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PROVEN FORCE -- PROOF OF CONCEPT FOR THE COMPOSITE WING

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Operations.

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

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The lion's share of USAF tactical air assets participating in Operation Desert Storm were functionally organized by aircraft unit and geographically dispersed among numerous air bases throughout Saudi Arabia and other Gulf Cooperation Council states. In Turkey the situation was quite different. A multiplicity of aircraft units were collocated @ Incirlik AB, and functionally organized into a composite wing under one boss. This was Proven Force. This article considers the advantages of this composite wing organization in the context of Desert Storm; and implications for the future role of composite wings within the USAF. It concludes that the composite wing organization is a force multiplier that offers decisive qualitative advantages over a geographically dispersed air combat structure.

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PROVEN FORCE -- PROOF OF CONCEPT FOR THE COMPOSITE WING

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IN BRIEF

The lion's share of USAF tactical air assets participating in Operation Desert Storm were functionally organized by aircraft unit and geographically dispersed among numerous air bases throughout Saudi Arabia and other Gulf Cooperation Council (GCC) states. In Turkey the situation was quite different. A multiplicity of aircraft units were collocated at Incirlik AB, and functionally organized into a composite wing under one boss. This was Proven Force. This article considers the advantages of this composite wing organization in the context Desert Storm; and implications for the future role of composite wings within the USAF. It concludes that the composite wing organization is a force multiplier that offers decisive qualitative advantages over a geographically dispersed air combat structure.

TACTICAL COORDINATION REQUIREMENTS AND THE AIR TASKING ORDER (ATO)

The primary vehicle for operational control of both Proven Force and southern theater forces was the Air Tasking Order (ATO). The ATO administered the combined force employment of aircraft in time, space, and purpose on a mission-by-mission basis to achieve desired effects with minimum attrition. In broader terms. the ATO distributed the weight of the air combat

effort against critical enemy centers of gravity in accordance with shifting priorities on a theater-wide basis. The ATO proved itself to be an excellent vehicle for centralized control of tactical air assets at the operational level, but it is here that its utility ends. Despite it's extensive length, an ATO does little more than set broad parameters within which a vast amount of tactical coordination may be essential to maximizing combat effectiveness. An example states the case.

Suppose the ATO tasks certain assets with the destruction of enemy command and control facilities. These facilities are defended by anti-aircraft artillery (AAA), numerous surface-to-air missile systems (SAMS), and there are enemy fighter bases in the area. The following information is gleaned from the ATO.

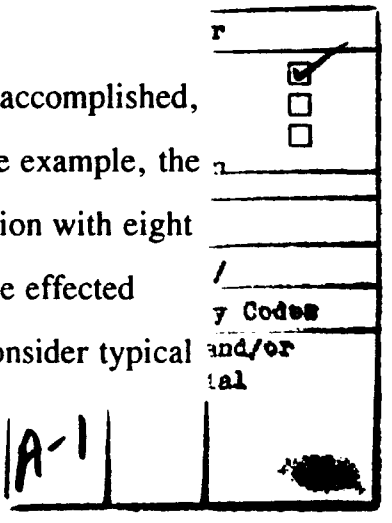
TARGET: Baghdad C^3I

TIME: 1200-1215Z

ASSETS	MISSION
24 x F-16	Destroy the Target*
04 x F-4G	Suppress Enemy Air Defenses (SEAD)
04 x F-16	Suppress Enemy Air Defenses (SEAD)
02 x EF-111	Close-in-Jamming (CIJ)
01 x EF-111	Standoff Jamming (SOJ)
01 x EC-130	Communications Jamming (CIJ)
08 x F-15	Offensive Counter Air (OCA)
02 x F-15	Defensive Counter Air (DCA)
04 x RF-4C	Tactical Reconnaissance (RECCE)
08 x KC-135	Air-to-Air Refueling (AAR)
01 x E-3A	Airborne Warning & Control (AWACS)
01 x RC-135	Electronic Support (ES)

* Mission Commander

The ATO specifies the time and place where said missions will be accomplished, a mission commander, and other generic information. In the above example, the F-16 mission commander may be responsible for tactical coordination with eight different package commanders. Some of this coordination might be effected inflight, but most must be pre-coordinated on the ground. Let's consider typical



coordination requirements in two mission support areas: Suppression of Enemy Air Defenses (SEAD), and Offensive Counter Air (OCA).

SEAD Coordination Requirements -- It is insufficient that SEAD package just show up near the target area and suppress SAMS in the vicinity from 1200-1215Z. First, consider the question of timing. It is quite possible the attack package will be in and out of the target area in less than five minutes. If this is the case, SEAD aircraft will incur unnecessary risks in remaining there for the full fifteen minutes. Timing adjustments may also be required inflight. Consider what can happen if either the attack package or SEAD package are unavoidably delayed -- say beyond a pre-coordinated five minute attack window. If the attack package is delayed and this information is not passed, SEAD aircraft might expose themselves unnecessarily for five minutes followed by entry of the attack package into a high threat area without SEAD support. The problem of timing is basic, but effective SEAD support will require much more than this. SEAD effectiveness may be significantly enhanced through coordination of specific SEAD objectives and procedures. For instance, certain categories of SAM systems in the target area may be made irrelevant to the attack package by virtue of the tactics employed. Other SAMS may be irrelevant because of their location. If Wild Weasels know which SAMS are relevant they will not be distracted by threats that don't count; nor will they expend ordnance unnecessarily. Furthermore, with sufficient coordination, Wild Weasels can give strikers real time information on the location and operational status of SAMS that are a threat to the attack package both in the target area and enroute. Effective employment of EF-111 aircraft in a close-in-jamming (CIJ) role is similarly coordination intensive. CIJ effectiveness is heavily dependent upon the spatial relationship between the EF-111, the threat, and the assets the EF-111 is protecting. In the final analysis then, what is required for effective

integration of SEAD assets is a meeting of the minds concerning the attack flowplan. SEAD assets must know the attack package route, timing along route, enroute altitudes, tactics that will be employed, and so on -- so that they can develop a tactical gameplan that effectively supports mission objectives.

OCA Coordination Requirements -- Effective integration of the OCA package is also relatively complex. Detection of airborne threats will be enhanced by coordination of radar search plans between F-16s and F-15s so that they are mutually reinforcing vice a source of interference. An effective detection, sorting, and targeting process will require coordination between the OCA aircraft, AWACS, and all other players concerning the type of radar control -- and, in most cases, the designation of mission-specific area reference points to aid in the fixing of airborne threats. Procedures may also be coordinated to aid in the identification of friend and foe. Inflight, OCA effectiveness will depend largely upon the spatial relationship between the attack package, OCA aircraft, and airborne threats. Thus, the OCA plan should anticipate and compensate for areas where the attack package may be particularly vulnerable. The threat of enemy fighters from an air base near the target area, for instance, might dictate the formation of a barrier combat air patrol by OCA aircraft throughout the period of the attack. Thus, just as with SEAD, effective integration of OCA assets requires that the counterair gameplan be built around the attack flowplan for maximum support of mission objectives. Ultimately, all three flowplans (ATTACK, SEAD, and OCA) must mutually reinforcing and comprehended by all combatants. In the absence of such coordination, the difficulty of the counterair problem will be multiplied many times. If players are not familiar with each other's flowplans, every unidentified radar or visual contact, most of which will be friendly, must be considered a potential air threat. This has a highly distracting influence in the execution of the primary mission born of the

need for self-defense. The mission impact may be as minor as a route deviation or as critical as a blue-on-blue live-fire engagement. This problem was greatly simplified in the Gulf War because the Iraqi Air Force didn't fly much -- but this may not always be the case. An understanding of the flowplan greatly improves each pilots ability to assess whether a radar contact is a probable friend or foe. Foes are unlikely to fly within the parameters of the flowplan. Friends are unlikely to deviate from the flowplan without informing the package.

Coordination for Contingencies -- All this said, coordination of primary flow plans for ATTACK, SEAD, OCA packages may still be insufficient. More often than not, all participants must grasp a set of related flowplans. A weather backup plan may differ radically from the primary plan and dictate a different flow. A reattack option may be viable and require yet another flowplan. A weather abort against the primary target may require an entirely different flowplan against an alternate target. Without a good understanding of these contingency plans and a way to direct a transition, mutual support between assets will be lost in the chase.

Coordination for Communication -- Finally, we come to the problem of effective communications in the employment of SEAD and OCA assets. The ATO lays out frequency assignments, but little else. The question of who monitors what frequencies and when; and who talks on the radios, and when, how, and why, may be highly mission dependent. To the extent that mission flowplans and objectives have been pre-coordinated, communications requirements will be greatly reduced. Under optimum circumstances, use of the radios will be reserved primarily for the prosecution of threats or other contingencies. On the other hand, if pre-coordination is minimal, the entire mission can become a contingency and extensive communication may be required for integrated employment. This may saturate a primary frequency to a

point where it is unusable and coordinated employment must be forborne. The bottom line is this: the greater the pre-coordination the less the need for inflight communications to execute the mission -- and, the greater the ability of the attack force to adapt to unforeseen circumstances by use of communications.

Having sampled some typical coordination requirements for combined force employment, let's consider how such coordination is effected in a composite wing and among geographically dispersed units.

TACTICAL COORDINATION PROCESSES IN COMPOSITE AND DISPERSED ORGANIZATIONS

Composite Wing Coordination -- In a composite wing, tactical coordination works something like this. The mission commander receives tasking via the ATO, breaks out forces assigned, does a threat assessment, and develops an ATTACK gameplan. Next, he meets with package commanders where he may adjust his plan with respect to their advice. The mission commander and package commanders then develop package support flowplans that buttress the primary attack plan. Package commanders return to their units where support plans are fleshed out in detail; while the mission commander finalizes ATTACK plans and coordination requirements. Finally, a few hours before takeoff, all mission participants gather in a single room where two things happen. First, a master map and a mission coordination card are distributed. The master map depicts mission flowplans. The coordination card summarizes all mission-relevant information (that can be presented in alphanumeric form) on a sheet of paper small enough to fit on a pilots kneeboard. Together, the master map and mission coordination card serve the same purpose that the ATO does at the operational level. They summarize tactical information for the coordination of

airpower in time, space, and purpose to achieve mission objectives. Second, the mission commander briefs all participants on the proper conduct of the mission and probable contingencies. In the course of this briefing, package commanders come forward to brief support plans in context. The primary focus of this briefing is upon the conceptual execution of the gameplan since all mission data has previously been distributed. The end result is that all mission participants know what they are about. They know the objectives, their role in the plan to achieve them, and everybody is reading from identical sheets of music.

Coordination Among Dispersed Units -- Mission coordination objectives among geographically dispersed units are exactly the same as those of a composite wing -- in theory, anyway. The difference is that all coordination must be effected by telephonic or electronic means, or by courier. This limitation is critical for several reasons. At this point let's consider how this effects the mission commander's capacity to transmit and receive accurate information in a limited period of time. Suppose he is limited to use of a telephone -- as was typical in the southern theater during Desert Storm. First, the number of opportunities for coordination are reduced. Nothing new here. Everyone is familiar with the mundane problems associated with reaching someone by phone. The lines are busy. If they aren't busy, the package commander is not available and a message must be left. When he returns the call, you cannot be found. When you finally make the connection it is interrupted -- ad nauseam. Second, in the absence of a conference call, each package commander must be dealt with in serial order. Third, telephonic transmission of information is likewise serial. If a package commander requires a copy of the attack flightplan with geographic coordinates and times you cannot hand him one. Information must be transmitted digit-by-digit by word-of-mouth. Fourth, data transmission errors will be prevalent for obvious reasons.

Alphanumeric information may be misread or misunderstood. Conceptual information may be misunderstood because the sender and receiver do not have the benefit of visual aids (i.e. a map). Additionally, the receiver will copy down some information and "remember" other information. Then, on the basis of the selective and partially inaccurate picture he will transmit an even more selective picture to subordinates for the delegation of mission planning duties. Fifth, there is little or no quality control in this process such as that provided by a master map and mission coordination card. The end result is that both the quantity and quality information that can be transmitted in a limited time may be severely reduced. Moreover, the composite forces involved are not reading from identical sheets of music. In order to offset these limitations, some units in the southern theater took the mission commander out of the planning and coordination process almost entirely. They created dedicated mission planning cells of pilots working through the day or night to plan and effect the lengthy coordination required for upcoming missions. In this case, pilots who commanded and executed missions were not the same pilots who had planned and coordinated them.

IMPLICATIONS FOR COMBAT EFFECTIVENESS

The principal advantage of the composite wing seems simple enough -- the opportunity for face-to-face tactical coordination among assets that are employed in mutually supporting roles. In reality, advantages are much more far-reaching than this. Like money in the bank which can be used to purchase a great many valuable things, this increased capacity for coordination has a broad range of derivative benefits that exist apart from, but are dependent upon, an efficient coordination process. Perhaps the best way to communicate this broad range of

benefits is to focus upon categories of advantages, illuminated by some examples. The principles of war given in AFM 1-1 provide an excellent point of departure in this regard.

The Principle of the Objective -- Direct military operations towards a defined and attainable objective that contributes to strategic, operational, and tactical aims.

This principle presents both the need for an objective and three desirable aspects of that objective -- these being: that it is clearly defined; that it is feasible or attainable; and that it contributes to and is consistent with objectives at higher and lower echelons. Let's consider how an increased capacity for tactical coordination within a composite wing furthers this principle of war.

Every operational objective necessitates that a network of supporting objectives be developed at the tactical level. Ideally, this process continues until every man who will be engaged in battle is imbued with the sub-objectives that apply to him; and understands how his subset relates to the accomplishment of the overall mission. When the test comes, operational effectiveness will depend not only upon the efficacy of this network of objectives, but upon the level of definition, or specificity, with which aims are transmitted. Once again, if SEAD aircraft know the objective is to suppress a particular SAM system, at a particular time, in relation to the particular position of assets they are protecting, they may be much more effective than they would "suppressing all SAMS in the vicinity of northeast Baghdad from 1200 - 1215." They also may reduce risk to themselves. Such is the case with a virtual encyclopedia of mission-specific objectives that are neither defined nor conceived at the operational level. The ATO cannot possibly cut this deep, nor should it try. When mutual support

between units is integral to success, pilot-to-pilot coordination must underpin the tactical solution to the problem and all derivative objectives -- to the last man. The composite wing's innate capacity for such coordination makes this fully realizable in even the most dynamic combat environment. This same capacity furthers objective tests for attainability as well. Operational planners assign mission tasks via the ATO on the basis of limited information and analysis. Time does not permit an in-depth study of the tactical feasibility of every mission in relation to assets assigned. Moreover, in combat, things change. For these reasons, limiting factors may not surface until coordinated tactical planning is well underway. For example, the ATO may not provide sufficient TANKER, SEAD, or OCA support for a particular mission. In the composite wing, tactical coordination is effected quickly. This has the effect of bubbling-up limiting factors more rapidly. Thus, changes can be effected before it is time to step out the door to fly. In the same way, the composite wing is well positioned to test the consistency of operational objectives with their tactical and strategic counterparts. Obviously, an operational objective may be tactically or strategically bankrupt if it is not attainable; but it may be flawed for other reasons as well. When the ATO is published, operational planners may not be privy to real time tactical information which limits or expands obvious operational choices. Thus, tasking may inadvertently impose risks upon forces that are no longer commensurate with rewards; or it may divert forces from objectives now promising higher rewards. The composite wing is far more likely to sense a such requirement for the reevaluation of tasking -- and act upon it -- than geographically dispersed units operating by remote control. For instance, an indigenous tactical reconnaissance capability within a composite wing may provide battle damage assessment (BDA) that makes a reevaluation of operational objectives imperative. In this case, it may not be suitable to risk

assets against targets that have already been destroyed; neither may it suitable to attack lower priority targets while higher priority that have been bombed, remain intact. Similarly, the fortuitous identification of high priority mobile targets may require a reevaluation of ATO tasking. Target area weather may dictate also that ATO objectives be revisited -- and so on. Finally, operational planners may gravely underestimate the tactical risks associated with any given mission. The question arises, upon what basis does a tactical commander either question the merits of operational orders that portend excessive attrition; or execute the mission and report losses? Clearly, a commander is obliged to act in the former regard when he believes attrition will greatly exceed the expectations of operational commanders; but when is this? In the composite wing, such issues are much more likely to be brought to the fore because all information prerequisite to an effective reconciliation of operational and tactical objectives is resident within the organization. The composite wing commander and his staff have a real feel for the tactical situation by attending mass briefings and debriefings; through personal contact with aircraft unit commanders and mission commanders who are flying and leading composite force packages on a daily basis; by virtue of indigenous reconnaissance and intelligence resources, etc. They are also intimately familiar with operational requirements and constraints as a result of frequent dialogue with higher headquarters. The combat intellect of the composite wing commander is greatly enhanced by virtue of these facts. Thus, his capacity and disposition to test the acceptability of operational tasking at the margin is significantly increased. This same capacity is essential to the effective application of a second principle of war.

The Principle of Economy of Force -- Create usable mass by using minimum combat power on secondary objectives. Make fullest use of the forces available.

This principle of war presents two imperatives: the need for the prioritization of objectives, and the need for effective allocation of resources in relation to that priority. Let's consider how an increased capacity for tactical coordination within a composite wing furthers this principle of war.

Foremost, the principle of economy of force may be violated if operational priorities are misplaced. One reason this may occur is because enemy capabilities can vary substantially within a theater. In war, no single set of categorical priorities will be consistent across the entire field of operations. For example, when Iraqi air forces fled north for safe haven from the preponderance of US air forces in within the GCC, air supremacy was declared. At the same time, these Iraqi air forces represented a substantial threat to Proven Force Wing operations by virtue of their location and sheer numbers. In this case, it was essential that operational tasking reflect the fact that air superiority north of Baghdad was still contested by a large Iraqi air force in being. In a similar way, enemy capabilities will vary substantially from target to target. These variations must also be figured into the operational hierarchy on a mission-by-mission basis. Suppose, for example, that the operational priority is destruction of a tight group of hardened targets which are heavily defended by fixed SAM systems. Numerous missions will be required to beat through the roofs of objective facilities. In this case, it may not be prudent to face the SAM threat day-after-day relying upon SEAD to avoid attrition. The most effective route might be to put all available ATTACK and SEAD aircraft against SAM sites on the first mission, so that objective targets can be serviced on subsequent missions

with significantly less risk. Thus, a tactical commander may recommend the operational objective be forborne 24 hours to effect the destruction of enemy air defenses (DEAD). The community of expertise within a composite wing makes it exceptionally sensitive to such considerations of operational priority. Furthermore, the composite wing's capacity for rapid tactical coordination enables it to revisit operational priorities in a timely way. These same qualities contribute to the second imperative for the economical employment of forces -- the allocation of resources in relation to priorities. The operational planner will invariably come up short when attempting to allocate forces in consideration of regional and target-specific variations in the threat. He is relatively insensitive to tactical force requirements for the simple reason that he is sitting in a command post instead of flying point everyday. Thus, if he is routinely allocating insufficient forces in relation the threat, he may remain fully content in ignorance of this fact until one or more aircraft have been shot down. Among dispersed tactical units, the day-to-day perception of the situation may be much more dire. It may be perfectly obvious that someone's number is coming up, but a request for more forces may not be forthcoming because units assume that "this is war" and that "everybody else is in the same boat." Such operational insensitivity is readily apparent when the ATO tasks an identical contingent of support assets for a heavily defended target as it does for one that is lightly defended. The composite wing has a unique capability to reconfigure forces to compensate for such deficiencies. An economical allocation of forces may be achieved by taking support assets from targets where they are not required and reassigning them against targets where they are. In cases where the sum total of forces is spread too thin over several operational objectives, the composite wing is well positioned to recommend that secondary objectives be temporarily forborne. Now let's consider the opposite problem. An operational planner

may also commit excessive forces to objectives. In this case, surplus aircraft may contribute little or nothing to survivability or desired affects. The operational costs of such an error are twofold: surplus forces are put at risk unnecessarily, and/or viable opportunities to achieve secondary objectives may be forfeit. The operational planner may continue none the wiser because his threshold of sensitivity is limited to BDA and attrition reports. Dispersed tactical units may be similarly disinclined to redress this type of operational overkill. They are much more likely to assume that higher headquarters knows something they don't. The composite wing can overstep this pitfall as well. Mass debriefings following every mission and a continuous dialogue among aircraft unit commanders push to the fore any malemployment of assets. In the case of Proven Force, for instance, such a dialogue resulted in the rapid evolution of the F-15 OCA mission in response to an increasingly docile Iraqi air threat -- from that of classic sweep to one of detached mutual support where F-15s established barriers CAPS to prevent the exodus of Iraqi aircraft into Iran. To sum up, the composite wing possesses a composite intellect which is both sensitive and responsive to situations were forces are either spread too thin; or where assets can be released to accomplish secondary objectives in order to make fullest use of available forces.

The Principle of Unity of Command -- Ensure unity of effort for every objective under one responsible commander.

Once again, every operational objective necessitates that a network of supporting objectives be developed at the tactical level. The principle of unity of command presents the requirement that all these sub-objectives be fully oriented towards the primary objective to maximize unity of effort -- and, that a single

commander be responsible for making this so. To understand the advantages of the composite wing in employing this principle of war, it is helpful to first consider how this principle may be undone by the geographical dispersal of assets.

The single commander ultimately responsible for the achieving an operational objective in Desert Storm was the mission commander. Theoretically, he had inflight operational control of assets tasked in support of his mission. He was responsible for the quality of the tactical gameplan; for its coordination; and for its execution. In the southern theater, however, the mission commander was often an invisible commander. He did not always plan or coordinate the mission he was leading. The little contact he did have with the forces under his control was that of a disembodied voice over the telephone or UHF radio inflight. In such circumstances, he could hardly be held accountable for ensuring unity of effort among all his forces. Neither could the forces under his control be held fully responsible implementing the gameplan as he conceived it. In a composite wing, the precise opposite is the case. The mission commander is fully accountable for the effective employment of assets and these assets are likewise responsible to him for correctly executing the gameplan. This relationship is made possible by virtue of the fact that all participants attend mass briefings and debriefings. The mass briefing provides the mission commander the opportunity to inculcate a sense of mission objectives and priorities; to provide a conceptual framework for the execution of the gameplan; and to establish a leader-follower relationship with the forces under his control. As a result, he can employ assets with the confidence that all participants know what they're about -- and, that he has unambiguous operational control of them. In other words, in a composite wing, leadership is ascendant at the mission commander level as well as at lower levels. This has real practical value in a dynamic combat environment. For

starters, everybody is on the right radio frequency at the right time. When a mission commander directs a weather abort, everybody aborts. When a mission commander wants to reconfigure the package inflight based on fallout of assets, he can do so. When mission timing must be slipped, everybody gets the word. As simple as these things sound, they can become insurmountable obstacles for a commander who lacks pre-mission and post-mission access to his forces. Finally, in a composite wing, accountability is made real by the debrief. The mission commander receives constructive criticism of his gameplan and inflight leadership. The performance of forces under his control is also scrutinized. The result is a team approach to combat employment and a continuous improvement in the combat effectiveness of composite wing forces.

The Principle of Simplicity -- Avoid unnecessary complexity in preparing, planning, and conducting military operations.

We have established in previous discussion that a composite wing organization embodies the principle of simplicity in war, but two related consequences of this fact have not been addressed. First, it is by virtue of the simplicity of tactical coordination that relatively complex operations are made possible when circumstances warrant. Second, the time required to coordinate any particular mission is greatly reduced -- therefore, the flexibility and responsiveness of a composite wing is significantly enhanced.

A Capacity for Complexity -- The effective implementation of principles of war not yet mentioned -- such as the *offensive, mass, maneuver, and surprise* -- may often be quite complex and coordination intensive. For instance, maneuvering and massing forces at the decisive point and time in an air-to-air battle may be exceedingly complex, but never the less feasible by way of

effective pre-coordination of an air-to-air gameplan. Efforts aimed at deception or obtaining the element of surprise may also present a high level of difficulty. For instance, while Iraqi air forces were still a threat in northern Iraq, one Proven Force package made a feint at the border to precipitate the launch of enemy CAPS, retrograded to back tankers, and then recommited once enemy air forces were returning to base for fuel. Another package combined a UHF broadcast of a previous mission with electronic jamming in advance of its arrival to effect a similar result. Many other relatively complex electronic warfare operations were conducted with the objectives of deception and surprise, most of which depended upon pre-coordination. Even simple emission control (EMCON) tactics may require pre-briefing to guarantee unity of action; and also to ensure that difficulties imposed by running silent don't outweigh tactical benefits. The bottom line is this -- an increased capacity for complexity within a composite wing leaves a mission commander in the enviable position of being able to weigh the costs and benefits of a greater number of employment options.

Flexibility and Responsiveness -- The ATO has two important limitations which have yet to be addressed. First, it takes a long time to write one. Second, ATO implementation is highly dependent upon the communications infrastructure that effects its dissemination. Both limitations may significantly reduce operational flexibility and responsiveness in the control of tactical air forces. A composite wing is well-positioned to compensate for these limitations. Geographically dispersed organizations are not. Let's consider why.

Once again, the ATO administers the combined force employment of aircraft in time, space, and purpose on a mission-by-mission basis to achieve desired effects with minimum attrition. In broader terms, it distributes the weight of the air combat effort against critical enemy centers of gravity in accordance with shifting priorities on a theater-wide basis. This all works very well when

priorities shift at a rate that is slower than the ATO planning cycle, but when the tempo of combat operations shifts priorities at a more rapid rate, operational control may become spasmodic. Suppose, for instance, that it takes 24 hours to generate and disseminate an ATO; and an additional 12 hours for units to effect tactical coordination and launch. If priorities change significantly within these 36 hours, the operational planner is between a rock and a hard place. If he substantially alters one portion of the ATO it may have cascading effects throughout the rest of the ATO. Thus, large portions of the document must be regenerated and the tempo of friendly air combat operations will be temporarily stalled. Even relatively minor changes may be extremely difficult to effect when they are late-breaking. As takeoff time approaches, an operational commander (or mission commander for that matter) will be loath to attempt to coordinate changes for fear that he will not reach every package commander before the launch is commenced; or because he may force assets into situations for which they are unprepared. Problems of this nature were relatively minor during the air portion of the Desert Storm campaign, but once the ground war commenced they were increasingly prevalent. As progress on the ground accelerated, the ATO could not keep up. It was being rewritten and rewritten until the time required for tactical coordination demanded its release. The principle advantages of a composite wing in such circumstances are twofold. First, the operational commander need not specify all information normally required for the coordinated employment of dispersed forces. He need only provide the target, the objective, and the time. Even the forces to be employed may be left to the discretion of the composite wing commander. Second, the composite wing's capacity for rapid tactical coordination significantly reduces reaction time under such circumstances. During Desert Storm, Proven Force mission

objectives were occasionally altered less than two hours before takeoff and composite operations were launched on time.

The second limitation of the ATO is its dependence upon a vast communications infrastructure. Allied air forces had four months to deploy, test, and reconfigure this infrastructure in preparation for Desert Storm. USAF doctrine clearly cannot depend upon such an advantage in preparation for future contingencies. A composite wing organization dramatically reduces the number of critical lines of communication required for effective composite force operations. In like manner, the composite wings capacity to operate autonomously in the event that higher headquarters are destroyed or lines of communication are temporarily severed is decidedly superior to that of a geographically dispersed air forces.

Doctrine -- Doctrine is a body of fundamental principles which guide the actions of military forces in support of national objectives. It is authoritative, but requires judgement in application.

Thus far, we have considered categories of advantages implicit to a composite wing organization under the headings of various principles of war. These advantages accrue to produce a synergistic increase in combat effectiveness. We can get some sense of this overall effect if we return once again to the idea that the combatants within a composite wing produce a "composite intellect" out of the community of their expertise. The most elite manifestation of this intellect is a greatly enhanced capacity to modify and adapt fighting doctrine in relation to a dynamic combat environment. At the onset of hostilities, and throughout the course of every war, doctrine must continually be revisited. Regardless of how comprehensive doctrine is in peacetime,

modifications will always be required in relation to the particular characteristics of a conflict. From one point of view, war is essentially a battle of doctrines. Most obviously, adjustments will be required based upon our enemy's modus operandi. Furthermore, modifications are likely to be the most profound where the action is -- at the tactical level. We saw this during Desert Storm. Tactical air forces that had been preparing for decades for a very low altitude war in central Europe found themselves operating almost exclusively between ten and 30,000 feet. In this, and in hundreds of other ways, tactical thinking was modified to improve combat effectiveness over the entire course of the war. In his book, The Dynamics of Doctrine: The Changes in German Tactical Doctrine During the First World War, Timothy Lupfer, makes the very compelling case that wars may be won or lost depending upon this capacity to effectively adapt tactical doctrine during war. In this same way, the ability of our tactical air forces to effectively adapt may be critical to maximizing the number of bombs on target with minimum attrition. A composite wing organization offers prodigious advantages in this regard. We can get some sense of these by examining the phases of the process that Lupfer identifies within the German Army during World War I. These include:

. *perception of the need for change*
. *solicitation of the ideas*
. *definition of change*
. *dissemination of change*
. *modification of procedures, organization, and equipment*
. *training and implementation*
. *subsequent refinement.*

Such a process is made extraordinarily difficult within a dispersed air combat structure because there is no forum for evaluating composite force effectiveness on a mission-by-mission basis. Even where there is perception of the need for change, the dialogue required to effect change is severely restricted by inefficiencies of communication. For instance, if a mission commander is dissatisfied with SEAD support on a particular mission, it is possible he might reconcile this with the SEAD package commander responsible; but how does he ensure that the lesson is not relearned again with different SEAD package commanders? Furthermore, unless the deficiency was life-threatening, it is unlikely the mission commander will even bother. He will be repelled by the difficulty of tracking down an individual by telephone and compelled to let the matter go because preparation for the next mission is more urgent. The composite wing is an entirely different beast. Here, there are vested incentives for effective tactical adaptation. Indeed, the process described by Lupfer is a resident operating procedure within the organization. It begins with constructive criticism of performance following every mission in a mass debriefing. Lessons are learned and corrective measures are effected with full access to the expertise and creativity of all combatants. The results are catalytic. The process of tactical adaptation is both accelerated and firmly grounded in composite (or common) sense.

THE RELEVANCE OF COMPOSITE MUTUAL SUPPORT

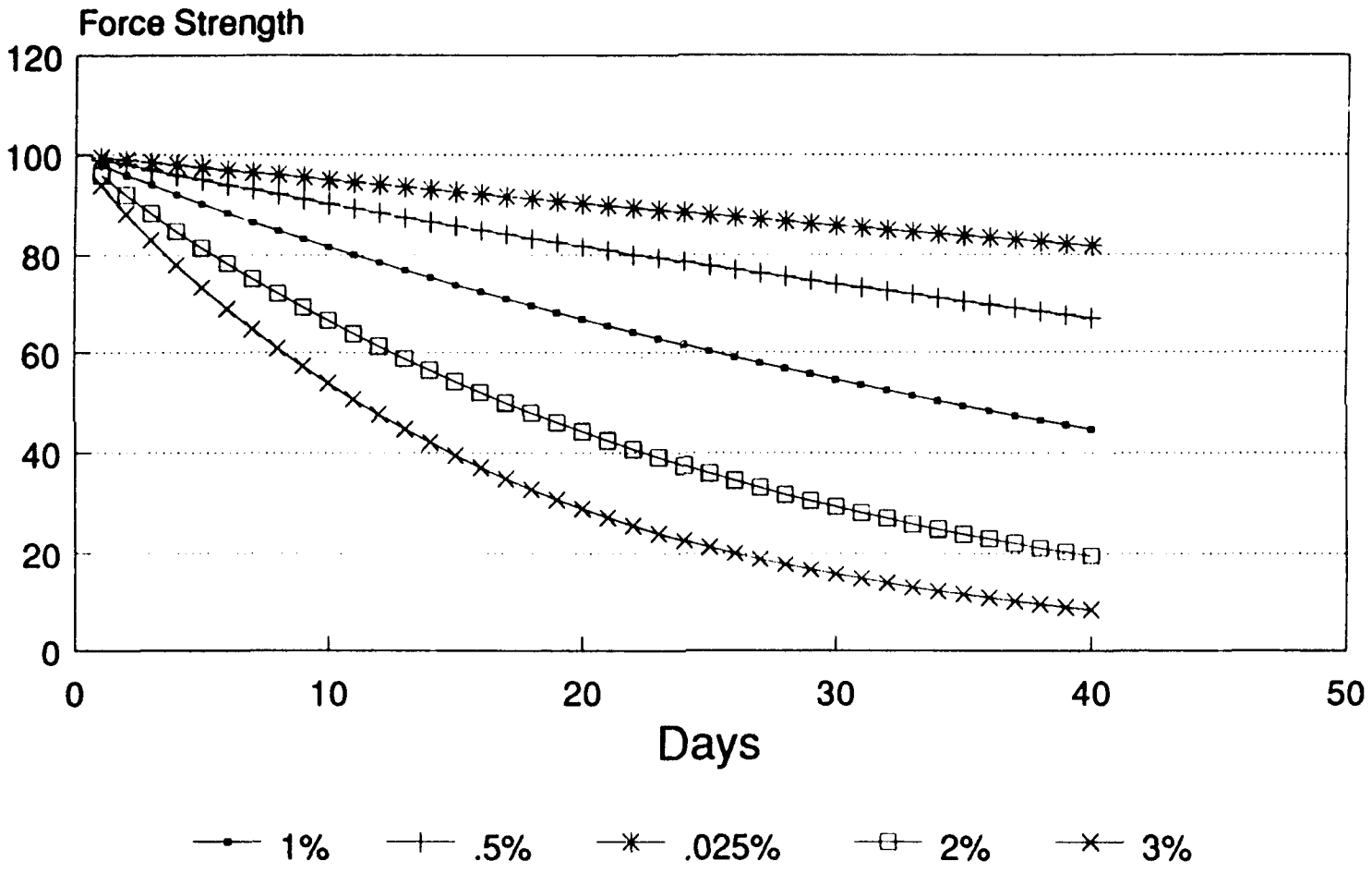
Thus far, our arguments for the composite wing have hinged upon the proposition that composite mutual support between tactical air forces is a decisive component of combat effectiveness. Is it really? In fact, it may be extremely important, or not important at all, depending upon the particular assets

employed and the nature of the threat to be overcome. The F-117 or the B-2, for instance, may be extremely effective in a high threat environment with little or no support. Thus, there may be few advantages to including these assets within a composite wing -- save possibly with tankers. Similarly, one can imagine low threat contingencies where a conventional fighter such as the F-16 may effectively accomplish combat tasks without composite mutual support. In this particular situation, again, a composite wing organization may be irrelevant. Such capabilities and circumstances are exceptional, however. The preponderance of our tactical air forces have been designed, built, and employed upon the premise of composite mutual support. There are excellent reasons for this. When we understand these, we have a much clearer sense of the practical value of composite wings.

Thunderbolts and Eggshells -- The relationship between combat effectiveness and composite mutual support will always be elusive outside the context of a particular contingency. We can, however, get some sense of the parameters of this relationship in consideration of two factors: the fragility of airpower, and the effects of attrition on total force strength over time. In the words of Hoffman Nickerson, "Airpower is a thunderbolt, carried in an eggshell, invisibly tethered to a base." His poetry is brought home in the chart on the following page. It shows the impact of various attrition rates on total force strength over time at a rate of two sorties per aircraft per day. If our attrition rate during Desert Storm had averaged one percent, for instance, we would have expended 56 percent of our tactical air forces in the first 40 days. Had it averaged three percent, we would have expended 92 percent of our forces in 40 days. What this tells us is that extremely small variations in attrition rate have huge consequences for total force strength in a relatively short period of time. It tells us something else as well. Composite mutual support need only effect a small

Impact of Attrition on Force Strength

at two sorties per aircraft per day



change in attrition rate to retrieve, what would otherwise be, significant losses over time. For instance, if attrition can be reduced through composite mutual support from one percent, to one-half-of-one percent, we will preserve an additional 23 percent of our force strength over 40 days. If we push it to one-quarter-of-one percent, we preserve an additional 40 percent of our force strength in the same period. Thus, the argument for composite mutual support turns upon the premise that it can effect such marginal reductions in attrition rate -- and, thereby, provide an extremely powerful hedge against the loss of combat effectiveness over time. Whether or not this is the case will depend, again, upon the special circumstances of employment -- but the central tendencies of air campaigns over the course of this century has led most fighter pilots to believe in their heart that composite mutual support can provide such leverage.

The Evolution of Composite Mutual Support -- One of the most fundamental principles shaping airpower doctrine even before the advent of the USAF, is the idea that the combat power of air assets is not added, but is multiplied, by mutual support between aircraft. A two ship of fighters is much more powerful than two fighters employed singularly. Even prior to World War II, it was realized that this potential for increased combat effectiveness through mutual support transcended both aircraft type and mission. No single weapons platform could bear the full weight of prolific technological advantages that multiplied combat power. The uplifting of specific technological advantages upon one platform has specific costs for that platform. In World War II, bombers carried a great deal of ordnance, but they were slower, less maneuverable, and hence more susceptible to destruction by enemy air forces. Pursuit aircraft carried little ordnance, but they were well-equipped to defend themselves and others. A composite force of bombers and pursuiters allowed for the maximum exploitation of technological means to achieve desired effects with minimum

attrition. In the last 30 years, this basic idea of maximum exploitation of technological means through composite force employment has been a linchpin of tactical airpower doctrine in response to an increasingly complex Soviet threat. It has also been the guiding light in the procurement of tactical air assets. The result has been an extremely well-balanced air force those most distinctive characteristic is its raw versatility -- its potential to configure itself to respond effectively to a broad range of contingencies and rapidly adapt in a dynamic combat environment. This raw versatility, however, is just that -- a raw potential. Realization of this potential depends entirely upon effective tactical coordination between assets. This, in turn, is highly dependent upon the physical organization of forces. We have now reached the edifice of our argument. In a composite wing, *the mission* becomes the organizing principle for the collocation of forces to exploit opportunities for composite mutual support in relation to particular contingencies. This then, is how composite mutual support *is made* relevant to combat effectiveness; and how eggshells can sustain lightening bolts across the broadest spectrum of conflict.

EPILOGUE

Revisiting Iraq -- On the face of it, a comparative analysis of the Proven Force and southern theater organizations may seem a futile exercise. After all, if combat performance in Desert Storm is our yardstick, then every organization must be considered a winner. This article looks beyond our success. USAF combat effectiveness was by no means fully tested in this decidedly one-sided war. Thus, many of the real lessons learned do not lie in the tabulation of end results, but in consideration of how *effectively* they were achieved under the operative conditions -- and, even more importantly, in consideration of the *sensitivity* of results to broad range of adverse circumstances that might have

developed, but did not. This must be the cardinal point of view for any forward-looking appraisal of our air combat operations in Iraq.

A New World Order -- The international security environment is transformed with the collapse of the communist body politic. During the cold war, the perilous consequences of a full scale conflict between the US and the Soviet Union were counterbalanced by a disposition towards rational action on both sides. This lent a measure of predictability to the rest of the world. Both superpowers had a vested interest in exercising their enormous influence to control regional conflicts. With some notable exceptions, oceans of instability were held in suspended animation by this tension. As we transition towards a one superpower world, we may find that hostile states turn increasingly to military action to settle their disputes. The nature of these conflicts will depend upon the various circumstances of individual states -- leaving us with a broad range of possible contingencies to consider. Wars may be fought in any operational environment. They may be wars of terrorism, insurgency, conventional wars with modern weaponry, or wars fought on the cheap with nuclear, biological, or chemical (NBC) weapons. Wars may begin at the hands of irrational actors, thereby scuttling efforts to predict and forestall crisis. They may be fought without the support of traditional allies, as the threat that brought about the current structure of alliances recedes from view. Our national policy and strategy are driven by assumptions regarding the nature of wars we may fight, the probability of engagement, and the consequences of failure in defending our vital interests. In the past, probable and worst case scenarios readily presented themselves as a baseline for planning in the form of the Soviet threat. The situation is now is quite ambiguous.

A New Military Posture -- US policy guidance regarding our future force posture is not ambiguous. The force will be reduced 30 percent from its cold

war high by the mid-1990s. The defense budget will decline to less than three percent of GDP. We will transition from forward defense to forward presence, significantly reducing US military forces overseas. With a reduced force size and an increasing reliance upon our capacity for crisis response, the USAF must look for new ways to be effective -- to hedge these national military policies against growing global uncertainties. In this regard, the potential versatility and effectiveness of a composite wing presents imperatives for a reevaluation of the peacetime organization, doctrine, and training of our tactical air forces. In fact, this is happening. Proven Force helps explain why.

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