Air Mobility Command and the Objective Force: A Case for Cooperative Revolution

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NOW IS A GOOD TIME to explore the correlation between US Army modernization programs and those of the US Air Force's Air Mobility Command (AMC). The Army is in the midst of a fundamental organizational and conceptual transition toward the Objective Force. Whatever its final form, the Objective Force will greatly depend on the ability to deploy rapidly by air.[1] AMC likely will remain the Army's primary source for high-capacity airlift for both inter- and intratheater movement.

Army aviation may evolve to provide specialized portions of the Objective Force's battlefield and perhaps theater air-mobility support. But any effort to replicate AMC's extensive capabilities in the common-user fleet would be wasteful and doubtfully viable in the defense budget process. The Objective Force will not be established fully for 20 years or more. This corresponds roughly to the time required to develop and field any new required aircraft and support systems. It is time to review the Army and AMC modernization programs because the future Army will need abundant air-mobility support. AMC will be the source for most of that support, and there is time—perhaps just barely—to adjust one or both programs to accommodate emerging requirements and technological opportunities.

The Objective Force's Air Mobility Requirements

The Objective Force is the Army beyond 2010. The Objective Force concept emerged from an Army transformation process that began with the Louisiana Maneuvers in 1992, followed by the Army After Next development program that began in 1996, which was adjusted because of the Army's difficult mobility experience during the movement of Task Force *Hawk* in 1999. With the greater complexity of the strategic environment and rapid development of precision weapons, senior Army leaders saw the need for revolutionary change in doctrine, organization and equipment.[2] Their vision is to develop a force that is "deployable, agile, versatile, lethal, survivable, sustainable and dominant at every point along the spectrum of operations."[3] The US Army chief of staff has called for these developments to "enable our divisions . . . to transition rapidly from one point on that spectrum of the future security environment to another."[4] Deployability is an important element of this vision. AMC Commander Major General Charles S. Mahan Jr. stated recently, "You are not relevant if you can't get to the fight."[5]

The Army's transition program has three main axes.[6] The core axis consists of doctrinal and technological developments that lead to converting most of the Army's combat units into a standardized Objective Force configuration. Meanwhile, the Army continues to modernize its "Legacy Force" to preserve its combat capabilities until its units convert to the Objective Force standard. The Army's third transformation axis is a program to transition up to eight of its brigades into interim brigade combat teams. In the near term, this program will allow land commanders to deploy medium-weight, highly mobile forces to crises. The transitional brigades' intermediate objective is to provide unit platforms upon which to refine the Army's understanding of the Objective Force.[7] In the long term, these units also should convert to the Objective Force standard.

The distinguishing characteristics of transitional brigades and the Objective Force are their technological philosophies. The initial brigades at Fort Lewis, Washington, are equipping as medium-weight mechanized units based on off-the-shelf combat vehicles and other equipment. The interim brigades likely will field more-advanced interim armored vehicles and other materiel.

The Objective Force's technological hallmark will be the Future Combat System (FCS). The FCS will be a common vehicle or system of vehicles whose variants will serve as main fire-support vehicles, troop carriers, engineer and transport vehicles, and perhaps self-propelled, indirect-fire-support platforms.

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Although the FCS is still only a concept system, service planners expect that its weight and logistic requirements will be far lighter than current battle tanks and armored fighting vehicles "but still [will] be able to handle any threat."[8] Planners expect the system to achieve power and survivability through advanced weapon and protective systems; tactical agility; extensive fire support from land- and air-based systems; digital links; and organic reconnaissance, surveillance and target acquisition (RSTA) support.[9] The FCS will be "the materiel centerpiece of the Army's effort to create a force that has something like the deployability of current light forces and the hitting power of current heavy forces."[10] Acknowledging the FCS's central importance to its future, the Army announced in January 2000 that it would spend $870 million between 2001 and 2005 to develop the system for fielding by 2012, about 13 years ahead of schedule.[11]

The success of these transition axes depends on global and theater air mobility. The Objective Force will be able to deploy a brigade anywhere in the world in four days, a full division in five days and five divisions in 30 days.[12] Clearly, the "4-day" brigade could only go by air. Army logistic planners are considering very fast ships (55 knots+) to move some of the initial combat elements, nearly all of the sustainment requirements of the "5-day" division and most of the "30-day" force. Those planners assume that initial and some follow-on forces and sustainment will have to move by air. Accordingly, the Army has predicated the Objective Force's physical characteristics on the carrying capacities of the C-5, C-17 and C-130 fleets. In describing vehicles and other combat systems that would go into the initial brigades, one Army spokesman said simply, "If it doesn't fit into a C-130, it doesn't go into the brigade."[13] This restriction also applies to the FCS that Army planners expect to "weigh no more than 20 tons and fit into a C-130."[14] Thus, to an unprecedented extent, the Army is counting on air mobility.

The Objective Force will depend on AMC to support operational-level missions. For example, in a forced-entry scenario, light forces, such as Ranger, airborne or Marine units, will likely still secure aerial ports of debarkation required to receive air-delivered objective units. Once on the ground, medium-weight units will be able to defend or launch offensive operations as required. For offensive power, they will operate with air forces and long-range, land-based fire-support systems.[15] If required, joint force commanders (JFCs) will be able to reinforce medium-weight units with traditional heavy mechanized forces, whose equipment usually will arrive by surface transport. Army leaders and planners anticipate that the Objective Force will give JFCs unmatched flexibility to flow effective combat power into crises or conflicts. This ability will be largely, if not completely, contingent on the availability of appropriate strategic airlift.

Tactically, the high incidence of deep, nonlinear operations anticipated for some of the Objective Force's employment concepts suggest that future Army commanders often may have to depend heavily on theater airlift for success. In a recent article, General Robert H. Scales Jr. suggests that airportable Army combat units would enable the United States to apply a balance of fire and maneuver against its enemies.[16] He compares a scenario using his concept with an air-only campaign to punish the Iraqis for blocking the UN inspection program: "Imagine how much more compelling the impact of military action . . . had we had the ability to follow tactical aircraft and cruise-missile strikes with a sudden aerial assault by hundreds of individual ground units, each capable of landing safely near a known or suspected site and commanding it by direct observation and covering it by fire."[17]

To make such a scenario possible, Scales argues that such a ground force's logistic and maneuver forces would "increasingly have to be delivered by air." Air transport also would "guarantee safety and lower casualties," he claims, since "a force mobile through the air will be practically immune from . . . missiles tipped with weapons of mass destruction."[18] While Scales' proposal raises questions from strategic and warfighting perspectives, its logistic implications are indisputable; if the Army intends to fight that way, it will need agile, capacious and survivable theater airlift support, and lots of it.

The Objective Force's implications for air mobility force structure are not hard to discern—the Army will require national air-mobility support that can make good on AMC's unofficial motto to deliver "anything, anywhere, anytime." To engage in many future conflicts, the Army must access global air mobility that can transport its forces over transoceanic distances, deliver them into any theater and support them as they maneuver and fight on dispersed, nonlinear battlefields. Moreover, those air-

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Prototype high-mobility artillery rocket systems (HIMARSs) taking part in battalion maneuvers with the XVII Airborne Corps, 1999.

Field Artillery Journal

mobility forces probably will have to function where the hostile air defense environment is fluid. Since the Army will not likely be able to pick its future battlefields, its air-mobility support forces must achieve a high level of throughput into even austere aerial ports of debarkation. Army war games and studies have shown that on many battlefields, the Army's ability to maneuver effectively will depend on a reliable theater air-mobility system that can move major forces on any terrain in any weather. The Army Transformation Wargame 2000, for example, involved a multiple-brigade force's operational-level air movements, first to "rip out the enemy's rear, and then to block his retreat from the advance of a friendly coalition army."[19]

The logic of the Army's requirement for agile and high-capacity airlift support for deep maneuver units is compelling. To be effective and survive robust enemy forces, units must move continually and unpredictably to engage the enemy selectively and avoid entrapment. To move continually and unpredictably, units must shed most of the organic supply and support that traditional mechanized units lug around the battlefield. To risk reducing their supply trains, maneuvering units must be confident that the air-mobility system will support them continually under any circumstances. To support unpredictable movement, the air mobility system must be able to put down a given supply increment quickly to reduce the receiving unit's vulnerability.

A notional scenario illustrates how air-mobility support might work for an Objective Force brigade in deep maneuver. A maneuvering brigade commander foresees that in about 12 hours his unit will be in position to receive supplies. Imagery indicates that his force will pass onto a series of large grain fields surrounded by relatively open terrain 100 kilometers out. The brigade commander directs the S4 appropriately, then proceeds on through the enemy's rear areas. About 14 hours later, the battalions approach the edge of the agricultural area. As they roll in, still deployed for battle, the horizon is dotted with advanced theater transports.

Using a dozen landing zones that unmanned aerial vehicles and the Air Force Tactics Team identified and marked in the past two hours, the aircraft land alongside or among specific units. The aircraft's extremely short-landing rolls and low-ground pressures make operating on ribbed, moist soil routine. Immediately, individual companies cycle their vehicles to predesignated, marked aircraft to draw fuel, ammunition and other supplies. Ill and injured soldiers and a few damaged vehicles are loaded onto the aircraft. Meanwhile, a package of sensors and manned and unmanned strike aircraft maintain security overwatch. Two hours after the first aircraft

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lands, the last one takes off, leaving the battalions fully supplied and free to maneuver and fight for several days.

For now, senior Army leaders are not confident that the Objective Force will have the air mobility for such operational deployment or sustainment. Mahan has announced that "the Army cannot expect that its needs will always be at the top of the priority list . . . [H]aving a million C-17s [does not matter] if they are not going to be put at the disposal of the Army deployment."[20] The Army is also concerned about future theater airlift capabilities, both in articulating its relatively high-speed, high-range requirements for the joint transport rotorcraft and through discussing possible follow-on aircraft to the C-130 with aircraft manufacturers.[21] These concerns about priority and giving traditional fixed-wing ranges to helicopters suggest the need to assess the National Air Mobility System's (NAMS') likely availability and capabilities.

Current and Future AMC Capabilities

Overall, AMC's modernization planning focuses on preserving or enhancing existing capabilities, partly through acquiring new aircraft and support systems but mainly through upgrading the existing fleet. *AMC's Strategic Plan 2000* is the roadmap for modernization efforts for the Mobility Air Forces.[22] The plan addresses air mobility as a system of systems, combining airlift, air-mobility support and aerial refueling into an integrated whole. This air-mobility triad is the backbone of sustained combat operations, allowing the command to project air- and landpower rapidly and flexibly. Air mobility depends on the combined efforts of the Active, Air Reserve (Guard and Reserve) and commercial components of the NAMS.[23] Each component makes unique and important contributions to the Air Force's ability to move the Army.

Two aspects of force planning need emphasis. First, no single aircraft design will optimally fill all of the Objective Force's movement requirements. Given the almost limitless range of time constraints, operating distances, load configurations, threat circumstances, terminal characteristics and other operational factors, the Air Force must field a family of air-mobility aircraft and systems. Such a multisystem fleet gives the Air Force flexibility to perform its overall air-mobility mission *optimally*, even if it reduces its ability to perform any specific mission *maximally*. Therefore, Army planners should evaluate the AMC modernization program as a broad effort to serve the full range of authorized military users in accordance with National Command Authority and joint movement priorities. They should evaluate specific aircraft as pieces of a system, paying particular attention to terminal requirements and the internal dimensions of cargo bays, which are the characteristics that will most constrain the ability to support land forces.[24]

The second aspect is the typical difference between the gross and practical throughput capacities of the fleet or a portion of it when applied to a particular mission. Gross throughput capacity is the ability to move cargo and passengers over a given route, including its debarkation terminals. It is calculated by dividing the fleet segment's notional ton-mile capacity by the round-trip distance of the route being flown. For example, a fleet of 10 C-5s expected to carry 100 tons of cargo each, at 440 knots, for eight hours per day to a point 4,000 nautical miles away has a gross throughput capacity of about 465 tons per day. But factors such as weather, terminal limitations and crew-management restrictions might substantially limit practical throughput.

For example, during the 1999 movement of Task Force *Hawk*, physical characteristics of Rinas Airport sharply limited AMC's practical throughput into Albania. The command could not apply its full capacity to the movement because the airfield could not accept more than two C-17s on the ground at once. In gross capacity, AMC could have made the movement in a few days, but its practical throughput capacity, under the circumstances, meant the movement would take a month. Thus, Army planners should understand that concepts and force-structure plans based on the aircraft or fleets' gross capacities can overestimate the actual productivity those systems will achieve in real-world contingencies.

AMC modernization plans begin with the commercial airline industry that is the core of the NAMS. In gross-lift capabilities, the commercial segment dwarfs the military component. The 723 aircraft in the Civil Reserve Air Fleet (CRAF) provide more than 90 percent of the military's readily

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Tents, vehicles, helicopters, connexes—and a C-17—vie for space at Rinas Airport in Kosovo.

US Air Force

available passenger lift and about 40 percent of its net cargo capability.[25] There are legal and practical limitations on the military's use of the voluntary CRAF and its civilian crews in hazardous conditions and on the kinds of military materiel it can carry. Also, commercial aircraft normally operate from long, paved runways, a requirement that greatly restricts their flexibility for military mobility. Nevertheless, the CRAF will continue to be a mainstay of American airlift capabilities, so its modernization is important. AMC's approach to CRAF modernization includes continued economic incentives and program refinements to retain air carriers and modern, high-capacity aircraft. So far, the command considers the program a success and sees no reason why it will not continue to function.[26]

As the spotlight system of the NAMS military component, the C-17 epitomizes the Air Force's long commitment to providing the Army with foxhole-to-foxhole lift. The C-17 Globemaster III can carry any Army armored fighting vehicle, a self-propelled artillery system, 102 troops, 36 litter patients or up to 18 standard cargo pallets weighing up to 80 short tons. Moreover, the direct-delivery C-17 can deliver loads over transoceanic distances to austere forward runways as short as 3,000 feet.

Because the C-17 is so capable and important to so many users—especially the Army—the Air Force is pursuing several initiatives to improve the fleet's capacity and availability. The Air Force is funding extended-range fuel tanks to go into new aircraft after July 2001. These tanks will add about 700 nautical miles to the aircraft's range with a normal payload. AMC's analysis shows that this seemingly modest increase in the Globemaster's range will increase its productivity greatly in many deployment scenarios, even as it decreases the aircraft's demand for air refueling support and en route basing.[27]

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The Air Force is working also to reduce the time required for C-17s to drop an airborne brigade from a current 51 minutes to 30 minutes or less. Initiatives in this area include allowing the aircraft to drop two rows of heavy-equipment pallets in a single pass, installing improved formation station-keeping equipment to allow it to cross drop zones at closer intervals and installing improved systems for personnel drops. When fully implemented in the next couple of years, these three initiatives should allow a C-17 force to deliver an airborne brigade in 26 minutes.[28]

Perhaps the most important decision the Air Force faces is whether to buy more C-17s. Current plans call for an in-place fleet of 134 C-17s by the end of 2004.[29] Those aircraft are coming into the fleet just as the last of more than 250 C-141s retire. The new C-17s will bring more gross capacity into the airmobility system than the retiring C-141 Starlifters will take out. But the net loss of airframes will reduce the airlift fleet's flexibility and increase the competition for airlift support. Accordingly, AMC continually evaluates opportunities to improve the C-17 fleet's flexibility and gross throughput capacity, including a recent, unsolicited Boeing proposal to produce 60 more aircraft after the current production run ends. But 60 C-17s and their support structure are definitely big-ticket items, so military planners must extensively research any decision.[30]

The C-5 Galaxy remains important to the military airlift fleet, but it desperately needs a major overhaul. This workhorse can lift up to 150 tons and 36 pallets of cargo over short distances or, more realistically, about 102 tons for 2,200 nautical miles.[31] It also is the only aircraft that can carry a fully loaded Abrams tank and operate into 5,000-foot runways at maximum gross weights.[32]

To keep the C-5 on line, AMC has launched a mid-life update program, installing new engine turbines, new avionics and other components, and eventually new engines on some or all of the fleet. The turbine program is under way, but funding for the system and engine upgrades is not yet secured.[33] Army planners should not underestimate the importance of securing that funding. Currently, the C-5's mission-capable (MC) rate is down to about 59 percent. For war-planning purposes, its desirable MC rate is 75 percent.[34] The current shortfall equates to a loss of 6 million ton-miles per day (MTMD) from the 49.5 MTMD total airlift capacity goal called for in current Department of Defense (DOD) planning. Taken together, the C-5's turbine, system and engine upgrades should bring its MC rate to approximately 76 percent.[35]

From an Army perspective, perhaps the most important airlift modernization after the C-17 is the C-130 Hercules. Because of its ability to operate in and out of unpaved runways as short as 2,500 feet, with a cargo box of 9 by 10 by 40 or 50 feet and a gross lift capacity of about 18 tons, the Hercules remains the best airlifter to provide general movement and sustainment support to Army forces in the field. Army leaders recognize that the C-130 fleet will likely be their primary source of fixed-wing airlift support for the indefinite future.[36]

To keep the C-130 ready the Air Force is investing billions into modernizing the current fleet and buying new C-130Js. The so-called C-130X program involves modifying most of the 21 different aircraft models, "rationalizing" them to a common configuration.[37] Rationalizing the serving fleet will greatly reduce maintenance costs and deployed logistic footprints while increasing the aircraft's overall productivity. As the C-130X program proceeds, the Air Force will retire older, unmodified aircraft and replace them with the more-capable C-130J. The new C-130J will fly faster and farther with a given load, will take off from somewhat shorter fields, and some will have longer cargo decks.[38] The C-130J will improve the Air Force's ability to move medium-weight units over transoceanic distances and deliver them to a wider range of terminals. Working with the C-17, the improved C-130 will give joint commanders better options to mix land forces into their plans.

To support the Army's future Objective Force, AMC and the Air Force are looking at other systems to improve their ability to deliver and support land forces. At the high end of the spectrum, AMC is considering an advanced theater transport. Among the designs being considered are tilt-rotor and inclining-wing concepts that potentially could get 30-plus ton loads in and out of runways as short as 500 feet.[39] Such aircraft would employ sophisticated aerodynamic and control system features that would make them expensive development projects. AMC is also developing a mission-needs statement for a precision airdrop system that

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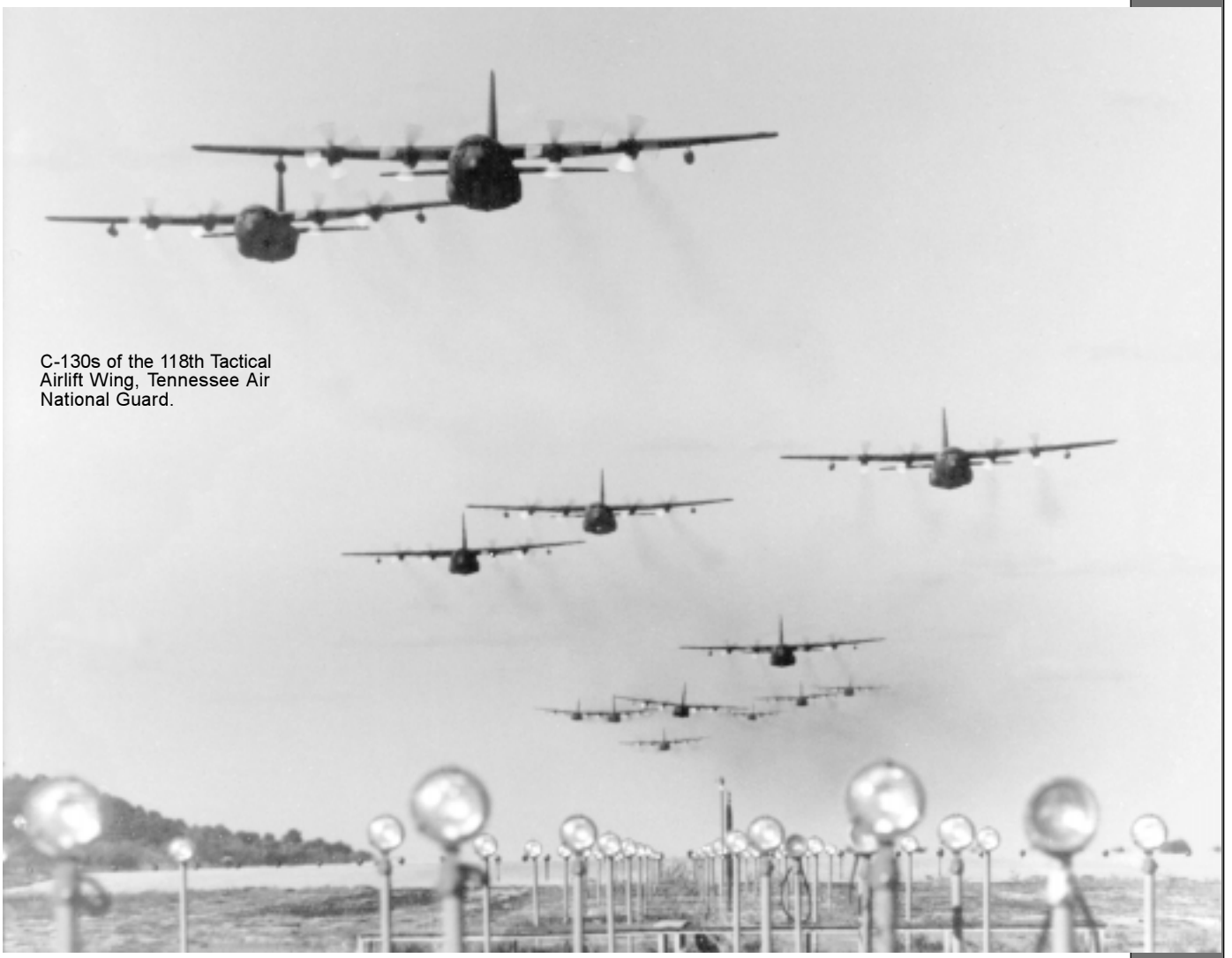

C-130s of the 118th Tactical Airlift Wing, Tennessee Air National Guard.

US Air Force

can deliver 2,000-pound supply bundles from 20,000 feet with an accuracy of 10 meters or less.[40]

The advanced theater transport concept is particularly attractive since it would allow delivery and extraction of medium-weight fighting systems and their supports at a much wider range of airland terminals than is now available. The precision airdrop system also holds promise, although it would not provide a backhaul capability and might load down a maneuvering unit with a lot of expensive airdrop equipment.

The second segment of the air-mobility triad is aerial refueling, which allows Air Force transports to carry greater loads farther. A few examples can illustrate the importance of this concept. One advantage of designing the FCS to fit into a C-130 is that a C-17 or C-5 might carry several of them.[41] That, in turn, should allow medium-weight objective brigades to close more rapidly in forward locations. But, if the Army wants to fill up a C-17 with FCSs, the Air Force will have to refuel the transports in the air to get them across the oceans without delay-inducing refueling stops. Even with the extended-range tank modification, a C-17 carrying its maximum

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Kosovo provides an example of the flexibility that air refueling provides to Army mobility. At the end of the conflict, C-17s simultaneously delivered US units to Pristina, Serbia, to participate in NATO operations and redeployed Task Force *Hawk* units back to Germany. By relying on air-refueling support for their return legs, the C-17s carried maximum loads into Pristina; shuttled empty to Tirana, Albania; departed there with maximum loads again; and refueled over the Adriatic Sea to make it the rest of the way home. Without air refueling, the Army's movements would have been slower and more expensive. Thus, Army planners should watch with more than academic interest as the Air Force develops and refines its plans to replace the more than 500 tankers in its current fleet. From the perspective of Objective Force deployment and support, the net effect of the AMC modernization effort should be assessed from at least three perspectives.

Lift priority. AMC's planning will result in an air-refueling and airlift fleet that will likely meet the Army's four-day brigade-deployment window but probably not the five-day division movement and the 30-day, five-division requirement under no circumstances. Even the Air Force's ability to meet the four- and five-day windows is contingent on the combatant commanders' priorities. Projecting even a brigade to Europe in four days will consume almost every bit of the airlift the Air Force can muster. Given the competition for airlift in the early phases of any major theater war, Army planners should anticipate tough battles over lift priority.

Infrastructure requirements. The infrastructure requirements of AMC's evolving airlift fleet will limit its ability to move the Objective Force over strategic distances. To achieve the high throughput the Objective Force's deployment windows require, the Air Force's large, fixed-wing military transports (C-5, C-17) need aerial ports of debarkation with relatively long runways (about 8,300 feet for the C-5 and 3,000 feet for the C-17), large parking ramps and possibly substantial fuel supplies.[43] If CRAF is involved, runways must be in the 10,000-foot range, the parking ramps much larger and the threat level low. Consequently, even in developed regions, the enemy will not have to make too many guesses about where the airlift flow will be going, especially to deliver something as large as a brigade, let alone a division.

Restrictions. At the operational level, airlift infrastructure requirements will restrict maneuver. The C-130 can operate into airfields in the 2,500-foot range. But, even those aircraft need hard-packed runways and parking ramps large enough to handle sufficient aircraft to keep sustainment pauses short. Notionally, if the resupply increment for a maneuvering brigade were 300 tons, the ideal C-130 field would park about 20 C-130s at one time with enough dispersal to allow individual units to resupply directly from the aircraft while maintaining battle formation. Anything smaller would require multiple waves of C-130s, with each wave increasing the time required to resupply a unit and its consequent vulnerability to enemy detection and attack.

Army mobility planners should carefully review maneuver expectations for the Objective Force, particularly the promise to give maneuvering commanders great freedom to pick the time and place for pausing to receive sustainment by air. The Air Force's objective airlift fleet has by far the world's most capable equipment, capabilities, doctrine and training. That fleet will likely satisfy most, if not all, of the Army's future maneuver support airlift requirements but it will not be able to generate a high throughput at every location. Army planners must understand Objective Force maneuver in terms of Air Force airlift. Depending on final shortfalls and costs of rectifying them, the Army must decide whether to live with them or try to convince DOD to fund new Army aviation or Air Force assets and capabilities.

Policy Implications

Perhaps the most important policy implication is that the Army and the Air Force should not continue air mobility planning efforts without close coordination. If the Army plans to use air-deployable medium forces and routine nonlinear operations, the Air Force and AMC must consider how they equip, organize and train the air-mobility fleet. This need will become more acute once combatant commanders begin to factor interim brigades into war plans. Likewise, as the Army refines Objective Force visions and concepts, it must review how they relate

to the capabilities and limitations of the objective air-mobility force. A major disconnect between the two could leave the Army with a "castle in the air."

These considerations suggest that single-service transition planning may be as passé as single-service warfighting. In most cases, the general success of major service warfighting concepts, such as nonlinear warfare and the Air Force's "halt phase," will depend on direct cooperation with other service or functional components. In any case, funding any particular concept will come at others' expense. Thus, there is no merit in arguing that a service's warfighting ideas are its own business. Major General James Dubik, Deputy Commanding General for Transformation, Training and Doctrine Command, recently said, "The Army is building a combat force that can compel people in the full spectrum of combat . . . in joint and combined operations because there are no single-nation or single-service operations anymore."[44] For that reason, the Army must insist on and exploit the cooperative expertise of airmen during this vital effort to revolutionize land warfare. ***MR***

NOTES

1. For a recent view from outside the Army, see Hans Mark, "Complementary Technologies Critical to Military Transformation," *Defense Daily*, (5 July 2000) 1.
2. General Dennis J. Reimer, "The Army After Next: Revolutionary Transformation," *Strategic Review*, (Spring 1999), 41; and MG James Dubik, Deputy Commanding General for Transformation, TRADOC, interviewed by Scott Gourley, *Janes Defence Weekly* (11 October 2000), 48.
3. *National Defense*, "Army To Trim War Wish Lists So It Can Deploy In 96 Hours" (April 2000), 26.
4. General Eric K. Shinseki, "Remarks at the Eisenhower Luncheon at AUSA on 12 October 1999," Army Public Affairs Homepage, online at <www.dtic.mil/armylink.>
5. Army Public Affairs Homepage, "Army Announces Vision of the Future," *US Army News Release #99-095* (12 October 1999), 1, online at <www.dtic.mil/armylink>.
6. The author thanks LTC William Hix, Patrick Holder and Rich Bierre for providing much of this overview of the Army's transition planning during a roundtable interview on 16 June 2000.
7. COL Joseph Rodriguez, "Status of Brigade Combat Team Development at Fort Lewis and the Planned Performance Demonstration at Fort Knox," transcript of TRADOC Press Briefing (16 December 1999), 1, online at www.army.mil/armyvision/briefing_tradoc_press.htm>.
8. *Defense Week*, "Search For Future Combat System," (24 January 2000) 1.
9. "The Army's Future Combat System," *Armed Forces Journal International* (McLean, VA: Armed Forces Journal, International, Inc. May 2000), 25.
10. Ibid.; Hix, Holder and Bierre.
11. "Search for Future Combat System," 1.
12. Shinseki, 5.
12. Rodriguez, 1.
14. *Defense Week*, 1.
15. Mark, 1.
16. Major General Robert H. Scales Jr., "A Sword With Two Edges: Maneuver in 21st Century Warfare," *Strategic Review* (Spring 1999), 45-54.
17. Ibid., 52.
18. Ibid., 53.
19. Hix, Holder and Bierre.
20. *Inside the Army*, "Alternative Strategies Needed to Counter Future Airlift Limitations" (15 May 2000), 1; Army Deployment Modeling Office, "Army Transformation Wargame Deployment Brief," Fort Eustis, Virginia (30 April 2000); Neil Baumgardner, "Army Transformation Wargame Demonstrates Objective Force Capabilities," *Defense Daily* (5 May 2000), 1.
21. Andrew Koch, "US Army's Futuristic Look to Next-Generation Rotorcraft," *Janes Defense Weekly* (15 March 2000), 8. Koch reported that the Army's specifications called for an aircraft with a "500km-1000km operational radius . . . speeds exceeding 175 kt . . . [and] a global self-deployment range of 2,100n miles."
22. *AMC's Air Mobility Strategic Master Plan 2000* , is online at <www.amc.af.mil/xp/index.htm>.
23. For a discussion of the structure and interrelationships of NAMS, see Robert C. Owen, "The Airlift System: A Primer," *Airpower Journal* (Fall 1995), 16-29.
24. "Terminal requirement" refers to the drop-zone or landing-zone characteristics required to support the operation of a particular aircraft. Cargo box refers to the internal dimensions of an aircraft's main cargo deck, but it also should include floor strength. Military air transport floors are designed to support the weight of heavy vehicles or other dense loads, while commercial aircraft floors often cannot support such loads.
25. Interview with MAJ Victor DelMoral, Headquarters, AMC/DOF (9 June 2000).
26. Ibid. Economic incentives for scheduled airlines include the GSA City-Pair program valued at $1.8 billion per year. Incentives for charter airlines include a guaranteed percentage of peacetime passenger and cargo business valued at $700 million per year. Both City-Pair and peacetime passenger and cargo business are offered to airlines as a percentage based on mobility value points (awarded based on type and number aircraft volunteered under CRAF). The CRAF program undergoes continual refinement in the awarding of contracts; a recent refinement was to offer double mobility value points for aircraft volunteered to fill the aeromedical evacuation role.
27. AMC, Directorate of Plans, Requirements Division (XPR) Modernization (MOD) 201 Brief, slide 23.
28. Ibid., slide 25.
29. Ibid., slide 39.
30. Ibid., slides 39-44. The Boeing proposal extended the multiyear procurement contract to purchase 60 additional C-17s at an average cost of $149 million, taking advantage of the optimal production rate of 15 aircraft annually. This proposal expired 31 December 1999, and the Air Force has not received a new proposal. AMC has an initiative to purchase 60 C-17s at a production rate of 8 aircraft per year. This initiative will add 16 aircraft at a total cost of $4.793 billion.
31. *AMC Strategic Plan 2000*, 3.5.1.2.1
32. USAF Fact Sheet, C-5 Galaxy, online at <www.af.mil/news/factsheets/C_5_Galaxy.html>.
33. AMC/XPR MOD 201, slide 52. Secretary of the Air Force and the Acquisitions Division of the Air Force Secretariat have helped AMC shift more than $125 billion to the C-5 Reliability Enhancement and Re-Engineering Program (RERP), so while full funding is not yet secured, it has begun.
34. Ibid., slide 51.
35. Ibid., slide 61.
36. *Defense Daily*, "Meigs: Army Already Becoming More Flexible, More Deployable" (25 May 2000), 4.
37. AMC/XPR MOD 201 Brief, slide 93; *AMC Strategic Plan 2000*, 3.5.5.1. Initially 397 combat delivery aircraft will be modified to the C-130X standard. Additional funds have been requested in the FY02 budget to complete the remaining 122 aircraft. Also, 150 of the worst C-130Es (based on service life and/or structural and corrosion problems) will be replaced with the stretch version of the C-130J.
38. AMC/XPR MOD 201 Slide Brief, slide 102. Improvements over the C-130E: take-off roll: -41 percent; rate of climb: +46 percent; time of climb: -50 percent; range: +40 percent; max speed: +21 percent. Also, the C-130J-30 will carry 2 extra pallets, +23 litters, +8 CDS bundles, +36 combat troops, and +38 paratroops.
39. *AMC Strategic Plan 2000*, 1.7.6.
40. LTC James A. Fellows, et al., *Airlift 2025: The First With the Most, Air Force 2025* (1996), 8. Referenced in *AMC Strategic Plan 2000*, 1.7.6.
41. Rodriguez, 3.
42. *USAF Fact Sheet*, C-17 Globemaster III, online at <www.af.mil/news/factsheets/C_17_Globemaster_III.html>.
43. Ibid.; *USAF Fact Sheet*, C-5 Galaxy, online at <http://www.af.mil/news/factsheets/C_5_Galaxy.html>.
44. Speaking specifically of the need to exploit Air Force and Navy indirect-fire weapons to a greater extent in future warfare, Army LTG Jack Keane reinforced the need for interservice cooperation in the Army's conduct of nonlinear warfare, saying, "This is a paradigm shift I think we have to make with the Air Force and the Navy"; Erin Q. Winograd, "Keane Calls Army's Thinking on Introducing Troops an 'Anachronism,'" *Inside the Army* (17 May 1999), 7.

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