligence at the tactical level, rather than looking for high-level system effects and indicators that the enemy is adjusting his policy in response to our attacks; it is much easier to count bomb craters than to analyze political reactions.

used that does not require all of these questions to be fully answered. Clausewitz wrote about the differences between "real war" and "war on paper," and these differences apply to airpower today.²⁰ To expect to know exactly how any enemy will react to, say, having his C² lines cut is unwise; to base an entire strategy on always having that knowledge would be arrogant in the extreme.

All of the mechanisms of coercive airpower—denial, decapitation, punishment, and risk—must be taken into account. Instead of calling these separate strategies, however, the unified strategy lists these as different methods at work within the same overlying strategy. Given the "fog of planning," it may

indeed be best to plan for several parallel effects in the hope that one or two will actually work as expected. This was true of the final airpower plan in the Gulf War, which used both decapitation—through destruction of key command, control, communication, computers, and intelligence (C⁴I) nodes—and denial by directly targeting the forward Iraqi units.²¹ People are still debating which method worked (or whether they both worked); either way, we won the war in large part due to coercive airpower.

Nuclear weapons have a demonstrated destructive potential that no nation can ignore; therefore, risk strategy has worked well for deterrence at the nuclear level. When nations commit to protracted conventional war, however, risk from airpower tends to not be greater than the risks already exposed by going to war in the first place. Vietnam was a prime example, in that the North was committed to victory at a higher cost than we were willing to inflict.²² For a risk mechanism to work, the damage risked must be greater (usually far greater) than what the enemy is willing to accept.

Denial mechanisms tend to be more effective when the enemy forces are stressed in as many ways as possible. Attacking the enemy's petroleum, oil, and lubricants (POL) storage and supply lines might have little effect if he is in a static defense, but it will have much greater impact if the enemy is advancing or retreating rapidly and using up his POL stocks. Bombing supplies of food and water for enemy troops can be devastating in hostile climates such as desert or arctic areas, but if the enemy can easily live off the land he occupies, a different target set will probably be better.

Decapitation mechanisms work best against highly centralized and tightly coordinated units (such as the United States Air Force). An enemy that practices liberal use of *Auftragstaktik*²³ will be much less affected, since his doctrine allows for units to be out of contact for long periods and permits junior commanders to exercise their initiative to keep fighting toward the objective. Loosely coordinated forces are often less ef-

fective, however, and forcing the enemy to adopt such a posture through threat of decapitation may have its own benefits. Proper intelligence on enemy doctrine is obviously critical.

Jointness

History seems to show that airpower can have its greatest coercive effect when employed in conjunction with other forces. The unified approach lends itself to joint operations, since all one has to do is expand the mechanism scale to include the impact of land and sea operations on the enemy at the various levels of war. Notably, as the "current fashion" of airpower strategy has gone from punishment through nuclear risk and Air-Land Battle, we have yet to see airpower win a decisive victory without some help from

surface forces. Perhaps the best answer is reached by reversing the question: When (since 1914) have surface forces ever won a decisive victory without airpower? The answer is "almost never" (the North Vietnamese victory in 1975 is a possible case). I believe the final message is that the proper coercive use of airpower rests with the greater question of the proper coercive use of military power in general. Although airpower gives us new avenues of approach and ways to avoid most of the enemy surface forces en route to a target, the question of what we are trying to get the enemy to do (or stop doing) remains the same. Effective coercion strategy required examination of the contextual variables during the Peloponnesian War just as much as in the Gulf War—and in every conflict in between.

Notes

1. Thomas C. Schelling, *Arms and Influence* (New Haven, Conn.: Yale University Press, 1966).

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3. Schelling, 4-5.

4. Graham T. Allison, *Essence of Decision* (Boston: Little, Brown, 1971), 67.

5. Joint Pub 3-0, *Doctrine for Joint Operations*, 1 February 1995, II-1 through II-3.

6. *Ibid.*, II-2.

7. Pape, 15-19.

8. *Ibid.*, 13-18.

9. Schelling, 166-68.

10. Col John A. Warden III, USAF, Retired, has been the leading modern advocate of decapitation as an airpower strategy, although there have been past strategists who also proposed decapitation as a war-winning approach. See "The Enemy as a System," *Airpower Journal* 9, no. 1 (Spring 1995): 40-55.

11. Pape, 79-86.

12. Richard P. Hallion, *Storm over Iraq: Air Power and the Gulf War* (Washington, D.C.: Smithsonian Institution Press, 1992), 150.

13. *Ibid.*, 125.

14. Giulio Douhet, *The Command of the Air*, trans. Dino Ferrari (1942; new imprint, Washington, D.C.: Office of Air Force History, 1983), 55-61. *The Command of the Air* was originally published in Italy as first and second editions in 1921 and 1927.

15. Alexander P. de Seversky, *Victory through Airpower* (New York: Simon and Schuster, 1942), 330-34.

16. Stephen T. Hosmer, *Psychological Effects of U.S. Air Operations in Four Wars: 1941-1991* (Santa Monica, Calif.: RAND, 1996), 152.

17. Maj Gen Hal M. Hornburg interviewed by Dr. Wayne Thompson and Maj Tim Reagan, Vicenza, Italy, 16 October 1995.

18. J. C. Slessor, *Air Power and Armies* (London: Oxford University Press, 1936), 1-10.

19. William C. Sherman, *Air Warfare* (New York: Ronald Press Company, 1926), 3-37.

20. Carl Von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton, N.J.: Princeton University Press, 1984), 119.

21. Hallion, 150.

22. Pape, 209.

23. This concept is similar to (and the basis for) our concept of "commander's intent."



Spring 1997

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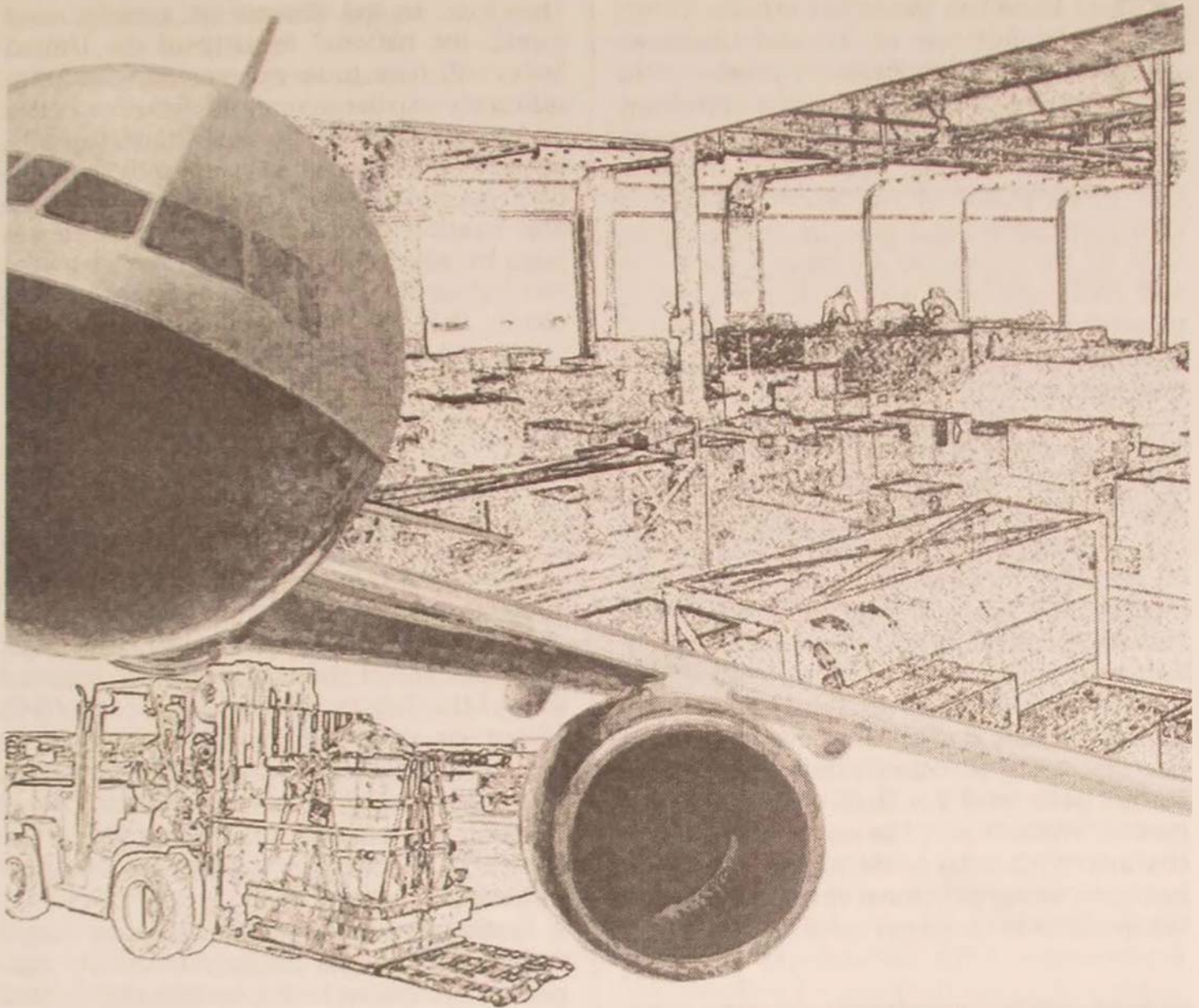
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Whither Aviation Foreign Internal Defense?

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The Changing Nature of External Threats, Economic and Political Imperatives, and Seamless Logistics*

DR. JAN P. MUCZYK

*The author is indebted to Dr. Paul G. Kaminski, undersecretary of defense for acquisition and technology, Department of Defense, for many of the salient concepts embodied in this article. The shortcomings of the article, however, are entirely attributable to the author.

SO LONG as the Soviet empire threatened our way of life and China attempted to subvert third world nations with communist ideology, elected officials had little difficulty passing large defense budgets. Neutralizing the military threat posed by the Soviet Union and China (effectiveness) was the central issue. Cost of the necessary weapons (efficiency) was secondary. Our way of life was worth preserving at practically any cost, even if it meant increasing taxes and/or running large budget deficits.

With the dissolution of the Soviet Union and with China looking inward, the worst-case scenario now posited by defense planners consists of engaging North Korea and Iraq, simultaneously or nearly simultaneously, with our military might. Not that many people have forgotten Granada, Libya, Panama, Somalia, Haiti, Bosnia, and Iraq, but most informed individuals realize that the standing military presence required by the new threats is different, both in terms of size and kind. In other words, the defense budget must now compete with salient domestic problems as it has not done for a half century. With citizens clamoring for tax relief, generating additional revenues through tax increases is no longer a viable option.

DOD should begin rethinking the role and size of staff departments. The purpose of staff departments is to serve line departments—not the other way around.

Also, a national consensus appears to be emerging on behalf of balancing the federal budget in the foreseeable future. Thus, deficit spending as a source of funds can be ruled out as well. Since many of the big-ticket problems, such as Social Security and Medicare, are political hot potatoes, the budget will not be balanced at their expense.

Therefore, in the absence of a major new threat, the national security of the United States will have to be guaranteed with a significantly smaller defense budget. For better or for worse, efficiency now shares top billing with effectiveness because in the new order, cost has become the biggest enemy for any weapon system. This article addresses ways by which the logistical support of the war fighter can be provided much more efficiently than ever before, without materially sacrificing effectiveness.

Why Focus on Logistics and Acquisition?

The decision to shine the spotlight on logistics was made for good reason. The life cycle cost of a weapon system can be as high as 70 percent of the total cost. The logistics slice of the defense budget is in excess of \$43 billion—or about 17 percent of the Department of Defense (DOD) top line each year—and roughly the same amount as is spent on procurement or research and development. Thus, the opportunity for savings is substantial.¹

Furthermore, logistics will loom larger than ever, since US military forces are rapidly consolidating in the continental United States (CONUS). Hence, the US Air Force, as well as the other branches of the armed forces, perforce will have to deploy its assets in an expeditionary mode, and deployment, as we have learned the hard way, is largely about logistics.²

Many of the war-fighting assets are approaching the end of their useful life and need to be replaced. Some of the funding for new weapon systems will have to come from efficiencies created elsewhere, such as the logistics arena, because all the acquisition funding will no longer come from Congress for reasons already stated. In certain instances, the useful life of existing systems will need to be extended as well. This could prove quite costly unless innovative approaches for such extensions are adopted.

Creating lean and focused logistics is necessary but not sufficient.

Driving down weapon-acquisition costs is every bit as important. That is why DOD instituted acquisition reform and is taking its implementation very seriously, especially such features as cost as an independent variable (CAIV), slashing paperwork, incentives for good performance, and penalties for poor performance.³

Economic Imperatives

The Law of Large Numbers

The law of large numbers also drives down unit costs for five major reasons. First, fixed costs, especially research and development costs, are allocated across many units, thereby reducing unit cost. Otherwise, the kind of costs associated with the B-2 bomber can be expected. Second, large quantities of anything permit the producer to take advantage of economies of scale. Third, the greater the variety of inventory, the greater the cost. Fourth, training costs are inflated as an organization introduces a large number of different systems. Last but not least, when a large order is at stake, more organizations will bid on the project, thereby increasing the likelihood that the customer will receive a better bargain.

We must appreciate the fact that small quantities of complex and expensive systems do not justify organic sustainment capabilities. Under these conditions, the DOD may have no choice other than relegating sustainment to the commercial organization that produced the system in the first place.

Reliance on Interchangeable Components

During the height of the cold war, DOD purchased most items in sufficiently large quantities to exert considerable leverage over suppliers. With the shrinking of the DOD budget, much of that leverage has disappeared. Even at that, since much of what

DOD ordered in the past had to be made in accordance with military specifications, unit costs were typically high relative to commercial items.

Many organizations have bloated staff departments, and too many of them.

Clearly, requiring all services to purchase the same or similar components and systems when appropriate—as is the case with the joint strike fighter—would create more defense for the dollar, not only with respect to acquisition, but also with regard to sustainment. There is, however, a downside to this approach. If a critical component, such as the engine, evinces a design flaw, the entire fleet is either grounded or compromised, with all the ensuing consequences. This is another argument for relying on proven technology. The electronic countermeasure system of the blocked impurity band (BIB) would be a case in point if the United States possessed only one bomber fleet. The tactical fighter experimental (TFX) experience is not forgotten by everyone either. It is much easier to intend to design one plane, even if it comes in variants, to execute multifarious missions than it is to actually do it.

It may very well be that a greater reliance on off-the-shelf components will be the only way by which the United States can acquire sufficient types and quantities of weapons to ensure military success in the next century. Relying on small quantities of technologically superior weapons is a risky proposition and is based largely on the childlike faith in technology with which some of our defense planners are imbued. Tank warfare during World War II constitutes a good example. The Soviet T-34 was the best tank during that war, yet the Soviets still needed prodigious numbers of that tank to defeat German armor. The US Sherman tank was inferior in



The GBU-28 Bunker Buster Program is an excellent case in point. One of the fruits of that program is being loaded onto an FB-111 for its trip into Iraq.



most respects to the German counterparts, but we prevailed with it because we possessed it in huge numbers. The World War II German Me-262 jet fighter, even with its considerable advantages, had little bearing on the air war because of its limited numbers. World War II, the Korean conflict, and the Vietnam War are much better object lessons for defense planners than is the Persian Gulf War.

Dependence on Proven Technology

The combination of high research and development costs and small order quantities produces prohibitive costs. Creating new and effective weapon systems with proven technologies, wherever practicable, is one way to drive costs down. Again, the nature of the threat to some extent determines the viability of this option, since extensive reliance on extant technology may very well produce the 85 percent solution.

With the disintegration of the Soviet Union, no other nation can match the United States across-the-board as far as technological innovation is concerned. Therefore, creating weapon systems from low-hanging ripe fruit—if we may be forgiven for using a familiar analogy—may be acceptable in the post-cold-war risk environment. Although we cannot become preoccupied with efficiency at the expense of effectiveness in a variety of risk environments, whenever practicable, each technology effort still must “buy its way onto the program” in terms of reducing life-cycle cost and program risk.⁴

The 85 Percent Solution

In the age of fiscal austerity, when order sizes are typically much smaller, significant efficiencies will be generated if DOD buys commercially available items—preferably of the “commodity” variety—in the global marketplace whenever possible. Military specifications should be permitted only as a last

resort. In many, if not most, cases the practice of purchasing commercial components or systems will sacrifice some capability, but it typically is that last 15 percent that disproportionately drives up the problems and the ensuing costs. Without the “evil empire,” the question that must be asked by defense planners is, Can we afford the risks associated with the 85 percent solution in a given weapon system? Indeed, it is essential to strike the proper balance between efficiency, effectiveness, and risk. The consequences of not doing so are too great.

So long as the Soviet empire threatened our way of life and China attempted to subvert third world nations with communist ideology, elected officials had little difficulty passing large defense budgets.

In 1973 approximately 7 percent of the US economy was affected by international trade. By 1993 that percentage had increased tenfold, and the trend continues. Getting the best value requires trading in the international arena. Buying American will simply encourage similar shortsighted retaliatory responses by other nations. Moreover, the US defense establishment is consolidating, thereby reducing competition. That is all the more reason for pursuing a global procurement policy wherever practicable. Lastly, this approach is far more compatible with coalition war fighting than a rigid buy-American strategy.

Some people would argue that this suggestion is the functional equivalent of open architecture in the personal computer industry and that it poses serious security issues. There is merit in such concerns. However, the technological genie is out of the bottle, and no one is going to put it back. The personal computer and video games are now driving developments in the electronic in-

dustry, and practically all of that technology is in the public domain. More and more, commercial communications are driving developments in that industry as well. The Internet, at the moment, is the best example, but commercial satellites possess unlimited dual-role capability.⁵

We simply must come to terms with the reality that multinational and/or transnational corporations produce most of the technology, and practically anyone can obtain it, either directly or through third parties. In any case, it is the software that accounts for the big performance differences in many fourth-generation weapon systems, and it may be the software that is in need of the greatest protection. More will be said about this issue in a subsequent part of the article.⁶

Relying on small quantities of technologically superior weapons is a risky proposition and is based largely on the childlike faith in technology with which some of our defense planners are imbued.

Of course, just about everything that applies to goods also applies to services. Like many manufacturing concerns, certain service companies have an international or even global presence. If Federal Express can ship DOD parts and supplies faster, cheaper, and better around the world, then it must be given serious consideration. Some folks ask a legitimate question: If hostilities break out, can DOD rely on commercial firms? First of all, whenever the United States has been endangered by external threats, civilians have come through admirably. Second, as a nation we must maintain our ability to preserve secure air routes and sea-lanes.

Paradigm Shift

Historically, most battles were fought in an understandably chaotic setting, euphemisti-

cally described as the "fog and friction of war." Little wonder that commanders insisted on a worst-case-scenario logistics system that we shall call "just-in-case" logistics. Under the new order, however, such an inventory system is simply not affordable, either in the private sector or in DOD.⁷

As it just happens, technological developments now make information and transportation less expensive, relative to inventories. Thus, DOD must now substitute information and transportation for inventory in much the same way as the private sector has—known as "just-in-time" logistics. Some firms have eliminated their warehouses. The necessary inventories are on trucks, in rail cars, on planes, and, in some instances, on barges and ships; arriving at the exact time they are needed. Some companies, such as Boeing and Caterpillar, have established worldwide guarantee of parts delivery in 24 hours.⁸

Since the face of battle will continue to be scarred by fog and friction, the pure just-in-case inventory model adopted by successful private-sector firms is in all likelihood unsuited for DOD. Therefore, we must begin syncretizing the two opposing approaches into a paradigm that will serve DOD in time of peace and war. Even the civilian just-in-time inventory models do not work that well around the Christmas rush, which does not even begin to approximate the chaos of battle. As battlefield commanders become confident that they know the range of their materiel requirements, the location of the materiel that they need at all times, and the amount of time it will take to acquire it, the need to own and hold stock will be dramatically reduced.

Necessary Preconditions

Reducing the DOD Infrastructure

The US force structure and budget have declined by about one-third from their 1985 peak levels. The infrastructure, however, has declined about 18 percent. Much work re-

mains as far as bringing the infrastructure in line with combat capability is concerned.⁹ Otherwise, an excessive administrative overhang will frustrate any attempts at efficiency.

DOD should begin rethinking the role and size of staff departments. The purpose of staff departments is to serve line departments—not the other way around. Many organizations have bloated staff departments, and too many of them. By trying to justify their existence and growth, these staff departments frequently create work for line personnel that is marginally related to the principal mission of the organization, thereby making it more difficult for the line to attain its objectives.¹⁰

Tall organization structures possess certain advantages, such as more promotional opportunities and more time available for each subordinate from the superior because of narrower spans of control. However, the disadvantages outweigh the advantages. Removing unnecessary managerial levels has the potential to improve communications, to reduce the time it takes to accomplish tasks, to empower employees, and to reduce costs. Benchmarking successful private-sector organizations may very well constitute a good starting point, especially with respect to rightsizing headquarters staffs.

One reason for the size of the DOD infrastructure is the penchant for managing just about everything contractors and subcontractors do. Perhaps managing the most important 20 percent—typically at the front end of a weapon system—and either just tracking or ignoring the rest would produce the same results with a smaller DOD infrastructure.

Workers will concentrate on those activities and outcomes that are measured and rewarded. If an organization is serious about reducing bureaucracy, it must measure important activities and outcomes and reward in a significant way those individuals who perform them well. The best way to preserve the status quo is to measure everything, as is frequently done now, and to reward all outcomes and activities the same.¹¹

Additional Preconditions

Reliance on a modified just-in-time inventory system requires other preconditions as well. First, if the US military has to operate around the globe from CONUS in an expeditionary mode, our armed forces must establish control over air routes and sea-lanes. Second, the United States must enhance its airlift and sea-lift capabilities. Given that recent coalitions have been situation specific, pre-positioning equipment and supplies on land becomes more and more problematic. Third, DOD must put in place the kinds of information technologies that will permit in real time not only battlefield awareness but also total asset visibility.

By trying to justify their existence and growth, these staff departments frequently create work for line personnel that is marginally related to the principal mission of the organization, thereby making it more difficult for the line to attain its objectives.

DOD has too many stand-alone computer systems (hardware and software) and databases. Top priority must be assigned to making these computer systems and databases interoperable across DOD and the industrial base that supports it. Until that is accomplished, it will be difficult to achieve the kind of efficiencies discussed throughout this article. We call this the “information age” because timely information shrinks time and space, thereby becoming the primary engine that drives the important processes in practically every facet of human activity.

Recently, the Air Force conducted a comprehensive study of its role in the year 2025. One of the conclusions of this study is that “information—as a commodity as well as a combat medium—will be more influential

than bombs in thirty years, and expertise in manipulating information will offer the United States its most telling advantage over future adversaries."¹²

"Our intoxication with technological advantages has made us blind and deaf to information-age vulnerabilities."

However, we must enter the information age with eyes wide open because of its double-edge nature. Sen. Sam Nunn cites DOD estimates that there are approximately 250,000 attacks on its computers each year, and that only the least competent and least mature hackers have been detected so far. He goes on to say that "our intoxication with technological advantages has made us blind and deaf to information-age vulnerabilities . . . and we should not wait for an electronic Pearl Harbor to spur us into rethinking the speed and nature of our entry into some of these information technologies."¹³

Specific Practices That Should Be Adopted

Reengineering

This word happens to be in vogue at the moment, as we well know; unfortunately, it means what folks want it to mean. It should be defined, however, as excising occupational hobbies (i.e., activities that are either unrelated or marginally connected to the principal mission of the organization), removing redundancies, and creating or refining processes through which the goals and objectives that are central to the mission of the organization are attained in an efficient and effective manner. Reengineering requires evaluating the value chain and elimi-

nating or reducing components that add either no value or very little, while retaining and even enhancing those that add considerable value. Downsizing, on the other hand, may or may not be synonymous with reengineering, depending on whether or not the aforementioned issues were considered before manpower reductions were made. Perhaps it would be more accurate to assert that the DOD needs to reinvent itself, rather than just reengineer itself.

Reducing Cycle Time

Even without the threats posed by the Soviet Union, it is still a dangerous world. However, future threats will be far less predictable than those during the cold war era. Consequently, future senior DOD leaders will have to name that tune after hearing just a few notes, and short cycle times will give them the ability to fashion appropriate and affordable technological responses. Since our enemies and potential enemies will have access to much the same technology as we possess, we must acquire dominance of product cycle time in order to maintain our competitive edge on future battlefields.¹⁴ Furthermore, time is money; in a resource-constrained environment, reducing cost by reducing cycle time is critical.

The GBU-28 Bunker Buster Program is an excellent case in point. During Operation Desert Storm, a new weapon system was needed to deal with deeply buried command and control bunkers, and time was of essence. A team of government and industry people integrated existing subsystems (off-the-shelf components) in an innovative manner so that in only 28 days they had conceived, developed, tested, and deployed an effective weapon that played a crucial role in terms of the outcome of that conflict.¹⁵

Establishing Dominant Battle-Cycle Time

The ability to turn inside an adversary's plans, to act before the adversary can act, even to act before the adversary's battlefield awareness system can see his opponent be-

ginning to act is what is meant by dominant battle-cycle time. To achieve a dominant battle-cycle time capability, one must possess rapid and effective planning tools, a strong command and control system, superior mobility, and information superiority. Attaining and maintaining information superiority requires protecting it as well, and that is why "information warfare" must be placed on the front burner and supported in a manner that befits a top priority. Out of economic necessity, if for no other reason, DOD will have to rely on commercial systems of communication such as the Internet and commercial satellites. Therefore, reliable encryption and decryption must be developed and implemented. Without information superiority, it will be difficult at best to attain battle-cycle-time supremacy.¹⁶

Establishing Appropriate Systemwide Objective Functions

System-optimization models typically outperform their single-item or single-echelon counterparts.¹⁷ The value added by system optimization models typically outweighs the additional time and expense associated with their development. If the system-optimization model includes the complete life cycle of the weapon system, then life-cycle costs can be minimized. Another example would be the optimization of weapons readiness at the unit level—or simply materiel readiness. Clearly, weapons-system readiness is the right metric for determining our war-fighting capability.

Greater Reliance on Simulation

The military has relied on simulations for years. What is needed now are simulations that will provide reliable estimates of the total life-cycle costs of a weapon system in its earliest stages of conceptualization. "Back end" sustainment costs must receive more "up front" design attention, and simulation may be the only practical way of attaining this objective

Total Asset Visibility

One of the critical necessary conditions to lean and focused logistics is total-asset visibility. The United States sent twice as much materiel to the Persian Gulf as was required, and our troops did not know where half of it was at any given moment in time. Half of the 40,000 bulk containers shipped into the theater had to be opened in order to identify their contents, and most of it failed to contribute in any way to our success on the battlefield. The tools being developed will prevent such a situation from recurring by giving the commander real-time information regarding the quantity, location, and condition of virtually all DOD assets anywhere in the logistics system at any time. If we recognize the coalition nature of present and future conflicts, then it becomes obvious that there is a big payoff associated with integration of our total asset-visibility system with that of our allies.¹⁸

The US Air Force, as well as the other branches of the armed forces, perforce will have to deploy its assets in an expeditionary mode, and deployment, as we have learned the hard way, is largely about logistics.

A major system-integration effort is needed to implement this logistics concept. We are quite certain that most of the enabling technologies have been developed. Some of these information technologies that could immediately be brought to bear on total asset visibility include bar-code tagging; relational database systems; miniature global positioning system receivers and position-reporting transmitters; satellite and fiber command and control communications links; and predictive planning tools.¹⁹

Reducing the Logistics Footprint

Another salient guiding principle associated with lean and focused logistics consists of the reduction of the logistics footprint to the minimum level that will permit the war fighter to attain his or her mission in a satisfactory manner. In light of the fact that the armed forces are now deploying precision strike weapons in much smaller numbers than before (six fighter planes at a time, for example), we must reduce the amount of support equipment and consumables that these expeditionary units must take when they go to war. This is especially important in the early stages of a conflict, when airlift assets are scarce and before a sea-lift bridge can be established.²⁰

There is doubt in many quarters that the United States could have prosecuted another MRC while it was engaged in Operation Desert Storm.

As has just been pointed out, the minimum supplies that the war fighter needs in the short run must be deployed with him or her. For the intermediate run, pre-positioning necessary materiel on automated fast ships at strategic points on the globe may prove to be the most viable option, in the absence of a huge airlift capability. One advantage of this approach is the ability to change locations of the fast ships at a moment's notice.

Deployment of war-fighting assets in small numbers requires major refinements in logistics doctrine. If a squadron needs only one item of a highly specialized maintenance or test device, does it get deployed with the six fighter planes, or does it remain with the rest of the squadron? The same quandary presents itself with respect to scarce human skills.

Fashioning Shorter Pipelines

Through the use of real-time information, off-the-shelf inventory, outsourcing, and fast

transportation, the number of steps in the distribution channel needs to be reduced, which, in turn, will lower cost and reduce cycle time. For example, the Defense Logistics Agency has reduced its wholesale medical inventory by 60 percent—\$380 million since 1992—and has achieved shorter response times as well by using commercial distribution methods rather than DOD warehouses to distribute medical supplies. Since more than \$22 billion of total DOD inventory—nearly 30 percent—is comprised of consumable items, these initiatives are obviously critical to achievement of continuing inventory reductions. Unless the \$75 billion inventory is significantly reduced, an effective modernization program will be difficult to achieve.²¹

Aircraft repair is another good example. Aircraft can be repaired at the wing (base) level, at a depot, or at the manufacturer's factory. Eliminating one of these steps will shorten the pipeline, thereby improving the mission-capable status of the planes and lowering inventory carrying costs. Whenever practicable, bypassing the depots by using commercial transportation companies to provide timely delivery of parts to the flight line should receive serious consideration. In the meantime, total-asset visibility could lower inventory costs and improve delivery times.

Vilfredo Pareto, a brilliant mathematician, economist, and sociologist, observed some time ago that many phenomena are distributed in accordance with the 80/20 rule. In the inventory management sphere, Pareto's 80/20 rule is known as "ABC analysis." Since typically about 20 percent of the items account for 80 percent of the cost or activity (and 5 percent of the inventory is often responsible for half of the cost or activity), these items receive special attention, while the remaining 80 percent are handled in a routine manner.

The Air Force's program is known as "lean logistics." Through better information and fast transportation, lean logistics is consolidating wholesale inventories, drastically reducing base-level inventories, and providing

an unprecedented focus on customer's mission requirements. Lean logistics also includes repair and return packaging (R2P), mail-like matter movement (M3), electronic data interchange (EDI), just-in-time (JIT) practices, industry information processor (I2P), and cargo movement operations systems (CMOS).²² The Air Force is expecting a \$4 billion savings from lean logistics.²³

Lease versus Buy

DOD should conduct "buy versus lease" analyses whenever practicable, just as is done in the private sector. For instance, many commercial airlines lease their planes. Many firms lease their buildings, trucks, and automobiles; and most railroads lease their rolling stock. DOD can save money in certain situations by leasing certain planes, ships, engines, vehicles, buildings, and so forth. Again, in the interest of affordability, the leasing needs to take place in the international marketplace.

Reliance on Flexible Manufacturing Systems

One way to shorten product cycle time and lower inventory costs is to rely on suppliers who in turn depend on flexible manufacturing systems that do not exact large productivity penalties resulting from retooling, setup times, and learning curves. At the moment, the heart of flexible manufacturing systems consists of reprogrammable machining centers; but as the potential of industrial robots is realized, it will be they who will form the heart of flexible manufacturing systems. It is this technology that will permit the production of small quantities of components on a timely basis and at reasonable cost.

Privatization

Scanning the environment for the best business practices and introducing them into DOD is an excellent way of achieving efficiencies. But in the absence of competition, and lots of it, these best practices will be-

come bureaucratized—and quite quickly. Although one can point to a number of privatization success stories already, we need to privatize all the activities that can benefit from the rigors of the marketplace without increasing the risk factor before the appropriate balance between public and private-sector logistics support for the war fighter is attained.

The United States sent twice as much materiel to the Persian Gulf as was required, and our troops did not know where half of it was at any given moment in time.

Integrating the Guard and Reserve into the Logistics Mainstream

For those people who weren't following recent trends, the "total force concept" is upon us. The reserve components participate in war fighting and forward presence with a combined total of nearly 40 percent of the fighter force, 25 percent of bomber capability, two-thirds of theater airlift, and over half of all KC-135 refueling. If we are to meet our future defense needs, the guard and reserve must be integrated into the new seamless logistics paradigm.²⁴

Summary

In terms of technology and doctrine, there has been a revolution in military affairs. What is needed now is a concomitant sea change in logistics doctrine and practice. Our national defense strategy calls for coping militarily with two major regional contingencies (MRC) nearly simultaneously. There is doubt in many quarters that the United States could have prosecuted another MRC while it was engaged in Operation Desert Storm.

The question that remains unanswered is, Could the United States have successfully

fought two MRCs had it sent just enough of the right materiel into the Persian Gulf under total asset visibility conditions? Reducing our national defense strategy to anything less than two MRCs is tantamount to an invitation to an adversary to gain militarily an advantage in one part of the world while the United States is engaged militarily in another. It appears that a more prudent approach would be to preserve the two-MRC capability in an affordable manner.

Efficiencies created in the logistics domain will not free up all the funds needed for modernization, and other arenas must be examined with the same diligence that was applied to logistics. However, logistics constitutes fertile ground for significant

savings. Toward that end, an attempt was made to offer a blueprint for the remainder of this century and the beginning of the next one. The cornerstone of this blueprint consists of a seamless logistics system that blurs the distinctions between civilian and military specifications, practices, and responsibilities; between domestic and foreign goods and services; and between active duty and reserve or national guard.

Gen Omar Bradley observed that "drawing a plan is 10 percent of the job; seeing that plan through is the other 90 percent." Given that the "devil is in the implementation," what is being proposed will not materialize unless incentives and ownership are passed down to all the stakeholders. □

Notes

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3. Dr. J. Ronald Fox, "Paul Kaminshki on Acquisition Reform," *Program Manager*, January-February 1997, 15-21.

4. Kaminski, "Reengineering Defense Logistics," 7.

5. John T. Correll, "Warfare in the Information Age," *Air Force Magazine* 79, no. 12 (1996): 3.

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9. Paul G. Kaminski, "Logistics for the Twenty-first Century: Affording Superior Combat Effectiveness," keynote address to the DOD Logistics Offsite Conference, Airlie House, Airlie, Va., 2 August 1995, 1-2.

10. Jan P. Muczyk and Robert E. Hastings, "In Defense of Enlightened Hardball Management," *Business Horizons* 28, no. 4 (1985), 27-28.

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15. Dean G. Clubb, "Blinding Speed Equals Competitive Advantage," *Acquisition Review Quarterly*, Fall 1996, 175-80.

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18. Kaminski, "Logistics for the Twenty-First Century," 3-4; and Pagonis with Cruikshank.

19. Kaminski, "Information Technology," 3.

20. Kaminski, "Reengineering Defense Logistics," 6-7.

21. *Ibid.*, 8.

22. Scott D. Chambers et al., "Unlikely Partners: Two-Level Maintenance and the Air Force Gold Program," *Air Force Journal of Logistics*, Spring 1996, 2.

23. Kaminski, "Reengineering Defense Logistics," 8.

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STRATEGY FORUM UPDATE

LT GEN LAWRENCE P. FARRELL JR.

Greetings from Washington. There is a great deal of change in the air these days. All the services are looking to the future. Some people look to the future with fear, but I'm convinced that our service is serious about restructuring to take advantage of the opportunities and requirements of the next century. It's a special opportunity to illustrate the contribution of airpower and space power to the defense of our nation and its interests. From my vantage point in Plans and Programs, it's clear that there are significant contemporary and future issues for the Air Force to address.

In the Spring 1997 issue of *Airpower Journal*, I called for papers on the strategic challenges facing America—and their potential solutions. As you're developing your ideas about air and space strategies for the next century, you might consider some of these provocative questions:

- Is prosecuting war to unconditional surrender a "landcentric" view of war? There have been no unconditional surrenders in wars between nations since 1945. Given the risk implicit in total war in this age, what are the likely characteristics of warfare in the next century? By extension, what might be the contributions of airpower and space power?
- Historically, strategic airpower has been generated for the theater commander (though not in all cases). In the next century, will the National Command Authorities employ strategic airpower and space power directly?
- We claim that airpower and space power are increasingly the strategic instrument of choice. What is fueling this assumption? If this is true, then why? Should it be?
- Is it time for the Air Force to abandon its concept of attacking strategic centers of gravity in order to destroy fielded forces?
- As we move to a space and air force—and then possibly to a space force—what role will TACAIR play? Is there a point at which we are strong enough in space that we should return tactical aircraft to the ground commander's control?
- Is it time to definitively change the traditional paradigm of military force employment from one of platforms and missions to one directly linked to the employment of weapons and effects (both lethal and nonlethal) in direct support of theater and world objectives?
- THE QUESTION NOBODY WANTS TO ASK: What would a unified (purple) National Defense Force look like? Would the peacetime advantages of consolidated base defense, logistics, administration, and acquisition hold true in wartime? Is this the only way for the nation to succeed in its efforts to address redundancy in air, land, and maritime forces?

Headquarters USAF

PLANETARY DEFENSE

Department of Defense Cost for the Detection, Exploration, and Rendezvous Mission of Near-Earth Objects

LT COL ROSARIO NICI, USAF
1ST LT DOUGLAS KAUPA, USAF



EARTH IS ON a collision course! Micrometeorites regularly streak into the atmosphere causing little more than a fiery flash. However, larger near-Earth objects (NEO) can have a more dramatic effect on the Earth. Recently scientists presented evidence in which an asteroid, at least a mile in diameter, hit the ocean 35 million years ago southeast of what is now Washington, D.C., shaping the Chesapeake Bay.¹ Today such an impact would cause devastation on a global scale. The mitigation of such a natural disaster necessitates an international planetary defense. This article provides a background of the threat of NEO-Earth impacts and addresses planetary defense taskings and Department of Defense (DOD) costs for the next 20 years as part of an international effort to detect and learn more about NEOs.

Background

A NEO is a natural object (asteroid, short- or long-period comet, or a meteor stream) of any size that will come close to or cross Earth's orbit, or even impact the Earth. In the past 15 years, research on NEOs has dramatically increased as astronomers and geologists realize the Earth is nothing more than a billiard ball in a cosmic pool game. Our world was struck in the past and will be struck in the future.

Craters on Earth do not last long due to weather and geological erosion. Geologists have, however, pinpointed some very old craters. A NEO slammed into Quebec 214 million years ago, leaving a 100-kilometer-wide scar known as the Manicouagan Crater (fig. 1). In central Australia 70 million years later, another NEO created a 22-kilometer-diameter crater (fig. 2). Evidence suggests the demise of the dinosaurs occurred 65 million years ago with the impact of an asteroid 10 kilometers in diameter. Named the K/T event, the asteroid struck with the force of 100 million megatons of TNT, creating a crater 180 kilometers wide off the coast of the Yucatan Peninsula in Mexico. Even North America was visited by a NEO nearly 50,000 years ago, creating Arizona's Meteor Crater (fig. 3).²

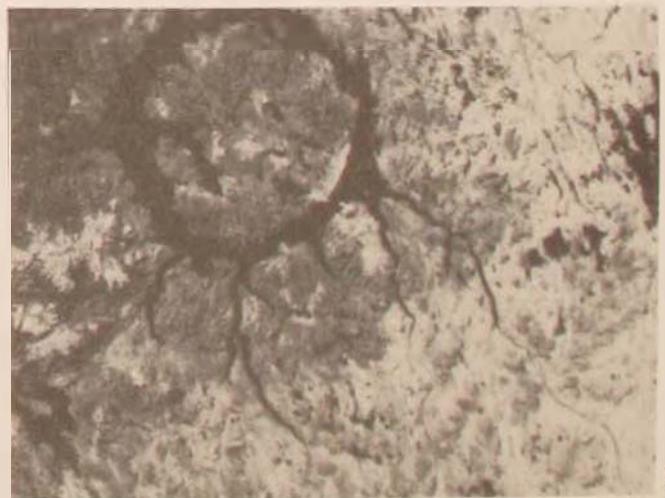


Figure 1. Manicouagan Crater, Quebec



Figure 2. Wolf Creek Crater, Australia

Today there are 140 known impact sites on the Earth with many hundreds awaiting verification.³ Figure 4 illustrates the major sites.

Earth, however, is not the only planet tormented by orbital debris. In July 1994, Jupiter was struck by Comet Shoemaker-Levy 9. The comet passed too close to the gas giant, breaking apart due to the immense gravity and then scarring the planet in several locations shown in figure 5. If even one of the kilometer-wide fragments had hit the Earth, the result would have been catastrophic,⁴ as shown by the computer model in figure 6.

Meteor streams occur when the Earth passes through the orbital path of debris left behind by comets. The debris can range in size from a centimeter to a millimeter in diameter. Though these streams pose no threat to humans on the surface, satellites and space



Figure 4. 140 Earth Impact Sites (Reprinted with permission of University of Arizona Press from Tom Gehrels, ed., *Hazards Due to Comets and Asteroids* [Tucson: University of Arizona Press, 1994], 430.)



Figure 3. Meteor Crater in Arizona (Reprinted with permission of University of Arizona Press from Tom Gehrels, ed., *Hazards Due to Comets and Asteroids* [Tucson: University of Arizona Press, 1994], 430.)

stations may be impacted, degrading their solar arrays or damaging optical sensors.⁵

Some NEOs nearly reach the Earth's surface. From 1975 to 1992, nuclear detonation detecting satellites recorded 136 atmospheric



Figure 5. Impact Scars on Jupiter



Figure 6. Simulation of Shoemaker-Levy 9's projected impact on Earth

blasts in the megatons-of-TNT range.⁶ NEOs can also cause damage to the Earth without reaching the surface.⁷ In 1908, an asteroid or comet exploded in the atmosphere near Tunguska, Siberia. Though no crater formed, the shock wave from the exploding body devastated 2,000 square kilometers of forest.⁸ If this NEO had reentered a few hours later, it could have destroyed Moscow with a force one thousand times greater than the Hiroshima and Nagasaki atomic detonations.⁹

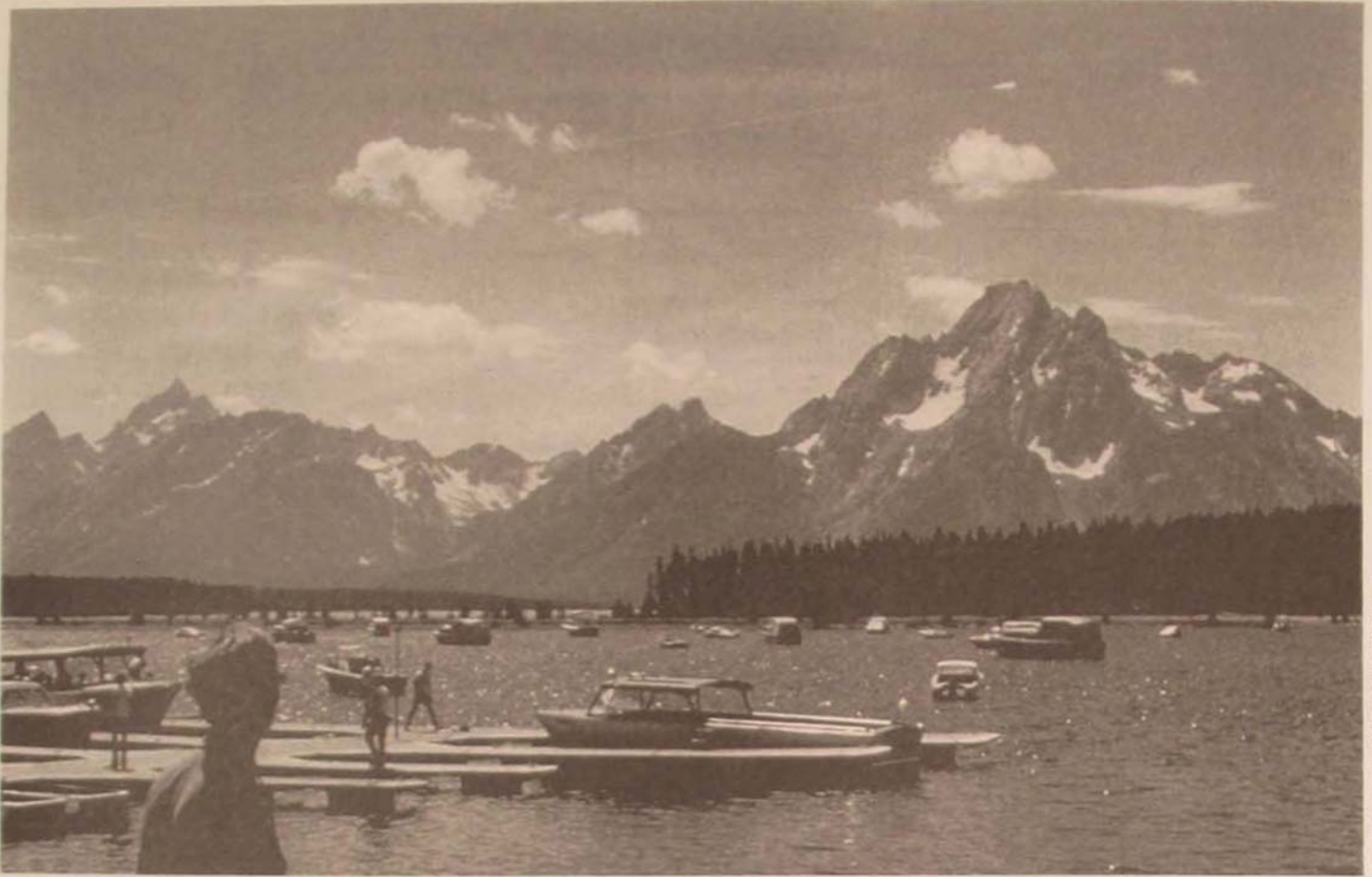
In 1992, a brilliant asteroid streaked through the night sky in Peekskill, New York, during several high school football games. This event was caught on a camcorder at one of the games, and the asteroid damaged a car.¹⁰ The Tunguska blast area is twice as big as New York City and three times as large as Washington, D.C.

Luckily, not all NEO "near hits" cause damage, but they do illustrate the fact the Earth is not immune to their destructive effects. Recorded on a videocamera in 1972, an asteroid grazed Earth's atmosphere near Wyoming's Grand Teton Mountains and skipped back out into space (fig. 7).

In 1989, astronomers discovered an asteroid labeled 1989FC after its closest approach to Earth. This illustrates a disturbing fact. Currently only astronomers on shoestring, academic budgets are trying to locate and track NEOs, making estimates of NEO populations very imprecise. Through the end of 1992, 163 NEOs had been detected and catalogued, representing only 5 percent of the estimated 2,000 to 5,000 NEOs larger than one kilometer.¹¹ Scientists believe a Tunguska event will occur every century and a kiloton (K/T) event every 25-26 million years based on the density of impact craters on the moon.¹²

Illustrated in figure 8 is the equivalent yield in megatons of TNT based on a NEO with a density of 3 grams/centimeters (CM³) and a velocity of 20 kilometers per second (km/sec). The shaded area to the left represents the NEO size that will burn up or explode in the atmosphere, though blast effects like Tunguska still could produce damage to the surface. Near the one-kilometer size, NEOs could produce global consequences, though there is some uncertainty in the threshold size required as shown in the dashed vertical lines.

Global disasters will result if a large (1-km) NEO impacts the Earth, perhaps killing as much as 25 percent of the human population.¹³ This is largely due to the indirect effect of the impact. A land impact produces fires and earthquakes, while an ocean impact produces tsunamis measuring several hundred meters in height, and perhaps even hypercanes, which are runaway hurricanes that inject large amounts of sea water and aerosols into the atmosphere, causing major global climate changes.¹⁴ Both will have blast effects flattening nearby structures with the possibility of a global winter emerging. Global winters are when large amounts of ash and dust enter the atmosphere, blocking sunlight from reaching photosynthesizing plants. Crops will die and world starvation may result. Also, worldwide temperatures would plummet for months, perhaps years.¹⁵



Mr. and Mrs. James M. Baker of Lillian, Alabama

Figure 7. An asteroid skips through the atmosphere, only one of many "near hits" recorded.

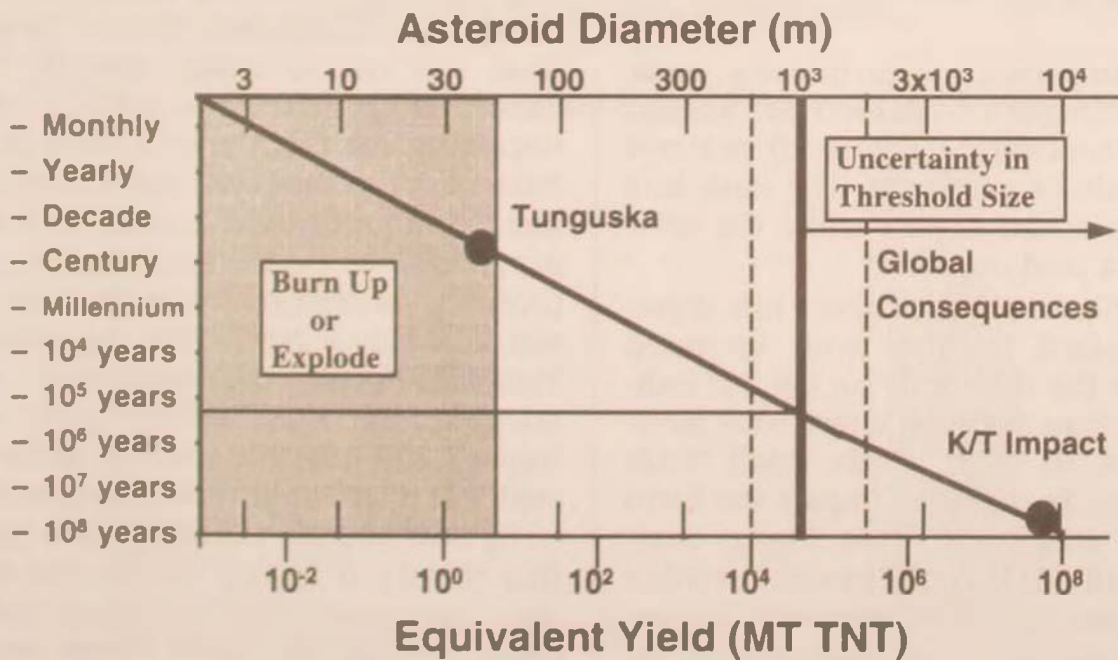


Figure 8. Average Impact Interval Versus Size (Reprinted with permission of *Nature Magazine* from Clark R. Chapman and David C. Morrison, "Impacts on the Earth by Asteroids and Comets: Assessing the Hazard," *Nature* 367 [6 January 1994]: 37.)

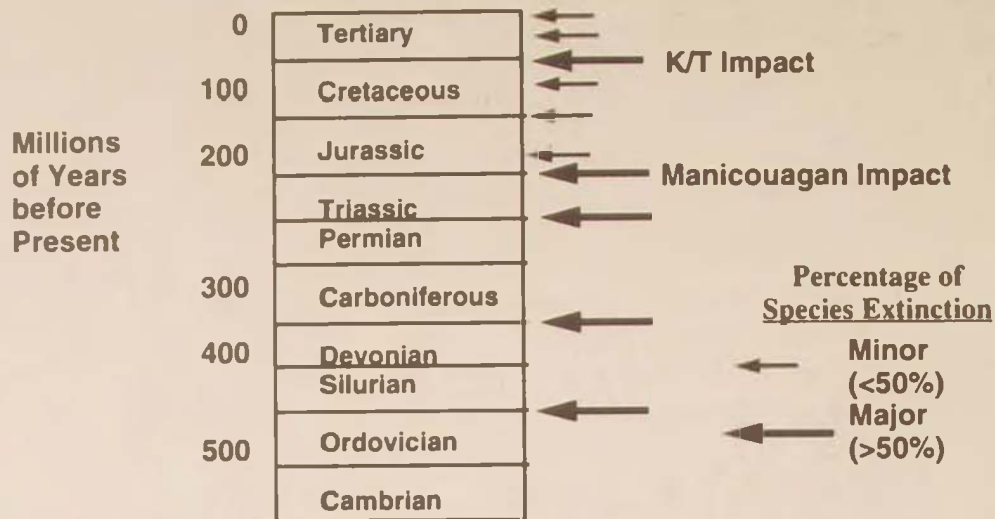


Figure 9. Mass Extinctions in Geological Record (Reprinted with permission of Plenum Press from C.R. Chapman and David C. Morrison, *Cosmic Catastrophes* [New York: Plenum Press, 1989])

Scientists have compared mass extinctions with major impact craters found on Earth and discovered a striking comparison as seen in figure 9.¹⁶ The K/T event could have begun the demise of the dinosaur era. The Manicouagan Crater in Quebec may have also helped to end the Triassic Era by throwing tons of sky-darkening dust into the air.¹⁷

If a NEO impacted the Earth today, what would the estimates of fatalities be? Should we even be concerned? Figure 10 portrays projected fatalities per event. The dash line represents an ocean impact while the solid line portrays a land impact.

In figure 10, we see the curved line representing increased fatalities with increased NEO size, yet the time scale on the left indicates longer times between larger NEO asteroid diameters. In other words, small NEOs near 50 meters in diameter impact the Earth much more frequently than larger ones. However, small NEOs could produce another Tunguska blast. Therefore, one needs to understand the probability of death by any size NEO. The relative probability of death by an asteroid impact is shown in table 1.

How does one arrive at a number of 1 in 25,000? Scientists estimate there are 500,000

years per global devastating impact, as shown by the horizontal line in figure 10. The probability of a strike in any one year is 1 in 500,000 assuming the strikes are completely at random. Assuming 25 percent of the world's population could die as a result, the risk of death is 1 in 4. Thus, in any one year per person, the risk of death is approximately 1 in 2,000,000. Over a 75-year life-time, the risk is nearly one in 25,000.¹⁸ Please realize that the probability of a NEO impacting the Earth and causing global disasters is very slim, yet the consequences if one did impact would leave us with this estimated risk of death. Furthermore, you are probably wondering when the last person was killed by a NEO. Referring back to the Tunguska blast, the expedition that researched the blast found trees, reindeer, teepees, and nomadic artifacts partly incinerated.¹⁹ It is still unknown if anyone did die.

By now you are thinking we're predicting that the sky is falling. We are not trying to scare the reader into spending billions of dollars to save the Earth. Rather, we ask for money to be spent wisely on assessing the threat, learning more about NEOs, and tracking and cataloguing NEOs. No NEO is currently predicted to hit the Earth. Yet

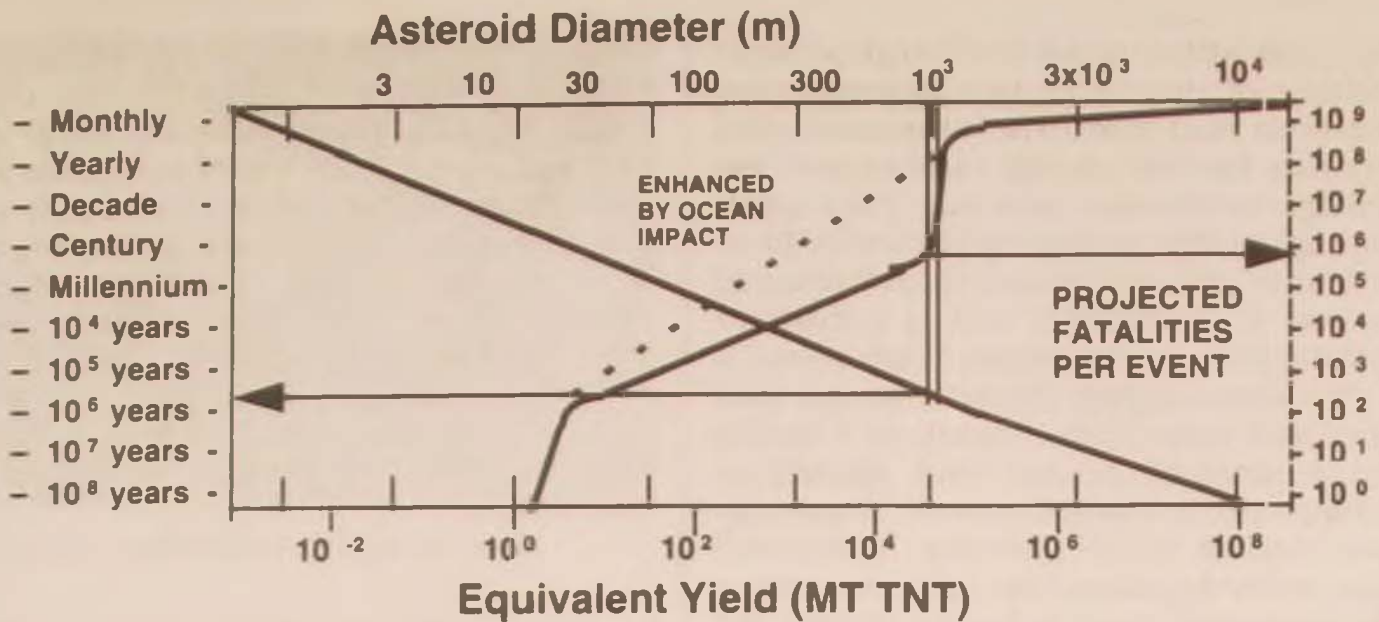


Figure 10. Estimated Fatalities Per Event (Reprinted with permission of *Nature Magazine* from Chapman and Morrison, "Impacts on the Earth by Asteroids and Comets: Assessing the Hazard," *Nature* 367 [6 January 1994]: 37).

someday there will be one, as the probability is finite. So who will take a leading role?

The US government, through the DOD, is obligated to protect the lives and safety of its citizens.²⁰ Further, the US may use its armed forces, under the hierarchy of interests, for cases of strict humanitarian concern.²¹ Thus,

responding to the NEO threat could be seen to fall under this policy.

In the past few years, several different organizations in addition to DOD began to assess the NEO threat. Astronomers working at colleges have discovered NEOs by several methods, such as by using telescopes

Table 1
Probability of Death by an Asteroid

Chances of Dying from Selected Causes in the United States

Motor Vehicle Accident	1 in 100
Murder	1 in 300
Fire	1 in 800
Firearms Accident	1 in 2,500
Electrocution	1 in 5,000
Passenger Aircraft Accident	1 in 20,000
ASTEROID IMPACT	1 in 25,000
Flood	1 in 30,000
Tornado	1 in 60,000
Venomous Bite or Sting	1 in 100,000
Fireworks Accident	1 in 1 million
Food poisoning	1 in 3 million
Drinking Water with EPA limit of TCE	1 in 10 million

Courtesy Dr. C. R. Chapman & Dr. D. C. Morrison

equipped with cameras to photograph small sections of the sky at two different times nearly an hour apart. The astronomers then compare the two photos to observe if any smudge or streaks occurred, thus representing a NEO passing by the Earth. However, it is very tedious and time consuming to peer at photographs with a microscope looking for such movement. Furthermore, if a streak does appear, the astronomers must first check to see if the streak is not a satellite flying overhead or a known asteroid or comet. Another method is to use charge-coupled devices (CCD) detector telescopes.²² This method utilizes computers to analyze electronic photographs for any streaks that occur that are not previously known, such as satellites or NEOs that have not already been detected. The CCD method is much quicker, though more expensive. Altogether, this is only a limited search due to the astronomers' restricted academic budgets.

In 1990, the American Institute of Aeronautics and Astronautics (AIAA) issued a position paper concerning the threat of NEOs after Apollo asteroid 1989FC made the closest approach to the Earth ever detected.²³ Stimulated by this AIAA paper, Congress recognized the impact hazard of NEOs and in 1991 asked the National Aeronautics and Space Administration (NASA) to convene a detection and interception workshop. The Subcommittee on Space of the Committee on Science, Space, and Technology, US House of Representatives, received the summaries and held hearings on the threat of large Earth-orbit-crossing asteroids on 24 March 1993.²⁴ Ironically, Shoemaker-Levy 9 was discovered about this time. Due to the impending impact on Jupiter, Congress directed NASA to develop a program and a budget estimate for cataloging NEOs in 10 years.²⁵ NASA's report encourages collaboration of the international community and the US Air Force.²⁶ However, Congress only asked NASA to give a cost estimate, and currently NASA has no plans to spend new money on tracking NEOs.²⁷

The military has also written about the NEO threat. Air University's Spacecast 2020 reported on the Air Force's future and

looked at the NEO threat in "Preparing for Planetary Defense."²⁸ Research was conducted at Air Command and Staff College on the same topic.²⁹ The chief of staff of the Air Force tasked Air Force Space Command to accomplish a mission area assessment for defense of Planet Earth, which should be finished in fiscal year 1997.³⁰ Thus, to date there has been some attention given to the NEO threat. However, the authors believe in order to accurately assess the threat, we need to follow several taskings as elaborated in the next section.

Taskings

A planetary defense should include everything that could mitigate a NEO-Earth collision. What does one need to know or do before one can mitigate the damaging effects of a NEO collision with the Earth? Should any of these tasks be accomplished concurrently? The following list of tasks answers the previous two questions.

Coordination is required to systematically cover the sky. Several astronomers from around the world are surveying the sky, although not in a joint effort. Who will do confirmations and follow-up orbit determination? Can we use the Air Force's tracking systems to help detect NEOs?

Detection is required. What should be the limiting NEO size detected? How fast should this occur, within 10 or 20 years? The requirement for timely completion of detection affects the decision concerning sky coverage versus limiting NEO size and magnitude. What are the sources of NEOs? Should we detect possible NEOs, ones that are currently not near Earth's orbit but that might become ones? Furthermore, how often should we recheck previously scanned areas?

Science covers the material characterization of the object. What does one need to know about the object in order to mitigate any damage effects? Can one simulate NEO composition on Earth and "test" these

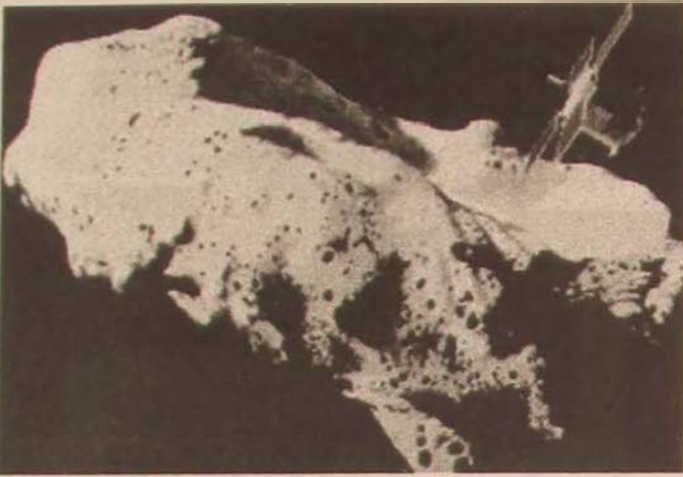


Figure 11. Exploration of a NEO in the Future

NEOs? Can we deflect the orbital paths of NEOs or is destroying NEOs and suffering the remnants impacting the Earth the only option?

Exploration of NEOs may be a means to combine the requirement to rendezvous with a NEO for scientific study while providing the orbital dynamics know-how for destruction or deflection. Missions to NEOs will prove helpful in planetary defense.

Destruction and Deflection may be the only ways to prevent damage to the Earth. Operation concepts and options should be planned and practiced before they are required to be used to avoid a catastrophe.

Harvesting is a spin-off of deflection. Would Earth be lucky if an NEO was approaching? Could a NEO be "captured" into Earth orbit and then mined to provide resources in space?

Warning of the "Big One" is only good if the outcome (global devastation) is avoidable. Warning of "small" NEOs may save countless lives and prevent destruction due to tsunamis, forest fires, and earthquakes. Also, warning to prepare for a meteor stream may save valuable space assets.

Cost

Currently planetary defense is not itemized in the DOD budget. As with any organization, priorities set the budget. The

apprehension from those not in DOD may be that any planetary defense could be just another excuse for an arms race since the cold war is over. The reality from the congressional perspective is that the money for any efforts specifically itemized for planetary defense should come out of DOD's current budget.³¹

Given that the funding is from DOD, support should be given to those academic research programs that are currently conducting NEO detection, research, and technology development and to the Air Force Space Command, which has spent over \$100 million on the technology to improve the current space surveillance mission of the ground based electrical-optical deep space system (GEODSS). Space Command's relentless efforts of quality and continuous improvement should be lauded. Not only is there an improvement in the accuracy of detecting man-made debris in Earth orbit, but also the enhanced tracking of NEOs for a planetary defense is now feasible. Clearly, the humanitarian search for NEOs would be a hallmark for efforts to transform military assets into civilian endeavors. Furthermore, current improvements in the GEODSS can be utilized to improve environment, weather, and remote sensing, as well as to create smaller, faster, more intelligent hardware. However, tracking NEOs is not the only solution for protection. We need to learn more about NEOs and be prepared to avoid a future collision.

Over the next 20 years, NEO detection, exploration, and rendezvous missions need to take place. In a recent Air Command and Staff College study, Larry D. Bell and others provided an excellent in-depth look at search systems, their advantages and disadvantages, a system architecture, and cost.³² Detection includes searching for NEOs, maintaining a NEO catalog, estimating populations of NEOs, and recurring operations and support. Exploration consists of determining the NEO origins, understanding how their orbits change due to the planets or collisions, and resolving the composition and density of NEOs. Are they solid or rubble objects orbit-

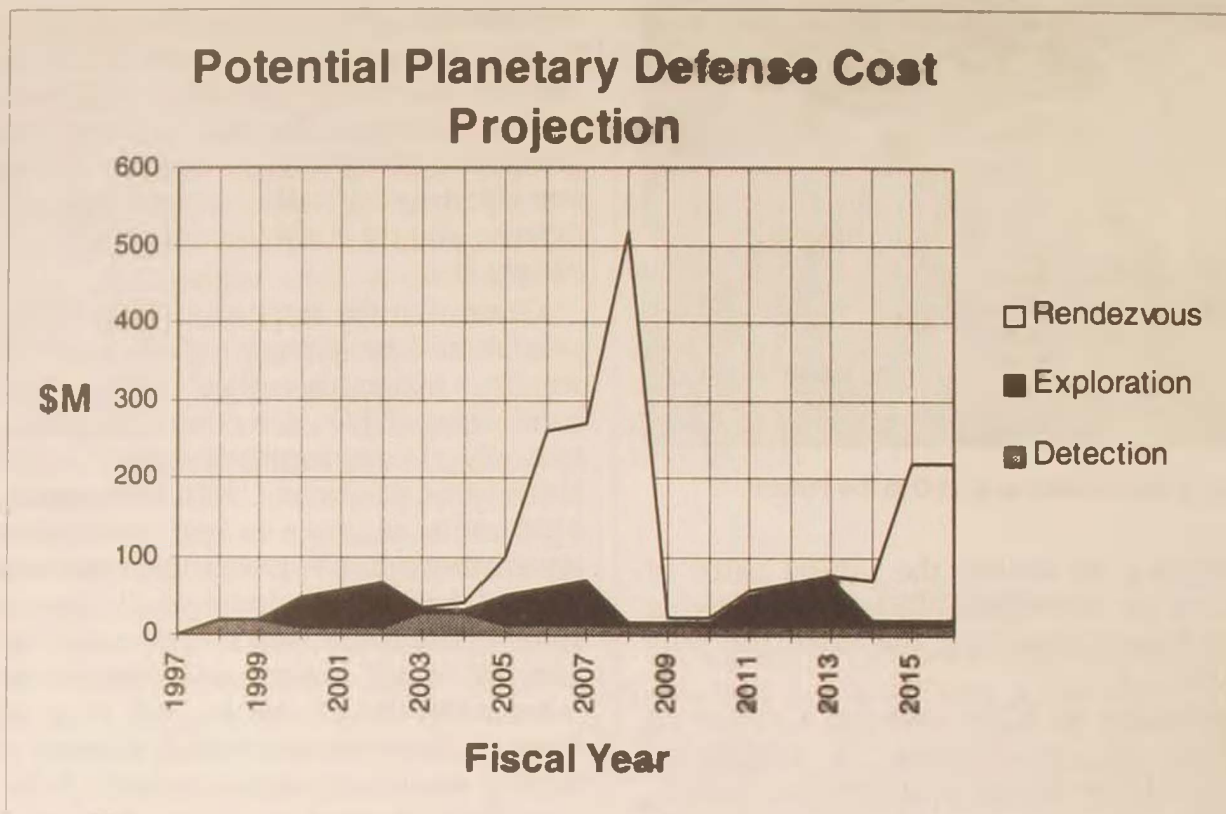


Figure 12. Projected Cost for a Potential Planetary Defense Effort

ing together? Flybys or ground-based research will be the vanguards. Missions like Galileo, Clementine 1 and 2, NASA's near-Earth asteroid rendezvous (NEAR) system, and use of the Arecibo and Goldstone radar systems will increase our knowledge of NEOs. Finally, rendezvous missions practice the meeting of NEOs beyond the Earth's orbit, testing methods to deflect or destroy an NEO. These are the practice, small-scale mitigation missions in case we need to perturb or destroy a NEO months or even years before an Earth collision occurs. The science missions may require observations from Earth or flybys of the target, whereas rendezvous missions require the interceptor to orbit the target NEO. The bottom line is that the estimated cost for a planetary defense is near \$14 million per year for detection, \$23 million per year for exploration, and \$75 million per year for rendezvous missions averaged over the next 20 years. Figure 12 reflects the breakdown of the budget each year if we begin today. These estimated costs were

finalized with comments from Mr Nick Fuhrman, science advisor to the Committee on Science, US House of Representatives, and Dr. Bill Tedeschi of the Sandia National Laboratory.

A limited mitigation system that would cost approximately \$1 billion over three years is not included above.³³ A different estimate sets costs at \$120 to \$150 million per year for two mitigation missions to either destroy or deflect non-Earth impacting NEOs over a 10-year period.³⁴ The United States will perhaps need an impact scare to push Congress to approve a mitigation program because any system with the capability to deflect or destroy NEOs might be viewed as a weapon.

The cost of the detection mission also includes the installation of an infrared sensor in the year 2003 to supplement the optical system. The exploration costs are portrayed as three distinct missions launched during the years 2002, 2007, and 2013. These missions could be easily slipped forward or

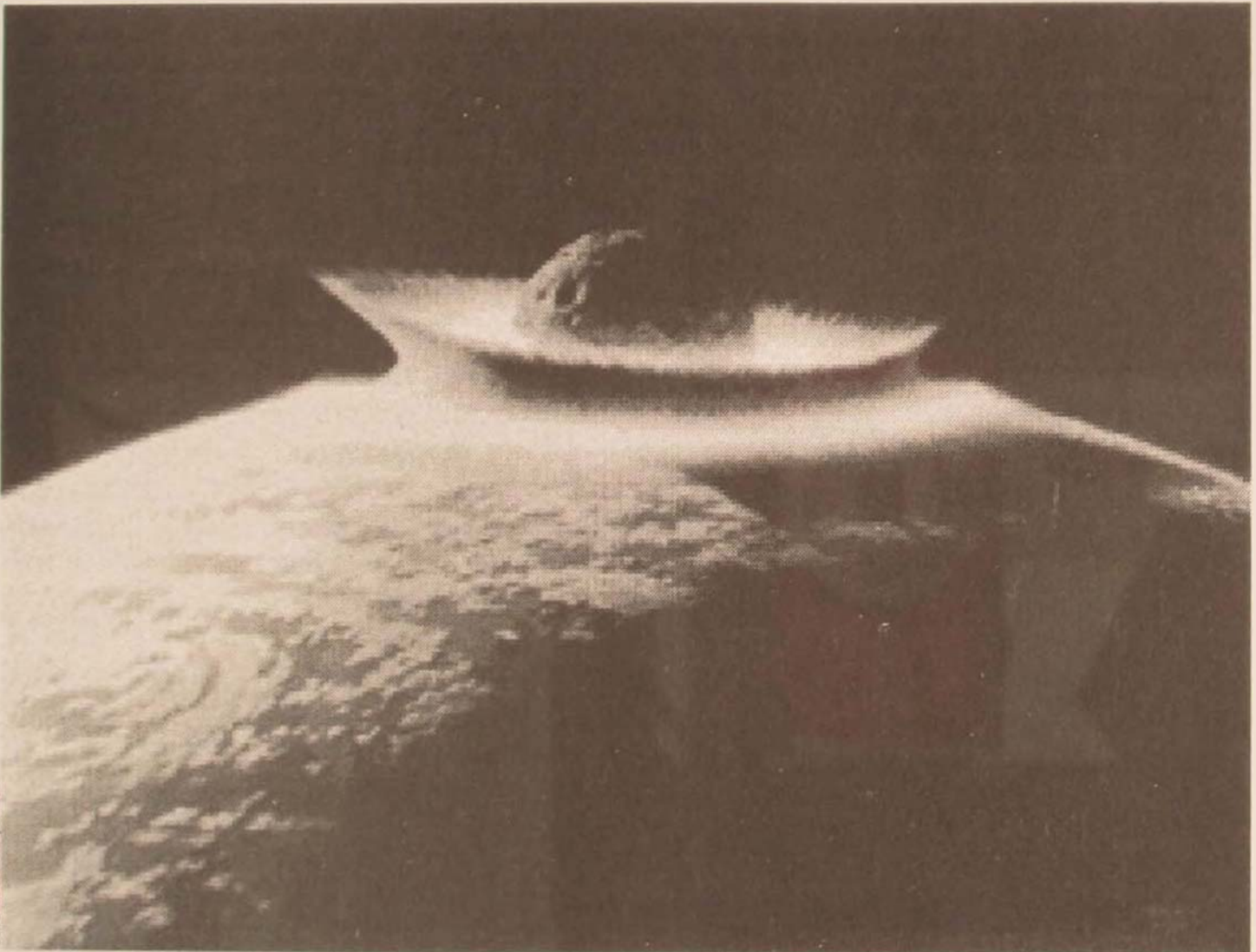
backward depending on what is detected and what NEO is of interest. The rendezvous missions of 2008 and 2017 should be used to develop the operations concepts and procedures for a mitigation mission.

Summary

Assessing the NEO threat would be a small cost for insurance, whereas an impact would cost billions of lives and trillions of dollars. While there is no reason to fear NEOs daily,

there is a finite probability another NEO will collide with the Earth.

We have the technology to track and predict NEO-Earth impacts and the possibility of preventing a catastrophic natural disaster. Other species are extinct because they could not protect themselves. We must not be the next. Therefore, it is imperative that we use our knowledge and technology to assess the NEO threat by addressing the seven tasks and invest in the detection, exploration and rendezvous missions. □



Don Davis used with permission

Figure 13. An Earth Impact, a Natural Disaster We Can Avoid

Notes

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Nothing in the world is more dangerous than sincere ignorance and conscientious stupidity.

—Martin Luther King Jr.

The greatest lesson in life is to know that even fools are right sometimes.

—Sir Winston Churchill

NAME THAT DOCTRINE!

CAPT DAVID G. LANDFAIR, USAF

THE UNITED STATES AIR FORCE should name its doctrine. Having taught a course in Airpower Theory and Doctrine for three years at the United States Air Force Academy, I echo a question that I have heard from dozens of cadets: “Is there an easier way to remember Air Force doctrine?” The answer may be, formulate a doctrinal statement. On the one hand, history teaches us that such statements can make our doctrine inflexible¹—that if they are too rigid, they prevent us from overcoming the fog of war, the unexpected.² On the other hand, we students of airpower theory and doctrine still search for a declaration that encapsulates what we believe about airpower.³ Why can’t Air Force doctrine writers give it to us? Why can’t they write an overarching yet simple statement that is flexible enough to overcome the fog and friction of war?

Gen Michael J. Dugan, former Air Force chief of staff, reportedly said in exasperation, “Ask a sailor about sea power, and he’ll give you a speech on the maritime strategy. Ask a soldier about ground power, and he’ll tell you about AirLand Battle. But ask an airman about air power, and he’ll tell you what time happy hour starts at the club.”⁴ Can you succinctly explain the doctrine of the United States Air Force?

Gen Ronald R. Fogleman, Air Force chief of staff, said that “airmen should be well versed in airpower theory.”⁵ A doctrinal statement would simplify this task—but would it make our doctrine inflexible? A review of over 50 years of experience shows that although doctrinal assertions *can* be inflexible, we do not necessarily need to eliminate them. Rather, we should simply make them less restrictive. A doctrinal statement must be broad enough to encompass everything that the Air Force can do—now and in the future.

Today, the service’s leadership is replacing current doctrine embodied in Air Force Manual (AFM) 1-1, *Basic Aerospace Doctrine of the United States Air Force* (March 1992), with that found in the new Air Force Doctrine Document (AFDD) 1, “Basic Air Force Doctrine,” which remains in coordination. Changes in the new document, however, will not make Air Force doctrine any easier to remember. The most significant addition is AFDD 1’s emphasis on the Air Force’s “six core competencies,”⁶ which could easily be translated into a doctrinal statement.

These competencies comprise the new cornerstone of Air Force capability—they represent the essence of what the Air Force must do to support US joint doctrine. Instead of relying on just one aspect of airpower capability (e.g., strategic bombing), they advocate a well-rounded Air Force that should be able to fight traditional wars as well as operations other than war.⁷ They take “global reach, global power” one step further and describe exactly what we need to achieve “global engagement.”

As part of a doctrinal statement, the six core competencies could make Air Force doctrine easier to remember by acting either as an umbrella or as an infrastructure for the rest of our doctrine. If airmen can remember their Air Force doctrine, they can understand their role in the Air Force. There is no better reason to adopt a doctrinal statement—perhaps this one: “To attain global engagement, the Air Force is committed to achieving air and space superiority, global attack, precision engagement, information superiority, rapid global mobility, and agile combat support.” That’s a bit long, but manageable. After all, since today’s airmen already have the “global thing” pretty much committed to memory, with a little more effort they could quickly articulate Air Force doctrine.

Notes

1. One of the key tenets of aerospace power is flexibility. For more information, see Air Force Manual (AFM) 1-1, *Basic Aerospace Doctrine of the United States Air Force*, vol. 1, March 1992, 8 (fig. 2-2).

2. Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton, N.J.: Princeton University Press, 1976), 119–21. Clausewitz’s concept of friction in war or the fog of war is reminiscent of “Murphy’s Law”: no matter how good one’s plans, something always seems to go wrong. See also Col Robert Debs Heinl Jr., USMC, Retired, *Dictionary of Military and Naval Quotations* (Annapolis: US Naval Institute Press, 1966), 121. Evidently, the earliest reference to the fog of war is by Chevalier Folard in “Nouvelles Decouvertes sur la Guerre” (“New Discoveries about War”), in 1724. “The coup d’oeil is a gift of God and cannot be acquired; but if professional knowledge does not perfect it, one only sees things imperfectly and in a fog.”

3. For more information on making doctrine easier to remember, see Maj Gen I. B. Holley Jr., USAFR, Retired, “A Modest Proposal: Making Doctrine More Memorable,” *Airpower Journal* 9, no. 4 (Winter 1995): 14–20. Gen Michael J. Dugan and Gen Merrill A. McPeak, former Air Force chiefs of staff, advocated brief publications so that all airmen could understand Air Force doctrine. Volume one of AFM 1-1 (1992) was not the first short edition of Air Force doctrine. The Air Force tried it over 40 years ago, but “this approach didn’t work. It resulted in a lot of unread pamphlets and a mass of wastepaper,” Holley, 15. Neither of these publications used a short, umbrella-type doctrinal statement.

4. Quoted in Lt Col Phillip S. Meilinger, “The Problem with Our Airpower Doctrine,” *Airpower Journal* 6, no. 1 (Spring 1992): 25.

5. Gen Ronald R. Fogleman, “Aerospace Doctrine: More than Just a Theory,” *Airpower Journal* 10, no. 2 (Summer 1996): 46.

6. See Maj Gen Robert Linhart, “Doctrine Update,” briefing to the Air and Space Doctrine Symposium, Maxwell AFB, Ala., 30 April 1996; on-line, Internet, available from <http://www.cdsar.af.mil/presentation/linhart/index.htm>.

7. See Capt William Thomas, “Range of Military Operations: Defining the Military’s Role in the Spectrum of Conflict,” *Military Art and Science Quarterly* 3, no. 2 (Spring 1994): 5–7.

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continued from page 3

informal communications among the coalition members and anyone working with them. Principles used in war fighting must also be modified to meet the mission (i.e., unity of purpose instead of unity of command and consensus planning rather than hierarchical decision making).

The book's overall assessment of US forces in peacekeeping operations is that they are far better employed in peace enforcement and peace imposition. Our forces are trained for combat and must be retrained for any peace operation. The authors conclude that we require a far more reliable and valid assessment of command arrangements in peace operations, including war games, simulations, and exercises, so that we can create valid and reliable systems of methodology and measurement for future operations. *Command Arrangements* has much valuable C² information that can be applied to current military and peace operations. But we cannot overlook the fact that the military establishment needs to study these command arrangements in more detail to ensure the success of future operations.

Capt Gilles Van Nederveen, USAF
Melbourne, Florida

Savage Peace: Americans at War in the 1990s by Daniel P. Bolger. Presidio Press, 505 San Marin Drive, No. 300B, Novato, California 94945-1309, 1995, 420 pages, \$27.95.

Daniel Bolger writes to tell America's soldiers what to look out for in the current spate of American operations. He also has advice for policy makers contemplating such missions. His writing style is clear and lucid, and entertaining. The topic is certainly a timely one, and Bolger does an outstanding job enlightening the reader on current hot spots Americans have visited. He especially wants America to avoid any more embarrassing, costly mistakes, such as our recent in-

volvement in Somalia. As he admonishes in the prologue, "what you don't see . . . can kill you." His book hits the mark.

Daniel Bolger is eminently qualified. His background includes tours as S-3 of a unit deployed in Korea, a battalion commander, and at the Pentagon. The book begins with an excellent introduction of how our armed forces are organized to conduct joint operations. It explains how our geographic unified commands work, nicely integrating it with a discussion of peace-keeping operations exercises at the Army's Joint Readiness Training Center. He then illustrates how a successful multinational operation kept the peace in the Sinai peninsula for the last 14 years. Part of the reason for its success is their attitude that they are facing a threat, and a decision to be vigilant. As he points out, this is hard to maintain when "low threat" begins to seem like "no threat." Against this example of a successful (albeit far from bloodless) operation, Bolger details how American Marines were caught unaware during their tenure in Beirut in 1982.

In the second half of the book, he describes what we can learn from such operations and goes into detail regarding three operations America attempted this decade. These three operations are: supporting the Kurds in Northern Iraq; feeding the starving in Somalia; and using airstrikes to support peacekeeping in the former Yugoslavia. The first operation is widely regarded as a success, and it may have set us up for failure in the second. After so easily quelling Iraqi actions against its minorities, without an overwhelming ground force, planners looked to the Kurdish relief effort as a model for helping the starving in Somalia. Using analogies to think about a new situation is not necessarily a bad way to do business. In this instance, however, planners needed to look at the differences between Northern Iraq and Somalia, not only in geography, but the situation on the ground. Analogy helped get us in trouble there, as did decisions based on wishful thinking versus reality. "We had a good plan for going in. But it turned out we

didn't have such a good plan for getting out."

If there is a weakness in his book, it is that Bolger is an operator, trying to make sense out of our national policies, and other branches' and service components' efforts to implement them. This leads to a less than complete analysis of how other branches or services may help the infantry soldier handing out food or keeping the peace. While his book is excellent (and very entertaining) reading for that soldier, it may leave the men and women who plan and execute such operations lacking the appreciation for intelligence in such operations.

Its main strength is that it reads like a fictional account, and will have you sitting on the edge of your seat several times. At the same time, Bolger has produced a well-researched and extensively documented book, making it both credible and a bounty for those interested in further research. This combination produces an excellent text for learning about America's future wars, and how to think about surviving them.

Maj Alan C. Bridges, USAF
USAF Academy, Colorado

Organizing, Training, and Equipping the Air Force for Crises and Lesser Conflicts by Carl H. Builder and Theodore W. Karasik. RAND, 1700 Main Street, Santa Monica, California 90407-2138, 1995, 93 pages.

Few authors have supported, cajoled, incensed, disgusted, and delighted the Air Force as Carl Builder. In the early 1980s, he wrote a provocative book on nonnuclear strategic weapons that challenged the very existence of the Strategic Air Command. Now, with co-author Ted Karasik, he is provoking the Air Force leadership again. This book has as its thesis that the Air Force should rethink how it should organize (reorganize), equip (re-equip), train (educate), and above all, establish doctrine and select a responsible organization to understand crises and lesser conflicts (CALC) in our unstable and disordered world. Even the term they

coined, *CALC*, jars the current thinking about the many nontraditional missions the armed forces are being called upon to perform. Some would describe *CALCs* as *military operations other than war*, or, *operations other than war*, and even, *noncombat missions*. However, Builder and Karasik believe these terms miss the mark because in the case of the Air Force, we are involved in not just domestic, nontraditional, or routine operations, but are "performing *international* and *nonroutine* operations short of war, especially those that *pose the threat of combat operations*." This is the meat of Builder's research and is the basis of his definition of crises and lesser conflicts.

CALCs are occurring with increasing frequency, overtaxing crucial parts of the Air Force resources while idling other resources that could conceivably be used to head off *CALCs*. The challenge to the Air Force, according to Builder, is not so much in determining future missions but rather to define, "how military power can be used effectively in a range of difficult situations."

The Air Force, according to the extensive research done to write this report, is encountering this problem sooner and more severely than the other services because our unique aerospace capabilities are in greater demand even though we are already severely stressed. He points out how our airlift, both global and theater, is in daily demand. Surveillance and enforcement platforms in both air and space, especially airborne warning control system, are overused. Reconnaissance and intelligence for situation and risk assessment are also overtaxed. Finally, there is maximum use of ground-to-air threat suppression platforms for enforcement of air security.

It is important to note that this book is not a clarion call for the reserve forces to take on more responsibility. Rather, there are valid recommendations to reorganize important assets in the reserve and active forces. It may be, Builder suggests, that airlift, suppression of enemy air defenses, reconnaissance and logistics units need to be in the

active force, while bomber and fighter units dedicated to major regional conflicts should be in the reserve structure. Builder suggests sort of a reverse of the tip-of-the-spear adage where the shaft is the cutting edge for CALCs.

The challenges the authors give the Air Force are neither insurmountable nor unfamiliar. Using historical examples, Builder shows that the Air Force can offer the nation's leadership military capabilities that can ameliorate crises and lesser conflicts before they become true combat situations. Aerospace power, with its independent capabilities to feed, supply, rescue, police, and punish from the air, could be fashioned to address urgent problems without being held hostage on the ground. It would behoove the Air Force leadership to read Builder.

David G. Bradford
Orlando, Florida

America at War: An Anthology of Articles from MHQ: The Quarterly Journal of Military History edited by Calvin L. Christman. Naval Institute Press, 118 Maryland Ave, Annapolis, Maryland 21402, 1995, 672 pages, \$35.00.

War is woven into the fabric of American history, and Calvin L. Christman, professor of history at Cedar Valley College and adjunct professor at the University of North Texas, has assembled an excellent anthology of the writings of many outstanding historians that describe America's war experience.

America at War is refreshing because he abandoned the history book approach and instead has assembled 51 stories which offer a range of perspectives on America's war experience.

I have read other works by many of the authors, people like Stephen E. Ambrose, David McCullough, and Martin Van Creveld. They are all noted experts and well-published historians, and the editor offers an extensive bibliography. I was confident with the quality represented by their work in this book.

Neil Asher Silberman's "The Pequot Massacres" is the lead-off story. While there were

many battles during the colonial era, the Pequot War of 1636-37 between the Puritans and the Pequot Indians of Connecticut deserves examination because of the motivation and level of violence of the combatants. This conflict set the pattern of Anglo-Native American relations for the next 250 years.

Willard Sterne Randall, author of "Benedict Arnold: Patriot and Traitor," provides a new twist to the Benedict Arnold story. He writes that Arnold's wife, Peggy Shippen Arnold, may have been an even greater traitor than her husband.

Custer's battle at the Little Big Horn on 25 June 1876 is discussed both by Silberman, an archaeologist and historian, and Robert M. Utley, a former chief historian of the National Park Service.

Silberman describes how battlefield archaeology assists the historian with recreating the event, while Utley gives a more traditional treatment of the battle.

Utley says that it wasn't Custer's military incompetence that lost the battle, but that the Sioux and Cheyenne were strong, confident, united, well led, well armed, outraged by the government's war aims, and ready to fight if pressed. Custer lost because Sitting Bull won.

Much of the anthology deals with World War II and Vietnam battles which were infinitely more complicated and vicious than those of the Indian wars of the late 1800s. Fast forward into the future and Thomas B. Allen, author of *War Games* describes the role that simulated war games played in Desert Storm. *America at War* is a good read. It's not your normal history book.

Col Jerry Cox, USAF, Retired
Shalimar, Florida

Tail of the Storm by Alan Cockrell. University of Alabama Press, Box 870380, Tuscaloosa, Alabama 35487-0380, 1995, 234 pages, \$24.95.

When Saddam Hussein's army invaded Kuwait in August 1990, precipitating US intervention to free the Arab emirate, few in

national policy-making positions could accurately envision the complexity of fighting a war 7,500 miles from American soil. In particular, the difficulty of supplying the war fighters in theater was probably imperceptible to most. But the logistics tail from the United States to Saudi Arabia—the point of embarkation for most military operations during the war—moved millions of tons of equipment, supplies, and personnel. It was one of the most crucial aspects of the conflict and eventually provided US forces with the tools for victory.

Alan Cockrell, a command pilot who logged almost 1,000 hours as an aircraft commander during Desert Shield and Desert Storm, uses the logistical “tail of the storm” as a framework for chronicling his keen affection for flying and airplanes in this very readable, humorous, and insightful view of military transport aviation during a time of national crisis. He accurately captures the balance of purpose most military aviators share in their profession: a broad sense of duty to country and a more selfish passion to slip “the surly bonds of earth” for personal satisfaction.

Cockrell punctuates his work with personal stories encompassing his 20-plus years as a pilot in which he has flown private aircraft, tactical fighters, and heavy transport aircraft for himself, the Air Force, the Air National Guard, and a commercial airline. These poignant vignettes from the cockpit and at military facilities around the world expose the human aspect of military aviation. In one episode, Cockrell brings life to the complex emotional and logistical demands of a transglobal C-141 mission from the United States to the Kuwaiti Theater. He illuminates the fraternal spirit, crew members’ practical jokes, inefficiencies and inconveniences endured, humorous and terrifying experiences in the cockpit, and adds commentary on such issues as female pilots in the Air Force. Also revealed are the personal consequences airmen pay in pursuance of their dreams—displacement from family, jetlag, never ending “bag drags,” and,

occasionally, the death of a comrade. Perhaps the most engaging aspect of the book is how Cockrell consistently praises the professionalism and talent of the men and women—both enlisted and officer, fliers and non-fliers—with whom he flew. The book is filled with nuances of teamwork that motivate all to endure, even in the face of danger or, worse, boredom and stupidity.

Cockrell shares personal stories of how misguided fervor in the cockpit can quickly translate into death for an unwise or unsuspecting pilot. He recounts how he tried to prove his tenacity to the wing director of operations by attacking a practice target at high speed, low altitude, and with great bravado but without proper planning and target acquisition. The result was near death in a fiery crash of his A-7. Another story involves a *genre* of frustration all crew members endure when on long missions. In this case, the commanding general learned hotel rooms in Torrejon were held in reserve for Air Force Academy cadets while visiting aircrews were forced to sleep in the base gymnasium. According to Cockrell, the general “proceeded to clean out the temple.” These and other examples highlight the illogic that seems to haunt all large bureaucracies.

Cockrell grabs the logistical tail and parlays it into an entertaining and realistic account of the magnitude and limitations of supplying a distant war. As a bonus, it is also an agreeable, personal memoir that merits reading by fellow aviators and aviation enthusiasts alike, because it provides a vivid and coherent account of the trials and tribulations of those who flew in the *Tail of the Storm*.

Capt Kevin M. Rhoades, USAF
USAF Academy, Colorado

Prisoners of the Japanese: POWs of World War II in the Pacific by Gavan Daws. William Morrow 1350 Avenue of the Americas, New York 10019, 1994, 441 pages, \$25.00.

As the World War II generation gets older, and less numerous, we have seen an explosion of personal memoirs of their experi-

ences. Amongst the more recent trends has been memoirs of prisoners of war relating detailed experiences of their years in captivity. *Prisoners of the Japanese* is among the better of these efforts. Readers will find it useful, whether as anecdotal documentation of events, personal study of human tragedy, or simply as moving tribute to the ability of the human spirit to survive.

While the anecdotal style of the work requires the reader to scrutinize the effects of time and memory on the events that are recorded here, the importance of prisoners relating their experiences, even after half a century, is relevant to military personnel. This particular work concentrates on the experiences of less than a half dozen prisoners of the Japanese in World War II, mostly of men who were captured very early in the war and who were prisoners for extended periods of time, in various locations throughout the Pacific and later in Japan itself. However, their stories are supplemented by other stories and events relating to a larger number of prisoners, in less detail. The memories are both of significant details of treatment during the Bataan Death March and other major incidents of maltreatment of Allied prisoners, and of tiny, personal, details of daily life and the mental and physical tricks and techniques the prisoners used to survive and sometimes to outwit their captors. Especially significant in this work is the fact that these stories cover the experiences of a wide variety of individuals, including enlisted soldiers and officers, civilian defense construction workers and medical doctors. While what stands out in their minds may vary, each adds an additional facet to the POW knowledge base.

The author has provided us with a commendable amount of careful research and interviews to support his work. This provides a level of documentation often not found in the personal anecdote style of these books. His style is easy to read and moves along quite well as he unfolds the chronological story of the prisoners. The author does less well as he attempts in a few spots to make

this work politically correct by making comparisons with the treatment of Japanese prisoners by the Allies and the experience of nonwestern prisoners by the Japanese. The author may have felt this helped balance his work, but it adds little and even seems in places to be an apology for the abominable behavior of the Japanese.

The significance of the work lies in its addition to the written record of POW experience, something worth studying by all military personnel. That the pool of those who remain alive to reveal their experiences continues to dwindle rapidly makes it all the more imperative that works such as this be written. The maltreatment recorded here is not isolated in time and applicable only to World War II in the Pacific. Rather, as we have seen in war after war, the willingness of one or more sides in war to abuse military and civilian prisoners is timeless. For military people, awareness of this phenomenon aids in preparation for their own possible captivity, as well as enhancing the understanding of the heritage of the military profession. This work needs to be a part of the library of background material at all military POW indoctrination training programs.

For those curious about the war in the Pacific, for those attempting to understand the POW experience, or for those simply interested in history on a personal level, *Prisoner of the Japanese* is worth reading.

Lt Col Michael A. Kirtland, USAF, Retired
Montgomery, Alabama

F-86 Sabre: The Operational Record by Robert Jackson. Smithsonian Institution Press, 470 L'Enfant Plaza, Suite 7100, Washington, D.C. 20560, 1994, 154 pages, \$24.95.

A very well-written book, *F-86 Sabre* could best be described as an operational synopsis of North American Aviation's successor to the P-51/F-51 Mustang. Veteran aviation author Robert Jackson takes the reader from the inception of the F-86 late in World War II through the twilight years of the last operational Sabres in the mid-1970s. In so doing,

he examines in at least some detail all the variants of the F-86 made in the United States, Canada, and Australia as well as the US Navy's Fury variants. Mention is also made of the F-100 Super Sabre and its follow-on, the F-107. One should note that descriptions of these types are somewhat limited due to the book's emphasis on aircraft operations. However, these descriptions do constitute one of the three highlights of *F-86 Sabre*.

The other two highlights involve the combat record of the F-86, first with the USAF and its allies in Korea and then with the Pakistani air force in two wars with India in the 1960s and early 1970s. The description of air combat in Korea is truly outstanding. In a very few pages, one quickly understands the gist of the Korean air war. Jackson discusses combat conditions, describes allied and Communist tactics, and covers the involvement of Russian pilots. He mentions the principal problems faced by the USAF fighter force, describes combat sorties, and recounts our losses. Pakistani use of the F-86 provides an interesting counterpoint to its use in Korea. Pakistan successfully used the 30-year-old design for air defense and air-to-ground operations. One veteran pilot became an ace in less than two minutes of air combat in the F-86. Although the F-86 acquitted itself well during the first Pakistani-Indian war, by the 1970s the Sabre could not compete with the newer types operated by the Indian air force. Because Pakistani Sabre losses during the second war were excessive, the surviving F-86s were relegated to training roles.

Although these highlights provide much to recommend *F-86 Sabre*, the remainder of the book, which catalogues its use with tens of other air forces, does not hold the reader's attention nearly as well. Despite Jackson's best efforts, these descriptions almost become a litany of squadron numbers, aircraft losses, and the few highlights associated with the F-86 in that particular service. Granted, one might expect this in a book subtitled *The Operational Record*, but that did not help me get through those sections.

Otherwise, my biggest disappointment with *F-86 Sabre* was the absence of color photos. Throughout its long and distinguished career in the world's air forces, the F-86 sported a myriad of colorful markings and nose art, well documented in color film and movies. However, one would never know this from Jackson's book. At this price, failure to treat the reader to even some of these photos borders on criminal behavior. This deficiency left me negatively disposed to the book before I read the first sentence.

Such problems limit the overall appeal of *F-86 Sabre*. On the strength of its combat descriptions, I recommend the library's copy of the book to general aviation fans. Only die-hard Sabre addicts should seriously consider adding *F-86 Sabre* to their library at list price.

Lt Col David Howard, USAF
Maxwell AFB, Alabama

The Nazi Occupation of Crete, 1941-1945 by G. C. Kiriakopoulos. Praeger Publishers, Greenwood Publishing Group, 88 Post Road West, P.O. Box 5007, Westport, Connecticut 06881-5007, 1995, 264 pages, \$55.00.

While World War II has been researched and written about at length, a few events still need more explanation. One such, at least in the United States, concerns the German army's capture and occupation of the Greek island of Crete in the Mediterranean Sea.

There are three firsts here: (1) the first airborne conquest (by elite German paratroopers) of an island fortress in the history of modern warfare; (2) the first organized (and first officially documented) resistance movement in Europe against Nazism, which set an example for others to follow; and (3) the first kidnapping of a German general, a legendary tale of the war.

G. C. Kiriakopoulos, a highly decorated World War II combat veteran, wrote *The Nazi Occupation of Crete, 1941-1945* as a natural but unintended sequel to his first book, *Ten Days to Destiny: The Battle for Crete, 1941*, acclaimed as the most authentic documentation of that battle by those who fought it. He

interviewed many survivors and their relatives and documented their accounts with diaries and letters. The result discusses the German occupation and the dramatic history of courageous human endeavor by local citizenry and Allied special forces against the enemy. On a small island like Crete, virtually every household suffered losses. In the first month alone, German soldiers executed over 2,000 civilians in retribution for resistance movement activities.

This is also a story of an American caught up in war. John Alexander, after graduation from high school in California, joined his family in 1940 to visit his father's parents on Crete. Trapped by the invasion, the father, a US citizen, was killed by the Nazis, and the son was thrown into prison. John escaped and became a guerilla fighter, British army sergeant, and US Army officer, mostly operating in and about Crete.

The reader learns how British and American special forces and Cretan resistance fighters successfully abducted General Heinrich Kreipe, the German garrison commander, and then survived for weeks the ensuing German army search effort.

Almost 30 years later, there was a reunion of former enemies in Crete to celebrate the general's kidnapping and other exploits, in addition to opening a German military war cemetery. When one of the British captors apologized for what happened, General Kreipe simply remarked, "*C'est la guerre.*" The fact that the general later requested that two of his Cretan abductors and resistance fighters become the caretakers of the graves of 5,000 German soldiers speaks volumes.

While reading almost like a novel, the book has shortcomings, the most noticeable being an absence of good detailed maps to follow the action. Source documentation, outside of interviews, was mostly secondary.

The Nazi Occupation of Crete, 1941-1945 will appeal to those who want to know everything about World War II and are not familiar with these events. Airpower enthusiasts will find satisfaction only in the 1941 airborne assault, and then indirectly. Never-

theless, the numerous tales of individual heroism and sacrifice in the face of overwhelming wartime hardships make for worthwhile reading. *C'est la guerre* indeed!

Dr. Frank P. Donnini
Newport News, Virginia

The Missile and Space Race by Alan J. Levine.
Praeger Publishers, Greenwood Publishing Group, 88 Post Road West, Westport, Connecticut 06881-5007, 256 pages, \$55.00.

Alan J. Levine offers a new synthesis of the US-Soviet missile and space race of the 1950s and 1960s. The focus is on space travel and how the United States and Soviets got there politically, socially, and technologically. Levine begins with the early rocket experimenters and thinkers—Tsiolkovskiy, Goddard, and von Braun, linking their interest in rockets to the dream of space travel. This sets the basic theme of the rest of the book—the close alliance of missile and space travel developments. Levine presents his argument that Goddard had a much more direct and important contribution to the development of missiles than is usually acknowledged.

Levine analyzes the missile race of the 1950s to explore the hows and whys of US and USSR missile development. He examines the contributions of the German V-2 scientists; the technologies of flight guidance, fuels, and rocket design; the political rationale (including interservice rivalries and partisan politics); and the social milieu in which the missile race began. Throughout it all, he points out those technologies which eventually led to space flight. His analysis of the first satellite launches by the United States and USSR and the "missile gap" presents his contention that President Eisenhower had a deeper appreciation for the real uses for missiles and space vehicles than most historians of the period have allowed. Levine also argues that Eisenhower kept the two programs on a rational economic, technological, and political track and refused to let Soviet propaganda stunts derail the United States from this approach.

Space travel is the bedrock rationale for the book. Levine discusses the beginnings of

the space race, the rationale behind it, and argues that in President Kennedy's hands the space race was just another arena for political competition with the Soviets and that he had no real love or appreciation of the true value of space exploration or uses. Consequently, the United States launched itself on an unnecessarily dangerous crash course for manned space flight. Levine also explores winged space vehicles and nuclear propulsion—approaches abandoned by both sides.

The most interesting aspect of Levine's book, besides his view of the historical record, is a broader social commentary on the United States and how it affected the missile and space program. One foray into social commentary grows out of his analysis of the Sputnik crisis and the resulting New Frontier and Great Society programs. Although unsubstantiated with references, Levine suggests the criticism that US society and education were failures is essentially unfounded and these political programs "resulted . . . not (in) the regeneration but the derailment of a society, which despite its faults had been progressing rapidly."

While admirable, Levine's attempt to show the Soviet side of the race suffers from a lack of detail. Approximately 80 percent of the narrative concerns the US programs and only 20 percent the Soviet programs. While understandable due to the dearth of secondary materials on the Soviet programs, it results in a very unbalanced view of the "race."

Overall, this is an adequate synthesis of the missile and space race of the 1950s and 1960s but offers no new revelations.

Maj Bill Beaman, USAF
Maxwell AFB, Alabama

The Road from Paradise: Prospects for Democracy in Eastern Europe by Stjepan Gabriel Mestrovic, with Miroslav Goreta and Slaven Letic. University Press of Kentucky, 663 South Limestone Street, Lexington, Kentucky 40508-4008, 1993, 204 pages, \$28.00.

Stjepan Mestrovic attempts to explain the future of Eastern Europe and the former So-

viet Union by highlighting the current conflict in the former Yugoslavia. Specifically, he explains why communism collapsed in Eastern Europe, the causes of the Yugoslav civil war, the "irresponsibility" of the United States and European powers in not stopping the Balkan conflict [this book was written before the US/NATO-sponsored Dayton peace accord ended the civil war], and possible outcomes for the future Eastern Europe and Russia. To cover these vast topics, Mestrovic uses a framework derived from sociology and psychology to prove his central thesis—that with communism's collapse, history has simply begun repeating itself.

While reading this book it becomes very apparent that the author is pro-Croat, anti-American, anti-Western, and anti-Serbian. It is not written for light reading; a dictionary close at hand is recommended to help decipher the meanings of each paragraph. However, it does offer a unique Croatian view of the bloodletting.

Mestrovic begins by placing the collapse of communism in perspective. He cautions the Western democracies against gloating over their victory in the cold war for two reasons. First, communism fell not because the West was ideologically or morally superior, but because communism was inherently unworkable. Second, the final outcome in Eastern Europe and the former Soviet Union may be anarchy, chaos, and bloodshed for years to come.

The author uses psychology to help explain that once communism fell, all the aggression, desire for revenge, and other repressed emotions explosively released. One result was the eruption of violence in the Balkans. The long suppression of nationalist tendencies, their sudden release, and the distinctions between culturally-based "nations" and politically-based "states" is offered to explain the "tribalism" that raged between Serbia, Bosnia, and Croatia.

While *The Road from Paradise* attempts to explain the collapse of communism and reasons for the Balkan violence, it also heaps blame on the West, especially the United States, for not doing more to end the fight-

ing. Mestrovic draws parallels between the Iraqi invasion of Kuwait and the Balkan civil war and clearly climbs up on his Croatian soapbox to accuse the United States of moral hypocrisy by ignoring the Balkans but at the same time aiding Kuwait.

Undoubtedly bitter, Mestrovic goes too far when he compares the West's destruction of the Iraqi civilian infrastructure to Serbian destruction of Croat cities. He apparently does not understand that nations act in their self-interest. US national security interests in the Balkans are tenuous, and the United States cannot afford to be nor does it desire to be the world's policeman. If he believes so strongly in foreign intervention in what he so accurately describes as a centuries-old problem, maybe he should have left the comfortable confines of academia and taken up arms at the "front."

While providing a good analysis of why communism failed and why civil war erupted in the Balkans in 1991, Stjepan Mestrovic errs seriously in blaming the West for not doing more. It is ironic that after this book was published, the bloodletting was finally ended by the United States and NATO, the very powers Mestrovic attacks.

This book is written in intellectual obfuscation, overuses psychology to analyze the Yugoslav civil war and the West's initial inaction, and is simply difficult and very dry reading. I do not recommend this book, unless you are serving a long prison sentence, perhaps in a Serbian detention camp, and have nothing else to read.

Maj Phil Bossert, USAF
Scott AFB, Illinois

To Win the Winter Sky: The Air War over the Ardennes, 1944-1945 by Danny S. Parker. Combined Books, Inc., Conshohocken, Pennsylvania 19428, 1994, 528 pages.

Danny Parker delivers a compelling historical work about air combat over the Battle of the Bulge that will change the way readers think about this battle. Most historical work on the second Ardennes offensive focuses on

ground operations, the allure of personalities like Patton and Montgomery, or the defense of Bastogne. Parker shows how Allied performance on the ground hinged on the ability of air commanders to swing their considerable might to the emergency when its seriousness became apparent. No armored offensive could withstand the destruction delivered by Allied air forces under airmen like Hoyt Vandenberg, Jimmy Doolittle, and Pete Quesada.

An unflattering characterization of the main protagonist, Reichsmarshal Hermann Göring, begins the book, and Parker efficiently scans the important elements of Nazi high-level planning that went into *Wacht am Rhein*, the code name for what we call the Battle of the Bulge. All the trends looked dismal for Germany by late 1944, yet Hitler hoped that a surprise counteroffensive would split the US and British forces and drive all the way to Antwerp. For a variety of reasons, it caught the Allies unprepared.

One of those reasons, which Parker explores in depth, is Allied overreliance on Ultra decrypts. Hitler suspected a leak in the Nazi hierarchy and enforced a high degree of secrecy that hid the buildup of forces in the Ardennes from Ultra. This fed the predispositions of Allied commanders, who ignored important preattack aerial reconnaissance. Also, the unusually bad weather that accompanied the attack kept Allied airpower from detecting and fully interdicting German armored columns during the initial penetration. Bad weather hampered the Allied attempt to win air superiority and crippled the attack in the first days of the battle, yet Parker's research shows that early air operations still slowed the armored spearheads on the narrow roads of the Ardennes.

To explore those crucial first days, the author takes a tactical perspective. Although the thick overcast on the first seven days of the attack (16-22 December 1944) inhibited a full Allied air effort, the newly revealed story emphasizes the airmen's courage in the face of this obstacle. Alerted to the attack by scouts of the US First Army, pilots from Gen-

eral Quesada's IX Tactical Air Command flew into the thick overcast, determined to find the enemy. In the first three days, bombing and strafing through holes in the clouds and using new radar-bombing techniques, they scattered and slowed the Sixth Panzer Army, in whose path lay a crucial Allied logistical depot at Liège. When the skies cleared on 23 December (Patton decorated his chaplain, whom he'd ordered to pray for clear skies), Allied tactical and strategic airpower poured into the fray, dominating the Luftwaffe and crippling the ground offensive through direct attack and interdiction. The Allied high command's ability to concentrate airpower on and around the battlefield, including the 3,500 aircraft of Doolittle's Eighth Air Force, testifies to airpower's flexibility and lethality.

The story is well told. Parker provides a steady stream of exciting yet sobering air combat accounts that give the work an intimate feel. His technique reminds one of Donald Caldwell's *JG26: Top Guns of the Luftwaffe*, and, in fact, their work overlaps. The feared pilots of *Jagdeschwader 26* saw heavy action in support of the Ardennes offensive. JG26 met its doom in a last great act of defiance on New Year's Day 1945 in Operation Base Plate, a massive Luftwaffe attack on Allied airfields that serves as a climax to the book.

Gen Dietrich Peltz, bomber pilot and commander of Luftwaffe air operations in the Ardennes offensive, designed the operation as a preemptive strike on Allied airfields, but weather delayed its execution. Fighter ace Adolph Galland opposed Base Plate in favor of concentrated antibomber attacks he hoped would stop the Allied strategic campaign. Reminiscent of Leigh-Mallory's "Big Wing" approach during the Battle of Britain, Galland's idea died because of *Wacht am Rhein*. Although Base Plate achieved tactical surprise, Allied anti-aircraft artillery and fighters butchered the attackers in one of the most crippling one-day air encounters of the war. Among the irreplaceable losses were at least 80 wing, group, and squadron leaders.

This led to bomber-fighter tensions in the Luftwaffe leadership that culminated in the "mutiny of the aces." Conducted against the unyielding depth and breadth of Allied air operations, Base Plate sealed the fate of the Luftwaffe.

The debate about airpower's decisiveness in World War II often emphasizes strategic bombing. This focus trivializes the multifaceted transformation in warfare produced by air forces both away from and on the battlefield. Parker reveals how Allied tactical and strategic forces converged during the Battle of the Bulge, stripping Germany's "geniuses of war" of the means to communicate their brilliance in any other form but artful retreat. *To Win the Winter Sky* is presented in an absorbing style that allows readers to gain new perspectives about airpower in World War II while immersing themselves in exciting and sobering personal stories that define the unique arena of air combat.

Lt Col Tom Ehrhard, USAF
Washington, D.C.

The Ship That Held the Line: The U.S.S. Hornet and the First Year of the Pacific War by Lisle A. Rose, The Naval Institute Press, 118 Maryland Ave., Annapolis, Maryland 21402, 1996, 328 pages, \$34.95.

The short life of the aircraft carrier *Hornet*—the first wartime *Hornet*—makes a singularly good introduction to the study of World War II in the Pacific, for the story of one is essentially the tale of the other. For professional warriors, it is also a useful study of the challenges of actual warfare.

What we forget about the epic sea battles of the Second World War is that most of the ships that died there were still new when they were lost. The life span of many vessels could be measured in months, and once the older between-the-wars relics and their veteran crews had been swept from the board, the war's pivotal battles were fought out by newly launched ships manned by newly trained teenagers. In the case of aircraft carriers, their brand-new pilots were led by senior

officers who themselves usually lacked combat experience, and all were handicapped by unformed or obsolete doctrines. The cost in blood was high while all the lessons were being learned.

The *Enterprise*-class USS *Hornet* (CV-8) was launched on 14 December 1940, during the first winter of the global war. She was only the nation's eighth aircraft carrier, designed at a time when the intricate tradeoffs between carrier speed, armor, armament, and capacity were still being worked out. Fitted out and commissioned in increasing haste as war drew nearer, she was lying at Norfolk Naval Base when Pearl Harbor was attacked. She was immediately sent out to the Caribbean with a raw and untrained air group for a frenetic shakedown cruise. There she began the never-ended process of welding the separate fighter, bomber, and torpedo squadrons into a single combat unit, and then harmonizing the new entity with its mother ship. From there to the central Pacific to provide air cover for the daring Doolittle raid on Japan, and then south to the Guadalcanal campaign to provide backup to the Battle of the Coral Sea. North again, then to Midway to play a strong part in the battle which turned the course of the entire war.

For all of its creature comforts in the teeth of battle—its hot meals, showers, and movies—war at sea is a war of annihilation, and the ship that loses usually loses everything. *Hornet's* time came only four days after the first anniversary of her commissioning ceremony. Fighting another Japanese fleet off Guadalcanal, the carrier was overwhelmed by a well-executed air attack during the Battle of Santa Cruz. *Hornet* perished in a volcano of flames with 133 of her men, the last American heavy carrier ever to be sunk in battle. A year later a newer and larger *Essex*-class namesake, USS *Hornet* (CV-12) honored her throughout the rest of the war.

Taken by itself, the story of the doughty warship's brief career provides a dramatic and exciting history lesson, but the book is much more than a simple action epic. It is the study of her men, the individual black-

shoes and airdales making up her crew and air group, which allows professional military readers to put themselves into the lives of their counterparts. Author Lisle Rose profiles the strengths and curious weaknesses of Capt (later Adm) Marc Mitscher as he faced a protean career change, the devastating challenges confronting his air group commanders, and the subtle and terrifying choices which greeted each of his pilots in training and in combat.

As much a study of men meeting the demands of warfare as the biography of a gallant man-o'-war, *The Ship That Held The Line* merits its place on the thoughtful airman's bookshelf.

Dr. Raymond L. Puffer
Edwards AFB, California

Masters of Deception: The Gang That Ruled Cyberspace by Michelle Slatta and Joshua Quittner. HarperCollins, 10 East 53rd St. New York 10022-5299, 1995, 256 pages, \$23.00.

This book might not be for everyone. You probably don't need to read it unless you use telephones or related communications systems in your work, or you use or rely on computers and/or computer-assisted systems, or your personal or financial life is significantly affected by networked computer systems. Unless you are in the 1 percent of the country that does not fall into one of these categories, you should read this book.

And that is the point we tend to live in blissful ignorance of not only the degree to which networked computer systems affect nearly every aspect of modern American life and work but also the vulnerability of these systems to tampering whether malicious or otherwise. *Masters of Deception: The Gang That Ruled Cyberspace* is about a small group of young men almost entirely teenagers still in high school who in the late 1980s and early 1990s, used their home computers (and woefully rudimentary ones at that) to penetrate deeply inside some of the country's most critical communications and financial networks.

To briefly summarize, *Masters of Deception* follows the careers of several young hackers, most of whom were from New York City, from their first interest in computers, through their penetration of the New York City telephone system and their entry into the databanks of companies containing thousands of credit card numbers and personal credit reports, to their eventual arrest in 1992. The best of these young hackers banded together in an informal group that called itself the "Masters of Deception." Their eventual gang war with another group, the "Legion of Doom," is one of the themes throughout the book. While it would be easy to dismiss these young men as messed-up teenagers who had too much time on their hands and too little interest in normal activities, this would be a serious mistake and tremendously understate their intelligence and abilities.

This book tells a fascinating and at times frightening story at several levels. From a sociological perspective, it is an intriguing depiction of rather typical adolescent male posturing, in which these hackers are constantly trying to top the others' latest exploits or demonstrate some new bit of knowledge or computer skill. Instead of hot rods or sports, however, their field of competition is their ability to penetrate computer networks. Each hacker has a unique signature by which he (this is not a sexist use of the word; none of the hackers in this book are female, and it seems like very few of the hackers nationwide are female) identifies himself: "Eric Bloodaxe," "The Scorpion," and the most famous—"Phiber Optik."

At another level and from a different perspective, the book highlights how the telephone and the computer have made it possible to electronically connect virtually limitless amounts of information and make that information almost instantly available. You will be left shaking your head in wonder as the authors describe how one hacker, calling from Brooklyn, went through at least six different computer-controlled switching systems and finally entered Southwestern Bell's main control computer in St. Louis to read the company's

own internal security guidance for safeguarding its systems.

This book also has implications at a third and higher level of national security. It is all too easy to focus on the who done it aspects of the story and thus dismiss everything as simply the acts of a few misguided (although brilliant) teenagers. Would you take it more seriously if AT&T and Southwestern Bell had been penetrated by the KGB from a supersecret C³ facility deep in the Urals, instead of from "Phiber Optik's" bedroom in Queens using a TRS-80? What if the credit databank and financial networks had been penetrated and the contents used for blackmail by a drug cartel, instead of the hacker from Brooklyn who published Geraldo Rivera's credit report to impress his fellow hackers and score points against another cybergang? It is worth remembering that at precisely the same time that the "Masters of Deception" were penetrating and exploring the intricacies of the computers controlling the telephone system, other identical computer-controlled systems, were the indispensable link to our forces in the Persian Gulf. While the "Masters" were downloading David Duke's credit history from an electronic databank, other electronic databanks contained the spare parts and supplies inventories vital to the logistical support for Desert Shield and Storm. This illustrates a key problem of the information age: computers, networks, and databanks are designed to be entered and used, not the opposite. The "Masters of Deception" were taking advantage of these systems' inherent nature, which is to let themselves be used. There is an obvious danger in the constant push and pull between simplifying access and safeguarding information. It is also worth remembering that while the "Masters of Deception" did not intentionally damage any information, recent reports indicate that incidents of intentionally malicious computer hacking are on the rise. If you depend on computers in your life or work you ought to read this book.

Dr. Daniel T. Kuehl
Washington, D.C.

Hope Is Not a Method; What Business Leaders Can Learn from America's Army by Gordon R. Sullivan and Michael V. Harper. Times Books, 201 East 50th Street, New York, New York 10022, 1996, 295 pages, \$25.00.

In 1989 the Army was operationally flexible but organizationally structured to win World War II. Despite the post-Vietnam emphasis on professionalism and values, the army was a multilayered bureaucracy. It was large, slow to change, and the most effective Army in the world. Only six years later, it was leaner by one-third, fully in the information age, capable of anticipating and using change, and the most effective army in the world. The new lean, technologically sophisticated Army has built a successful modern organization from a successful outdated organization.

The world didn't stop while the Army downsized by 600,000 people. Changing on the fly, the Army successfully performed its new humanitarian and police missions in Somalia, in Bosnia, and at the scene of many a natural or manmade disaster. That it maintained, perhaps improved, its effectiveness is powerful substantiation of the authors' basic argument. The United States Army has found and implemented a method of mastering, indeed prospering, through change.

The problems faced by the Army apply to all forms of business, government or not, for profit or not. Increasingly, intense global competition requires faster reaction time, maximum reduction in cost, better quality, and a speeded up pace of innovation. There's no longer time for a 1940s' command and control structure—even one good enough to win World War II and the subsequent peace. A contemporary organization, the Army defines and focuses on its mission and vision, empowers workers, and uses any applicable tool teaming, organizational learning, orientation by process instead of function, and measurement of the real systemwide impact of decisions. And it always makes time to learn from each exercise. Reinvention is a path, not a destination. According to the authors, *Hope Is Not a Method* is an after-action report on the reinvention of the United States

Army, and its lessons apply to all institutions that would compete and prosper.

How did the Army change? Through trial and error and extensive nothing-held-back post-mortems, the Army tested itself, discarding mistakes and incorporating successes. It committed itself to a method in which the leader and the people would work as a team acculturated to creativity, adaptivity, and a commitment to successful capitalization on unpredictability. The organization redesigned itself for change.

The Army method requires a leader with a broad vision shared by the organization that ties today to tomorrow and that can capture an unexpected opportunity. There is clear definition of the organization's vision, its values, and its critical processes. This process requires clarification, change, and the growth of core processes in a context of values and vision. There must be commitment to nonstop learning. There must be thin threads to span the gap between what is and what will be and support for the bridge that carries today's strengths into the agreed-to future, qualitatively different but still containing the core values, vision, and processes. Today's Army has to be always prepared for the unexpected, in order to be ready to benefit from opportunity and when necessary, roll with the punches.

Hope Is Not a Method is structurally excellent. It combines a strong theory with examples from the past six years. Pertinent anecdotes from history and the modern business world reinforce and clarify the concepts. There is one major caveat: the authors are the former chief of staff and one of his principal planners; they had three stars to back their effort, and their turnaround was top-down. A view from the trenches might define the new Army and the past six years less favorably. Whether or not the reality matches the authors' perception even if the argument is diluted by eyewash, the book is mandatory reading for any manager who wants to be more than just a caretaker for an organization turning slowly irrelevant.

Dr. John H. Barnhill
Tinker AFB, Oklahoma

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Dr. John H. Barnhill
Tinker AFB, Oklahoma

Stealth at Sea: The History of the Submarine by Daniel van der Vat. Houghton Mifflin Company, 215 Park Avenue South, New York 10003, 1994, 374 pages, \$30.00.

It seems pretty clear to me that the modern Air Force professional has much that he can learn from the study of submarine warfare past and present. There is nothing that new about stealth to airmen. Spooky (AC-47) used the cover of darkness to work its mayhem in Vietnam to cite a recent example. However, the essence of submarine warfare for the past century has been exactly that, stealth, and studying the subject in another context may well reward the warrior-scholar with some different insights. Further, submarine warfare and blockade have much in common with strategic attack and interdiction. One of the problems the RAF grappled with during the Battle of Britain was whether it was necessary to kill the Luftwaffe bombers *before* they discharged their cargoes on London. As Dan van der Vat explains, one of Doenitz's concerns in running the World War II submarine campaign was whether he should concentrate on the laden merchant vessels or whether he should have his boats sink them wherever and whenever they were found.

Daniel van der Vat was born in the Netherlands in the second month of World War II. His father was a writer; his mother a teacher. He received his BA from the University of Durham in 1960. He spent the first part of his career in journalism, and has written several books on naval warfare, especially the European dimension of it in the twentieth century. One of his books is on the Pacific campaigns of World War II. He has elsewhere claimed to be first and foremost a storyteller, though the jacket of the present work calls him a world authority on the operational history of the submarine. He is explicit in citing the victory in the Battle of the Atlantic as *the* decisive campaign of World War II.

Stealth at Sea is organized into more or less chronological chapters, and within them there is a loose scheme of covering the various episodes in the history of the develop-

ment of submarine warfare by geographical areas or nations. It begins with a forty-six page description of the development of submarines *before* 1914, and dismisses the entire 50-year experience since 1945 in 30 pages. Up until 1945, the book is filled with anecdotal material in great detail—to include a tale of how a single cat jinxed a British aircraft carrier (among several other vessels). Occasionally, van der Vat does include short passages devoted to analyses of decision making and strategy, but does not dwell on those topics. In them, he makes some sweeping generalizations without much explanation or support. His treatment of technology and logistics is uneven (though the great Allied success he describes against the German “Milch Cows” [submarine supply ships] should stimulate the modern airman’s thinking about our tankers, AWACS and JSTARS).

The book is really one about the Battle of the Atlantic into which is inserted a chapter on the US submarine campaign in the Pacific occasional passages about undersea warfare in the Mediterranean, the Black Sea, and even the Baltic. All this results in a potpourri that would have benefited from the hand of an editor to improve the work’s coherence.

Notwithstanding all the interesting sea stories, *Stealth at Sea* would be difficult to rescue even for an outstanding editor. Van der Vat is biased too much toward the naval and British side of things, too prone to make sweeping generalizations, and too inaccurate with his facts (Hampton Roads is off Long Island, not Virginia) to serve as a reliable source for the Air Force professional. He continually bashes the RAF and the Air Ministry for “neglecting” naval aviation—a misperception, I think, that is uncritically accepted in Britain everywhere and frequently in the US Navy. In my opinion, even if the Royal Navy had been full of *Saratogas* with decks laden with Wildcats, Dauntlesses, and Avengers, it would not have prevented Dunkirk, and still less have achieved a victory by itself in the Battle of Britain. Nor would it have done any better against the submarines than was the case—wrong ships, wrong planes, and espe-

cially the wrong mind-set among the Royal Navy commanders.

When van der Vat asserts as he does that the Battle of the Atlantic was the *central* campaign of the entire war, he demonstrates both his nationalism and his maritime bias. I agree that the victory in the Battle of the Atlantic was necessary to winning the war, but not that it was sufficient. When the author asserts that the two German submarine campaigns were the two most cost-effective campaigns in history, he is far off base. Both campaigns were lost along with the war, and therefore, their efficiency and their effectiveness were zero. When he asserts that the American failure to get MacArthur and Nimitz to agree on a single strategy was enormously costly to the Allies, he does not offer support. It might have been so in other circumstances, but as both prongs of the divided Pacific campaign were stronger than the Japanese, he fails to prove that it was radically more expensive than a single thrust would have been. Finally, to call *Stealth at Sea* the whole history of undersea warfare is wrong, given the superficial treatment of the past half century and the failure to place it in the context of its times.

The modern USAF warrior-scholar would do well to study submarine warfare, but with other books. Candidate works might include: John Terraine's *The U-Boat Wars*, Clay Blair's *Silent Victory*, David Syrett's *The Defeat of the German U-Boats*, plus the relevant chapters of Eliot Cohen's *Military Misfortune*, Steven Rosen's *Winning the Next War*, and John Keegan's *The Price of Admiralty*.

Dr. David R. Mets
Maxwell AFB, Alabama

Inside the Blue Berets: A Combat History of Soviet and Russian Airborne Forces, 1930-1995
by Steven J. Zaloga. Presidio Press, 505 San Marin Drive, Suite 300B, Novato, California 94945-1309, 1995, 339 pages, \$24.95.

After World War II, airborne forces became the Soviet Union's weapon of choice in dealing with difficult military situations.

Airborne forces provided the Kremlin with power-projection capability in foreign interventions as well as a reliable force in internal disputes. As a result, Soviet leadership favored airborne forces. The "best and the brightest" of the Soviet military sought to wear the Blue Beret of the airborne soldier. Today's airborne forces are considered Russia's premier fighting force and will likely spearhead future combat operations. Until recently, much of their combat history was cloaked under the cover of state secrecy. Steven Zaloga has taken on the task of tracing the development, evolution, and combat experiences of airborne forces. He has used recently declassified Soviet documents to fill in the gaps in the combat record.

The book's main emphasis is on airborne combat operations. It discusses the airborne operations in World War II, interventions in Hungary, Czechoslovakia, and Afghanistan, as well as "peacekeeping" operations conducted during and after the breakup of the Soviet Union. Many of these operations, especially the World War II airborne operations, ended in disaster and were not included in Soviet history.

The author's expertise really shines when discussing the weapon systems employed by the airborne forces. He provides a good review of airlift and helicopter development, as well as a discussion of armor and antiarmor weapons. Especially interesting is the discussion of such airdrop techniques as dropping armored personnel carriers with their crew inside. Zaloga also compares and contrasts airborne force structure, weapon systems, and tactics with other nations' airborne forces.

The book is not limited only to airborne forces. It also discusses other elite forces such as the Soviet "Black Beret" naval Infantry and naval Spetsnaz, the General Staff intelligence directorate Spetsnaz, the KGB special operations units, and the MVD Dzerzhinskiy Division. Mr. Zaloga bursts the popular Western image of the Spetsnaz as a combination of Rambo and James Bond. He discusses the different forms of Soviet special

forces, their level of training, primary missions, and capabilities.

Since the breakup of the Soviet Union, the airborne forces have been used primarily in peacekeeping operations. Mr. Zaloga guides us through the turmoil that accompanied the breakup of the Soviet Union as age-old political, ethnic, and nationalistic issues are resurrected. He provides us a rather rare glimpse of the professional soldier when loyalty is challenged by internal political struggles.

Overall, I recommend *Inside the Blue Berets*. It is interesting, well written and researched. The book provides us with many lessons about airborne operations and counterinsurgency campaigns. I found it to be more than just a combat history of airborne forces. It is also a glimpse into Soviet and Russian history. As students of war, this book may help us understand events as they continue to unfold.

Lt Col Chris Anderson
Maxwell AFB, Alabama

The Soviet Armed Forces, 1918-1992: A Research Guide to Soviet Sources by John and Ljubica Erickson. Greenwood Press, 88 Post Road West, Box 5007, Westport, Connecticut 06881, 1996, 224 pages, \$75.00.

Professor Erickson's latest offering is an *essential* book for serious students of Soviet/Russian military thinking. It is a selected bibliography and research guide to Soviet sources, one which is a must for any serious student of the field. It is not a book to read; rather, it is one to use.

Professor Erickson's Soviet holdings and contacts are legendary. Part of his collection of Soviet sources had to be removed from his fifth floor office in an eighteenth century Edinburgh tenement because its weight compromised the structural integrity of the building; his home office resembled the Grand Canyon, with a single narrow path through the four-foot piles of books to his desk. His expertise dates back to the 1940s and his collection covers 200 years of Russian military art. He shorts himself by saying

that his personal contacts are senior Soviet officers. He nurtured the junior and field grade officers decades ago and retained the contacts. And his wife, confidante, and harshest critic, Ljubica, herself an expert in the field, guided his course. The Ericksons never take anything at face value: they call it as they see it. At times they were severely criticized by the Soviets; at other times, they lectured the Soviet General Staff.

As a selected bibliography, *The Soviet Armed Forces, 1918-1992* certainly meets its stated goals. It has 1,400 Soviet sources, plus a limited number of Western ones. The annotations are superb. The Ericksons identify where to find the original sources, and in many cases they point to English translations of the works.

Beyond this (and herein lies perhaps the most valuable part of their contribution) when they describe sources, the Ericksons do not limit themselves to the books themselves. Rather, they explain where to find many of the less common sources, the archives in which they can be located, how to contact the archives, and some of the individuals there who were most helpful. Using this approach, *The Soviet Armed Forces, 1918-1992*, goes beyond what might be rightfully expected of a bibliography and becomes perhaps the most valuable extant road map to the field of Soviet military studies . . . hence fulfilling its subtitle as a research guide.

The classics (many unknown to even informed Western researchers) are all there, along with a guide to using them: Frunze, Gorshkov, Tukhachevskiy, Zhukov et al. The significance of this volume lies in the remaining 1,350 or so other texts the Ericksons have catalogued and annotated. One might wish for entries on *grazhdanskaya oborona* [civil defense] or the exceptionally talented (and purged) Chief of the Red Air Service Alksnis or the USAF translation of the "Officers' Library," but, given the fact that the Ericksons had to navigate their own collection of tens of thousands of books in addition to the books and manuscripts they had

viewed in the former USSR to select the most seminal works on the Soviet military, this is understandable.

The Soviet Armed Forces, 1918-1992 is the essential source for serious students of the Soviet armed forces. It is a gift from the West's premier Sovietologist, a synopsis of what it took him a half century to learn the hard way. To overlook it is to pass up on a great opportunity.

Dr. Gregory Varhall
Kaneohe, Hawaii

Pay Any Price: Lyndon Johnson and the Wars for Vietnam by Lloyd C. Gardner. Ivan R. Dee, 1332 North Halsted St., Chicago, Illinois 60622-2637, 1995, 610 pages, \$35.00.

Lloyd Gardner, a highly respected diplomatic historian and author of *Spheres of Influence* (1993), focuses on Lyndon Johnson's handling of military strategy, international diplomacy, and domestic politics during the Vietnam War. The author begins by stating that "to understand Johnson on the Mekong River in 1965 at the point of no return in Vietnam, we must seek his beginnings on the Colorado River." Gardner does a masterful job of demonstrating how Johnson's early background and New Deal experiences molded his political outlook, influenced his ideas about the role of government, and motivated much that he tried to do in Vietnam. Johnson was a firm believer in government intervention for the public good, and while this worked reasonably well at home, the coupling of the Great Society with the anti-Communist imperative overseas led to disaster in Southeast Asia.

Gardner provides a convincing argument that Vietnam was not merely Johnson's war, but rather an extension of cold war diplomacy that had begun long before Johnson became president. He reviews Eisenhower's action in Southeast Asia, but focuses more on John F. Kennedy. Gardner clearly believes that Kennedy's Southeast Asia policy (which resulted in the increase of American advisers in Vietnam from 700 to 16,000) set the stage

for Johnson's escalation; according to Gardner, Kennedy's death left Johnson to figure out how to "pay the price" in Vietnam.

Gardner demonstrates how the new president tried to apply the tenets of the Great Society to resolve the conflict in South Vietnam with the promise of a Mekong Valley project to surpass even the New Deal's Tennessee Valley Authority. When it became apparent that such an approach was not going to work, Johnson found himself faced with an insolvable dilemma. If he abandoned the Saigon regime, he would have been charged with "losing" South Vietnam to the Communists. If he pursued the enemy and struck at his base of operations, it would be said that he had escalated the war to "satisfy a vainglorious quest, dragging everything down with him as the war consumed American spiritual and material resources."

Gardner describes in great detail how Johnson and his advisors tried to come to grips with this quandary, focusing on the behind-the-scenes policy-making process within the Johnson administration, shedding new light on the internal debates over strategy and conduct of the war. He demonstrates how the Kennedy men on Johnson's staff first tried to apply crisis-management techniques that had been successful during the Cuban missile crisis to the situation in South Vietnam, rather than crafting a cogent strategy at the national level that realistically considered national interests and the reasoned application of military power.

The Tet offensive in 1968 proved a turning point for Johnson. Although Gardner acknowledges that the Communists sustained a major tactical defeat, he believes that they won a psychological victory that shook American resolve and in effect, "the U.S. psyched itself out of victory." Johnson was stunned by the news footage of Viet Cong attacking the US Embassy, and he came to the realization that the war could not be "won" in the traditional sense. Accordingly, Johnson announced on 31 March 1968 that the United States was "taking the first step to de-escalate . . . unilaterally and at once." He concluded by announcing that he

would not seek a second full term so that he could devote his efforts to rectifying the situation in South Vietnam. Gardner maintains that this speech "reflected the divisions among the president's advisers and was really the opening, not the climax, of an intense struggle to shape policy."

This is a very readable, balanced, and comprehensive study of presidential decision making. Drawing on recently declassified documents from the Johnson Library in Austin, Gardner provides keen insight into a subject about which much has been written. The book's most significant contributions are the explorations of Lyndon Johnson's roots which go a long way toward explaining his actions as president. Gardner is objective, demonstrating how honest men trying to do the right thing could become so enmeshed in such an untenable situation. This book is a valuable addition to the historiography of the Vietnam War and is highly recommended.

Lt Col James H. Willbanks, USA, Retired
Fort Leavenworth, Kansas

Spandau Phoenix by Greg Iles. Penguin Books USA Inc., 375 Hudson Street, New York 10014, 1993, 536 pages, \$22.00.

Greg Iles's spy novel *Spandau Phoenix* is a work of continuous suspense. It begins with a 340 mph flight over enemy territory in 1941. Aboard the Messerschmitt are Rudolf Hess, Deputy Führer of the Third Reich, and a physically identical double. Hess bails out of the airplane over England as planned to execute a top secret Nazi mission—one designed by Adolf Hitler to win the war. The double, who is supposed to swallow a cyanide capsule if he does not receive a radio message from the parachuting Hess, does not obey orders. Instead, he also bails out. And once he lands safely on English soil, confidently proclaims, "I am Reichminister Rudolf Hess!"

Iles ignites your curiosity with this bungled but daring German mission. What happens to the real Hess? Will the double

succeed in his deception? However, the reader's real task is to unravel the meticulously contrived plot revolving around the Nazi mission, which is capable of forcing England to become allies with Germany. Although preposterous, this unlikely alliance would enable Germany to attack Russia and thus wage war on a single front—which would possibly ensure a Nazi victory.

Iles carefully reveals the first clues to this Nazi mission when a sheaf of tattered papers are found in Spandau prison after it is destroyed in 1987 following the death of the last war criminal, Rudolf Hess. Berlin police sergeant Hans Apfel finds Hess's frayed diary in a hollow brick while patrolling the demolished prison with Russian, American, French, and British troops. Although the world believes the prisoner to be the real Hess, the diary reveals that it was written by Hess's double.

Iles keeps the reader's interest as international spies compete to find the newly discovered Spandau diary. Apfel and fellow Berlin policeman, Dieter Hauer (also his estranged father), struggle to determine why British, Russian, German, and American undercover agents are willing to kill anyone to get the diary. Iles skillfully offers just enough information about the papers to sustain our curiosity. Just as we learn what happened on the original German flight, for example, Iles hints that the diary may prove British officials were going to sign a peace agreement with Hess during World War II.

The diary is eventually recovered by a wealthy defense contractor and head of a neo-Nazi cult, who obtains it by kidnapping Apfel's wife and exchanging her for the diary. The climax of the novel occurs as numerous international players converge on the contractor's residence in South Africa.

Although diverse, Iles's characters are often one-dimensional. For example, Apfel instantly withers from the superstar professional policeman, who had heroically rescued an elderly couple from a burning vehicle, to the overly cautious, protective husband, who proceeds to make every deci-

sion about his kidnapped wife with knee-jerk emotion. While this sketch could be forgiven, Iles's sketch of Hauer cannot. Hauer is the stereotypical bulldog cop, immune to the barbaric torture and brutal violence that punctuates the action-oriented text.

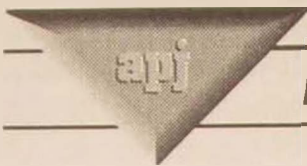
In spite of the flatness of Iles's characters, the challenge of solving an international conundrum overcomes the shortcomings of

this realistic thriller. Even Iles's curious epilogue, which suggests the possibility of new mystery surrounding the diary, leaves us curious to find out more. If you're interested in a suspenseful espionage novel, *Spandau Phoenix* will not disappoint.

Capt Rosemary A. King, USAF
Onizuka AS, California

I think there is only one quality worse than hardness of heart and that is softness of head.

—Theodore Roosevelt



Mission Debrief

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Richard Szafranski (BA, Florida State University; MA, Central Michigan University) retired from the Air Force as a colonel in 1996 to join the strategic planning and advising firm Tofler Associates. He was the first holder of the Chair for National Military Strategy at the Air War College, Maxwell AFB, Alabama. Colonel Szafranski's duties included staff positions in the headquarters of Strategic Air Command, United States Space Command, North American Aerospace Defense Command, and Air Force Space Command. He commanded B-52 units at the squadron and wing levels, most recently as commander of the 7th Bomb Wing, Carswell AFB, Texas. His writings on military strategy and operational art have appeared in *Parameters*, *US Naval Institute Proceedings*, *Joint Force Quarterly*, *Military Review*, *Naval War College Review*, and *Strategic Review*. Colonel Szafranski is a graduate of Air Command and Staff College and Air War College.



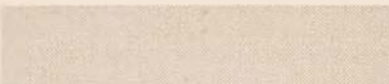
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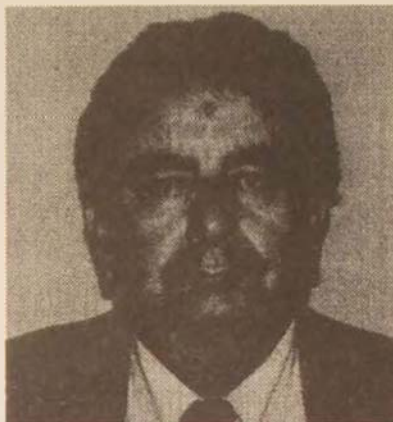
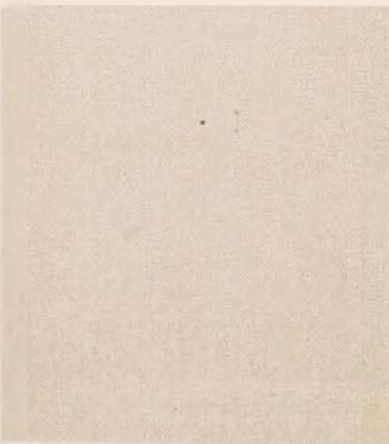
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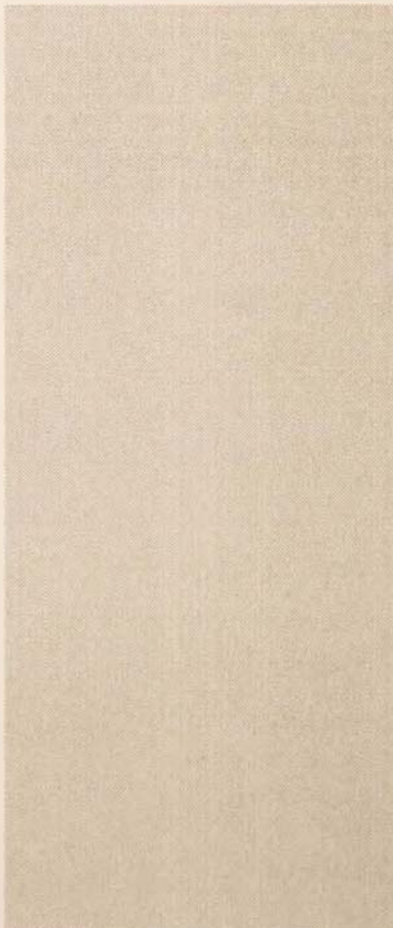
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Dr. Jan P. Muczyk (BS, MBA, DBA, University of Maryland) is the dean and professor of management at the Graduate School of Logistics and Acquisition Management at the Air Force Institute of Technology. Among other positions, Dean Muczyk was a professor of management and labor relations at Cleveland State University, where he also was executive assistant to the president and associate provost of Cleveland State University; associate provost; and Special Assistant to the Provost for Academic Planning. Dean Muczyk is a former Chairman of the Department of Management and Labor Relations. In 1993 he received the James J. Nance College of Business Administration award for Excellence in Service.



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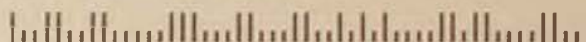
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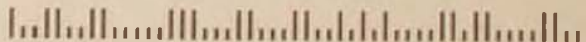
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