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A Tactical Commander's View of C^3I
Thomas H. McMullen

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A Tactical Commander's View Of C³I

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General McMullen's has been a military family for three generations; his father made the transition when the Army Air Corps became a separate service, and the son has made his life in Air Force system acquisition and tactical aviation — flying fighters, seeing command and control work as a forward air controller in Vietnam. He has been a test pilot, worked in R&D, been associated with Gemini, Apollo and the B-1 bomber and the A-10 attack aircraft, and seen systems from the acquisition side as well. He comments: "None of these is specifically command and control; yet command and control is really the business I've been in all my life." About his last-minute substitution for scheduled speaker General Wilbur Creech, TAC's commander, he adds wryly: "That's how the command and control process works. General Creech stayed in control. When he couldn't come, he commanded me to. The process, it seems to me, is alive and well."

McMullen. My congratulations to you all for picking a timely subject for study. There is clearly a lot of interest in C³I these days; there has been, in recent years, a lot of money invested in it. Just yesterday morning, for instance, I had a briefing before leaving Langley on the MILSTAR program, which is the new communications satellite we're pursuing; it looks like it could be about a 5 billion dollar program. There's a lot of money being spent, a lot of resources flowing into the C³I business. It's appropriate that people take interest in it — particularly to see that the money is spent as wisely as possible. I think there's greater opportunity for people to do the job better.

C³I is a complex, tough area with tremendous opportunity for improvement. Much of the improvement has to do with equipment; I think the principles of command and control and concepts from the tactical point of view are pretty well set; but there's a lot of room for improvement in equipment.

I thought it would be useful to talk to you first about what the Tac Air roles are — what our missions are in Tac Air, to provide a background for why C³I is important and give you our perspectives on it; then how we're organized to do C³I; some improvements which would be useful; and finally our training for C³I.

There are six different roles for which Tac Air is used; I'll go briefly into each. They are: counterair, offensive air support, interdiction, special operations, support, and finally one I won't say very much about, theater nuclear force. (I don't talk about it, not because it's unimportant, but it's not greatly different from things I think General Ellis talked to you about earlier.) The mechanisms for controlling the release, etc., for the theater nuclear force are not unlike the strategic system.

So, first, counterair; that is, how do we counter the air forces of the potential enemy? There are two specific roles: defensive counterair — the air combat that will usually take place on our side of the lines — and offensive counterair. The fundamental purpose of defensive counterair is to prevent the hostile bomber force or fighter-bomber force from getting through to friendly targets. We envision the need for our aircraft to be at the right place, to be able to strip away the fighters escorting the bombers and get at the bombers — which we would expect to be coming at us at very low altitude and very fast. The tactics used with our modern-day airplanes, like the F-15 and F-16, are very

different from those used in the past, because current airplane performance is so much greater. On the other hand, the fundamental command and control element is a flight of two — a leader and a wingman — which really remains unchanged from the days of World War I. But the way they operate together today requires a lot more communication than before because they'll be operating more widely separated from each other as they execute their coordinated tactics. They must be able to talk to each other to take full advantage of the capabilities we've built into the systems.

The other half of counterair is offensive counterair, that is, our attacks on the enemy's airpower in the air or on the ground — but on our initiative. A key element is to get his airplanes on the ground and attack his runways so that we interfere with his ability to mount sorties. For this mission, the F-111 is the principal airplane we have. It would penetrate the high-threat areas — areas where the surface-to-air missiles and the enemy's lookdown/shootdown fighters are present — at very high speed and low altitude, preferably under cover of darkness, to attack the runways and the airplanes parked on enemy airfields.

The second major role I mentioned was offensive air support, which has to do with our support of the ground forces. Again, that's subdivided into two specific elements. The first is close air support, in which our fighter strikes are closely integrated with the fire and maneuver of the Army echelons; the firepower is put down in such close proximity to our friendly forces that it must be closely coordinated with them. We put great store in that, and executed it very successfully in Vietnam; but it is probably of somewhat less relative importance now, though its importance will continue to be high in future wars. The other element of offensive air support, battlefield air interdiction, covers our actions to strike the enemy forces as they approach the battlefield, before they're deployed or commingled with our ground forces. It is the most important direct support we provide the ground forces.

In close air support, the A-10 is the primary aircraft, supplemented by the F-16 and the older F-4. In battlefield air interdiction, the F-16 and the F-4 are primary.

The third major role is interdiction. We don't now talk about interdiction in the sense that it was used in World War II — attacking the enemy's industrial ability to wage war. We're talking about attacking his forces, and doing it further away from the FEBA — the forward edge of the battle area — than in the roles I've mentioned, getting those forces as they're approaching the battle area. It also includes attacking his logistics net as supplies flow forward. We expect there'll be thousands of vehicles on the roads in central Europe. If the Soviets mount an attack, with the time schedule they've set for themselves, they will require a large logistics tail of vehicles which will have to be on the roads; attacking them will have high payoff for us. There again the F-111 is useful, and the F-16 and the F-4 are also important.

The fourth role is special operations. It requires specially trained troops operating in enemy-controlled territory where the threat is not too high, or in politically sensitive territory doing special missions.

There are a lot of different subcategories under the next role, "support;" it includes such things as our aircraft attacking and jamming the radars that control enemy surface-to-air missiles to degrade their ability to attack our air forces. We have a system, called "Compass Call," to jam the communication systems the enemy uses for command and control. Also included under support is the total field of reconnaissance, a very broad area. It includes things like RF-4s penetrating the hostile area to take pictures optically or with infrared systems; or a system like the new TR-1, which is a version of the U2R, standing off on our side at high altitude and looking across the forward edge of the battle area with radar. We also have a system called PLSS, the Precision Location Strike System, which can accurately locate hostile radars and pinpoint the location of defenses, giving us the option of jamming them, attacking them or avoiding them.

The final category is the theater nuclear force, wherein we have dual-capable aircraft sitting alert, waiting to be committed to strike targets, as well as in-theater missiles such as the Pershing and soon-to-be ground launched cruise missile.

Well, those are the missions. The C^3I system must carry out the military function of control, exercising authority and direction on those forces; that's really what C^3I is. It's the leader, the commander, exercising the age-old military functions of authority and direction. And to do that, of course, we need a way to communicate well.

I separate the two functions, command and control, in the sense that it's up to the command function to set priorities and determine the strategy that will be used, because the commander has the responsibility for the outcome. He is charged with executing the command function and with the responsibility of allocating resources. The control function is charged with matching

weapons to targets — given the priority of missions to be accomplished and the allocation of resources with which to do it. People tend to think of C^3I as things, but in fact it's a lot more. The fundamental elements of C^3I, in our notion, are people and procedures, and the equipment must be matched to that set. Obviously, it also includes strategies for forces and tactics for units. I mentioned that the fundamental fighting unit in tactical aviation is the element, a flight of two fighter aircraft; but sometimes we have important missions involving singles. For some missions, like interdiction or reconnaissance, we might send one airplane to a predetermined spot to do a specific task; the need to execute control of that single aircraft, once the crew knows its mission, is small — whereas with a flight doing offensive counterair, getting deployed to the right place to carry out their responsibilities means success or failure. In fact, a military goal, in that sense, is to deploy forces properly. This means we must tailor the force, we must have the right force to carry out the mission; they have to be at the right place and obviously they have to be there at the right time. And then, importantly, during the execution we must have a good ability to adjust. So we have to have a good plan, good information, good ability to control the force to get them where we want them, and then we have to be able to sense what's going on and adjust. C^3I really is the sum of the things done to achieve proper, effective employment of tactical air.

Let me make a brief summary now. Effective command and control lets us see the situation as it develops; it collects information and presents it in the appropriate way to decision-makers; it lets them decide what to do so they can posture the force correctly to be at the right place at the right time. Then, when we get into the employment phase, we have to be able to see — we have to see the targets, if not with our eyes, then through some kind of sensors — so as to decide how to use the force. We then have to assess how it's going, so we have to get information on what the situation is and how it's changing. Fundamentally, we need to be able to take advantage of the speed, the maneuver capability, the ability to shift rapidly from one place to another, and the firepower that is fundamental to Tac Air. We have a notion that says we re-role aircraft on the ground; we change them from one of the roles that I mentioned earlier to another role before they're launched; once they are airborne, we can change their tasking, but if they're configured for an air-to-ground mission, that's what we will use them for. We may change the point at which we apply them, but we usually can't change them from an air-to-ground mission to an air-to-air mission in flight, because they would probably not be carrying the right kind of ordnance. Simply said, the key element of C^3I is people doing the time-honored military business of leading; they're supported in doing this by a mixture of procedures, facilities, sensors and data processing equipment.

One of the characteristics that makes Tac Air different is worldwide applicability. So, while we tend to think of employing Tac Air in central Europe, and that may be the most important area, it isn't necessarily the most likely place that Tac Air will be used. There's also Korea; there's Southeast Asia; and there are many other places. Tactical operations involve land, sea and air forces, so there is a need to coordinate the operations for all three, and not just US forces, but those of our allies as well. It involves execution of all those roles that I've talked to you about earlier, simultaneously. Perhaps we'll be working only a few of them, but often we'll be doing them all. It can involve a very few people, a very few missions or sorties, but it can also involve thousands. For instance, in a war in central Europe we would envision that the Warsaw Pact nations would have two to three thousand airplanes coming at us in a single wave, not all in the same place, but all in the initial wave. We would counter that with all the forces we could marshal, so we probably would have thousands airborne ourselves. That's a lot of airplanes to have to position and execute effectively.

Our C^3I system is not designed to work just at home. We're not preparing ourselves, in tactical aviation, to fight in the United States, so it has to fit within the command and control structure of the host nation, wherever and whoever that is.

How well will we do? At the best, we'll do it very effectively; at worst, we'll be scrambling to recover from a poorly positioned force initially — and not able to communicate well, and so forth. In all likelihood we'll do somewhere in between the best and the worst. But the goal is to establish and protect a C^3I system that gets the best we can out of the forces we have.

Again, I'd say that people are the key effectiveness factor; that's the third time I've said it, for a lot of reasons. They understand what the forces are, they understand the capabilities, they understand the limitations, they know the rules by which the war will be fought — the so-called rules of engagement, they know the communications system, and people are, after all, inventive and difficult to predict. So, having good people

and having them well-trained is certainly the most constructive area in which to focus and improve the C^3I system. Our procedures generally don't change very much. In fact, they've been proven over time; they're exercised frequently and are well understood. We do change equipment, but the new equipment must not change the procedures by which we operate. New equipment must fit within the hierarchy of procedures that already exist.

A good C^3I tactical system has to be able to degrade gracefully; that is, it must be able to lose some of the capability that it started with initially, and still not come unglued. And that's a very challenging requirement; in fact, as we concentrate more and more on how best to design the C^3I system, there's a tendency to envision one that's centralized — but frequently centralized systems don't degrade gracefully. As one link goes out, it might take with it a lot of force capability. So that's something that we concern ourselves about.

On the other hand, graceful degradation is one of the good characteristics of manned systems; they are capable of reasonably effective independent operations. Part of our C^3I training prepares for that. Our training prepares our people not only to use the system when it's fully operating, but to preserve its effectiveness when it becomes degraded.

If you look at some of the top-level notions that motivate need for change to the system, the change in environment and the passage of time are the things that drive our equipment needs. We know that we're going to have to operate overseas, so the equipment we need must be transportable — often including the facilities it will occupy. We can take equipment and put it in buildings, but more often we've got to take our shelters with us. We need better air transportability; we need better survivability in our systems so that they're harder to degrade, but when they do degrade they do so gracefully. And then, things simply wear out. Many of the command and control systems we have were built with a five-year life in mind — and we've had them now for about 12 years.

We need improvements in our communications systems. We need to be able to operate in the communication jamming environment. We know that the Soviets put great faith in their ability to jam communications; that's something that, until recently, we haven't worked on very hard. It's not to be confused with security; people talk about secure communications and that's important. But what I'm talking about is of greater priority: the ability to communicate when somebody's trying to interfere with your communications.

We also need equipment that's easier to move and easier to set up. We need to replace some of the obsolete automated data processing equipment we have with equipment that's better. I might also mention that we need better sensors. We need better radars. And they face a jamming threat, too, so our radar systems need to be able to deal with radar jamming better. We need to be able to improve their physical survivability. We need to be able to improve their transportability and their reliability. But again, all of these equipments, with any improvements, must fit within the existing structure. The structure is there, it has been tested over time. We'll doubtless make changes in it, but they'll be in the sense of adjustments as opposed to major reorganizations.

Well, let me get a little more specific in how the tactical C^3I system is put together.

McLaughlin. When you say the improvements have to fit within the present structure, which structure do you mean? The Tac Air command structure? The NATO command structure?

McMullen. Well, I'll talk a little bit about that, later... In essence, we have three principal command and control systems that control Tac Air. You've mentioned two of them — the one that's bedded down there in the United States called the Tactical Air Control System or TACS. It's for contingency operations; that is, it's something we station in the US and send wherever in the world the national command authority dictates. There's a NATO tactical air control system; it uses some different titles, as I'll point out, but the functions are identical with the contingency TACS located here in the United States. Then there's the Korean TACS — which really is patterned strongly after that in the United States, but having the principal difference that it's firmly bedded down in Korea.

Let me briefly discuss now our organizations for command and control. The tactical force which would operate within a theater would nominally be made up of separate elements from each service — the Army, Navy, Marines and Air Force. These separate elements operate under a single joint task force or theater commander. (In addition to these separate elements there is the force for unconventional warfare, which has elements from all four services.) The tactical element from each service has its own component headquarters;

for example, in a joint tactical force there would be a distinct Marine component (if there are Marines involved) with its own command structure; an air component and a land component. It's about these tactical components that I'll comment next.

The tactical air force is the air arm of a unified or theater area of operations. The tactical C^3I is a theater process by which the tactical air forces in that theater are employed. The senior Air Force person is the tactical air force commander; he, along with his other service counterparts, reports directly to the joint task force commander or the theater commander. (I use those two terms almost interchangeably. The joint task force commander concept envisions a commander who deploys with a task force to a geographical area where there is no existing force, as opposed to a theater commander, where the structure already exists, as in Europe.) The tactical air force commander is the senior Air Force individual in the joint command structure. It's his responsibility, in executing the strategy of the JTF or theater commander, to carry out the planning and provide advice on the apportionment of air, that is, the division of air forces among the various missions that I talked about earlier. He is directly responsible for the allocation of air, which is the detailed division of Air Force units between specific tasks, as well as the direction, the execution and the control of tactical air operations. To help him, he has a tactical air force headquarters and a staff that provides operational logistics and intelligence support.

The principal operational element at the tactical air force headquarters level is the tactical air control center (TACC). The tactical air control center really has three major functional areas: combat operations, which is responsible for carrying out the day's mission; combat plans, which does the planning for the next day's operation; and intelligence, which supports both of those functions.

The rest of the tactical air control system is subordinate to this TACC in carrying out three major functions: battle management, battle control, and, finally, execution. I'll talk briefly about each of those, beginning with battle management.

The battle management function is carried out at different levels in the system. The TACC has the responsibility for overall management, such as determining what the threat is and making sure that the right people are aware of it, and determining what the preplanned approach to addressing it will be. The TACC contains the elements that receive, integrate and validate requests for intelligence. They likewise develop the procedures by which various kinds of air support, air strikes and airspace control are carried out. They provide target nominations for immediate strike, for striking the next day or for further reconnaissance. The battle management function of the TACC includes publishing the daily air tasking order — we used to call it the "frag order" — which is a set of instructions describing to each Tac Air unit its specific missions for the next day. The TACC monitors action by enemy air and ground forces so as to be able to commit our friendly air forces to counter them at the right time and place.

The principal organization subordinate to the TACC which is charged with the management of air support of the war on the ground is the ASOC — air support operation center. (It used to be named the DASC — direct air support center, if that's a help.) The ASOC is the agency that coordinates the tactical air missions in support of a specific ground force organization — typically a corps. It has responsibility for providing fast air reaction to ground needs; for instance, the ASOC tasks units to fulfill requests by ground commanders for allocated, immediate close air support (air missions involving close support of the Army units), reconnaissance or tactical airlift. It meets this responsibility by scrambling airplanes that are sitting alert for that purpose or diverting airplanes already airborne and scheduled to go someplace else. The ASOC decides between scrambling or diverting allocated airplanes to put the air support where it's needed the most within a specific ground unit's area — usually a corps area.

There's another set of units called tactical air control parties which are, in turn, subordinate to the ASOC. They're the Air Force people collocated with Army tactical units at corps, division, brigade, and battalion levels. Air Force pilots who have good understanding of the capabilities of Tac Air are collocated so they can counsel the Army commanders on how best to use Tac Air resources. In a nutshell, that is what we mean by battle management. Let me turn to the next major function of the TACS — battlefield control — and the facilities used.

Battlefield control, to an airman, means actual control of formations of aircraft on a mission. The facilities are those that actually direct airplanes. Generally, they're control centers that have a radar sensor by which they collect the data they need to exercise control. The principal control center is the control and reporting center. It is directly subordinate to the

TACC; again, there's a hierarchy on down — control and reporting posts and then forward air control posts. All of those use radar sensors to get information on both enemy and friendly air. They make decisions on the air-to-air battles; they can scramble airplanes from alert status to meet an enemy airborne threat or divert airplanes, as required. In addition, they control all air traffic, whether on an air-to-air mission or air-to-ground. One of the important new elements charged with the control function is our AWACS — Airborne Warning and Control System — the E-3A. It gives us a capability that is of tremendous importance — to see deep into enemy territory. It is also a more survivable radar than the fixed radars on the ground, because it's airborne and hence very mobile.

Finally, there are the execution elements. These are the command and control facilities which deal most directly with the actual employment of tactical airpower. The first of these are our wing operations centers. This is the part of the command and control structure that's in the fighter wings themselves — that owns the airplanes; it's the real "force." The WOC is responsible for planning use of the fighter aircraft that are assigned to the wing, and then managing their employment. The other execution element is the forward air controllers — the FACs — who are the actual communication link between the supported Army commander in the battle area and the fighters performing close air support.

Because of the limitations of time, I won't go through all the improvements in the TACS that are underway. I must briefly mention, however, the training we do, such as in exercises. We do command post exercises, wherein we simulate the forces employed but have real people in the command, control, communications and intelligence functions. In these exercises we use a scenario which simulates a war situation over time, so the battle managers get good training. We do this unilaterally — that is, Air Force alone — as well as in joint exercises which involve our tactical air forces and other services, too.

Probably the keystone of our C^3I training is a program we call Blue Flag, carried out at Eglin Air Force Base, Florida. Here we put together a battle staff and simulate different scenarios — for instance, a sector of Europe, using equipment like we have in Europe. The people come from all over the tactical part of the Air Force as well as from our NATO allies. The Allies give us the realism that their on-scene knowledge can impart, but they benefit from the training that takes place, too. At Blue Flag we go through a scenario — the active part of it generally lasting about four days. The team is together for about two weeks, during which they get trained in their responsibiities, go through the scenario — it lasts about four days — critique the operation, and finally, write a report on it so we can export the results.

We started Blue Flag back in 1976; we now run about four a year. To give you some feel for the kind of things we do, we have run 11 of them with a NATO scenario — in which we typically pick an allied tactical air force, a fundamental element of NATO tactical air organization, and use a scenario that fits its area. We've done about three with a Korean scenario, and two of them with our Rapid Deployment Joint Task Force. In the latter scenarios we use command and control personnel who have responsibities in the RDJTF, working together on a Mideast problem. The very first Blue Flag we did back in 1976 was a contingency exercise in which we simulated an embassy in trouble; the problem was to deploy forces into a foreign nation, under duress, and extract people from an embassy. It was an interesting one.

Well, in sum, tactical air command and control means people employing airpower according to time-proven principles which change very slowly. The principles went through significant revision in World War II, where early on we unwisely had the notion of parceling out airpower — dividing it up into small ineffective elements. But we no longer do that. We now maintain command and control of our tactical airpower so we can commit it to the point in the theater where it's most required to support the Army commander who has the greatest need. Our tactical air control system must be survivable, obviously; it must be reliable; and it must have the flexibility to deal with a situation that proceeds very differently from the original plan, because change is a way of life in combat. The current equipment we have is generally good, but we need some improvements. And I remind you that they must fit into the system that we already have.

Student. I wonder if you would put something in perspective for me. You talk about a TACC and an ASOC, and then you talk about people who actually control the planes, your control and reporting centers. How does all this fit into the large picture? Are you physically located in the Pentagon in Washington with the NMCC? Are you part of it?

McMullen. No, I have not talked about echelons that high. To do so, first you must start with the national command authority, the president. He, through his system of advisors, provides decisions to the secretary of defense and hence to the Joint Chiefs of Staff (JCS). The JCS then provides direction to the echelon I call theater commander or the joint task force (JTF) commander. CINCEUR is an example of a theater commander. He owns all the forces there, whether Army, Navy, or Air Force. An example of a JTF commander is one who commands a force assembled by the Readiness Command (located at MacDill Air Force Base, Florida) but containing forces from all the services. There is a joint command there, a unified command headquarters, made up of Army, Navy and Air Force people ready to go — when the president decides we need to go somewhere. The command and control process I have talked about would be subordinate to the theater or JTF commander. Now he'll have under him a LANDFOR (ground forces), a MARFOR (a Marine forces component) perhaps, and an AFFOR (air forces component). The senior Air Force officer we call the tactical air force commander. He has his headquarters in the TACC — tactical air control center — which I described to you. The TACC is the senior element of the tactical air control system and has battle management as its primary function. Directly subordinate to it are the ASOC — the air support operations center — and the CRC — the control and reporting center. The ASOC controls that part of the tactical aviation that's responsible for supporting the ground forces. The CRC controls the air-to-air war; that is, it takes care of intercepting hostile air forces. It also controls all friendly airplanes as they're passing through its airspace to get to wherever they're going.

One of the elements I did not mention earlier is the one that manages the interdiction effort. Although they are located in the TACC, it is a separate function, in fact, not necessarily a TACC-link function. But, since these missions really are mostly preplanned, you don't need people, radars, etc., below the center level to execute them — we just leave the entire function in the TACC.

Where do these people function? Well, the TACC is often located in a thing we call a bubble, a big inflatable structure that has all the necessary equipment in it. The ASOC is in one, too, or in a van; we're going more to vans now, because they are more mobile. The ASOC often operates out of the back end of a truck. It needs to be fairly mobile to move with the ground forces; its responsibility is to plan for and execute the support needed by the forces, so it moves with them. The CRC is more of a fixed facility because of its radar systems. And, of course, there are subordinate radars, CRPs and FACPs. There's more than one — there may be several of them. And CRPs (control and reporting posts) and FACPs (forward air control posts), all radar facilities, can move, but not rapidly. And finally, the TACPs (tactical air control posts) are aligned with the Army echelons — corps, division, brigade and battalion — and so they form a parallel with the Army organization.

Student. Well, is your joint task force, though, in the Pentagon?

McMullen. No. A JTF doesn't exist until the correct authority decides there's a contingency that requires a military response — and decides to deploy a force to, say, Country Orange. When the national command authority (NCA) decides we have a problem in Country Orange — we have friendly people there we must support or whatever — he directs the JCS to establish a joint task force. That joint task force will be put together and deployed. Perhaps you were thinking about the Rapid Deployment Joint Task Force.

Student. I think the purpose of my question is, how difficult is the flow of information back and forth to the JCS and the national command authority, if all these people are mobile rather than staying in one place?

McMullen. Well, communication would go back up to the joint headquarters which is fixed, somewhere in theater; it will have whatever communications are required, say up to a space link and back down to the national command authority.

Student. Does the nature of the JTF depend on which part of the world your crisis may be in?

McMullen. Oh, sure. The JTF would be tailored to whatever the mission is. Obviously the tougher the challenge, the more robust the JTF you'd want to have. On the other hand, it may be a tough challenge, but it's so far away — like southwest Asia — that the things we send first are the things we think can be most effective very rapidly. In other words, if we had a contingency arise in southwest Asia, we would probably send Tac Air as the first order of business to hold the fort, without waiting until we get heavier Army forces deployed.

Student. This relates to the chain of command. I'm not sure exactly where the Tac Air commander ties in with the USAFE commander. And do we have — I would think we have Tac forces on the ground in Europe. Who do they report to? Ramstein?

McMullen. Well, the Air Force organization in Europe, like the Army, is dual. We have a United-States-Air-Force-only organization that's responsible for operating things in peacetime — keeping training going, etc. We also have the NATO organization that we are a part of, whose mission is war fighting. Many of the people are dual-hatted; they have the US Air Force responsibility, but when they exercise or when the war starts, they slip right into their NATO role. So there are really two somewhat separate organizations. Now, at the force level there really is no difference. For instance, at wing level, a tactical fighter wing performs the same function for NATO as for the US Air Force. But some of the intermediate-level headquarters, like USAFE, have a diminishing role after combat starts. It's the Allied tactical air force that will be employing the forces. Thus we avoid surrendering some of our sovereignty in peacetime, as do all the other nations, while being committed to supporting the NATO forces.

Student. You say that we fit right into the NATO organization. How are we organized, though? There are various allied tactical air forces in Europe. Are they individually assigned to support certain Army groups? Is that the way it works? Because there are problems with the Army. That's where I'm looking at it — the Army communicating across the national sector boundaries. But obviously it's different.

McMullen. There's obviously a very complex set of situations. The air-to-air war really doesn't recognize the ground boundaries, so let's set it aside. In general, you'll have Allied tactical air forces associated with upper-echelon Army organizations — like Central Army Group (CENTAG); but then when you start getting below that level, you do not have specific Air Force units committed to Army units — say, at the division level. The Allied tactical air force commander has the authority to commit his forces wherever they're needed within the Army area that he's supporting.

Student. So he does support an Army area? Then my question would be: if we're going to be truly interoperable, not only in the sector of operation — if you're the ATAF commander in CENTAG, you've got to be able to support a variety of national forces. We cannot take our air forces from that sector and ship them, say, to NORTHAG, and expect them to cooperate with them?

McMullen. Well, we want to be able to do that, and we do. Effectiveness will vary some, for a lot of reasons, but it's clear that if the threat comes rolling through the plains up north, we're going to fight our Air Force there. The fact that airpower can move like that is one of its strong points. We'll not go through what we did early in World War II, when we parceled it out in small ineffective packages dedicated to specific ground units — some of which weren't even in the fight. Meanwhile we were losing where the battle was taking place. We learned from the battle of Kasserine Pass; it is touted as the watershed where we established, to the satisfaction of all, that we have to keep airpower centrally controlled even though we decentralize it for execution.

So we would employ central Europe airpower up north, even though they might not do quite as well up north as they do down where they're normally training. In a parallel sense, we face a tremendous challenge in getting forces from the CONUS over there and integrated — yet we do that regularly and well, because we practice it. We have a program called Checkered Flag in which every Tac squadron has a European bed-down base. They prepare themselves to fight from that base. They study the location in detail. The wing and squadron commanders visit it every year to year-and-a-half so that they know the people there. And then about once every two to three years, we deploy a squadron to that base. Thus our people know what the problems are, they know the people with whom they'll work in wartime, and they're going to be able to hit the ground running when it starts. Flexibility is one of the strongest attributes of tactical airpower.

Student. Could you tell us about the compatibility of systems and equipment? From my readings and just listening to you today, I wonder if there's a discrepancy between the Army, the Air Force and various branches of the services, and also with some of the bases that are not in the United States. Just the kinds of systems — language, and things that are necessary for good, clear communications.

McMullen. The subject you raise is interoperability;

it's an important consideration. At the basic level, the basic echelon of interoperabiity in tactical airpower is a flight leader talking to his wingman. Now, you must have that; if you don't, all of the rest of our tactical capability is moot. People imagine the problems we might have in our fighters being able to communicate with the Dutch Air Force or the Navy or other elements; but really, because of the way we interoperate, fighter-to-fighter communication between Air Force flights and those of our Navy, or of one of our allies, is just not all that important. In tactical aviation, we do most of our interoperating between services and with allies through our command and control centers. As the forces are employed, they operate by talking to each other within their own units; but if the senior commander needs to relocate them or employ them differently, those instructions go through the command and control centers. Right now, a lot of that is done manually; some of it's automated. We have a device called the Message Processing Center that lets us exchange radar track data between Army, Navy, Air Force and Allied radars; it's a translator. There is a joint group that's responsible for making sure the MPC software doesn't get changed unilaterally, and that all changes are coordinated and tested before implementation. We have a joint test force in San Diego that continually makes sure that process stays alive. But fundamentally there is no great need for interoperation between individual fighter aircraft of different nations.

Student. But past sessions of this course have made it fairly clear, for example, that despite the fact that Marine and Army units have operated side by side in the last four wars, we have non-interoperating artillery in both systems.

McMullen. Well, the Marines are organized a little differently, so that is a different matter.

Student. Yes, but they're not Dutch.

McMullen. But the Marines are organized to be self-sufficient, so they probably look at interoperability as a lower priority than any of the other services. In other words, the Marines count on having to go somewhere where they would be the only friendly force there; they've got to take whatever artillery they're going to employ — and they have less heavy artillery than a corresponding Army unit — they take their own air to make up for the shortfall in other fire support, and they commit air to specific Marine ground units. They cannot count on somebody being there to support them, so they have to count on doing it themselves. And in that way they tend to put a lower priority on the ability to interoperate. On the other hand, the Air Force and the Army interoperate a great deal; in fact, the Army counts on us to do things and we count on them to do things. And if the one or the other doesn't do it, it just doesn't get done. So it's a different picture between the Army and the Air Force than with the Marines. I don't pretend to be an expert on how the Marines and the Army interoperate; but I do know the Marines tend to want to be, for good reason, a separate, self-supporting package.

Student. In both Korea and Vietnam, despite integral Marine air wings with the division and integral artillery, it was not uncommon for Army artillery or Air Force air to be called in to bail them out of tough situations. In fact, on the artillery side it was very common. In some of the NATO scenarios, RDF or whatever, the price of intra-US interoperability would seem to be subject to great sensitivity.

McMullen. Well, if you look at the war in Vietnam, there were a lot of challenges that we may not have handled as well as we might have in the sense of interoperability. But again, it gets back to the Marine dictum of being self-sufficient. For instance, if you look at the number of air sorties flown per Marine maneuver battalion — and sorties per day per maneuver battalion is a good measure of how much air support you're getting — the Marines had about two and a half to three times what the Army had. Now, were I the theater commander, I might wonder why that is. We're all doing the same mission; why don't we divide up the air resources evenly? But that idea never got completely implemented in terms of giving the theater air commander control of the Marine air. The theater air commander in Vietnam did not have control of all the theater air.

Student. Wasn't the use of Marine air a compensation for the lack of heavy artillery?

McMullen. Yes. That's the reason they hang onto their air — they're a light force, they can't carry a lot of artillery with them, so they need to depend on air. They just don't know whether somebody else will be there to provide it when they are off in a contingency area. On

the other hand, it's not all that clear to me how that notion prevailed in Vietnam as long as it did.

Student. Maybe I misunderstood, but I thought a battle to that effect was recently fought by the commandant of the Marine Corps and won. So the situation you describe would prevail in the future, but the Marines did not think it prevailed in Vietnam. Marine air assets from Danang were controlled and tasked by the Seventh Air Force, and therefore were not available for close air support as often as they wanted them. I thought the change was recent, guaranteeing the Marines that in the future they would have more direct control of their own assets within the theater, and that they would not be siphoned off — since doctrine does require aircraft to support the Marines in the field.

McMullen. In the late stages of the war there was some change, but that was after the war had begun to wind down. The history's there. If you look at the year-in and year-out support, there was a large difference in the number of sorties per maneuver battalion for the Marines compared to the rest of the ground forces. Some Marine air was allocated to Seventh Air Force, but that was what the Marine air commander declared excess. In other words, when he said, "Tomorrow I'll have X number of sorties and Y of those are excess," he then was required to turn the excess over to Seventh Air Force to execute. But he satisfied his own requirements first; and they were at a higher rate than was available for US Army support.

Student. But that's a matter of doctrine. The Marines' version is, "The Army wishes they were like us, and if they were they'd ask for more." I don't know whether that is true or not.

McMullen. But the issue is equitable allocation of existing theater air resources, not what to do with more. It's an interesting dichotomy in allocation or management of forces.

Student. Can I follow up with a question on close air support? You mentioned that you think it's not going to be as important a mission as it has been in the past. I think that certainly applies to a central European battlefront as it's envisioned. But the administration is talking about developing greater power projection, greater ability to play a role in third-world regional conflict. It would appear that close air support would start to come back into the picture where you're not going to be able to move in artillery in a hurry. The technical issue is: as the aircraft delivering the ordnance have gotten faster, the safety zone between friendly troops on the ground and the point at which you were allowed to deliver the ordnance has gotten wider and wider — to the point where, under a lot of the ground rules, the enemy forces you might want to bomb are out of sight — and really weren't the ones who could be doing you any immediate damage. Will precision-guided munitions (PGMs) and other technology, even with high-speed aircraft, permit us to move that safety zone in closer, to the point where close air support can be effective support?

McMullen. Well, let me first take issue with the conclusion you drew — that as airplanes move faster, the separation zone must become wider. There really is no tie between the two. Moreover, your question implies that we're buying only faster airplanes, and that really is not the case. We are buying F-16s for the air-to-ground role, and they're faster than F-4s, but we're also buying A-10s — and A-10s are slower than anything we've bought in my time. The A-10 is uniquely effective in the close air support role; in fact, it is bought only for that application. We really are paying attention to close air support; I'm glad you raised the issue because I didn't want to leave the impression that it was unimportant. In fact, close air support continues to be very important to us, as demonstrated by the fact that for the only time ever we're buying an airplane, the A-10, which can only do close air support and is dedicated to that role.

It's just that battlefield air interdiction has assumed a new importance, mainly based on new Air Force thought and on a thesis developed by General Starry when he was commander at TRADOC, the Army's Training and Doctrine Command, and pursued, now that he's commander-in-chief of REDCOM, Readiness Command, that the Army should begin to concern itself more with the enemy beyond the area of contact. We — the Army and the Air Force — just can't deal with those forces at the FEBA at the rate they could be committed. And the Army can't really deal with the second echelon forces en route to the battle area. Unimpeded, the Warsaw Pact nations can bring forces up faster than we and the ground forces together can deal with them at the line of contact. It's for these reasons that the Army would like to have us concentrate on those second echelon forces; Tac Air can get them.

Now, the issue of precision-guided munitions. I think that, properly developed, good reliable precision-guided munitions will pay for themselves; they will let us operate as close as we want once we establish our confidence that they're reliable. But that's always the tradeoff, because if they go wild, they can go a lot further than a plain gravity weapon.

Student. This is perhaps a bit out of your jurisdiction, but within the last couple of days the GAO has come out with a study saying that the NORAD system is terribly outmoded, that they're using antiquated technology, and that sort of thing. What about the tactical arena? Are we depending on communications equipment that is vintage 1965, or is the system relatively up-to-date, the best available technology?

McMullen. Well, probably in between. We're introducing some new things in our automatic data processing capability. We're getting into the area of computer-assisted mission planning, in which we take the performance capability of airplanes and store it in a minicomputer. The pilots let it help them crank out the flight plan. We can store threats in it, and it can help the pilots pick out the best route to the targets so as to avoid the threats.

In a larger sense, we're trying to automate our tactical air control system so that we do a better job of dealing with the kind of information we need. For instance, the frag order that I mentioned, which is the theater air commander's direction to his forces for the next day's missions, contains the specific targets, when they are to be attacked, and what sort of ordnance is to be used. It's a very detailed set of instructions when you think of scheduling thousands of sorties. That's an operation which greatly lends itself to automation. We have a system that we're just beginning to introduce that helps us do that. I think our system is somewhat antiquated, though, and needs some updating. We're working on it.

Student. Southwest Asia has come up several times in the discussion. Could you comment specifically on what problems Tac Air would have in that area? And as a chance to talk about some of the improvements with all the focus on the American role there, have there been any improvements in Tac Air specifically for the southwest Asia region?

McMullen. Well, probably organization is the major improvement we've made. There are two principal problems, and both of them are geography. One of them is how far it is to get there. It is 7,500 miles from the CONUS to a bed-down base there, while from the Soviet Union to Saudi Arabia is 800 miles. Now, that's a distance ratio of roughly 9 to 1. And the Soviets could move through Iran and Iraq and Kuwait right on into Saudi Arabia by land while we would have to travel by sea and air. I think that's the fundamental problem. The second one is the employment ranges, that is, the ranges between the bases from which we might operate in southwest Asia and where we might be interested in interdicting Soviet ingress into the area. Obviously we'd like to get them as far north as we can. The country's rougher up north so they are going to have to be going through certain bottlenecks. If we could contain them up there, it might be the best way to take them on. But those are tremendous distances. We really have only a few airplanes that can be effective over those ranges, like the F-111 for air-to-ground and the F-15 for air superiority. We haven't really changed our command and control system for this contingency. But, on the other hand, we do have the Rapid Deployment Joint Task Force, which you're doubtless familiar with, which has been set up to develop plans to permit us to be effective there.

Student. Who determines the priority among the six missions you enumerated? The theater commander could have come up through the ground forces, through the army, and could envision this theater requiring much more close air support than counter-air. Who in the chain of command sets the priority on the number of missions that will be flown among the six?

McMullen. The theater commander decides. His command function is to establish the priority given to the different missions. Now, obviously, he's going to get a lot of advice from both his Army commander and his Air Force commander, but he sets the priorities — and that's the way it ought to be.

Student. The second question: At what Army command level would an ASOC be located? At corps?

McMullen. Yes, the ASOC is at corps. As you know, we now have some lack of clarity as to how we interface with the Army above corps, because the Army has gone through some reorganizations. For some time the field Army has been gone as a command echelon; but it looks like it may be on the way back. Maybe one of you

Army fellows can tell me better than I know; but, at any rate, we envision the ASOC interfacing with corps.

Student. I worked on a JTF at Fort Hood for about two months, and the largest command and control problem I saw with the Air Force was that the DASC (now ASOC) and the CRC never knew what the other thought was going on. How much lateral intercommunication takes place between those two organizations?

McMullen. Well, there should be lots of it. To some degree they're working different problems — the CRC is working the air-to-air war and the ASOC is working the air-to-ground war. But the CRC also has to control the aircraft that execute the air-to-ground war, so they have to have good communications. And they should be good at it.

Student. My experience was that the CRC never knew where the forces were that were committed to the ground war.

McMullen. They should. Everybody should get the frag order, so they ought to know what's scheduled to happen where and when. Somewhere there was a problem peculiar to the scenario you describe.

Student. Admiral Inman, in his presentation last year,* talked about the problem that developed in southwest Asia and particularly in Iran: a failure of our technical intelligence gathering. We didn't have the capability to gather intelligence against our own equipment; our systems were designed to collect against Soviet equipment, and when our own devices were in somebody else's hands, we had to do a lot of scrambling and improvisation. On the tactical side, what kind of problems do we face in going up against our own equipment in terms of countermeasures and counter-countermeasures in the tactical air environment?

McMullen. Well, at the fundamental level, when two airplanes are going against each other and they're the same airplane, you quickly get down to who's the better pilot; that sorts out, to some degree, how it comes out. But who gets position advantage to start off with, and so forth, likewise plays a role.

Student. I understand that. I'm a Navy guy, so I'm used to Navy electronics, and a problem we have is that our radar and sonars are compatible, but still you can't have everybody out there banging away on the same frequency with the same piece of equipment, or you have a hell of a lot of interference and it doesn't work right. So you've got a bunch of buttons you can push, and everybody can select a slightly different frequency to work on. If you're all on the same side, you all know that, and you can take care of it. But if you're going up against somebody who has the same piece of equipment with the same thing in it, and he wants to work it against you —

McMullen. But even there, for instance, if it's a radar problem you'll see the radar interference, and from your own sensors you recognize what it is, so you know the steps you can take to get rid of the interference.

Student. What about programmable countermeasures equipment? The ECM black boxes are for specific pieces of enemy equipment. In Europe, obviously, it isn't a problem, because we know where the aircraft are going to fly. But when we start talking about a rapid deployment task force, we've got to be able to pick up these aircraft and whatever else, and send them into the environment in a hurry.

McMullen. Well, we really don't have many programmable countermeasures that could have fallen into hostile hands. Now, we have something called the ALQ-131 pod, but I don't think we've sold them to anybody else. The hardest thing about the reprogrammability is not putting the new program, or changing the techniques, or whatever — it's deciding what to use. That's something we've held to ourselves. Therefore, as we change settings on our systems, their ability to counter us with equipment we've sold them is really not all that good. On the other hand, in some cases, we're selling the best things we have; so it's a measured trade whenever we make foreign military sales like that. But the hardest part of the programmability issue is, first, sensing that there's been some sort of a threat change, then deciding how you counter it, and then writing the software program to do that. It's actually easy for the technicians on the flight line to take that new program and insert it. So the enemy ability to

*See "Seminar on Command, Control, Communications and Intelligence, Guest Presentations, Spring 1981," Program on Information Resources Policy, Center for Information Policy Research, Harvard University, Cambridge, MA, December 1981.

put a new program in may be straightforward, but their ability to generate that new program is poor. In that sense we're very careful about what we give them. We go through a lot of very careful consideration, when we sell somebody a piece of equipment, about how much of the software ideas go with it — and particularly how we update it.

Student. I've been interested for some time in contemporary Korean security problems. I'd like to know how you see the joint tactical air problems confronting US or ROK forces in countering a North offensive, which is going to be a ground offensive. I was reading that one of the chief problems is in acquiring solid ground targets because of the terrain. The mountain ranges along the DMZ run up and down, and our fighters would have a very difficult time in acquiring solid Northern targets as they roll along.

McMullen. The principal problem I think we'll have with tactical air control in Korea is survivability. The Korean tactical air control system is fairly fixed. The war would start at the North's initiative, so they'd get the first stroke in. If the tactical air control system is an important element to us, and I think it is, they'd probably go after it early on, as a high priority. So probably survivability is a challenge. In fact, as you may know, we have a program called Constant Watch, which is a joint program with the Koreans to make it more survivable. As for locating targets, the sensors have limitations independent of the way the mountain ranges run. Essentially we have to go up and find mobile forces. It's that sort of notion that keeps us thinking we need to get a new penetrating reconnaissance airplane. We have the RF-4C, which is the backbone of our reconnaissance now; it started flying in the mid-1950s, and we think we need a new one. We think we need to continue to be able to penetrate and find things, even though we're coming along now with the TR-1 with radar which lets you stand off. But again, no matter how the mountains range, you can try to align yourself with their long axis. You see, I think we'll be able to find them; I don't think locating targets is going to be our big challenge in Korea. I think it's dealing with the initial thrust, recovering from that and seeing what forces are left to take on the onslaught.

Student. Can you discuss the air-to-air situation as you might see it developing in Korea in the very initial stages, as the North initiates an attack and its air attack is something like one or two minutes from Seoul? How would we interdict those forces?

McMullen. Well, it would be difficult at first. To do so, we'd have to have what people term "strategic warning" — that is, have a notion that things are building up to the initiation of combat and be up and ready and waiting for them. But from our peacetime posture, even as forward-looking as it is, I don't think we can afford to maintain a level that would not encounter great difficulty stopping a stroke out of the blue short of Seoul. In fact, you may recall from how things went in the Korean war: the North Koreans and Chinese really weren't very effective in stopping our air attacks. Historically, a determined air attack against a target has been a terribly difficult thing to stop. When the attacker comes off the target, he is vulnerable, or it may be possible to get him enroute back home; but if he gets up a head of steam behind a sanctuary and wants to attack something, he has been hard to stop. But I must say that with modern weapons, because they are all-aspect, that may have changed considerably.

McLaughlin. You mentioned the complexity of the scenario in the NATO theater where you have 2,000 to 3,000 sorties coming at you at once. I think everyone here has seen the Hackett book on the Third World War, and it's been noted by many people that while he talks about targeting Soviet manual control capabilities, throughout the book most of the allied NATO command and control capabilities seem to continue to function without much of a problem. The Air Force's Compass Call program has the mission of looking at enemy command and control vulnerabilities for targeting. Does that give you any sense, mirror-imaging or whatever, about the status of US or NATO forces in that regard?

McMullen. Absolutely. The enemy is way ahead of us. In fact, it's sort of a Soviet dictum that they'll count on killing one-third of our forces and jamming one-third of them so that the remainder really has no military utility, no military effectiveness left. They have jammers deployed. There's no question in our minds that they think it's important. An interesting contrast, however, is that they have not done very much to protect their own systems against jamming — maybe because we haven't done much about fielding the jammer. Compass Call is the first step in that direction. The Army has some ground-based communications

jamming capability, but Compass Call is really our first step.

On the other hand, we are making large investments, large commitments to protect our ability to communicate. For antijam digital data, we are fielding JTIDS — the Joint Tactical Information Distribution System — which is great for passing digital data from AWACS down to the ground stations. For voice — which is of much more importance to the fighter pilot — we've just embarked on an antijam system for fighter-to-fighter communications — a system called "Have Quick." It is a frequency hopper; it hops in frequency faster than the enemy can keep up. That lets fighter pilots talk to each other. It will probably be a thoroughly viable system through the mid-1980s. For the later time frame we have another system in development called Seek Talk, a more sophisticated antijam voice system that will deal with the more sophisticated jammers we expect to see then. The Soviets have been at it for a long time, and if we were to go to war tomorrow, we would be in trouble, except for the aircraft already modified. In the October 1973 war the Israelis were reduced to talking to the control tower on their own home airfield through little portable radios because their regular airplane radio was jammed; without some communication, they couldn't even get off the airfield. So it's a matter of highest priority within our C^3I program to get both an antijam capability to let us talk, and a capability to jam enemy communications. We have a list of priorities that we formalize with Air Force Headquarters, covering all the things we're interested in — 191 total requirements. Number one on that list is a new air-to-air missile, but number two is this Seek Talk system that will let us communicate from one fighter to another. That's how important we think it is — number two on that list of 191 things.

Student. Given performance over the last decade or two, how phlegmatic are you about our ability to produce and deploy Have Quick in the sort of time frame that would still be useful?

McMullen. Well, even though we're just starting to modify aircraft now, we already have several hundred of them. Have Quick was something that was just in somebody's mind as recently as 1978; it got through the "poohbahs" quickly, really got started quickly, because it was that important; and we're going to get it in most of the radios in our tactical aircraft over the next few years. It uses our standard fighter radio, a system called the ARC-164 — for Airborne Radio Communications. The ARC-164 is a modular radio. To convert it, we take out one of the modules, modify it, and reinstall it in the radio. The modification changes the radio from one that normally operates on one frequency at a time to one that will hop around in frequency many times a second.

It's a very capable system. We've run tests on it. In an exercise called Red Flag — a fairly large scale fighter exercise we run on the Nellis range — we put lots of fighters up against lots of other fighters, simulating a small piece of an air battle. We have jammers similar to what we expect the Soviets to have; when we use them, it tends to interfere significantly with fighter operations. The pilots just can't understand anything they hear because of the interference. Generally we do not jam for very long, so that we can go ahead and get other training done. But now we have Have Quick in some of the aircraft. During our new exercises, which we call Green Flag, we've left the jammers on — and the fighters that don't have antijam protection are out of the game. Yet those who do have Have Quick don't even know the jammer's going. They have to turn the Have Quick mode off to hear the jamming. That's a success story.

Student. Will our jamming capability against enemy voice radios, against their fighter sections (and I guess their data link to fighters) — will that go into fighters, or is it going to have to be in a dedicated aircraft?

McMullen. It's in a dedicated aircraft. It takes a lot of power, it takes sensing and so forth; it's a support system, rather than part of the fighter force.

Student. In a sense you've already answered part of my question, but with regard to Saudi Arabia, the President implied that if a hostile government came into power there, rather than let the oil fields get into unfriendly hands, we would take over. What is your opinion as to its feasibility? I know we've made a lot of noise in the Middle East with our Rapid Deployment Force, but you've got the Saudis with AWACS that they could turn against us—-

McMullen. No, they can't. They don't have AWACS now — although they will get them in the future.

Student. Is there potential for AWACS use against us? I wonder how that would factor in. We have 2,500

Americans sitting in Daharan who are potential hostages, and you've got oil fields scattered over a large area. I'm just curious what your opinion would be.

McMullen. Well, internal power changes would be a pretty tough thing to address. It seems to me you have posed a political issue that really is not part of what we have to talk about here today. The AWACS by itself can't shoot anybody down; it takes the AWACS as the control element and a capable fighter force to wind up with effective combat power. The terrible trauma of how we deal with a nation holding 2,500 people captive, if they chose to do that, is difficult. We saw what happened in Iran; it's not straightforward. But before those things happen, there are signs to alert us; perhaps we are better at reading the signs with our recent experience behind us.

Student. I'd like to ask about the benefits you see with the integration of AWACS into NATO. Could you quantify what force multiplier you think AWACS in Europe will be?

McMullen. Well, I don't know what the number is, but it's a tremendous multiplier. A lot of people wonder whether the sensors that are now part of the tactical air control system will survive the first few hours of combat. They're fixed, the radomes are great big things that people can see, so surely the enemy can attack them if he wants to. AWACS, on the other hand, is going to be hard for him to get to. AWACS has the eyes to see hostile air coming and can withdraw gracefully. I think AWACS is going to add a tremendous amount in just the survivability sense alone.

Now, in the terms of being able to look deep and see hostile air forming before it attacks, that's a very useful capability we now do not have. In the warning sense, AWACS has the ability to provide the political leaders the insight that the war is starting; that will help solve the political problems which the NATO nations must face up to in order to start defending themselves. So I think AWACS is going to be just a tremendous enhancement. Moreover, there is the fact that the NATO AWACS unit is a truly joint organization. NATO is buying 18 AWACS, and it's going to be in a NATO organization where people just have to live and work together and solve problems during peacetime, and that's going to have great utility, also.

Student. Going back to your discussion of the warfighting scenario in Saudi Arabia: if our oil is choked off and we have to go in, if my understanding is correct, the oil targets we would either have to secure or take out are all concentrated in the eastern provinces. If so, what are the purely tactical considerations, be they difficult or relatively easy, in performing a mission to either secure or take out those oil fields, if you can discuss that?

McMullen. I'm not sure how useful it is for me to expound on it until I know what the situation is. In other words, if the mission is to bomb the oil fields, if the political leadership decides that we need to take out the central oil points, that's a straightforward assignment.

Student. Let me rephrase the question. Suppose our RDF and ground forces are in place — combined air and ground forces, for example in Cairo, if we are to assume we've got some mobility in the region. If a decision were made to go into the eastern provinces, what would your functions be as tactical support?

McMullen. We'd be looking for a good basing structure; that's important — where you're going to operate from. Other important questions are to decide what the target set is and what the air situation is. If you hypothesize there is no internal government, why, perhaps there is no opposing military force — I don't know. Again, it really depends on what the scenario is — whether we're resisted by an organized force. If there's anarchy or there's been a revolution and the military force in being is destroyed, that's another situation. But I don't think it's useful for us to speculate, at least in this kind of forum, on how we might attack targets in currently friendly areas, because that's just not our business today.

Student. From the outset of the discussion you have suggested the need to be able to do Tac Air missions on a worldwide basis. Judging by some of the scenarios we've been throwing around, what kind of substitutability is there between naval air power and the kind of missions you're talking about here?

McMullen. Of course a significant difference between Air Force and naval air power is that the Navy takes its base with it.

Student. I guess that's what I'm talking about. It appears to me that when you're talking about getting to

different places in the world, here's another method for doing that, although it's not a substitute.

McMullen. You take your base with you. But there are drawbacks. That's a great way to do it if you're operating in an area that's proximate to water, and a lot of the world is. But it's a very expensive way to do it. In other words, if you look at the force structure on a carrier, the amount of offensive aircraft on it is small in comparison to the investment — I don't known specifically what it is — a couple of billion dollars — in the carrier itself, plus all the equipment. And a lot of the airpower is involved in protecting the carrier. The carrier costs so much that you have to do that; you have to protect the carrier. Well, the airpower used in that role is not involved in projecting your will on shore. Also, if it is not close at the outset, it takes a long time to get there. So it has very useful advantages, but it also has its risks.

Student. My question is more our subject: do you have any kind of joint command structure?

McMullen. Oh, sure. At Norfolk is Atlantic Command, which is a unified command, commanded by a Navy four-star admiral; his position is titled Commander-in-Chief, Atlantic, or CINCLANT, for short. The Tactical Air Command commander is the Commander-in-Chief Air Force Forces, Atlantic Command, or AFLANT. So he's the Air Force component commander of Atlantic Command. There are also naval, Marine and Army components. So there is an example. We exercise it in a biennial exercise called "Solid Shield" — it's a big exercise down in the southeast part of the US where we exercise the forces that belong to the Atlantic Command. Ocean Venture is also a big joint Navy/Air Force exercise. The ability to work together exists. I've talked more about our working with the Army because we have direct responsibility to support the Army around the world; it's one of our fundamental missions — close air support. To some degree the Navy takes care of itself in that regard. We work with the Navy, however, in joint operations.

Student. I'd like you to be specific about the lead times in Europe in case of a Russian attack. How soon can you get a tactical aircraft up to full force?

McMullen. From a no-warning start, each wing has the responsibility to deploy its first squadron within 24 hours. Then the rest of the wing, the other two squadrons, within the next two days. We test ourselves regularly on our ability to execute that responsibility. In fact, we have exercises called "operation readiness inspections" in which we measure a wing's ability to meet that kind of tasking. The ability to lift all of the support with the wing is another matter, and the commander-in-chief who is to be supported plays the key role there. CINCEUR, in the case you raise, would decide what he wants to come to him first. If he decides he wants Tac Air to come to him as a first priority, the available airlift would then be committed to move the fighter squadrons as directed.

Student. You very briefly mentioned Milstar. To what extent are the Tac Air forces going to be dependent on satellites, or the Worldwide Military Command and Control System, or the Global Positioning System (GPS) for location?

McMullen. Well, it will vary with time. I don't think anybody really can say specifically now what it will be in the future. The Global Positioning System, with its tremendous accuracy, will let us attack targets in the blind with area weapons — not with pinpoint accuracy, but with area weapons, if we know the target location accurately. It will let us navigate and do a lot of things with greater precision than we do now. So we think it's going to be a useful system. We are committed to use of satellites for long range communication. Like all the other users, we worry about their survivability. We use all modes of communication — high frequency, the shorter-range line-of-sight systems, and satellite systems; we use everything there is to communicate. We don't depend on one; we depend on being able to survive through redundancy.

Student. In the European theater, with its high density of aircraft activity, how much would the typically IFR weather conditions impact your ability to conduct tactical air missions?

McMullen. A lot. The two principal areas I will talk about are doing the air-to-air role — that is, stopping Red air — and penetration to attack second echelon ground forces. First, air-to-air. We will need the ability to look down and see hostile aircraft with radar, and to shoot missiles down at them against the clutter of radar ground returns. We have fairly good capability to do that now with the F-15, which has a super radar so we

can see down very well. The missiles can shoot down fairly well depending on how high the targets are and what the terrain background is. We're going to get a new missile called AMRAAM, for Advanced Medium Range Air-to-Air Missile, which I mentioned earlier, that will improve our ability to shoot down.

In terms of ability to penetrate in weather at low altitude and hit ground targets, we're really now limited to the F-111. It has a low-altitude terrain-following capability, but none of our other fighter aircraft have a radar with that capability. We're expecting to put some of that capability into a large number of our F-16s, and also to enhance either an F-15 or a specially modified F-16 — we don't know which one yet. We're going to test them both, and then pick the better. That will give us long range penetration capability underneath the clouds with the ability to find targets, using an infrared and radar system we call LANTIRN. It will probably be three or four years before we're able to field that one but it is an important capability for us to take on.

Right now, for instance, if you consider Europe in the wintertime, with our current aircraft we can operate about four and a half hours a day, limited both by darkness and weather. If we can just work the darkness problem and operate underneath the weather, we can stretch that window to about 14 hours per day. That lets us generate about four-plus sorties per airplane per day, as opposed to two or less now.

Student. I'd like you to comment, if possible, on the impact of the cruise missiles on the Air Force interdiction mission, and where they would fit in — not just the nuclear ones. There's talk of employing low-cost, conventional-tipped cruise missiles, too.

McMullen. Of course the impact they've had to date really is nil, since there aren't any. First, you mentioned the nuclear-tipped one, the ground-launched cruise missile: we'd like to field enough of those so we can bolster our theater nuclear force to meet the threat while releasing some of the dual-capable airplanes to other missions. Whether we'll get that done or not is uncertain; but it is important that we do, because the balance in that area is not good. You mentioned the low-cost cruise missile with a conventional warhead — we're still a little bit skeptical as to whether there is such a thing. We are concerned right now that there is a lot yet to learn about their cost-effectiveness. They need to be very accurate, which means they must have a very good guidance system. That, in turn, means they need to have terminal area guidance — so they can acquire the target and home in on it, if they're going to have the kind of precision that's necessary to make their high expense pay off. There are postulated systems, like MRASM, or Medium Range Air-to-Surface Missile, which is a cruise missile that attacks runways. Whether it'll pay off or not, we just don't know yet. We're going to have to wait and see.

Student. To what degree do you depend on commercial (either national or international) communications for the ground support role?

McMullen. Quite a bit. Probably more than I'd like to go into a lot of detail on. When we go into a country we need to use a lot of their communications systems — for example, the Bundespost in Germany is an important system to us. But we have workarounds, as I mentioned. We try to use all avenues of communication, satellite and HF; but we also count on using, as we can, the native communication system, whatever it is.

Student. Who would coordinate between the strategic forces' and tactical forces' use of that equipment? Who is going to integrate their use?

McMullen. Well, it depends on where it is. If it's communication within a country, there isn't any competition, at least between tactical and strategic. Now, there's great competition among the tactical users as to who gets priority; that's a matter for the theater commander to sort out. He owns all the forces, so he has a responsibility for sorting out the use of it.

Student. You were talking about the weather and enhancing the ability of certain aircraft to operate at low levels. How low is low?

McMullen. A couple of hundred feet is low — that's really low; particularly if you're doing it in the dark of night and inside a cloud, that's low.

Student. What improvements would you like to see made in Tac Air's ability to deploy rapidly to Europe? I can see a situation where there would be competing demands for the MAC airlift for support equipment to Europe. What improvements would you like to see in that area, either specifically, in TAC, or in a broad sense?

McMullen. Well, of course, the real answer is very complex, but fundamentally we need increased airlift, and I think that's recognized; in fact, the recent notion of reopening the C-5 production line, somewhat surprising to some, nonetheless is addressing an Air Force requirement in airlift. Again, it's the supported theater commander who decides the priorities. So if he wants Army forces or Air Force forces or some mixture — which is likely the case — he gets whatever he asks for. As you know, there are things such as the TPFDL — the time phased force deployment list — that help by doing the planning beforehand. That way, somebody doesn't have to think through all those priorities while his feet are on fire, but can think them through in advance. We also have actually a time-phased program for getting fighter wings to Europe that's independent of that timing requirement; as I said, we have time requirements on our wings for when they have to have the first squadron ready to go, independent of the demand.

Student. Now, is that just aircraft?

McMullen. No, that's a squadron ready to go. That's people — maintenance people and pilots — and the support equipment and supplies. Of course, some of the pilots would fly the airplanes, but there are additional pilots that we must transport over. In fact, that's an important element. What we want to do is have some pilots and the maintenance teams transported over, and they'll turn around the arriving fighter aircraft that are capable for an immediate combat sortie. The pilots who flew over in the airlift, C-141s or whatever, will get into the combat-capable fighters and take off immediately on their first combat sortie. That's a normal thing; we practice it that way. For example, when we perform a practice deployment to Europe or to Egypt, such as Bright Star, we'll deploy equipment, the maintenance force and some pilots while we're generating the airplanes at home base; then when the fighter aircraft arrive, there are pilots ready to fly those that are in commission.

Student. There's been, according to some reports, some movement on redefining some of the basic doctrines for ground operations in FM 100-5 and so forth. I'm curious if, under such a scenario, the increased emphasis on fluidity of ground forces doesn't dictate some basic changes in conceptualization of Tac Air support, and in the kinds of C^3I requirements you're going to have.

McMullen. Well, again, part of what you raise has to do with General Starry's notion of a forward-looking battlefield. That's the kind of thing from which we derive increased emphasis for the battlefield air interdiction role — that is, trying to get the enemy while they're still coming at us rather than after they're engaged in the battle. As for the Army being more mobile, that doesn't really change our basic concepts; it may affect the equipment that we need so that it's more mobile — the bubbles I mentioned aren't very mobile. We're looking at a thing called an MCE — modular control equipment — that packages things in vans for control stations; data is fed in from different kinds of sensors. The basic element can be any size to meet the need; based on the situation, you decide what capability is required, and that determines how many of the vans we'll put together, the basic element being one. So it changes our equipment notions; it really doesn't change our basic concept.

Student. I wonder if you could expand a little bit more on the intelligence part of Tac Air. Do you rely mostly on your own tactical intelligence, or DIA, or other sources?

McMullen. We rely on all sources. The fundamental input has to be tactical sources; that is, tactical reconnaissance. We have a programmed device called ENSCE — the enemy situation correlation element — based on an earlier concept formulation program called BETA (Battlefield Exploitation and Target Acquisition system). BETA was a joint-service program aimed at correlating all source information. We wound up with two experimental BETAs, one for the Air Force and one for the Army, which correlate sensor inputs. Now we intend to develop a production configuration, ENSCE, that will have the capability to correlate all sources — radar, IR data, photography, everything — and do it with computers rather than manually. Different kinds of sensor inputs are put in a standard format and then into a computer. The computer will help us sort out and determine what the real targets are.

Student. Is that sanitized?

McMullen. Right. It takes the data that has been sanitized and displays it.

Student. You mentioned you were involved in development of the A-10 close air support aircraft. I've been in Army maneuvers where they were involved, and they seemed very capable. And yet, a few weeks ago I read that the government was cutting out the A-10 procurement and not purchasing any more. Was that because we have enough of them, or did something better come up, or what?

McMullen. No, the real reason is that we're reaching the point of buying out the program, the original number we envisioned. We set that number back in 1970. The number we have matches the priority of missions we have to do. So, is it enough? No, probably not. Are we getting enough of anything else? No, probably not. The shortfall in A-10s matches the shortfall we have in other elements. Again, the priority we and the Army need Tac Air to address better is to improve our ability to do battlefield air interdiction; the A-10 just doesn't do well that far into enemy territory, because it doesn't survive in that environment.

Student. There's nothing up the pike to follow up on it, it's just that the money crunch has hit it, is that right?

McMullen. Yes, that's right. The matter of priority of resources tells us that we need to put emphasis on BAI and ability to accomplish air interdiction beyond the battlefield. It's battlefield air interdiction and beyond that we're emphasizing now. Again, that means we need to go after enemy forces, not the industrial plants like the ball bearing raids which characterized interdiction in World War II. That is not our priority.

McLaughlin. You talked earlier about training exercises where you used other allies' technology.

McMullen. No, I didn't mean that. Not their technology. We use their people and procedures; we use command and control people from NATO. They come over and we integrate them into a team just like they would be integrated in a ASOC or an ATOC in NATO. And we try to use the equipment as it is in NATO. Down at Eglin Air Force Base in Florida we have a mockup of all that equipment.

Student. You were talking in the beginning about how you use resources. Do you have control over the budget? For instance, for the whole of Tac Air?

McMullen. No, certainly not.

Student. Then how do you make recommendations? I'm terribly curious about how — when there are discrepancies between how different people in military services would like to see budgets utilized — that is resolved, and how much control people at your level have over these kinds of budgets.

McMullen. I think, at least in the Air Force, we have increasing influence over it. We used to have a process where only our Air Staff, which is our organization in the Pentagon, allocated resources; they alone decided the direction for pushing resources, et cetera. There was a written input from the field that was considered, but to what degree it is difficult to tell. Over time, while the people in the Pentagon continued to have the responsibility for making those decisions, they realized they needed the inputs from the field in greater depth. So now there is a series of meetings during the preparation of our budget. It goes through the various cycles: commanders — and the planners on the commander's staff — go in and interface with the Air Staff directly. We submit what we think are our priorities, but then we go in and participate in the live tradeoffs — and that's just what they are. There's always more than will fit the pot.

Student. And you're in competition with other branches of the service?

McMullen. Well, that's a whole other course of instruction! There's OMB, OSD, JCS, and others in a very complex interfacing that sort that one out. One, how big is it? Two, where do you divide it up? — and many more such issues. As you know, it gets done with the best logic and reason available — but it is susceptible to dramatic changes within the last few seconds as the budget issues get resolved. It's a complex process that, in general, gets done as well as it could get done.

Student. Could you comment on the automatibility of the Army and Air Force ability to control both A-10s and attack helicopters? Is there going to be a greater problem as more and more attack helicopters get introduced into Army aviation?

McMullen. Well, I think quite the opposite; there are going to be more opportunities. As you may know, we ran a test out at Fort Hunter Liggett and came up with the set of procedures we call joint air attack tactics. We

divide the friendly forces into capable small teams which operate very well together. With the different capabilities that the A-10 and helicopter have, for instance, we get good results. The helicopters can sort out the surface-to-air threats for other targets and kill them, while the heavier firepower that the A-10 can bring is being applied to the more durable targets like tanks. I think we're moving ahead in leaps and bounds in integrating how effectively we use systems as diverse as helicopters and A-10s. We do that joint work well, I think.