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Force Protection and Strategic Air Mobility: 
The MANPAD Challenge

by

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

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy

Signature: [Signature]

5 February 1999

William R. Kunzweiler, Lt Col, USAF
Joint Military Operations Department

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Two proposals would help meet the MANPAD challenge. Emphasis on technology improvements in Security Force detection equipment and ADSs will alleviate personnel pressures. Assigning Mobility Air Force Commanders to regional Commanders-in-Chief during contingency or wartime operations will improve the present decentralized force protection effort.
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Strategic mobility is essential for the U.S. military to be an effective fighting force today and into the 21st century. A vital part of strategic mobility is strategic air mobility. The Air Force's team members in satisfying the nation's strategic air mobility needs are the civilian air carriers. Civilian air carriers do not have the same design and features of military strategic aircraft. They are uniquely suited for transporting troops over long distances. Regional Commanders-in-Chiefs (CINCs) rely on the services of civilian air carriers to accomplish their missions. United States Transportation Command (USTRANSCOM) depends on civilian carriers to implement the strategies of Strategic Agility and Force Projection today and Dominant Maneuver in the future.

The formidable threat posed by shoulder launched or manportable surface-to-air missiles (MANPADs) has cast doubt on the continued reliability of the civilian air carriers. The U.S. military simply cannot guarantee their protection. Modern MANPAD technology is starting to affect the agility of military strategic airlift as well.

This paper offers two solutions for providing unimpeded strategic air mobility support to the CINCs. First, regional CINCs must be able to receive a complete package of personnel and modern technology to counter the MANPAD threat. Additionally, an air mobility expert should be assigned to the operational commander's staff to direct theater airlift operations while ensuring force protection issues are executed. The solution for providing unfettered strategic air mobility support to the CINCs is available. Commitment is the key and the missing ingredient.

Airlift is Essential

The U.S. military has become a CONUS-based, rapid-reaction force. The number of military installations closed overseas and the number of personnel shifted from overseas to CONUS in the past decade evidence this change. The change is also reflected in the National
Military Strategy's concepts of Strategic Agility and Power Projection.\textsuperscript{1} The ability to react to crisis situations is emphasized as the way of the future in the Chairman of the Joint Chiefs of Staff's Joint Vision 2010 under the concept of Dominant Maneuver.\textsuperscript{2}

The U.S. military's shift to a rapid-reaction force means that the U.S. is more dependent on strategic mobility than ever. The National Military Strategy states, "Robust strategic sealift, air mobility, and ground transportation combined with prepositioned supplies and equipment ashore and afloat, are critical to maintaining strategic agility."\textsuperscript{3} While all modes of strategic mobility are critical to how the U.S. military operates, the most vital mode may be strategic air mobility. Strategic air mobility's speed and versatility make it essential for expeditiously supplying a combatant CINC. Joint Tactics, Techniques, and Procedures for Airlift Support to Joint Operations states, "Airlift is the cornerstone of global force projection."\textsuperscript{4}

**MANPAD Vulnerability: Airlift's "Achilles' Heel"**

Strategic airlift is also the most vulnerable mode of strategic mobility. Limitations of strategic airlift and the need for a secure environment in which airlift can operate are recognized in joint doctrine.\textsuperscript{5} The most severe threat to strategic airlift in Southwest Asia and other areas around the world is the threat from MANPADs.\textsuperscript{6} MANPADs have successfully downed both military and commercial aircraft. They are inexpensive, easily obtained, extremely mobile, and difficult to counter.

Providing the secure environment necessary for unimpeded airlift falls under the category of force protection. Force protection is a major concern of all military personnel, particularly with the recent terrorist attacks in Saudi Arabia and Africa. Without force protection for strategic airlift, a CINC may not receive personnel or critical supplies. Without personnel and supplies, the CINC's ability to respond to any type of crisis is severely limited.
The Military-Civilian Airlift Partnership

Strategic airlift's ability to respond to the CINC's needs depends on civilian as well as military air carriers. Combatant command of the military's strategic airlift assets, which include C-5, C-17, C-141, KC-10, and KC-135 aircraft, rests with USTRANSCOM. Air Mobility Command (AMC), the Air Force component of USTRANSCOM, maintains operational control (OPCON). Civilian air carriers volunteer to augment the military's strategic airlift capability during a crisis or war via the Civil Reserve Airfleet (CRAF) program. There are three levels of CRAF commitment. Level III is the highest and is necessary to meet the strategic airlift requirements for a two Major Theater Wars (MTW) scenario. During a two MTW scenario the CRAF could move as much as 93 percent of the U.S. military's passengers and up to 41 percent of its required cargo. During the DESERT SHIELD and DESERT STORM deployments, the CRAF moved 62 percent of the passengers and 27 percent of the cargo while flying 20 percent of the strategic airlift missions.

Due to peacetime demands on USTRANSCOM's strategic airlift fleet, CRAF partners are routinely hired to augment the Department of Defense's (DoD) strategic airlift needs. Commercial air carriers augment USTRANSCOM on a routine daily basis, during contingency responses, and during crisis responses. In 1998, USTRANSCOM paid $707 million to these carriers for airlift. "OPCON," if the term can be applied to the civilian fleet, of commercial aircraft hired by USTRANSCOM remains with each respective carrier. The aircraft and crew are simply chartered for a flight. However, the decision to send or not send a commercial carrier to a CINC's area of responsibility (AOR) rests with AMC.
MANPADs: Low-tech Lethality

The MANPAD threat is serious. Strategic airlift aircraft, both civilian and military, are vulnerable to this threat. *Joint Tactics, Techniques and Procedures for Airlift Support to Joint Operations* states, “Airlift aircraft are very vulnerable to hostile actions. Large fixed-wing airlift aircraft have significant radar signatures and lack maneuverability, and many have no onboard defensive systems. Additionally, they fly at relatively slow airspeeds, prolonging their exposure to attack.”14 The history of MANPAD use attests to their effectiveness. In the Gulf War, MANPADs hit almost half of U.S. aircraft lost to the Iraqi forces.15

MANPADs are small, easily operated, mobile, and deadly. An entire MANPAD system can weigh as little as 14 kg. The length is usually less than 1700 mm. It is efficient against aircraft flying at altitudes between 1300 and 5500 meters. Technical specifications for some of the world’s MANPADs are in Appendix A. Engaging a target with a MANPAD is quick and easy. For example, if an aircraft is at 15,000 feet at a range of 6-8 km, a MANPAD can be set up and hit its target in less than 19 seconds.16 Due to the range of these weapons, the threat from MANPADs is most critical for strategic aircraft during takeoff and landing, when the aircraft are low, slow, and unmaneuverable.

Thirty airliners or air transport aircraft have been shot down with MANPADs.17 Even the most sophisticated Air Defense Systems (ADS) on board an aircraft may not be capable of stopping a MANPAD attack. An ADS confuses the seeker on a MANPAD by dispensing flares and chaff. During Operation DELIBERATE FORCE, a series of NATO-led attacks on Bosnian-Serb ground targets, a French Air Force *Mirage 2000D* was hit by a MANPAD. The *Mirage 2000D* is one of the most advanced fighter aircraft in the world.18
Though the MANPAD is lethal, it is not a perfect weapon. In downing at least 12 out of 29 aircraft with MANPADs during the Gulf War, there are no figures for how many missiles the Iraqi forces may have fired.  During the war in Afghanistan, Afghan rebels shot over 1,000 MANPADs at Soviet Air Force aircraft and downed at least 250.  Both MANPAD technology and defensive countermeasures have improved over the years. Modern MANPADs, such as the French *Matra*, Russian *Iгла*, Swedish *RBS 70/90*, British *Blowpipe*, and U.S. *Stinger*, have infrared homing or laser command line-of-sight guidance seekers that are difficult to detect and counter.  Previous MANPADs relied on radar guidance. The radar signal was much broader and easier to detect. The ADS used to counter modern infrared or laser guided MANPADs relies on electronic jamming of the seeker.  While MANPADs may not have been highly effective a decade ago, modern technology has made them harder to detect and defend against.

MANPADs are available to many countries and terrorist groups around the world. They are being transported or sold to the highest bidders. There is a long list of countries and terrorist groups known to possess them (Appendixes B & C). On a recent ABC News report, the known terrorist Bin Laden admitted using his wealth and connections to purchase U.S. *Stinger* missile launchers. During the Afghan War, the U.S. Central Intelligence Agency (CIA) gave the Afghan rebels *Stingers* to use against the Soviet Air Force. These *Stingers* were estimated to be 40 percent effective against their targets.  Bin Laden was one of the Rebels shown on the ABC World News telecast using the *Stingers*. In the late 1980s, U.S. forces captured several Iranian gunboats armed with *Stingers*. The trail of the missiles was found to track from Afghanistan, through Pakistan, and finally into Iran.  Today, of the seven states on the official U.S. list of nations supporting international terrorism, Iran is believed to be the only one still active. In 1993, it was estimated that there were 200 to 300 unused *Stingers* in the hands of the Mojahedin
-- the former Afghan rebel organization. In an effort to curb Stinger proliferation, the CIA was purchasing the unused weapons for $175,000 to $200,000 each. The original cost of the weapon was $35,000, and they were selling on the black market for $100,000.\textsuperscript{27} In 1990, three Provisional Irish Republican Army members were arrested while trying to purchase Stinger missiles and other weapons.\textsuperscript{28} In the list of countries and terrorist groups that possess MANPADs, several, including Bin Laden and Saddam Hussein, have targeted and openly expressed a willingness to target U.S. interests or forces.\textsuperscript{29}

To attempt to keep air lines of communication open for the CINC\textsuperscript{s} and to counter the MANPAD threat, the Air Force is modifying many of its strategic airlift aircraft with ADSs. All C-17\textsuperscript{s} are equipped with ADS. C-141\textsuperscript{s} tasked with special operations missions have the same system. Twelve C-5\textsuperscript{s} are already outfitted and the remaining are scheduled to be modified. KC-10 and KC-135 aircraft are not yet scheduled to be modified with an ADS. The system being installed in all the aircraft is a first generation ADS designed to counter an attack on a fighter aircraft. Strategic airlift aircraft have a much larger radar signature than fighters. The ADS being installed is also incapable of detecting or countering modern infrared or laser guided MANPADs.\textsuperscript{30}

Commercial aircraft do not have an ADS. Due to cost (\$1 million to modify a C-5, for example\textsuperscript{31}), and expenses associated with routine maintenance and inspection, the Air Force expects that commercial air carriers will not install an ADS in the near future. Another reason commercial carriers do not have ADSs is acknowledgment of the threat associated with installation. Commercial carriers are guaranteed to only fly into non-threatening areas by their contract with AMC and AMC's agreement with the Federal Aviation Administration. Installing
an ADS on a commercial carrier would tacitly acknowledge and accept the MANPAD threat. Yet, for the CRAF to be fully effective, deliveries must be made to the theater of operations.32

Today, AMC is permitting commercial air carriers, augmenting USTRANSCOM’s strategic airlift mission, to fly into only a few Middle East nations because of local MANPAD threats. AMC is also dictating that military aircraft entering those same countries must be equipped with an ADS to the maximum extent possible.33 “To the maximum extent possible,” means that if a mission is considered to be high priority or worth the risk, and an ADS equipped aircraft is not available, one without ADS will be used.34 Regardless of how aircraft are shuffled, the net result is that a reduced airlift capacity is available to support U.S. Central Command (USCENTCOM).

Countering the Threat: Who’s in Charge?

The MANPAD threat is greatest overseas, particularly in Southwest Asia. Protecting strategic airlift aircraft from MANPADs in an AOR is ultimately the regional CINC’s responsibility. Strategic airlift aircraft are usually transitory to a CINC’s AOR; AMC retains their OPCON. The regional CINC, however, is ultimately responsible for ensuring that force protection measures are in place for all assets in his theater. His responsibility is defined in joint doctrine and it was reaffirmed or emphasized in DoD Directive 2000.12, Combating Terrorism Program, implemented after the attack on Khobar Towers.35

Actual force protection measures for military installations or airports used by strategic airlift assets in an AOR are commonly delegated to the service component using those facilities.36 For example, strategic airlift aircraft flew missions into Kuwait City International Airport during the most recent U.S.-led Operation DESERT FOX. A Tactical Airlift Control Element (TALCE) from AMC was deployed to Kuwait City with personnel to handle supply on-
load and off-load as well as force protection for the TALCE. Force protection in a crowded, densely populated place like Kuwait City required close interaction with host nation forces. AMC was in charge of protecting their own personnel and aircraft on the ground. At the opposite end of the spectrum, Air Force presence in Saudi Arabia has been largely consolidated at Prince Sultan Air Base (PSAB), far away from populated areas. The decision to relocate the majority of air forces to PSAB was made after the attack on Khobar Towers and subsequent investigation. Personnel from across the Air Force are accomplishing the force protection mission at PSAB because it is home to a mixture of fighter and airlift aircraft. Security Forces at PSAB are providing force protection for all strategic airlift aircraft, including their departure and arrival corridors. The dilemma, however, rages on. Who is in charge? Regardless of where Security Forces or Military Police are sourced, if they are conducting operations in a CINC’s AOR, that CINC is ultimately responsible for ensuring force protection.

AMC’s Commander makes the ultimate decision for sending civilian air carriers into an AOR and setting policy for strategic airlift aircraft. The decision is based on a risk assessment performed by AMC’s Threat Working Group (TWG). The TWG also recommends policy, such as whether to send ADS equipped aircraft into certain countries. The Director of Intelligence at AMC heads the TWG, which works closely with USTRANSCOM’s Joint Intelligence Center to gather information.37

For the MANPAD threat, the TWG has developed a MANPAD Vulnerability Risk Assessment matrix that includes criteria such as Terrorist Threat, Threat to Military Operations, Security of MANPAD Footprint, MANPAD Availability, Intent to Carry Out Standoff MANPAD Attack, Government Stability/Regional Political Tensions, and Mitigating Factors.38
Using those criteria and information from intelligence reports, the recommendation on use of civilian air carriers is made.

There are options for countering the MANPAD threat if civilian air carriers must be used. One option is to have aircraft arrive and depart at night, when aircraft markings are difficult to see. Attackers would not know if they were firing at U.S. aircraft, one from their own country, or a neighboring country. Another option is to have aircraft fit into routine or peak-period commercial arrivals and departures for a large airport like Kuwait City. A third option is to work with host nations to have aircraft follow non-regular or varying altitudes as well as arrival patterns or routes. The dilemma in applying any of those options is analogous to the argument for not installing the ADS. Civilian aircraft will not be sent into an AOR where the threat is assessed as high. Using unique techniques would be a tacit acknowledgment and acceptance of the high risk.

The Spectrum of War and Airlift Security

If the U.S. is involved in a MTW, the security of the area where strategic airlift would operate is to be accomplished in accordance with Joint Tactics, Techniques, and Procedures for Base Defense. The CINC or Joint Forces Commander (JFC) would appoint a Joint Rear Area Coordinator (JRAC). The JRAC would establish a secure area to conduct all supporting operations for the war. Aircraft arrival routes and procedures would be coordinated with the airspace control authority and published in the airspace control plan per direction of the Joint Forces Air Component Commander (JFACC).³⁹

The JRAC’s tasks are further defined in Corps Operations.⁴⁰ For a MTW, the “footprint” established by arriving U.S. forces and the security requirements have been defined. While the threat may be obvious to forces in a MTW, available defensive measures and their employment
are unambiguous as well. Once the rear area of operations is secure, use of civilian air carriers should not pose a high risk.

The MANPAD risk to strategic airlift, and civilian air carriers in particular, is highest when the air bridge is being established. The “air bridge” is a term used to define USTRANSCOM’s plan to establish the air lines of communication and an uninterrupted flow of strategic airlift. Strategic airlift is crucial because it is also the means of deploying the JRAC and the associated forces. Strategic airlift may be delivering heavy equipment and personnel or it may be bringing soldiers to meet up with pre-positioned or afloat heavy armor. That armor and associated equipment is useless unless personnel arrive to operate it. While the air bridge is being set up, the joint rear area has not been established or secured.

For military operations other than war (MOOTW), there may not even be a rear area. The area where operations are being conducted may be the area where strategic airlift operates. For example, during Operations RESTORE HOPE in Somalia and RESTORE DEMOCRACY in Haiti, the main airfield in each country was where the operation was taking place. In both instances, civilian air carriers were not used because the risk was determined to be too high. Force protection was provided by U.S. Army helicopter patrols before strategic aircraft arrived, while they were on the ground, and for their departure.

One of the major conclusions of a Defense Science Board Study was that U.S. forces are more vulnerable to terrorist threats today than at any time in the past. U.S. military strategic airlift aircraft equipped with ADS are shouldering the load for supporting USCENTCOM’s AOR because of assessments like the Defense Science Board’s. Security Forces in the region are using some of the same tactics, techniques, and procedures that would be employed during a MTW. For example, before any strategic airlift aircraft arrives at PSAB, motorized patrols make
their presence known as far out as 30-40 km from the base. The base perimeter at PSAB is 10 km. The same technique is used at Kuwait City, except host nation forces conduct the patrols.42

The problem with employing wartime techniques in peacetime is that current force structure is not large enough to support them. Because we have a much smaller force, the Security Forces rely on sensor technology to keep vigilance. Sensors have their limitations, though. While they may be able to detect personnel or even a MANPAD launch, they can do little in the way of preventing a launch that can reach its target in 19 seconds or less.

While a MANPAD has not downed a U.S. aircraft since the Gulf War, the threat of MANPADs has limited the U.S. in executing its strategies of Power Projection and Strategic Agility. During Operation DESERT FOX, forces were needed in USCENTCOM’s AOR to defend against a possible Iraqi retaliation to the air strikes. Those forces were transported via USTRANSCOM chartered commercial air carriers as far away as Europe. From Europe, the forces were transferred to military strategic airlift aircraft equipped with ADS for the flight into the AOR.43 If the CINC or JFC needed supplies along with those personnel, he would have needed to prioritize the flow because of the competing need for military strategic airlift aircraft. One of the lessons learned by the U.S. Army from Operation RESTORE HOPE centered on the role of strategic airlift. There would have been an estimated 41 percent increase in throughputs and delivery rates had chartered civilian aircraft been used, and if the C-17 had been available instead of the C-5.44 The C-5 took up too much ramp space at the airfield. Only one aircraft could be on the airfield at a time. Production of C-17s could not be accelerated. The use of commercial airlift, however, could have occurred if the airfield and the surrounding area were deemed secure. Security of the airfield in Mogadishu, Somalia was a joint operation under JFC
control, but rules of engagement and constraints put on forces in the area did not allow them to establish a secure area large enough to permit safe use of civilian aircraft.

Any operational plan or concept of operations coordinated with USTRANSCOM for transportation of troops will inevitably include reliance on civilian air carriers. Civilian airliners are made for carrying passengers. Military strategic aircraft are designed to transport oversized and outsized military equipment. By taking civilian air carriers out of the force deployment equation, pre-planned time-phased force deployment data for many operations or concepts may have to be re-evaluated or recalculated. It may take much longer to get troops and equipment to a theater because of the MANPAD threat. Strategic air mobility's speed and versatility advantages are waning. The CINC's ability to accomplish his mission will be adversely affected.

**Addressing the Challenge: Resources and Restructure**

To ensure that the full spectrum of strategic air mobility will be available for regional CINC's and to carry out our strategy of Dominant Maneuver in the future, three actions must be accomplished immediately. First, state-of-the-art ADS technology needs to be installed in all military strategic airlift aircraft. Second, the CINC needs to allocate more Security Forces or Military Police to focus on MANPAD detection and defense. Third, the CINC needs to assign responsibility for the protection of strategic airlift aircraft in his AOR to an expert on airlift operations. Two findings in the Report of the Downing Assessment Task Force after the attack on Khobar Towers concurred with all those assessments. Compliance with the report, however, has not gone far enough.

The need for a state-of-the-art ADS is obvious. MANPAD technology has leapfrogged the countermeasures that are being installed today. MANPAD accessibility is high. The U.S.
military’s strategic airlift fleet must be available to support the combatant CINCs even if civilian air carriers are not.

In an attempt to provide more forces and modern technology, the Chairman of the Joint Chiefs of Staff has set up a counter-terrorism task force under the J-3 Directorate. The task force visits overseas military installations and helps the commander establish the proper force protection posture.\textsuperscript{46} Since the Air Force will most likely be responsible for force protection of its assets, it has established the 820\textsuperscript{th} Force Protection Battlelab. The Battlelab is the Air Force’s front line Security Force. It is designed to establish a secure environment at deployed locations so that forces can enter.\textsuperscript{47} While both of these actions are laudable, they did not generate more forces or accelerate technology development. They did provide unity of effort from both a single service and joint perspective. By consolidating force protection expertise at the Joint Staff, positions were created that took personnel away from positions at Headquarters, Corps, and Wing levels. Also, another level of bureaucracy was added to help the CINC perform his job.

The same argument can be made for the Air Force’s Battlelab. The plan for the Battlelab is to consolidate over 500 Security Force personnel in the same location. Security Forces are planned to come from outsourced and privatized security positions at various CONUS Air Force Wings.\textsuperscript{48} Considering the foundation of force protection for all deployed forces in USCENTCOM’s AOR is a secure footprint, more personnel are needed in outlying areas of military installations overseas.

Technological superiority for Security Forces or Military Police would help alleviate personnel shortfalls, but is limited in what it can accomplish. Development and employment of advanced sensors can not be underemphasized. Another proposal is use of camera-mounted
unmanned aerospace vehicles (UAVs).\textsuperscript{49} While UAVs can provide surveillance, they can do little in the way of stopping MANPAD launches.

To meet the real intent of the Downing Assessment and Force Protection Battlelab's goals, all U.S. military forces need the ability to react to threats outside their base perimeter. All Security Forces or Military Police securing areas where strategic aircraft will traverse need to have forces available to provide a presence like the one at PSAB. Short of that, they need helicopter patrols capable of detecting, defending against, and destroying the MANPAD threat. Emphasis has been placed on force protection because of terrorist attacks on Khobar Towers and the U.S. Embassies in Kenya and Tanzania, but procedures necessary to allow chartered commercial aircraft to deliver personnel to an AOR have not been developed.

To emphasize the importance of force protection, the DoD uses maxims in the Downing Assessment and the Defense Science Board Study that say everyone is responsible for force protection. While everyone needs to practice diligence for force protection, the truth of the matter is that the force protection requirements are different for individuals, fighter aircraft bases, helicopters, ground personnel, and strategic airlift aircraft.

USTRANSCOM has addressed force protection and other airlift-specific problems by providing a Director of Mobility Forces (DIRMOBFOR) to the CINC or JFC during contingencies or major deployments. The DIRMOBFOR's job is to be a liaison with USTRANSCOM on airlift matters that concern the CINC.\textsuperscript{50} He has no authority over forces in the region, but he is usually a general officer and an airlift expert. AMC's Security Forces Directorate offers an advisor to accompany the DIRMOBFOR on deployments to ensure force protection measures are handled properly.\textsuperscript{51} Not giving the DIRMOBFOR authority over air
mobility forces in a region, however, is like giving a general officer command with no authority over his troops.

The DIRMOBFOR should be assigned to the CINC, work beside the JFACC, be designated the Mobility Air Forces Commander (MAFC), and be given OPCON of air mobility forces in the CINC’s AOR. The concept is not new. It is spelled out in *Joint Tactics, Techniques and Procedures for Airlift Support to Joint Operations*, except AMC currently retains OPCON of the forces. Under this proposal the MAFC would have OPCON over the airlift coordination cell in the air operations center, deployed TALCEs, theater airlift control systems, and tactical airlift aircraft. By aligning all deployed AMC forces under a MAFC, lines of command and control would be greatly simplified and a greater unity of effort achieved. It would also be extremely beneficial during MOOTW such as Somalia, where a JFACC was not designated. A MAFC would provide airlift expertise to command and execute all air mobility functions, including force protection. A compelling reason for expanding the current liaison role of the DIRMOBFOR to one of command, and assigning AMC deployed forces to the regional CINC, is to be in compliance with DoD Directive 2000.12. Since a regional CINC is responsible for force protection of all deployed forces he should have OPCON of those forces. Former Secretary of Defense William Perry told the Senate Armed Services Committee, after the terrorist attack on Khobar Towers, that the military was not meeting the intent of the Goldwater-Nichols Act by having a commander 7,000 miles away. Having a DIRMOBFOR in an AOR, but not having him in an authoritative position to deal with issues like force protection, is exactly what the former Secretary of Defense said not to do.

To concentrate, employ, and sustain our forces when and where we choose, at a speed our adversaries can not match, is the objective. Rapidly deploying forces and being able to respond
to any crisis anywhere in the world is a decisive point in attaining that objective. The MANPAD threat is denying access. The civilian air carriers are vital team members for our strategic mobility needs, yet their availability is not assured. The threat is beginning to affect military strategic airlift assets as well. Clausewitz proposed that changes in military hardware or their capability are not major concerns. If an enemy has an advantage in weapons it is only a matter of time before the other side acquires the same weapon or a means to counter the advantage. Eventually both sides will become equal and the superior side will prevail. In the case of MANPADs, our counter to the threat is a show of force. We do not yet have the technology to guarantee the safety of every strategic aircraft. While we are trying to make that technology a reality, we are countering the threat by making our presence known. At PSAB, the show of force is extensive ground security enforcement that allows civilian air carriers to fly in and out. But using a show of force to deter the use of MANPADs will only be successful if the forces are directed to the right location at the right time. USTRANSCOM's DIRMOBFORS have the expertise to ensure all available resources are used so the U.S. military can achieve its strategic mobility objective. The capability to safely deter the MANPAD threat and provide a clear chain of command for all airlift issues, including force protection, is available. We need the commitment to make it work.
Appendix A - MANPAD Technical Specifications

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<td>Launcher length</td>
<td>1500mm</td>
<td>1400mm</td>
<td>1860mm</td>
<td>1500mm</td>
</tr>
<tr>
<td>System Weight</td>
<td>16kg</td>
<td>14.5kg</td>
<td>24kg</td>
<td>16kg</td>
</tr>
<tr>
<td>Max Altitude (m)</td>
<td>8000</td>
<td>3500</td>
<td>5500</td>
<td>4200</td>
</tr>
<tr>
<td>Avg Speed (m/s)</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Guidance System</td>
<td>P-Infrared</td>
<td>LOS</td>
<td>P-Infrared</td>
<td>P-Infrared</td>
</tr>
<tr>
<td>Max Effective Alt</td>
<td>3500m</td>
<td>2500m</td>
<td>3000m</td>
<td>2300m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>US Designation</th>
<th>Vanguard</th>
<th>Hongying</th>
<th>Sakr Eye</th>
<th>Anza MkII</th>
</tr>
</thead>
<tbody>
<tr>
<td>Launcher length</td>
<td>1530mm</td>
<td>1450mm</td>
<td>1400mm</td>
<td>1500mm</td>
</tr>
<tr>
<td>System Weight</td>
<td>16.5kg</td>
<td>16kg</td>
<td>15kg</td>
<td>16.5kg</td>
</tr>
<tr>
<td>Max Altitude (m)</td>
<td>5000</td>
<td>2500</td>
<td>4400</td>
<td>5000</td>
</tr>
<tr>
<td>Avg Speed (m/s)</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>Guidance System</td>
<td>P-Infrared</td>
<td>P-Infrared</td>
<td>P-Infrared</td>
<td>P-Infrared</td>
</tr>
<tr>
<td>Max Effective Alt</td>
<td>4000m</td>
<td>2400m</td>
<td>4000m</td>
<td>4000m</td>
</tr>
</tbody>
</table>

P = Passive

LOS = Line of Sight
Appendix B - Countries Known to Possess MANPADs

Abu Dhabi
Afghanistan
Angola
Argentina
Australia
Austria
Bahrain
Belgium
Benin
Bosnia
Botswana
Brazil
Bulgaria
Cambodia
Canada
Cape Verde Islands
Chile
Chad
China
Croatia
Cuba
Cyprus
Czech Republic
Denmark
Dubia
Ecuador
Egypt
Ethiopia
France
Finland
Germany
Ghana
Greece
Guinea
Guyana
Hungary
Hungary
India
Indonesia
Iran
Iraq
Ireland
Israel
Italy
Japan
Jordan
Kuwait
Laos
Lebanon
Libya
Malawi
Malaysia
Mali
Mauritius
Mexico
Mongolia
Morocco
Mozambique
Netherlands
Nicaragua
Nigeria
North Korea
Norway
Oman
Pakistan
Peru
Philippines
Poland
Portugal
Qatar
Romania
Saudi Arabia
Seychelles
Sierra Leone
Singapore
Slovakia
Slovenia
Somalia
South Africa
South Korea
Spain
Sudan
Sweden
Switzerland
Syria
Tanzania
Thailand
Tunisia
Turkey
Uganda
United Arab Emirates
United Kingdom
Venezuela
Yemen
Yugoslavia
Zambia
Zimbabwe
Appendix C - Groups Known or Suspected of Possessing MANPADs

<table>
<thead>
<tr>
<th>Group</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hezbollah</td>
<td>Lebanon</td>
</tr>
<tr>
<td>Irish Republican Army</td>
<td>Lebanon</td>
</tr>
<tr>
<td>Kurdish Workers Party</td>
<td>Turkey</td>
</tr>
<tr>
<td>UNITA</td>
<td>Angola</td>
</tr>
<tr>
<td>Mojahedin</td>
<td>Afghanistan</td>
</tr>
<tr>
<td>Contras, Sandinistas</td>
<td>Nicaragua</td>
</tr>
<tr>
<td>Various warring factions</td>
<td>Bosnia-Herzegovina</td>
</tr>
<tr>
<td>Farabundo Marti National Liberation Front</td>
<td>El Salvador</td>
</tr>
<tr>
<td>Chechen rebels</td>
<td>Chechnia</td>
</tr>
<tr>
<td>Tamil Tigers</td>
<td>Sri Lanka</td>
</tr>
<tr>
<td>Various warring factions</td>
<td>Somalia</td>
</tr>
<tr>
<td>GIA</td>
<td>Algeria</td>
</tr>
<tr>
<td>Muslim AMAL</td>
<td>Lebanon</td>
</tr>
<tr>
<td>Rwanda Patriotic Front</td>
<td>Rwanda</td>
</tr>
<tr>
<td>Sudanese People’s Liberation Army</td>
<td>Sudan</td>
</tr>
<tr>
<td>Iranian Revolutionary Guards</td>
<td>Iran</td>
</tr>
</tbody>
</table>
Notes


5 Ibid, III-5.


7 Joint Pub 4-01.1, II-9.

8 Headquarters Air Mobility Command. Civil Reserve Air Fleet Critical to Readiness, (Scott Air Force Base, IL. 1989), 34.


11 Civil Reserve Air Fleet Critical to Readiness, 37.

12 Joint Pub 4-01.1, II-7.


14 Ibid, III-5.


17 Zolaga, 147.

18 Hewish, 52.
19 Zolaga, 153.


21 Hewish, 50.

22 Ibid, 52.


24 Hunter, 474.

25 Ibid.


27 Hunter, 474.

28 Leader, 42.


30 Hewish, 51.


33 Maher.

34 Ibid.

Joint Pub 3-10.1, II-2.


Joint Pub 3-10.1.


Lomantagne.


Joint Pub 4-01.1, II-10.


Joint Pub 4-01.1, II-9.


56 Hunter, 476.

57 Ibid, 475.
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Maher, Roger D., Colonel, USAF. Director of Intelligence Headquarters Air Mobility Command. Telephone conversation with author, 25 January 1999.


