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COST EFFECTIVE AIRLIFT IN THE 21ST CENTURY

HEARING

BEFORE THE

FEDERAL FINANCIAL MANAGEMENT, GOVERNMENT INFORMATION, FEDERAL SERVICES, AND INTERNATIONAL SECURITY SUBCOMMITTEE

OF THE

COMMITTEE ON HOMELAND SECURITY AND GOVERNMENTAL AFFAIRS UNITED STATES SENATE

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COST EFFECTIVE AIRLIFT IN THE 21ST CENTURY

THURSDAY, SEPTEMBER 27, 2007

U.S. SENATE,
SUBCOMMITTEE ON FEDERAL FINANCIAL MANAGEMENT,
GOVERNMENT INFORMATION, FEDERAL SERVICES,
AND INTERNATIONAL SECURITY,
OF THE COMMITTEE ON HOMELAND SECURITY
AND GOVERNMENTAL AFFAIRS,
Washington, DC.

The Subcommittee met, pursuant to notice, at 3:35 p.m., in Room 342, Dirksen Senate Office Building, Hon. Thomas R. Carper, Chairman of the Subcommittee, presiding.

Present: Senators Carper, Coburn, and Voinovich.

OPENING STATEMENT OF SENATOR CARPER

Senator CARPER. Good afternoon. The Subcommittee will come to order. We are to be joined by several of our colleagues here in a few minutes, but let me just start off before we introduce our witnesses.

I just want to thank our witnesses for coming, and for your preparation. I am going to ask, Secretary Payton, if you and General Schwartz might stay around for the second panel, that would be much appreciated. If your schedules don't permit you to do that, I understand, but if you could stay, I would be grateful.

The Senate will soon complete legislation intended to equip our Armed Forces to meet our national security threats and to keep our country safe. This is really one of the foremost responsibilities of our body, the Senate and the House.

Our Armed Forces are charged with providing our Commander in Chief and our military leaders with flexible options for responding to a wide variety of threats.

In Iraq, our Armed Forces are keeping the lid on a civil war and protecting civilians from terrorists and from one another. In Korea, our Armed Forces are charged with guarding an ally's border and deterring aggression on the part of a large conventional military force. In the Pacific and the Persian Gulf, our Armed Forces protect American interests through the projection of naval power and carrier-based air power. At home, our National Guard provides our Nation's governors with critical response capacity to cope with natural disasters like Hurricane Katrina.

At times, it can seem as though the demands on our military are practically limitless. Unfortunately, the resources available for equipping our military to meet these demands are not limitless. At

a time when our Federal budget remains mired in red ink, we need to be looking for ways to meet our military requirements in a fiscally responsible manner.

It is my hope that today's hearing on "Cost Effective Airlift in the 21 Century" will help us determine the most cost-effective way forward as we ensure reliability and superiority of the U.S. Strategic Airlift Fleet.

Though the men and women of the Strategic Airlift Fleet rarely receive the attention they deserve, the reality is that our military could not perform its many missions, some I just mentioned, if it were not for their hard work and dedication. Strategic airlift involves the use of cargo aircraft to move personnel, weaponry, and materiel over long distances, often to combat theaters on the other side of the globe. During the current War in Iraq, airlifted sorties have made up the majority of the nearly 30,000 total sorties made by U.S. aircraft.

Strategic airlift enables our military to respond to threats wherever they occur in the world real time. Not only must our fighting men and women be transported to the fight, they must be continuously supplied, and airlifted, along with sealifted, makes that happen. Both the C–5 and the C–17 have fulfilled airlift duties admirably and the United States owes much of its rapid deployment capabilities to these machines.

I want to let you know that right from the get-go, where I am coming from—I don't know if others do, but I like to think of myself as an honest broker in this issue and this debate. I don't pretend to be an expert on procurement. That is not my job. But I have spent about half my life around airplanes, an old Civil Air Patrol cadet, a Midshipman, Navy ROTC Midshipman, Naval flight officer on active duty and 5 years in—another 18 years in Reserves and got to be Commander in Chief, not of the U.S. Armed Forces but of the Delaware National Guard replete with its helicopters and its C–130s.

Today, I am privileged to represent the State of Delaware in the Senate and that includes a big part of that responsibility is the Dover Air Force Base, where we are blessed to have both C–17s and C–5s. In fact, we are just getting the first squadron of C–17s, not as we speak, but literally this month. It started a month or two ago.

I just want to stop for a minute and say C–17 is a terrific aircraft. The C–17 has a great mission capable rate anywhere from 80 to 85 percent. The C–17 can go places where the C–5 cannot. The C–17 uses a smaller crew. They use less gas. And while they can't carry as much as a C–5 or maybe fly as far as a C–5, they are a terrific plane and I am not here to question the value of the C–5. It is part of our airbridge, a big part of our airbridge.

We have the seabridge, which moves mostly cargo, not so much personnel, and we have an airbridge, which moves mostly personnel and a fair amount of cargo. Some of the airbridge is provided by, on the commercial side, aircraft that we lease. Some of the airbridge is provided by—strategic airbridge is provided by the C–17 and the C–5. In my own view and I think the view shared by others is we need the capability of all of them, both of them, along with the capability of the C–130s.

I have been around Dover Air Force Base long enough to know that the C–5 has had a checkered past. I have heard for years from crews that love the plane, in many cases. What I have heard for years are problems with reliability, largely engines, and when you have engines that you have to change every 1,000 flight hours instead of every 10,000 flight hours, I would be complaining, too. We have had problems with hydraulic systems. We have had problems with landing gear. Initially, we had problems with C–5A wings that have, I think, largely been addressed.

I am not here to defend the C–5. It needs work. It needs a fair amount of work. And the question in my mind is, given the amount of work that needs to be done in terms of modernization, given how much money we have to spend, does it make sense to modernize fully the C–5 fleet? My hope is during the course of today's hearing we will get a little closer to the truth.

Over the past 10 years, the United States has reduced its cold war infrastructure. We have closed about two-thirds of our forward bases, including a lot of places I flew out of during the Vietnam War, or my crew and I flew out of during the hot war in Vietnam and the cold war after that. Therefore, to maintain the same level of global engagement, U.S. forces now must deploy more frequently and over greater distances.

Since September 11, 2001, the scale and pace of operations has increased dramatically. Our current Strategic Airlift Fleet, including the aircraft currently flying and aircraft on order, consists of, I am told, 111 C–5s and, I believe, 190 C–17s.

There have been several efforts in the last decade or so to quantify our military's strategic airlift requirements. I think the most recent one was completed in 2006, the Mobility Capability Study commissioned by the Pentagon. I think we got their input early last year. And the conclusion, I am told, of that study was that the Nation's airlift requirements could best be met with a fleet of, at the time, 112 C–5s—we have lost one—and 180 C–17s.

As I said earlier, our current Strategic Airlift Fleet includes aircraft currently flying and aircraft on order, 111 C–5s and 190 C–17s. An update to the Pentagon's 2006 Mobility Capability Study included in the President's budget this year confirmed this mix is sufficient to meet our airlift needs.

At present, there is a big debate regarding the degree to which aging C–5s are replaced by smaller C–17s. The question is, what is the right mix of C–5s, the right mix of C–17s that will provide the most cost effective airlift for this country in the 21st Century? And I might add to that, what is the right mix of aircraft that we would lease from the commercial sector or maybe even from other countries? We will get to that later.

We know the United States needs oversized cargo aircraft to help meet the strategic airlift needs that flow from our military commitments around the world. My colleague, Senator Biden, has made large portions for us to ramp up quickly the number of MRAPs that we purchase and ship overseas and cargo airlift helps us to get them over there.

Several years ago, Congress and the Bush Administration directed the Air Force to fully modernize three C–5s, known as C–5Ms. C–5Ms would be equipped with new engines, new hydraulics,

new communications system, 70 other new systems in all, as well as a state-of-the-art cockpit. The 2004 defense authorization bill further directed the Air Force not to retire any additional C–5s until those three C–5Ms that had been modernized had been extensively tested and evaluated.

To date, two C–5Bs and one C–5A have been fully modernized, as we know. They have flown a total of over 500 flight hours. The flight testing, I think, is a little more than halfway complete, maybe about two-thirds complete, and the flight testing on the three aircraft is to be completed, I think either next year or sometime maybe in the first part of 2009 and the full evaluation of that flight testing is to be sometime in 2010.

Lockheed Martin, the prime contractor on the C–5 modernization program, is contractually bound to produce C–5Ms whose mission capable rate meets or exceeds 75 percent. Lockheed Martin reports that nothing—and let me just say, the mission capable rate, I am told, of C–5As, particularly those that are held in Guard and Reserve units, is below—may be as low as 50 percent or lower and the C–5s that are flying missions today around the world, their rate for mission capable is probably closer to 60, 65, maybe 70 percent.

We shouldn't be surprised with that. I flew in an active duty squadron. I flew in a Reserve squadron for 18 years, and I can assure you, when we were an active duty squadron on the line off the coast of Vietnam flying missions that our mission capable rate of our aircraft was a lot better because we had all the spare parts we needed. If we needed an engine, we got it. If we needed avionics, we got it. When our squadron returned to the United States and we were not going to be deployed for another 8 months, we didn't get as much, and especially we didn't get as much in the first few months after returning to the States.

Our National Guard unit don't have that kind of priority. Neither did my Reserve unit. Our National Guard units in Delaware and other States, they don't have the kind of priority for parts, for spare parts, for maintenance. So we shouldn't be surprised that as C–5As are moved into the Guard and Reserve squadrons, that their mission capable rate is going to be lower. They just don't get the priority that the airplanes that are out there flying missions between here and Kuwait or Iraq or Afghanistan are going to get.

I guess the remaining question, at least to me, is at what price per aircraft can Lockheed Martin modernize all or part of the remaining C–5 fleet of 108 aircraft? First of all, they have a contractual obligation at Lockheed Martin to meet a mission capable rate of 75 percent. Can they meet that? Or can they maybe exceed that? And second, can they produce consistently aircraft that will meet a 75 percent mission capable rate at a price that we as taxpayers are willing to pay, and can we count on it? Can we take that to the bank?

The company, Lockheed Martin, offered this past summer to modernize the C–5 fleet at what they call a flyaway cost of less than $90 million per aircraft whether the Congress and the Administration choose to modernize half of the C–5s, two-thirds of the C–5s, or the entire C–5 fleet. In my view, if Lockheed Martin can deliver C–5s consistently that meet or exceed a 75 percent mission

capable rate at a flyaway cost of $85 million or $95 million, even $105 million, if they can do that consistently with the avionics and engine modifications that we are talking about here, then we would have at least a quarter of a century, if not more, on this aircraft, which is what the 2004 Fleet Viability Board estimates.

If all of this is true, and if Lockheed Martin can meet this commitment, I just believe we would be foolish not to modernize all 108 C–5s. If they can't deliver, then we should find an alternative. The Air Force questions whether Lockheed Martin will actually be able to deliver what the company has promised.

Mark my word, if we don't modernize C–5s in the next decade or so, we are going to come back in 15, 20, or 25 years and somebody from the Air Force and somebody at the Pentagon, maybe one of my colleagues are going to say, we need a big new aircraft to carry big, oversized cargo. Do we pay $85 or $95 million or $105 million a copy now for an aircraft that may be able to provide 75 percent mission capable or higher, and arguably for the next 25 or 30 years, maybe longer, do we pay that money now or do we wait until somewhere down the line, 15, 20 years from now when we are asked to pay maybe $485 million or $495 million or an even higher price?

Again, our major goal in today's hearing is to better ascertain whether Lockheed Martin can be contractually bound to produce what they promised, fully modernized, highly reliable C–5Ms at a price the Pentagon and our Nation can afford?

Let me just finish by commending the leadership of the Armed Services Committee and the Seapower Subcommittee, which has jurisdiction over this issue. The leadership of the Seapower Subcommittee has been very gracious in working with us as we discussed this hearing. We appreciate the kind of cooperation that we have had and we appreciate particularly the input of the staff of the Senate Armed Services Committee as we prepared for this hearing.

The Subcommittee, the full Armed Services Committee and particularly the Seapower Subcommittee has shown a commitment over the years to identify the facts on this issue and make decisions based on the facts. The defense bill reported out of the Senate Armed Services Committee retains the requirement in the 2004 law that we flight test three fully modernized C–5s before retiring any C–5As or Bs beyond that. I thank the Members of the Subcommittee and their staff for their work on this issue.

I am going to close where I started. I don't pretend to be an expert on this, but I do know a little bit about airplanes. I spent a fair amount of my life in the military, most of it in aviation. I know enough about acquisition probably to be dangerous, which probably pertains to other issues, as well, that we are not going to get into today. But I have learned a bit in the last month or two or three.

I am not here to defend C–17s. I am not here to defend C–5s. I want to make sure that at the end of the day, we get the most bang for our buck, and if that is a combination that includes a bunch of C–17s and C–5s fully modernized, good. If that is not where the chips fall at the end, we need to know that, as well. But if Lockheed Martin has the ability to produce on a consistent basis, if modernized C–5s can meet or exceed 75 percent mission capable

rate for a price of $85 or $95 or even $105 million a copy, I think we would be foolish to pass up that deal.

[The prepared opening statement of Senator Carper follows:]

OPENING STATEMENT OF SENATOR CARPER

The Subcommittee will come to order.

I would like to thank my colleagues, our witnesses and guests for joining Senator Coburn and myself today.

The Senate will soon complete legislation intended to equip our Armed Forces to meet our national security threats and keep America safe. this is one of the foremost responsibilities of this body.

Our Armed Forces are charged with providing our Commander-in-Chief and our military leaders with flexible options for responding to a wide variety of threats. In Iraq, our Armed Forces are keeping the lid on a civil war and protecting civilians from terrorists and from one another. In Korea, our Armed Forces are charged with guarding an ally's border and deterring aggression on the part of a large conventional military. In the Pacific and the Persian Gulf, our Armed Forces protect America's interests through the projection of naval power and carrier-based air power. At home, our National Guard provides our Nation's governors with critical response capacity to cope with natural disasters, like Hurricane Katrina.

At times, it can seem as though the demands on our military are practically limitless. At a time when our Federal budget remains mired in red ink, we need to be looking for ways to meet our military requirements in a fiscally responsible manner. It is my hope that today's hearing on cost-effective airlift in the 21st Century will help us determine the most cost-effective way forward as we ensure the reliability and superiority of the United States' strategic airlift fleet.

Though the men and women of our strategic airlift fleet rarely receive the attention they deserve, the reality is that our military could not perform the missions I just mentioned if it were not for their hard work and dedication. Strategic airlift involves the use of cargo aircraft to move personnel, weaponry, and material over long distances—often to combat theaters on the other side of the globe. During Operation Desert Storm, U.S. aircraft moved over 500,000 troops and more than 540,000 tons of cargo. During the current war in Iraq, airlift sorties have made up the majority of the nearly 30,000 total sorties flown by U.S. aircraft.

Strategic airlift enables our military to respond to threats wherever they occur in the world real-time. Not only must our fighting men and women be transported to the fight; they must be continuously supplied. Airlift makes that happen. Both the C–5 and the C–17 have fulfilled airlift duties admirably, and the U.S. owes much of its rapid deployment capabilities to these fine machines.

Over the past 10 years, the United States has reduced its Cold War infrastructure and closed two-thirds of its forward bases. Therefore, to maintain the same level of global engagement, U.S. forces now must deploy more frequently and over greater distances. Since September 11, 2001, the scale and pace of operations has increased dramatically.

There have been several efforts in recent years to quantify our military's strategic airlift requirement. The most recent one—the Mobility Capabilities Study, which was commissioned by the Pentagon—was completed in February 2006. It concluded that the Nation's airlift requirement could be met with a fleet of 112 C–5s and 180 C–17s.

Our current strategic airlift fleet—including aircraft currently flying and aircraft on order—consists of 111 C–5s and 190 C–17s. An update to the Mobility Capabilities Study included in the President's budget this year confirmed that this mix is sufficient to meet our airlift needs.

At present, there is a big debate regarding the degree to which the aging C–5s are replaced by the smaller C–17s. The question is, what is the right mix of C–5s and C–17s that will provide the most cost-effective airlift for this country in the 21st Century?

We know that the U.S. needs oversized cargo aircraft to help meet the strategic airlift needs that flow from our military commitments around the world in the fist half of this century. In fact, for the past several years, during Operations Enduring and Iraqi Freedom, the Department of Defense has been forced to lease. AN–124 aircraft, the world's largest cargo aircraft, from Russia because C–17s cannot carry some of the oversized cargo that needs to be transported to Iraq and Afghanistan, and not enough C–5 aircraft have been available.

Several years ago, Congress and the Bush Administration directed the Air Force to fully modernize three C–5s, known as C–5M's. The C–5M's would be equipped

with new engines, new hydraulic and communications systems, and 70 other new systems, as well as state of the art cockpits. The FY2004 defense authorization bill further directed the Air Force not to retire any additional C–5's until those three C–5M's had been extensively flight tested and evaluated. To date, two C–5B's and one C–5A have been fully modernized and have flown a total of 531 hours. Flight testing on the three aircraft is to be completed in 2008 or 2009 and the full evaluation of that flight testing is to be completed by June 2010.

Lockheed Martin, the prime contractor on the C–5 modernization program, is contractually bound to produce C–5M's whose mission capable rate meets or exceeds 75 percent. Lockheed reports that nothing in the flight data to date suggests that rate cannot be met or exceeded.

A remaining question is at what price per aircraft Lockheed can modernize all or part of the remaining C–5 fleet of 108 aircraft. The company offered this past summer to modernize the C–5 fleet at a "flyaway" cost of less than $90 million per aircraft whether the Congress and administration modernize half, two-thirds or all of the C–5 fleet. If the company can meet that commitment, we would be foolish not to modernize all 108 C–5s.

The Air Force questions whether Lockheed will actually be able to deliver what the company has promised.

Our major goal in today's hearing is to better ascertain whether Lockheed can be contractually bound to produce what they've promised—fully modernized, highly-reliable C–5M's at a price the Pentagon and our Nation can afford to pay.

Let me finish by commending the leadership of the Armed Services Committee and the Seapower Subcommittee, which has jurisdiction over this issue. They have shown a commitment over the years to identify the facts on this issue and make decisions based on the facts. The defense bill reported out of the Armed Services Committee retains the requirement in current law that we flight test three modernized C–5s before making any C–5 retirement decisions. I thank the Members of the committee and their staff for their work on this issue.

I look forward to hearing from each of you. And I look forward to continuing to work with our witnesses and with Senator Coburn and my other colleagues on this Subcommittee to provide the oversight and give taxpayers the kind of financial management they expect and deserve.

Senator CARPER. With that having been said, I again appreciate our witnesses being here and I am going to ask my former colleague as governor, who was also Commander in Chief of the Ohio National Guard, to take whatever time he needs for his statement. Welcome, Senator Voinovich.

OPENING STATEMENT OF SENATOR VOINOVICH

Senator VOINOVICH. Thank you, Senator. I am pleased to be here and appreciate the witnesses being here.

Quite frankly, I have a very busy schedule and I am anxious to hear what you have to say, so I am going to put my opening statement in the record and, Mr. Chairman, let us hear from the witnesses.

[The prepared statement of Senator Voinovich follows:]???

Senator CARPER. Senator Voinovich, thank you.

Ms. Wright, I understand that you are here to, in part, respond to questions that are asked but not to provide testimony, is that correct?

Ms. WRIGHT. That is correct.

Senator CARPER. Secretary Payton, we are delighted that you are here. I am not going to provide your full background. It is available for the record, and your full statement will be entered into the record. Feel free to proceed. Thank you.

STATEMENT OF SUE C. PAYTON,[1] ASSISTANT SECRETARY OF THE AIR FORCE FOR ACQUISITION, U.S. AIR FORCE, ACCOMPANIED BY DIANE M. WRIGHT, DEPUTY PROGRAM EXECUTIVE OFFICER FOR AIRCRAFT, AERONAUTICAL SYSTEMS CENTER, WRIGHT-PATTERSON AIR FORCE BASE

Ms. PAYTON. Mr. Chairman, Senator Coburn, distinguished Subcommittee Members, thank you for the opportunity to appear before you today to discuss how we are going to meet the Nation's strategic airlift demands in the most cost effective manner.

As the Assistant Secretary of the Air Force for Acquisition, I am honored to represent the Air Force, along with General Schwartz, my customer and Combatant Commander of U.S. Transportation Command, on such a vital national defense topic. I am also joined by Diane Wright, the Deputy Program Executive Officer at Aeronautical Systems Center who shares the day-to-day responsibility in directing our major aircraft acquisition programs. My statement will address the acquisition community's progress in modernizing and recapitalizing our strategic airlift.

Relative to fleet modernization and recapitalization, as the Air Force's acquisition executive, I am responsible for replacing and modernizing a large number of aging aircraft in a fiscally constrained environment. I have inherited several programs with cost growth challenges because the cost, schedule, and performance were established well in advance of when we could reasonably project the technical and schedule issues that can drive costs out of control.

It has, therefore, been my objective, informed by several GAO findings, to put affordability and cost control back into our weapons systems, to include insisting on better planning, better estimating, and well-defined, achievable requirements to drive well-written requests for proposals (RFPs), and these RFPs must include maintenance data rights for organic maintenance and life-cycle support; open systems architectures to allow rapid, affordable insertion of innovation; incentive and award fees that reward contractor results, not just best effort; time certain development that avoids immature technology; funding to realistic, high-confidence, and accurate cost estimates; and open and transparent communication that results in fair and open competition.

In sole source environments, I insist that our program offices understand the cost and pricing data being proposed by prime contractors and comply with the Truth in Negotiations Act, Anti-Deficiency Act, and all Federal Acquisition Regulations to set the highest standards for Air Force procurement integrity to protect the taxpayer dollar and to deliver warfighter capability on time and on cost. And so today, I would like to briefly address three major aircraft programs that enable our strategic airlift mission, the C–5 Avionics and Modernization Program, otherwise known as C–5 AMP, the C–5 Reliability Enhancement and Re-engining Program, C–5 RERP, and the C–17 program.

The C–5 modernization effort is a combination of two programs, C–5 AMP and the C–5 RERP. This Avionics Modernization Program provides modernized avionics and allows the aircraft to meet

[1] The prepared statement of Ms. Payton appears in the Appendix on page 49.

increasingly stringent communication, navigation system, and air traffic management requirements worldwide, thus allowing the C–5 to fly in many places around the world that would otherwise be restricted to us.

The second program is the Reliability Enhancement and Re-engining Program, or RERP, which builds upon the C–5 AMP modifications. C–5 RERP replaces the propulsion system and improves the reliability of 70 systems and different components. The C–5 RERP will increase the payload capability and transportation throughput by increasing the fleet availability or mission capability rate from the lower 50s today to at least 76 percent in the future. A RERP-ed C–5 will have a 30 percent shorter takeoff, be able to climb 58 percent faster, and be cleaner and quieter. These modifications are critical to ensuring our forces can go anywhere, anytime.

Once a C–5 is both AMP-ed and RERP-ed, the fully modernized C–5 will be redesignated the C–5M. I personally know how important this modernization program is because my son-in-law, Captain Thomas R. Callan III, flew many missions from Dover Air Force Base to Europe, Kuwait, and Iraq as a member of the Third Airlift Squadron. I have spent many hours discussing C–5 flight operations with him and his fellow pilots, and I value the contribution all of our C–5s make to our national security. The C–5 modernization program will extend the C–5 fleet well into 2040.

Unfortunately, the C–5 RERP has experienced program cost growth, most notably in the upcoming production program currently scheduled to begin in 2008 and conclude in 2021. The Air Force is evaluating cost growth to determine affordability and the way ahead for this program. C–5 RERP costs have increased due to development delays, budget cuts due to Air Force priorities, the production cost increases in areas of engines, specialty metals, pylons, and touch labor. The C–5 program office and the Air Force Cost Analysis Agency completed an independent cost estimate, several of them, and reconciled them to what we call a service cost position in early September 2007. After further analysis on September 24, 2007, the C–5 RERP Program Director and PEO notified me that the cost of the program has increased more than 50 percent from the original unit cost report of November 2001.

As a result, I recommended yesterday to Secretary of the Air Force, Secretary Mike Wynne, that we begin the Nunn-McCurdy notification and certification process on C–5 RERP. Earlier today, Secretary Wynne signed the official documents notifying all parties that the C–5 RERP is, in fact, in a Nunn-McCurdy breach.

Relative to the C–17, we have accepted delivery on 168 C–17s. The original program buying of 180 aircraft was extended to 190 by the fiscal year 2007 bridge supplemental. The supplemental provided 10 additional aircraft which answered two concerns, our backup aircraft inventory shortfall and the wartime wear and tear. In addition to these additional C–17s, international sales have helped the C–17 production line stay intact. However, our Nation is rapidly approaching a major C–17 production milestone with long-term implications to the mobility enterprise, the decision to terminate production.

In conclusion, I would like to thank you very much for the opportunity to be here today and I very much look forward to your questions and comments.

Senator CARPER. Secretary Payton, thank you very much for those comments.

We have been joined by our Co-Chairman of the Committee, Dr. Coburn, and I am going to recognize him at this time for as much time as he wishes to consume.

OPENING STATEMENT OF SENATOR COBURN

Senator COBURN. Thank you. I apologize for being late. I want to thank each of you for your service and your cooperation as we deal with this.

We are not going to spend too much money, folks. As long as I am alive and in the Senate, the waste is going to stop. I find it peculiar that we got to a Nunn-McCurdy breach the day before this hearing, strangely peculiar. I think it is highly important that communication be effective and I am disappointed that the Air Force doesn't want to hear and sit and listen to the Lockheed Martin testimony on the other panel. I also am somewhat worried in some of the rumors I have picked up, the fact that Lockheed Martin is willing to stand and challenge some of the assumptions that the Air Force is making and some of the quiet talk is that it may cost them for doing that. There is no place for that. This didn't come from Lockheed Martin, this came from other sources.

So what I would say is we have a lot of contracting problems in this country and we have a lot of efficiency problems and we have an airlift need. None of those other problems ought to get in the way of us developing and supplying what we need to have adequate airlift.

I also find it strangely peculiar, for the first time since I have been in the Senate, that I get notice of an Air Force grant. The first time in my history, in 2 years and 9 months, 8 months in the Senate, I finally get a notice of an Air Force grant that is going out. It never happened to me before. I can't understand why that would all of the sudden happen right before we are having a hearing.

I say those things because I honor those people who are committed to our country and I am a straight shooter. If I have something on my mind, I say it. I just said it. I think we have to get this problem solved and I am thankful that Lockheed Martin has the courage to say, we are challenging some of your assumptions, and rightly so. Through conversations we have had, there are a lot of questions about the Air Force's assumptions that I think need to be questioned.

So I look forward to your testimony. Thank you, Secretary, for yours, and General, I look forward to yours and Mr. Bolkcom, as well as Lockheed Martin's. My hope is that come the middle of November, we can have a fixed-price contract and we can be on the way of not wasting money and not buying a piece of equipment that we don't need when we have a piece of equipment that we could fix and supply for us for the next 30 years.

Senator CARPER. Let me just add one thing in conjunction with what Dr. Coburn has said. It was not Lockheed Martin's idea to be here today. We directed them to come, and they are not here with

any particular joy, but we are grateful that they have been willing to come.

Dr. Coburn and I are going to be around here for a while, not just at this hearing but in this Senate for a while, and this guy is a bird dog or watchdog and I like to think I am, too. If we hear anything that smacks of retribution to them because they have been willing to speak out and to question some of the assumptions, I will be very disappointed with that and I hope that nothing like that will happen.

With that having been said, General Schwartz, we welcome you. Thank you for your service and for being here today.

STATEMENT OF GENERAL NORTON A. SCHWARTZ,[1] COMMANDER, U.S. TRANSPORTATION COMMAND, U.S. AIR FORCE

General SCHWARTZ. Mr. Chairman, Senator Coburn, it is my privilege to be with you today on behalf of the 150,000-plus men and women of our Transportation Command. I thank you for the opportunity to appear to discuss strategic airlift, which really is a critical capability for our Nation and, of course, our warfighters.

Whether by air, land, or sea, TRANSCOM provides support to the warfighter and the Nation by rapidly delivering combat power and sustainment to the Joint Force Commander, redeploying our forces home, and providing the utmost care in moving our wounded troops to move advanced medical facilities for treatment. We execute this mission through the Air Force's Air Mobility Command, a major focus of today's hearing, the Navy's Military Sealift Command, and the Army's Surface Deployment and Distribution Command, as well as our national and commercial partners.

As the DOD's distribution process owner, Transportation Command is also leading a collaborative effort across the defense logistics community to increase the precision, reliability, and efficiency of the DOD's supply chain. By increasing collaboration, adapting our business models, and ensuring the appropriate mix of lift assets, we keep our promises to our warfighters and the Nation today and tomorrow. Ensuring that the appropriate mix of lift assets is available is vitally important given the scope of the demands on the airlift fleet around the globe.

Since the start of 2007, Air Mobility Command has moved over 940,000 passengers in support of the Global War on Terror, an achievement accomplished in collaboration with their commercial industry partners as they provide us with cost efficient and effective means of moving our service personnel. This is important, this relationship with our commercial industry partners that has allowed our C–17 and C–5 aircraft to airlift almost 118,000 tons of vital cargo into the Central Command area of responsibility.

The delivery of Mine Resistant Ambush Protected vehicles, or MRAP vehicles, is a top priority for us and we are currently delivering them almost exclusively by air, with a commitment to fly up to 360 MRAPs per month to support theater requirements. Additional MRAPs will likely move by a combination of air and surface modes of transportation to satisfy production rates as they evolve.

[1] The prepared statement of General Schwartz appears in the Appendix on page 58.

As of September 25, our total of more than 980 MRAP and MRAP-like vehicles have been delivered to Central Command.

We also continue to satisfy ongoing force rotations, with up to 1,000 mobility sorties flown per day. This very high operation tempo equates to 350,000 aircraft departures per year, or one about every 90 seconds.

Perhaps the most important of all our missions but the least heralded is the movement of our injured warfighters from the battlefield to world class medical treatment facilities. In 2007, over 7,700 patients were moved from Central Command, and over 11,000 patients were transported globally.

Our aging airborne tanker fleet, a key force multiplier, should also be mentioned here today. Air Mobility Command tankers delivered over 110 million gallons of fuel to United States and coalition aircraft in support of Operations Enduring Freedom and Operating Iraqi Freedom and has made long-range operations possible worldwide.

As we look to the future, rapid global mobility will continue to be a key enabler. TRANSCOM needs out-sized and over-sized lift capability provided by the C–17 and the C–5. The C–17 is a highly productive platform with high departure reliability and high mission capable rates. In contrast, the C–5 has had the lowest departure reliability and mission capable rates in the Air Mobility Command fleet. Additionally, the C–5 cost per flying hour is the highest in the Command. C–5 modernization must deliver the needed reliability, but we remain concerned about rising costs of the modification program.

In terms of organic capacity, too much aluminum is just as counterproductive as not enough. We should guard against overbuilding the organic fleet to the detriment of other strategic necessities, such as modernizing the aging tanker fleet or the viability of our commercial partners

Mr. Chairman, my top airlift priority is the recapitalization of the aging tanker fleet. The KC–X with multi-point refueling, significant cargo and passenger carrying capability, and appropriate defensive systems will be a game changer, a game-changing platform for the future of global mobility.

And finally, sir, a critical partner in our Nation's ability to project and sustain forces is a viable Civil Reserve Air Fleet. The continued success of CRAF relies on the strength of U.S.-flagged airlines. Although the U.S. airline industry has recovered from the worst of the post-September 11, 2001, challenges, we are beginning to look forward to a post-Iraqi Freedom time frame when requirements will begin to subside. Given that eventual reality, we are looking at ways to encourage the participation, to continue that participation of our CRAF partners and we have proposed and encouraged support for the Assured Business Initiative reflected in the current Senate version of the fiscal year 2008 authorization bill, and I would be glad to discuss that with you further if you would like.

With regard to the CRAF program, it is essential that action be taken to reauthorize the Aviation War Risk Insurance Program, which is set to expire in March 2008. The ability of our CRAF partners to fly missions in support of our operations in a combat the-

ater is completely dependent—completely dependent—upon the replacement insurance coverage that this program provides.

I am grateful to you, sir, and the Subcommittee for allowing me to appear before you today to discuss these and other issues at your discretion and I look forward, sir, to your questions. Thank you.

Senator CARPER. General Schwartz, thank you very much.

Our third witness on this panel is Christopher Bolkcom, who is, I believe, the Defense Analyst at the Congressional Research Service and he has been a valuable resource. We appreciate very much your responses to our questions and the information you have provided to us from your perspective and you are now recognized. Your full testimony will be made a part of the record. You are welcome to outline it, if you wish.

STATEMENT OF CHRISTOPHER BOLKCOM,[1] SPECIALIST IN NATIONAL DEFENSE, CONGRESSIONAL RESEARCH SERVICE

Mr. BOLKCOM. Thank you, Mr. Chairman. Mr. Chairman, distinguished Members, thanks for inviting me to speak with you today about cost effective airlift. I will address C–5 modernization and C–17 procurement and some of the pros and cons of pursuing each program.

The main point I would like to make today is that there are strong arguments for both programs and viewing them from an either/or perspective appears overly simplistic and unconstructive. There are several factors that complicate a comparison of these programs and a broader mobility context that should be considered to make the most informed decisions.

I will start by addressing the complications. First, strategic airlift requirements are unclear. DOD's most recent analysis, the Mobility Capability Study, did not quantify requirements using the traditional measurement of million ton miles per day. Instead, the MCS found that fielding 290 to 380 strategic airlift aircraft were required to meet the national military strategy with acceptable risk. The bottom of this range, 290 aircraft, coincided with the Air Force's plans for the C–5 and C–17 at that time. This led some to criticize the study as a budget-driven rather than an unbiased look at requirements. A number of MCS assumptions are debatable and there is little consensus on the optimum number of airlift aircraft required.

Future cost estimates are another murky area. DOD's airlift plans were informed by a March 2000 study conducted by the Institute for Defense Analyses that compared the life-cycle costs of various C–5 and C–17 options. IDA found that fully modernizing the C–5 fleet and deferring additional C–17 procurement provided the most cost effective airlift capability. Today, however, Air Force leaders project that the cost of the C–5's Reliability Enhancement Re-engining Program, or RERP, may increase by approximately 60 percent over December 2006 estimates. As we have just heard, they believe we have breached the Nunn-McCurdy over the original baseline estimate.

[1] The prepared statement of Mr. Bolkcom with an attachment appears in the Appendix on page 66.

In contrast, Lockheed Martin expects modest cost growth, growth that would fall below Nunn-McCurdy thresholds and would fit within long-term Air Force budgets. Resolving the disparity between the cost estimates and understanding how projected cost growth would affect IDA's recommendations appears essential.

Some have suggested that the Air Force should trade C–5 RERP for C–17 procurement, but budget lines to pursue this option don't coincide. C–17 procurement is a fiscal year 2008 issue. C–5 RERP funds for fiscal year 2008 are $253 million less than the cost of a single C–17. Significant C–5 RERP funds are not projected to be available until the end of the future year's defense plan. Therefore, to purchase more C–17s in fiscal year 2008, Congress and DOD will either need to find room in the Air Force's base budget or Congress will need to add funds to fiscal year 2008 Global War on Terrorism funding request, a move that some view as controversial.

Unique C–5 and C–17 capabilities also complicate decisions on whether to support one program or the other. The C–5 is DOD's largest airlifter and by some measures can carry twice as much cargo as the C–17. The C–5's principal shortcoming has been its low reliability, which RERP is hoped to rectify. On the other hand, the C–17 has the unique ability to carry cargo long distances and deliver it directly to austere airfields close to the battle. The C–17 can perform intra-theater airlift, and due to its smaller size is less likely to clog airfields than the C–5.

The last factor that complicates airlift decisions is the potential risk in closing the C–17 production line. The C–17 is currently the only strategic airlifter being produced and some are concerned that the line will close before C–5 operational testing and evaluation are complete. To mitigate risk, DOD could pay a one-time fee to shut down the facility in a manner that would help facilitate restart at a later date, but some worry that even this strategy doesn't hedge against the risks of losing the C–17's skilled production force or even the Long Beach Plan itself.

As I mentioned a moment ago, informed decisions on airlift must also considered a broader context than just the C–5 and C–17 programs. As General Schwartz mentioned, the Air Force is considering options to recapitalize the KC–135 aerial refueling fleet. Currently, airlift is a secondary mission for the replacement tanker aircraft. Procurement of a larger tanker with more airlift capability could increase the airlift provided by the tanker fleet and could potentially reduce the number of C–5s or C–17s required. In contrast, procurement of a smaller tanker could potentially have the opposite effect.

Because the C–17 conducts tactical airlift missions, it is also linked to the C–130 and its recapitalization. In this role, C–17s deliver more cargo than the C–130, although at a higher cost. C–17s make a noteworthy contribution to tactical airlift, but the optimum mix of the two aircraft is currently unclear.

There are other programs that also influence strategic airlift, and again, as General Schwartz mentioned, the Civil Reserve Air Fleet, which supports DOD during national emergencies when the demand for airlift is highest. Using CRAF is cheaper than using military aircraft and could potentially be expanded. However, the pay-

load carried by civilian aircraft is limited and loading and unloading takes longer than military aircraft. This is just one example.

Second, at least two studies have recommended that DOD invest more heavily in prepositioned equipment instead of strategic airlift. Finally, systems such as fast sealift ships or even airships, blimps in the early stages of development could have high potential for quickly moving large units to future battlefields.

Mr. Chairman, this concludes my remarks. Thanks for the opportunity to appear before you.

Senator CARPER. Mr. Bolkcom, thank you very much for your excellent testimony, for your input today.

Something that you said—let me just start off with some questions and then turn it over to Dr. Coburn. Something that you said, Mr. Bolkcom, reminded me of a conversation I had with General Moseley back, I want to say in May, the first half of May, and he was good enough to come over to my office and he shared with my staff and others who were there—and General McNab may have been with him, as well, I am not positive—but General Moseley said to us that, sort of outlining what his druthers would be, as to what his preference would be, it would be retire the 30 worst-performing C–5As and to use the savings there to acquire 30 additional C–17s.

And I said to him at the time, I don't see how that works, and you just mentioned the difference in the cost if we do away entirely with RERP for a year. I think you suggested it was actually less than the cost of buying one C–17.

Let me just ask Secretary Payton and General Schwartz, how can we pay for 30 C–17s by the savings of retiring 30 C–5As?

Ms. PAYTON. Thank you very much for that question. I will tell you as the acquisition executive for the Air Force, we have no requirements for C–17s. There is no money for C–17s. And my acquisition workforce is totally dedicated to the C–5 RERP, getting C–5 AMPs done and then following up by getting C–5——

Senator CARPER. But if you will answer my question, please. How do we pay for buying 30 C–17s by retiring early 30 C–5As?

Ms. PAYTON. My answer is, you cannot do that.

Senator CARPER. All right.

Ms. PAYTON. That is my answer.

Senator CARPER. That would be mine, as well.

Let me see if we can put up a couple of charts, please.[1] This is a comment from General Moseley, I guess it was back in March of this year in testimony before the Senate Armed Services Committee. I will just read it out loud because the print is pretty small. This is what he said in testimony to the Senate Armed Services Committee. "What we would like to do is to be able to run the Avionics Enhancement Program out on all the remaining C–5s and then run the Re-engining Program on the C–5s that have the most life."

An additional quote, I think this one is from the Secretary of the Air Force, and this was also on March 20, 2007. This was also at a hearing before the Senate Armed Services Committee. He said, in response, I guess, to a question, "I can tell you, sir, that right

[1] The charts submitted by Senator Carper appears in the Appendix on page 207.

now, some worry about the entirety of the C–5 fleet. There are two things we should know about this. First is that we don't, we don't want to line up worst to best, and we think there are 20 to 25 or 30 of the bad actors that we would like to retire."

And in another comment from General Moseley before the House Armed Services Committee early this year, I think February 28, he said, "In a perfect world, we would like to be able to manage that inventory and divest ourselves of the bad acting tail numbers. Some of them are bad actors. They are broke. A lot of the C–5As have low flight hours on them because they are broke and you can't fly them. If I could line up the best B models and the best A models at the head of the line, a 59 to and 49 and go to the back of the line and begin to kill off the bad actors and replace them with something new, I would be very happy. That doesn't mean that we can block class or block retire airplanes. It just means let us get at the tail numbers that are bad actors."

And let me just ask, first of all to Mr. Bolkcom, are you aware of any effort to actually say by tail numbers what are the bad actors among the C–5s and the C–5A and the Bs?

Mr. BOLKCOM. Mr. Chairman, I am aware that on at least two occasions in hearings, Members of Congress have specifically asked the Air Force for that list of bad actors by tail numbers. I am unaware of whether they have provided that list. I suspect they have not, but I wouldn't say that is authoritative.

Senator CARPER. All right. General Schwartz.

General SCHWARTZ. Mr. Chairman, I have not seen such a list as the operator of the platforms.

Senator CARPER. Secretary Payton.

Ms. PAYTON. Sir, I have not seen such a list.

Senator CARPER. Well, there may or may not be a list, but I am not aware that one exists. But for us to talk about being able to line up the bad actors among the C–5As and the Bs, it would be interesting to know if there is a list and how that list was developed.

Let us look at another chart, the next chart, if you will.[1] This is a chart that deals with proposed production schedules. Someone was good enough to give me a laser. It looks like we have three—what is that one, it says Presidential budget, I guess, in 2003, is it 2006, and this is President's budget in 2008. Let us just focus on those.

It starts in fiscal year 2007 and runs out to fiscal year 2021. The President's budget initially called for starting to modernize, I guess beyond the original three, five C–5s in 2007, seven in 2008, 12 in 2009, and continuing up to fiscal year 2016 when we would do the last 12.

That Presidential budget was amended in 2006 to say in 2007 we are going to do one, three, five, seven, nine, and then finish it out in fiscal year 2018 with 12.

And then the President's budget, the current President's budget, which I presume is the policy that the Air Force is promulgating that Lockheed Martin is supposed to respond to in terms of bids, but the latest President's budget calls for, I believe, one modern-

[1] The chart submitted by Senator Carper appears in the Appendix on page 108.

ized aircraft in fiscal year 2008, three, seven, ten, and so forth, up to finishing up in fiscal year 2019.

Is that last one there, the 2008, is that still the Administration's position, and I presume the Air Force's position?

Ms. PAYTON. Yes, sir, it is.

Senator CARPER. All right. When Lockheed Martin or really any contractor is asked to bid on a contract to build or rebuild aircraft, how do they know in terms of being able to say what the price would be if the numbers keep moving around? So one year we say, like in the 2003 budget, you are building 12 a year, or they are going to be rebuilding 12 a year by 2009 and by 2010, and then down here we have them in 2009 and 2010 are doing three and nine.

How does a contractor know how to bid if the numbers keep changing? And how can we hold them to the bids? I think if we put ourselves in the shoes of the contractor, you would want to know, what is the deal? Are there going to be nine aircraft? Is it going to be three? Is it going to be 10 or 12? Where is the sweet spot in terms of getting the most cost efficiency out of it? How does it work?

Ms. PAYTON. I appreciate the question. I will tell you that when I mentioned in my opening testimony we baseline way too early both the quantity and the amount of money we need, and I would like to follow up by saying that when the C–5 AMP program was the leader program, and C–5 RERP is depending on AMP to be finished, and when we have C–5s that take much longer to get AMP-ed because while we are doing them legacy maintenance issues happen, like the landing gear break and things that aren't at all relevant to the scope of AMP happen, that takes longer to get the C–5 AMP done, which pushes the whole schedule out. So because we suffered slippage in the AMP program, that pushed us to not be able to start our production in fiscal year 2007 and that pushed it further and further out.

So you have brought up a very good point, that there are things that are sometimes out of the control of even the Air Force. C–5s go into maintenance. They can have some catastrophic problems happen. Their maintenance flow days can be extended. They can be at war and we cannot get them back sometimes to get them on the schedule. And that is why variable quantities are very important for us, because once we break the schedule that we have committed to in a firm fixed price, that is a re-opener and everything can be renegotiated in that contract.

So we are in a time of war. We have very old aircraft. Lots of things happen to them. We have noticed the wings, for instance, in the C–5 needed to be strengthened in order to be able to have the pylons and the engines on them. These were things that we were overly optimistic——

Senator CARPER. Excuse me for interrupting, but weren't the C–5A wings all restrengthened like 20 years or so ago?

Ms. PAYTON. These have to be stiffened for the RERPs to be applied to them. As you open up a C–5, you can find cracks in the wings and things you never expected to find because they average 29 years old, but some of the older ones are 35.7 years old.

Senator CARPER. I am going to ask you to just hold on that point, if you will. My time is expired and I don't want to be abusive of the rights of my colleague here. Let me just mention in closing on this point, Dr. Coburn and to our panel, I think if you look up there on the top line at the President's 2003 budget, what you find in 2007, 2008, and 2009, initially this Administration wanted to have us modernizing, fully modernizing, it looks like by 2009 24 of these aircraft——

Ms. PAYTON. Absolutely.

Senator CARPER [continuing]. And that suggests to me that they are anxious to get out of the starting gate and get going. Now with the slow ramp-up, I don't think we are going to get to an optimal production rate any time soon. In fact, likely we won't get there until maybe 2011 or 2012 or beyond that, which indicates to me that maybe somebody doesn't want to really do this as much anymore, and I am not suggesting it is the Administration, but that is one of the lessons I derive from this chart. I will just say that. Dr. Coburn.

Senator COBURN. Thank you, and thank you for your testimony.

Let us talk about the breach and the delta on the breach and the reasons for the delta. Madam Secretary, I talked to you yesterday. You were going to try to find out how much of the delta was based on a delayed roll-out of numbers coming from the production decline because the AMP didn't come up. Can you explain for us the breakdown of what is in the delta, the change, the area that is over budget? Can you explain, what was it, $5.4 billion?

Senator CARPER. Four-point-five billion dollars.

Senator COBURN. Four-point-five billion dollars, and then they managed to eliminate through talks with Lockheed Martin $300 million, and then there is some engine component that has brought it even down further. But the question remains how much of that has to do with decreased units on a slower take rate and how much of that delta is associated with that versus some other difference between Lockheed Martin and the Air Force?

Ms. PAYTON. OK. Relative to the $4.2 million, that equates to basically $30 million per aircraft where we have delta. As we look at the pricing and costing data that we have received from Lockheed Martin, and some of that data has not been received yet, so we need to get more data in from them, but what we can tell at this point is that we are about $10 million of that $30 million disconnected because of what we believe the actual price of the engines will be when we have to reopen the contract due to the fact that we probably will not be able to keep to discrete quantities for the next—until 2021, or 2020.

As you saw, this goes for an extended period of time, and so we have an engine in which we believe that by 2013 we will probably be one of the few customers for that CF–6 engine, and we believe that after looking into some databases relative to what commercial companies are paying for those engines right now, that we have at least a $2 million per engine—there are four——

Senator COBURN. Did you all speak directly to General Electric?

Ms. WRIGHT. Yes, sir.

Senator COBURN. And you got that number from them?

Ms. WRIGHT. We got information from General Electric. The Service Cost Team got information from General Electric. As well, for the engine portion we subscribe to a commercial database that identifies the actual commercial prices for engines over the past 10 years and makes projections for the future, and by using that, we came up with what we believe is a more realistic cost for the engines than what the Lockheed Martin proposal indicated.

Senator COBURN. Did you all ask GE if you could buy the engines as government-furnished equipment?

Ms. WRIGHT. No, we did not.

Senator COBURN. So you didn't even make that comparison before you decided that they are out of whack on the engine costs?

Ms. WRIGHT. I am sorry, we didn't make——

Senator COBURN. You did not make the comparison of what the government could have bought them directly for versus what is coming through the contract to see if you were anywhere close on price—Lockheed Martin can buy as well as you can buy, right?

Ms. WRIGHT. Absolutely.

Senator COBURN. So if you were to be buying those, it would seem to me if you are going to look at what the potential cost increase is going to be, you might inquire of GE as to what if we bought them versus it going through a contractor. Was there any discussion on that?

Ms. WRIGHT. As far as I know, we did not ask them specifically whether or not we could buy them as GFE.

Senator COBURN. OK.

Ms. WRIGHT. The strategy is to have them bought through the prime contractor. However, in looking at the commercial database, the source that we subscribe to, which talks about the actuals that commercial people pay for those engines for the past 10 years, we believe that we know what it would cost to——

Senator COBURN. You know better than Lockheed Martin knows what it would cost?

Ms. WRIGHT. We believe that the Lockheed Martin proposal—and they have a general procurement agreement now. They did not at first, but now they have a general procurement agreement with GE. We believe that the prices of those engines are much less than we had anticipated and that if we do not stay with the quantities per year as they were proposed by Lockheed Martin, which do not match the SAR quantities and which we probably cannot commit to out in the out years unless we would have some sort of multiyear, that we would have to open that up.

Senator COBURN. Has the Air Force looked at man hours on both de-mate and RERP? Their estimates were that Lockheed Martin was extremely low on their estimate and they were higher.

Ms. WRIGHT. Yes.

Senator COBURN. Did you look at the man hours on the KC–135 de-mates and how long it takes to de-mate and reassemble both through the contract for the engines and also through the operations at the various places around this country where we do that? Did you look at the hours for that?

Ms. WRIGHT. I do not know whether or not they specifically did. With respect to the installation——

Senator COBURN. Well, let me make my point.

Ms. WRIGHT. OK.

Senator COBURN. Why would you not?

Ms. WRIGHT. They may have. I just don't know——

Senator COBURN. Well, why would we not know whether we have, because if, in fact, you are going to say Lockheed Martin is wrong, you ought to be able to say, well, here is the data on a KC–135 where we have redone all of these older, just as old or older airplanes than a C–5. Here is what it has taken. Here is what we have discovered. Here is what is done. Why would that not be there and say, you are wrong, Lockheed Martin. Here is what it has taken on a KC–135 and we have done a hundred and how many of them? A hundred and forty-nine. So why would that not be an important statistic to have at your hand if you are going to say Lockheed Martin is wrong?

Ms. WRIGHT. On that point, sir, for the installation hours, we use the installation hours that were used specifically on this program, on the three what they call SDD aircraft, the aircraft that were done——

Senator COBURN. Well, I understand where you got the numbers. I have been in the meetings on all that.

Ms. WRIGHT. OK.

Senator COBURN. I have all that information. When you look at production runs like we have on KC–135, you can learn a whole lot from them because they have been doing it for a long time with multiple different years of aircraft birth, with multiple different problems, and you can get a great estimate of what kind of things you are going to run into.

What I am worried about, I am worried about spending $80 to $95 million to get a C–5A or a modified C versus having nothing. That is what I am worried about.

General Schwartz, you mentioned on the KC–X program that if C–5 can't be solved and the C–17 line is shut down, is it in your estimation you will solve your lift problems through a combination of tanker lift capability through the new tanker program?

General SCHWARTZ. No. I think, sir, the KC–X program is an augment to the lift equation. It is not a solution set, especially for out-sized and over-sized equipment. Remember, the KC–X, both offers are not roll-on, roll-off airplanes. I mean, the bird's we have are designed to do what we need.

Senator COBURN. You end up with the same problems you do with private contracting.

General SCHWARTZ. Exactly.

Senator COBURN. OK. Well, I am going to excuse myself for a very short moment and I will be back. I apologize.

I have a Supreme Court Justice waiting on me and it is not nice to keep them waiting in case I am ever in front of them.

Senator CARPER. I am going to ask if we can look at some more charts.[1] In the Senate, our colleague, Kent Conrad, is famous for his charts, Chairman of the Budget Committee. I will never come to rival him. He is a great role model when it comes to that.

This really relates to the question that Senator Coburn was beginning to ask and I want to use this chart as a sort of a starting

[1] The charts submitted by Senator Carper appears in the Appendix on page 107.

off point. In the meetings that we have been fortunate enough to have with a number of you and folks that work with you and people from Lockheed Martin, we have learned that this major difference in terms of what Lockheed Martin says they can produce, RERP 108 aircraft over time and what the Air Force believes that the actual number is more likely to be, a difference of about $4.5 billion, and $300 million of that has been—you agreed that number can come down by $300 million, so we are talking about $4.2 billion.

The major three areas that we have here are the ones that Senator Coburn has been talking about. The propulsion system, the difference is about $1.2 billion. Second, the installation and other labor costs, and the difference there is about—I guess you call this touch labor—the difference there is about $1.6 billion. And the third, you call it other RERP costs, overhead and so forth, which I don't have a complete understanding of. Maybe you can inform me a bit on that. But the difference there is about $1.6 billion.

What I want to do is just to start off and follow up on Dr. Coburn with respect to the engines. We actually reached out to the folks at GE. We talked with them about their ability to offer engines over a long period of time.

It was interesting, one of the meetings we had just in the last week, maybe it was on September 25, with a group of Air Force folks led by Major General Gray and there was an open speculation on the part of our friends from the Air Force. They were asking, or they were speculating, does GE even want this business? Is this a line of business, these engines—what are they called, the CF–6 engines—are they really interested in continuing to produce these for the Air Force? Do they have any customers beyond the Air Force in the next couple of years? Does GE have a desire to actually use the facility where they are making these CF–6 engines? The speculation was that they would rather be using that facility to build engines for the Boeing Dreamliner. Those were the kind of questions that were raised in our conversation.

So we turned around and called GE and we said, is it true you want to stop producing these engines? Do you have any other customers? As somebody here just suggested, no, they do have other customers, not only customers around the world that want to buy these engines, but they also are going to be in the business of providing spares for the customers who have already bought them in the past. While GE would like to build an engine for the Dreamliner, they have no interest in closing the production facility, I don't know if it is in Cincinnati or wherever they make these engines. But they have no interest in closing the manufacture of the CF–6 engines and beginning to manufacture an engine for the Dreamliner. They would like to do both.

We talked with them about their price and it is proprietary information. They were not able to disclose the price. But it sounds to me like GE told us, and maybe they have told Lockheed Martin, I am not sure what they told the Air Force, but it sounds to me like they are willing to commit to producing engines for a good deal less than the Air Force is willing to believe. It is one of those weird situations. It is kind of an ironic situation where you may have a contractor who is offering to produce an engine for less than you

are willing to accept. It is almost like being unwilling to take yes for an answer. I hope that is not the case.

I would just ask unanimous consent to enter into the record the response that we received, the written response that we received from GE, and since I am the only one here right now, I guess no one is going to object.[1]

Let us just talk a little bit more about this engine. If there is a difference, and I think the difference of $1.2 billion comes from a difference in assumptions. What we are hearing from the supplier and the subcontractor, and it looks like there is a $2 or $3 million delta just per engine. If you have a customer who wants to buy 10, 12, or 20 of these engines and you have a customer that wants to buy—what is four times 108, that would be 432, plus 25 spares, what would that be, 457? That is a lot of engines. Is it possible that given that kind of buy over the next dozen or so years that you have a supplier, GE, who finds a way to continue to manufacture these engines and have already covered a lot of their fixed costs that maybe it makes sense to supply them at the cost that we recorded and the cost that underlies Lockheed Martin's assumptions?

Let me just ask anyone on the panel to react to this.

Mr. BOLKCOM. Sir, if I may, I would like to answer your question the way I want to answer rather than the way you asked me, and this is what I mean. It is important to get to the difference between cost estimates on this, and I take your point, I think it is very important that risk can cut either way. If we are the last buyer, that can be leveraged or maybe can be used against us, depending on how savvy we are, how we negotiate.

The point I would like to mention here, since I have the opportunity, is this. If it is a firm fixed-price contract and Lockheed Martin is mistaken and it actually costs them more to buy the engines than they think, we don't care because they have to eat that cost.

Senator CARPER. They being——

Mr. BOLKCOM. Lockheed Martin, except, as Ms. Payton has noted, if there is a variable quantity that breaks the agreement, then it is an opener and we could get stuck.

I think the important thing to understand besides the difference in cost estimates is are these future lots options that we can exercise or not, and therefore if we have a choice of exercising them, that would tell you that there is little or no risk. If in the out years it turns out that it is an opener, we don't have to exercise that option.

Senator CARPER. All right.

Mr. BOLKCOM. So we are not committed. It is not a multi-year procurement. That would be a line of inquiry I think would be very important to assess the importance of the deltas in these cost estimates.

Senator CARPER. Thank you. Ms. Payton.

Ms. PAYTON. Sir, if I might add that I would like to take for the record the ability to answer the question about the engines because I recall that the PB–2003 that was really to fund the original baseline, those engines, I believe, were $4.1 million. Now that we

[1]The information from GE submitted by Senator Carper appears in the Appendix on page 115.

know—I can't mention now what the number is because that is competition-sensitive or proprietary, but I know that the number is higher than that now and I believe it is higher by a significant number, and that would be an example for you to look at the growth that has happened just since 2003 as we have now gone back and gotten the actual bid in from Lockheed Martin. So I would like to take that for the record to give you information about how much that engine has already grown just in the last couple of years relative to our cost estimating.

Senator CARPER. Let me just ask as a follow-up, can the difference between Lockheed Martin's proposal and the Air Force baseline budget, could it be addressed through—I don't know what it is called—a variation in quantity within a Lockheed Martin fixed-price offer? Ms. Wright.

Ms. WRIGHT. The request for proposal that we went out for was asking for Lots 1, 2, and 3. We did not ask for any firm fixed price, or a firm fixed incentive fee contract for past that. We didn't do that because we didn't know how to structure the quantity profile out in those years and we believe that if in Lots 1, 2, and 3, that those were close enough in in projections that we could figure out from a risk perspective, so that we did not run into risk, what would be the pricing for those three lots?

We did in Lot 3 indicate a variable between five and eight, and we asked Lockheed Martin to price that so that we could see what the variable would be had we changed or if we do change what annual quantity we buy in that Lot 3.

What was proposed to us was a full 12-year program, and the concern that we have, not just with the GE but also with the Lockheed Martin portion of that, is that we can't project that we will stay with that 12-year annual quantities for those 12 years. In fact, it is highly unlikely that we would buy those annual quantities for the next 12 years.

So rather than commit the Air Force future and the future Congresses to those 12 years, we asked——

Senator CARPER. I don't mean to be rude. I am going to interrupt you, though, and please forgive me.

Ms. WRIGHT. Sure.

Senator CARPER. But I don't know that you are answering the question that I asked. Let me just try it again and maybe you could take another shot at it.

Ms. WRIGHT. OK.

Senator CARPER. Would price variation in quantity—would a clause eliminate the risk of reopeners and the risk to the government?

Ms. WRIGHT. A proposal that did not include what they call an EPA clause, or an Equitable Pricing Adjustment clause, would do that. The Equitable Pricing Adjustment clause says if you change anything—it is essentially the fine print in a quote that says, if you change any of those quantities out there, we can reopen negotiations and we can change our prices. What we have from Lockheed Martin is, in fact, a proposal that includes an EPA clause, which means there is risk to the Air Force.

The cost proposal, the service cost proposal or cost position, has got to take into account that risk that we would incur if those

quantities change. So we kind of have to separate the Lockheed Martin proposal from the service cost position. The service cost position says what we truly believe the entire program is going to cost, not just the Lockheed Martin proposal the way it is stipulated with the fine print.

General SCHWARTZ. Could I just——

Senator CARPER. Before you do, then what I think I hear you saying is that if we are smart, we will have one of these price variation and quantity clauses, and if we have one of those, that can eliminate the risk to us, to the Air Force and to the taxpayers.

Ms. WRIGHT. Yes, and that is what we did in Lot 3 was asked for variable pricing where they can get the information that we need to certify the cost that they are proposing to us. If you do it too far out, though, it becomes a very difficult process.

Senator CARPER. Thank you. Dr. Coburn.

Senator COBURN. What if Lockheed Martin comes to the table and puts in your lap an absolute guaranteed price for this many at this rate, another guaranteed price for this many at this rate, and another guaranteed price for this many at this rate that gives you the flexibility you want and it is a firm fixed price, no variables, no openers, no nothing? What happens then?

Ms. WRIGHT. No variables, no reopeners, no EPA——

Senator COBURN. Nothing.

Ms. WRIGHT. Lockheed Martin is at a lot of risk——

Senator COBURN. The price would reflect that risk.

Ms. WRIGHT. The price would reflect that risk, and the other thing that we would make sure that we would need to know is that the cost and pricing data is compliant with the Truth-in-Negotiating Act, meaning that we have certified costs and pricing for——

Senator COBURN. So that is the only real requirement, that they have every intent to fulfill this contract by being truthful about the pricing?

Ms. WRIGHT. Absolutely.

Senator COBURN. OK. But if they choose to do that and they choose to do that because they see an option for a $10 billion contract and they are willing to take some of the risk to get over the years $10 billion worth of business, or some number, maybe it is $11 or $12 billion because what they option to you, why shouldn't they be able to do that and why shouldn't we take all this other stuff where there is debate and take it offline and put the responsibility on them if they are willing? They have to answer to their shareholders. What is wrong with that proposal?

Ms. WRIGHT. There is, I guess, nothing wrong with that, but that is not what we have.

Senator COBURN. I know that is not what you have now, and I know there is a debate between Lockheed Martin and the Air Force about where you come down with the numbers and where they have. Just for honesty's sake, so you will know, I am not loved by Lockheed Martin. I go after their earmarks all the time. So that need to be said here. I am not defending Lockheed Martin. What I want is the best price for airlift that gives us what the Air Force wants to get done. So I am not here touting Lockheed Martin or trying to beat up the Air Force.

I have this really uncomfortable burning in my stomach that somewhere there is not the real commitment to get this C–5 modification done, and I can just tell you that from everything I have looked at, everybody I have talked to, everything I have read, everything I know about C–17, everything else. I am real worried that truth in advertising isn't with the commitment of the Air Force on the C–5, and that is not your area. I know that. Your area is to look at the numbers and say if it doesn't look realistic.

I think Chairman Carper would like to go to the next panel. I want to thank each of you for being here.

One last point for Mr. Bolkcom. There is no question on a per ton, million ton miles per day, if we flew to a large airfield and we put C–17s compared to C–5s and they both had the same reliability rate, the cost for shipping and the cost for getting goods to the same place would be significantly lower with the C–5, or modified C–5, is that true?

Mr. BOLKCOM. I can tell you that there is no doubt that a modified C–5A would move more. I don't know if it would be less. I would have to do the math, to be honest, because——

Senator COBURN. Well, we have done the math. It is about 25 percent less.

Mr. BOLKCOM. The only figure I have in my head, sir, is that the cost per flying hour of the modernized C–5 is about twice that of the C–17.

Senator COBURN. Yes, but the fuel efficiency is markedly with the modified and the load is twice——

Mr. BOLKCOM. Yes, sir.

Senator COBURN [continuing]. And the load-on and load-off, plus the capability of carrying other things. Well, that is not a fact, is what you are saying. You can't tell us that. Would you look at that for us——

Mr. BOLKCOM. Sure. Yes.

Senator COBURN [continuing]. And get back to us to let us know that?

Mr. BOLKCOM. I would be happy to.

Senator COBURN. I have no other questions. I will hope, General, that your staff will stay around and listen to the Lockheed Martin testimony. Thank you again.

Senator CARPER. I am not quite ready for panel two. I want to go back to our chart here for a moment and maybe we can—let us take a look at the second area of difference, and it is called the installation and labor management costs.[1] I guess it is labor and materiel costs, which we called touch labor, and the difference is $1.6 billion. Do we have another chart that relates to that?

That is good. Thanks. What we are looking at here is the touch labor hours for the C–5 RERP per aircraft, and this is the very first aircraft that was RERP-ed and Lockheed Martin tells us they invested about 145,000 man hours in that aircraft.

This is the second one. They tell us they invested about 124,000 man hours in that aircraft.

[1] The chart submitted by Senator Carper appears in the Appendix on page 109.

The third C–5—those are both Bs, C–5Bs. This is the third one, and in the third aircraft we are told that they spent about 111,000 man hours working on that aircraft.

The Lockheed Martin folks tell us, and we are going to be questioning them extensively about how they get down to 95,000 for their estimate for the fourth aircraft, but it seems peculiar to me that the Air Force's estimate for the fourth aircraft goes from 111,000 or 112,000 back up to 116,000. I understand the line has been closed down for the modernization at Marietta, Georgia. There has been some scattering of the workforce. Not everybody is available. Some folks are going to have to be hired, rehired, brought back. New people have to be hired and trained. But it just seems strange to me that the number would go up that much for the fourth aircraft.

It also seems strange to me that the number that is estimated by Lockheed Martin would be as low as it is for the fourth aircraft. Maybe one is right and maybe not. In asking Lockheed Martin, if they were on this panel I would just ask them right now, but we will ask them later, but one of the things that we have heard from Lockheed Martin is the reason why they go down, they are using some kind of slope I think they call the learning curve slope, about 85 percent.

It took me a while to understand this, but I understand if you have 100 aircraft, you have 85 percent slope, the first aircraft takes, we will say, 100 hours. The second aircraft would be 85 percent of that, or 85 hours. The third aircraft would be 85 percent of that, and so forth. It took me a while to learn that.

Go ahead and put up the other chart. We asked the folks at Lockheed Martin, how do you drop? How do you get it as low as 95,000? And obviously, if they can move from 145,000 to 124,000 to 111,000, you might assume, especially if they had the line running again, that this number could be pretty low. Lockheed Martin—maybe not as low as 95,000, but Lockheed Martin comes back and they say, well, we have learned some things in the first three aircraft that tells us how to work differently with wiring harnesses and they feel that is worth about 4,000 man hours on the fourth aircraft.

They indicate that, and I don't fully understand this, but they indicate that they think they can save several thousand hours with respect to pylons and that is something they learned from the first three aircraft and it would be an improvement.

All told, Lockheed Martin says that there is almost 20,000 man hours that they are going to be able to improve cost, but I think the two biggest ones and the only ones that I know enough about to even mention, one is the wiring harnesses and the second is the pylon. Together, it is about 7,000 man hours. You knock 7,000 man hours off of 111,000, it brings it down to 104,000, and from 104,000 to 95,000, it is not as great a leap as would otherwise seem to be the case. We will ask Lockheed Martin about this.

Explain for us how given what I think Lockheed Martin has learned about using wiring harnesses, what they have learned about the pylon installation, why does this number go up on the fourth aircraft from 111,000 to 116,000? I can see that it maybe

shouldn't go down to 100,000 and to 95,000, but how does it end up going up to 116,000 man hours? Ms. Wright.

Ms. WRIGHT. Yes. Because the first three dots that you have there are for the SDD aircraft and had we——

Senator CARPER. I am sorry?

Ms. WRIGHT. For the development aircraft. Had we continued the production line without a gap, it would have continued to go down. That is typical of a production, a learning curve. And then it tapers off because——

Senator CARPER. I understand.

Ms. WRIGHT [continuing]. You leaned out your manufacturing and then it goes on. And if you have a production break, which we have, we have a production break of 29 months, so a production break will make your curve go back up because it is a disruption. Your workmen are off doing other things. They are not doing it on a day-to-day basis and that is why it pops back up.

The other thing that is of concern to us from the installation that is proposed is that the Lockheed Martin projections are that it will continue to go down at a very steep rate. In fact, that 145,000 is what they call a T–1. In the production language, that is the first aircraft, and you have a fairly steep learning and then you taper off. Lockheed Martin's proposal indicates that not only are they going to spend less time making this next aircraft after a 29-month production gap, but that they are going to continue—they are going to reset the 95,000 as a T–1 and take a steep dive down.

We believe that is double-counting learning. You have learned, and we are encouraged by the fact that they have learned and come down, but we think a 15 percent reduction during a production gap is not the right way. It is not typical of what a production would be. And in addition, we think if you had added more dots on the charts to what they had proposed, that is also too steep because they are projecting that they are going to learn at the same rate for an even longer period of time.

So our rate is not as steep. It is a little flatter, which means that more man hours will go into the product, which means more cost will go into the product and it will level out. So those are the two parts of it.

Senator CARPER. In our conversations with our friends from the Air Force, we have learned that an 85 percent slope is not uncommon for a new aircraft. We have asked for some information. I think Dr. Coburn was trying to get some information on aircraft modernization, and I don't know that we have that yet, but we are looking forward to seeing when we are modernizing aircraft, if you were to do a RERP on another existing aircraft, if the curve is closer to 85 percent or not.

What we have been able to glean—do we have another chart, as well, on the AMP, that actually has the visual demonstration?[1] We couldn't find a true apples-to-apples comparison to find out, is it 85 percent? Is the slope on the learning curve 90 percent or not? But we actually have some experience with the aircraft in the first part of the modernization that you all have talked about and that is the AMP.

[1] The chart submitted by Senator Carper appears in the Appendix on page 112.

I was actually on the line at Dover Air Force Base, I think with the very first C–5 that we AMP-ed, and I had a chance to watch the folks literally pull out the guts of the cockpit and go to work and trying to modernize it. It took a good period of time. In fact, the first one took, I think, almost 30,000 man hours. This says up to 26, I think we have actually AMP-ed about 30 and they have another six underway today.

But the slope for the touch labor hours for the C–5 AMP has been about, actually, 84 percent, and I don't know if it is fair to say that if they could do 84 percent here, then maybe we could do 85 percent on the RERP. I am just not smart enough to figure that out. But I thought that was interesting. At least on the same aircraft, the first part of the modernization, they not only met 85 percent, but they actually were able to beat it by a little bit, and I thought that was worth knowing.

But the more interesting thing that came out in our conversation—if the number actually does turn out that this 95,000 number is wrong and it is something in between 95,000 and 116,000, and even if this assumption for a learning curve is 90,000 or closer to 90,000 than it is to 85,000, there is a way to structure this deal, this modernization program with Lockheed Martin so that if there is a difference in the number, if the Air Force is closer to right than Lockheed Martin, there is a way to structure it so that Lockheed Martin eats the difference.

Is that true? How do we structure the deal so that if they are wrong and if it is 90 percent and if it is 116,000, they eat the loss and we don't?

Ms. WRIGHT. If it is a firm fixed price and it takes them longer to do it, then they eat the cost of it.

Senator CARPER. Why wouldn't you try to do that?

Ms. WRIGHT. Well, if it takes them longer to do it, then we get less aircraft. I mean, there is a schedule delay there. We get less aircraft and our schedule gets pushed out and it gets stretched——

Senator CARPER. But they have a huge incentive——

Senator COBURN. You are already pushing the schedule out. I mean, you all have pushed it out by 20 aircraft over the last 3 years. That is the cost.

Ms. WRIGHT. I agree. We have had budget cuts and we have pulled out the schedule, but part of the reason why we do the service cost position is to try to figure out what is reasonable to believe and executable. So we have to budget in there and look at the schedule and when we could get this done. So we don't want to be overly conservative in our service cost position. If we go on contract for a shorter schedule and they are committed to doing that and we make that, then obviously that is great. But for service cost position, we need to be reasonable about what we believe is executable and that is how ours is structured.

Senator CARPER. Go ahead.

Senator COBURN. So let us say that Lockheed Martin in the middle of November drops in your lap four options for every one of these over a different spend-out and different everything, firm fixed price, nothing there. What happens if you say in looking at it, you don't think they can do it?

Ms. WRIGHT. If they have the supporting data for cost and pricing——

Senator COBURN. Yes.

Ms. WRIGHT [continuing]. In compliance with the Truth-in-Negotiating Act, there would be no reason why we would disagree with them. Right now, we don't——

Senator COBURN. So we might eventually get a real commitment to get the C–5s modernized and take care of our airlift capability?

Ms. WRIGHT. Absolutely. That is my goal.

Senator COBURN. All right. Thank you.

Senator CARPER. I want to go to our next chart, if we could.[1] I am running out of charts, so you will be pleased to hear that.

We talked about the first two of three major areas of disagreement between the Air Force and Lockheed Martin. First, engine costs. Second, the assumptions for touch labor costs and the slope of the learning curve. I think we want to go to the other RERP costs. Do we have anything on that? We may not have a chart on that. If we don't, that is OK.

I don't fully understand these other RERP costs, but one thing I think I do understand is that part of the difference of this $1.6 billion—not all of it, part of it—maybe has to do with assumptions on spares or whatever. But I think part of it has to do with this question of when we open up an airplane and start RERP-ing it and we are changing the engines and changing the hydraulics or these other 70 systems, what if we find things that are structurally wrong with the aircraft, that there are things that need to be fixed? How do we account for those?

I think what I heard you all saying in your explanation to Dr. Coburn and myself and our staff earlier is that the reason, part of the reason why there is this difference of 1.6 on this other RERP is because it is not that Lockheed Martin would be spending more than they agreed to spend or they proposed to spend on putting on the engines, changing out the hydraulics, the cockpit and all, it is just that other stuff is found that needs to be fixed because of the RERP-ing that takes place.

It doesn't seem fair to me to charge that against the contractor. And one of the things that—I remember in my old squadrons in the Navy, every now and then we would send aircraft to depot. I don't know how often these aircraft go to depot, but it would seem to make sense to me, and we have 108 of them to work with and a fairly slow start-up off the line in 2008 and 2009 and in 2010, it would seem smart to me to sequence it so that the aircraft that go to Marietta—I don't know where they do the depot, maybe they do it there—but the aircraft that go to be RERP-ed, that they would be just coming right out of depot, and if there are problems like this, then they would have been addressed.

I would also say we have had a chance to look at these aircraft for a while, and I know that we have had testimony from the Air Force leaders that there are a bunch of bad actors, there are 25 or 30 of them that can be identified by tail number, although we have never seen that done, but if we are smart, we put them through depot, we fix most of their structural problems, but in the fleet via-

[1] The chart submitted by Senator Carper appears in the Appendix on page 113.

bility examination of the aircraft, at least in their more cursory view, I don't think they identified major structural problems or corrosion problems. I think they looked at the fuselage and the wings and they said there are another 25 or 30, maybe 35 years on the fuselage and the wings if the RERP can go forward.

We had one C–5A, I think, which is literally torn apart. I remember one of our P–3s a couple of years ago was taken by the Chinese. They were forced to land over there and they literally sent it back to us in boxes and crates. I think we must have taken a C–5 and taken it apart just like that, a C–5A to see what the corrosion looks like, the problems that we could identify, and pretty much they said it is not anything you wouldn't expect to see on an aircraft that is 30 or 35 years old.

Plus we have had a chance to actually RERP three of these aircraft, Bs and an A, and I don't know that they have sent up big warnings.

So we have had the Fleet Viability Board, we have had the aircraft that was torn apart, we have had three of them modernized, and yet we still say that we are going to—punish is probably the wrong word—but we are going to punish the contractor if there are problems that are uncovered in RERP-ing these other aircraft. That doesn't seem right. Maybe I am misinterpreting it, but let me ask you to take a minute or two and straighten me out.

Ms. WRIGHT. If I might, in that category, it is not just what is commonly referred to as over and above cost or legacy repair. That also includes——

Senator CARPER. What do you mean by legacy repair costs?

Ms. WRIGHT. Well, this is the same as it is in the baseline, so this is not something different for this cost estimate. It has always been in there. We do intend to send them to the depot ahead of time, and there is a number of things in the deck, they call it, to do, to take care of in what they call PDM. So it will go to the depot and it will have the things fixed that need to be fixed, and as they go through the depot, if they find things, if they take off the pylon and there happens to be a crack and they need to fix it, they will fix it there in the depot.

However, then when it goes to the RERP line to be mod-ed, if in the modification of the RERP we find something that was not found in the depot, and these should be minor things that come up afterwards, that you didn't know. Maybe they didn't open up that portion of the wing in the depot. These are things that you don't know about. We, in our cost estimates, and have, like I said, in the baseline we did it also, we have what they call over and above or legacy repair, where you fix it. It is like if you take your car to the garage for an oil change and you find out that there is a hole in the oil pan. You fix the oil pan. They have to do it there.

In fact, under the Anti-Deficiency Act, it is required that we do it with the money that is associated with the appropriation for the mod, so that you can't spend production money on things that you should have been doing in depot. As well, you can't spend depot money on things that you should have been doing—so it is to keep from augmenting different appropriations. So by law, we have to have funding so that we can take care of those things that are un-

covered during the time that we are in the modification, and that is where—and that is the portion that you are talking about.

But the other part that is inside that discrepancy, that disconnect there, are spares——

Senator CARPER. I apologize, but I have to interrupt you. Why isn't that a depot cost instead of a RERP cost?

Ms. WRIGHT. It is because under the Anti-Deficiency Act, you have to use the appropriations that is appropriated for the RERP mod, you have to use that if you uncover it during the time that it is in mod. So it is to keep you from augmenting appropriations with different money.

Senator CARPER. OK. Let me just make one comment and then we will move on. I am not sure how you develop your estimate for what these RERP costs are going to be that relate to stuff that has to be fixed after you have opened up the aircraft. I would hope that those estimates are informed by what we learned by going through the first three mod——

Ms. WRIGHT. Absolutely.

Senator CARPER [continuing]. And I hope they would be informed by what we saw when we tore apart the C–5A, and I hope they would be informed by what was uncovered when the Fleet Viability Board looked at all of the other aircraft.

Dr. Coburn mentioned earlier, and he thought it was quite a coincidence that we learned of a suggested Nunn-McCurdy breach on the eve of our hearing. Maybe it is just a coincidence, maybe not. I don't know.

But in one of our conversations within the last week with some senior folks from your team, again, I think, led by Major General Gray, some people from Lockheed Martin were there, as well, we discussed the communications between Lockheed Martin and the Air Force. Really, we discussed the lack of communications. And sometimes we run into problems here in the Senate, as you know, because we stop communicating. And I heard from both sides, both from Lockheed Martin and from the Air Force, that the communications, particularly this year, haven't been very good, and as the concerns were raised, and I heard this from the Air Force—I had acknowledgement from the Air Force that it hasn't been what they should have been and they haven't been from Lockheed Martin what they should have been.

We get in trouble when we stop talking around here, and I was concerned about what I heard. I am not going to ask you to answer here, but in our conversation, I think with Secretary Payton, when you called and spoke to me yesterday, and I think you spoke to Dr. Coburn, as well, one of the things that you cited as an advantage of getting into a Nunn-McCurdy breach scenario is that it would improve communications, or at least that is what I understood you to say. All I can say is we should have been communicating better before we got to this point in time, and I am not sure that we were.

Dr. Coburn.

Senator COBURN. I just have one other question for Ms. Wright, just one. Is any of the RERP cost overhead difference between you and Lockheed Martin based on units?

Ms. WRIGHT. On units?

Senator COBURN. On buyout rate.

Ms. WRIGHT. It is based on——

Senator COBURN. Let me be very specific with my question.

Ms. WRIGHT. OK.

Senator COBURN. Is there any factor of dollars in the propulsion system, the installation and other LM costs, or in the other RERP costs, is there any factor of that based on roll-out rates in any of those numbers to account for a difference between what Lockheed Martin might assume and what you are assuming?

Ms. WRIGHT. Yes, in the sense that, like for the propulsion system, we don't believe that we will be able to stay with the quantity stream that is proposed in the Lockheed Martin, and therefore we don't believe the propulsion costs will stay the same——

Senator COBURN. OK. Was that communicated to Lockheed Martin?

Ms. WRIGHT. Yes.

Senator COBURN. When?

Ms. WRIGHT. It was communicated—actually, they have been talking about it since—the team at Wright-Patterson who does both the service cost estimate as well as the team that is negotiating, or are part of the negotiating team, has been in near daily communications——

Senator COBURN. Since when?

Ms. WRIGHT [continuing]. With Lockheed Martin. Since May 17.

Senator COBURN. OK. And you are saying the fact that there is going to be a lower roll-out rate by units has been communicated to them throughout this?

Ms. WRIGHT. Yes.

Senator COBURN. OK. Thank you.

Senator CARPER. Mr. Bolkcom, did you have anything you wanted to say in response to the last question?

Mr. BOLKCOM. Yes, sir.

Senator CARPER. Go ahead, please.

Mr. BOLKCOM. I have said—I am sorry. I misunderstood your question. I didn't have anything else to add.

Senator CARPER. OK. Fair enough. One of the things we have talked about in, I think, conversations certainly with Secretary Payton and General Schwartz and others, too, the question on strategic airlift needs, we need big aircraft and we have the option of flying C–5s or we have the option of RERP-ing and modernizing the C–5s. We have the option of going out and leasing other aircraft.

There is an aircraft that is actually bigger than the C–5, maybe a couple, but one of them is the AN–124 and it turns out it is a Russian aircraft. I was startled to find out that we have wound up and paid almost $200 million to the Russians to lease to us the AN–124. I am not criticizing that decision, but as a cold war warrior, the idea that we are paying that kind of money to the Russians so that they can let us use their airplanes to provide strategic airlift because we don't have it is a real irony.

Does the AN–124 carry something that the C–5 can't? I asked my staff to dig out for me, like MRAPs. I said, tell me what it costs per MRAP to carry them in an AN–124, a C–17, or a C–5, and they came back and they told me—I hope these numbers are correct—they said, if you are flying a C–17 carrying MRAPs, it is about

$150,000 per vehicle. If you are sending them over in AN–124s, it is about $134,000 per vehicle. If we are flying them over in C–5s, it is about $125,000 per vehicle. So they can all carry MRAPs, but there is a difference in the cost of delivering each vehicle.

Are there some things that the AN–124 can carry that the C–5 cannot? Has our reliance on the AN–124, the Russian aircraft, accelerated of late? I know we have been using them for a while. And does the Air Force plan to continue to lease the 124s?

General SCHWARTZ. Sir, let me take that question because I am the operator here. The AN–124 is an excellent vehicle carrier. In fact, it has somewhat greater capacity than the C–5. The AN–124 can carry five or six, depending which MRAP category you are speaking to, four or five on the C–5, two or three on the C–17.

Senator CARPER. But in terms of the cost per vehicle, were my cost numbers about right?

General SCHWARTZ. The numbers you have are about right. I would say that, frankly, C–5 and AN–124 are about the same, $130,000 in round numbers. But the difference is reliability. Mr. Chairman, when the AN–124 goes—when it is scheduled, it flies, and——

Senator CARPER. Do they have some kind of cost penalties built in so that if they don't, they pay a heavy cost?

General SCHWARTZ. No, sir. They just operate. They are a very reliable outfit. And by the way, we access that capability through our CRAF partners, Atlas Air, a U.S. company, Lynden Air, another U.S. company. But the key point here is that they fly, and when the expectation is that we will move MRAPs as expeditiously as possible because kids are in jeopardy, I am not going to have airplanes broke in Europe or somewhere else when I have an alternative which, to date, has not resulted in a late delivery.

Senator CARPER. OK.

General SCHWARTZ. Yes, sir.

Senator CARPER. All right. Mr. Bolkcom, anything else? You haven't had a chance to say as much as some of our other witnesses. Is there anything that you would like to add?

Mr. BOLKCOM. No, sir. Did you want me to stay for the second panel?

Senator CARPER. Yes, if you would. I would be grateful if our other witnesses could stay, as well, and you are welcome to respond for the record. We may have some more questions to submit, and we just ask that you respond in a timely way.

Ms. Payton, I am going to ask you just to be brief, but go ahead.

Ms. PAYTON. Very briefly. I appreciate the question about the timing of the Nunn-McCurdy. The very first meeting I attended in the Pentagon in my new role in August 2006 was the program manager briefing, Secretary Wynne, that we were very concerned because we had heard from Lockheed Martin about the cost growth. He directed the program office to go gather as much information as possible to do a program office estimate, to put an official RFP to Lockheed Martin so that they could respond in writing what the costs really were, and then to bring in an independent cost agency of the Air Force to look over everything.

This has taken some time. It was supposed to have been completed in July. We did finally get everything consolidated on Sep-

tember 24. And here is the advantage of knowing you are in a Nunn-McCurdy breach, and this is a critical Nunn-McCurdy breach. We can take away a lot of numbers up here before we get down to the point we are no longer in a Nunn-McCurdy breach.

The good thing about the timing of this is that we can deliver the quarterly SAR to you, the report that says——

Senator CARPER. What is a SAR? Selected Air Reservist? That is what I was.

Ms. PAYTON. Selected Acquisition Report. That indicates to you that we are in a Nunn-McCurdy breach, and then the clock starts and we believe we can be through the analysis of this with a well-structured program by the end of January and we can have Lockheed Martin on contract for an excellent C–5 program before their bid to us becomes invalid on February 28.

So we did this in the best interest. Now, Secretary Wynne could wait 45 days to tell you of this, but we want to move out, because if we don't do it in September, then we won't be able to start the Nunn-McCurdy process until January, and then we will have lost all the good data that Lockheed Martin has provided us.

I would also like to mention that we have—I will submit for the record the 45 different meetings and discussions in person and between our contracting officers that we have had with Lockheed Martin trying to get the kind of cost and pricing data that we need in order to comply with the law and get the best we can do for our tax dollars.

Senator CARPER. Let me just ask the question, are those meetings that you participate in?

Ms. PAYTON. No, sir. Here is how I like to manage my acquisition workforce. We have a very small number of excellent acquisition workforce. People or contracting officers need to be empowered and I have been very proud that they do the work and do the proposal work at their level. When senior people from Lockheed Martin start talking to the Chief and the Secretary and me about details like this, we could make a very serious mistake because we are not the experts on Truth-in-Negotiations and the Anti-Deficiency Act and the Federal Acquisition Regulation.

So I do not want to marginalize my people. I want my people to be empowered to work with the people at Lockheed Martin. I have had discussions about this with the senior people at Lockheed Martin, that our people need to negotiate this out and get the data in that we need from Lockheed Martin.

I have talked to Ralph Heath about this. I talked with him this week about it. I called him to give him a courtesy notification that we were going into a Nunn-McCurdy breach so that he would know it before everyone else. And we do meet from time to time. I have a CEO roundtable scheduled on October 17 and 18. The CEO won't be there, but Chris Kubasik will be there. We do discuss things at the senior levels, but it is very important that we do not marginalize our acquisition workforce and that we empower the few that we have.

Senator CARPER. Well, I appreciate your saying that. Having said that, I heard from both the Air Force side and the Lockheed Martin side, we heard as recently as last week that the communications

hasn't been what it could have been and should have been. My hope is it gets a whole lot better in the weeks that lie ahead.

I am told by my staff that the Air Force briefed the Senate Armed Services Committee staff that the Air Force feared that there were cost problems with the RERP back in January and February this year. I will just ask you to answer it on the record and the question would be, why is the Air Force leadership only looking at it in the August time period? We will come back to you in writing with a question on this and just ask you to respond in writing.

Ms. PAYTON. Thank you very much.

Senator CARPER. I am a big movie buff and I especially like Paul Newman's films. Some of you have seen a few of those films. One of them was "Cool Hand Luke." Remember the great line from the prison warden in "Cool Hand Luke" where he said, "What we have here is a failure to communicate." I think that may be part of the problem.

I am not sure why there has been a failure to communicate. I am not sure if it is—and like in couples, husbands and wives, there is usually some blame for both. But in the Senate, we get into trouble when we don't communicate and I think we have gotten into trouble here, at least in part because we are not communicating as well as we should.

We appreciate very much your being here today. Ms. Wright, nice to have met you. Thank you for joining us, as well. Secretary Payton, General Schwartz, good to see you. And Mr. Bolkcom, thank you very much, not just for your presence and testimony today but for the input that you and the Congressional Research Service have provided to us in the past. Thank you very much.

With that, I am going to ask our fourth panel to come forward, and again, our other witnesses may stay at the table or you may just have a seat in the audience if you prefer. You are welcome to sit in the audience if you would like.

Senator McCaskill hoped she would be able to join us but she is not going to be able to. She has sent a statement for the record, and if there is no objection, then I will ask that her statement be included in the record.

[The prepared statement of Senator McCaskill follows:]???

Mr. McQuien, would you take just a moment and tell me—I understand you are a representative from Lockheed Martin—your position, your title is?

Mr. MCQUIEN. Yes, sir. I am the Vice President for Business Ventures for the Lockheed Martin Aeronautics Company, headquartered out of Fort Worth, Texas. In that role, I am responsible for all the contracts and estimating and all of the new business transactions the company enters into.

Senator CARPER. And what is your relationship, if you will, to this program?

Mr. MCQUIEN. Well, last November, at Thanksgiving, I was assigned by our President, Ralph Heath, to be a full-time responsibility for working to transition the C–5 RERP program from development into production, and so that has been my role since Thanksgiving.

Senator CARPER. Are you the senior person at the company?

Mr. MCQUIEN. I am the senior person for responsibility for transitioning to production. In the audience here today, I have George Schultz. He is the Senior Program Director for continuing the development program and he will have responsibility for actually implementing the production when and if awarded.

Senator CARPER. Mr. Schultz is welcome to come and take a seat at the table. We may or may not call on him, but a lot of times, witnesses will have somebody who happens to be in the nitty-gritty and I would invite him to join us, if he would like. I don't know that we have a name tag made up for him, but please join us, if you would.

I want to recognize you for a statement. Thank you both for joining us, and to Mr. Bolkcom, thank you for staying at the table. Please, Mr. McQuien, your statement.

STATEMENT OF LARRY J. McQUIEN,[1] VICE PRESIDENT OF BUSINESS VENTURES, LOCKHEED MARTIN AERONAUTICS COMPANY, ACCOMPANIED BY GEORGE SCHULTZ, VICE PRESIDENT, LOCKHEED MARTIN AERONAUTICS COMPANY

Mr. MCQUIEN. Yes, sir. I want to say it is a privilege for me to appear before you this afternoon in support of this hearing on "Cost Effective Airlift in the 21st Century."

Lockheed Martin is normally shoulder-to-shoulder with our Air Force customer, and this is an awkward instance in which I will be presenting a different perspective on the cost for performing the C–5 Reliability Enhancement and Re-engining Program than the Air Force.

Lockheed Martin is committed to supporting our customers' decisions on America's strategic airlift. Modernization of the C–5 Galaxy is a fiscally sound means of addressing U.S. strategic airlift requirements. The acquisition strategy for the C–5 RERP program is to improve reliability, maintainability, and availability while reducing total ownership costs. Current developmental testing indicates these goals are attainable. Analysis indicates a 30 percent or higher improvement in mission capability.

The principal driver underlying these improvements is the reliability and maintainability of the new General Electric, GE, CF–6 ADC–2 propulsion system. This propulsion system has demonstrated outstanding reliability, having accumulated more than 300 million flight hours in both commercial and military applications, including Air Force One.

Modernization will produce about $50 billion in C–5 operation and support cost savings through 2040. The Air Force will realize $4 in savings for every dollar invested in the program, based on our estimate.

Lockheed Martin is aware that the Air Force and the Nation are depending on us to deliver on this program. As stated earlier, the 2005 Mobility Capability Study and the 2006 Quadrennial Defense Review included modernized C–5s as a critical part of the Nation's strategic airlift. We are committed to ensuring the success of this program. I am acutely aware the Air Force recapitalization is fis-

[1] The prepared statement of Mr. McQuien appears in the Appendix on page 95.

cally constrained and it is imperative that every dollar be spent wisely.

As stated earlier, C–5 modernization is a two-phase program, including the Avionics Modernization Program and the Reliability Enhancement and Re-engining Program. Development for the Avionics Modernization Program is complete and the Air Force has declared initial operational capability for the aircraft. We have produced 28 updated aircraft at this point.

Development of the Reliability Enhancement and Re-engining Program is progressing well with the C–5M Super Galaxies, three of them, two former C–5Bs and one C–5A, active in developmental testing which we plan to complete by August 2008. The three aircraft are meeting performance expectations.

We have taken what I consider to be exceptional steps to ensure the program meets Air Force expectations. We provided the Air Force a firm fixed-price commitment for modernization of the remaining 108 aircraft. Lockheed Martin chose to assume this inherent risk of a firm fixed-price proposal based on rigorous objective analysis, demonstrated performance, and our best judgment. Our proposal balanced the cost risk to the Air Force for the portion of the Reliability Enhancement and Re-engining Program to be performed by Lockheed Martin, namely modernization of the aircraft. We took this action to demonstrate our confidence in the estimated cost for the program and to support Air Force deliberations on the right composition of its force structure going forward.

The proposal was structured as an initial production lot and eleven additional options. Our offer does not require the Air Force to commit to modifying all C–5s but gives them a solid price commitment by lot.

Lockheed Martin's firm fixed-price offer ensures the Air Force that the aircraft could be modernized for an average cost of $83 million per aircraft. Our offer, however, does not address other costs, as has been discussed earlier, to be incurred by the Air Force, such as training, spares, support equipment, over and above aircraft maintenance, and program management, costs typically associated with ongoing programs. Accounting for these other costs, the total average cost for modernization based on our proposal would be between $108 million and $118 million per aircraft, assuming that such costs are between $2.7 and $4 billion.

Our proposal can be executed within the total C–5 Reliability Enhancement and Re-engining Program dollars available in the current future years defense plan, but a rephasing of the funding would be necessary. Our full proposal could be executed within the current program of record plus additional new appropriations of at least $1.4 billion and as much as $3.1 billion in the 2014 to 2020 time frame, depending on the amount of the Air Force other costs.

The C–5 air frame has more than half of its structural life remaining, more than 30 years of utility. The Air Force Fleet Viability Board, as discussed, has concluded the C–5A fleet was healthy. The Air Force's internal cost analysis has repeatedly concluded that the C–5 modernization not only pays for itself, but generates significant savings over the life of the aircraft. It would be fiscally prudent to continue modernizing the C–5 to protect the investment

made by the government and the taxpayer and the realize the C–5's full potential rather than parking them in the Arizona desert.

Mr. Chairman, Lockheed Martin understands the challenges faced by the Congress and the Air Force. We appreciate having an opportunity to participate in open and constructive dialogue concerning the merits of our proposal. The Air Force program of record supports C–5 modernization, and Lockheed Martin is committed to making it a reality. The C–5, unheralded, flew 25 percent of the Operation Iraqi Freedom airlift missions deploying for the war, yet delivered 50 percent of the cargo. The C–5M Super Galaxy can continue providing this exceptional capability through 2040.

I thank you and I look forward to your questions.

Senator CARPER. Thanks, Mr. McQuien. Let me just start off by going over here—you have seen this chart. You have had an opportunity to think about it, probably a lot more than just today.

Before we start talking about engines, let me just ask you, we were talking with the earlier panel about communications. Would you be the person who would dialogue with Secretary Payton or General Schwartz? Are you that person?

Mr. MCQUIEN. I am that person. I have dialogued with both at one level or another, earlier on with General Schwartz. My primary role lately has been dialoguing with Ms. Wright, with General Hudson and the program staff that is implementing the C–5 modernization program.

Senator CARPER. OK. Let us go up here to the propulsion system. GE engines, potentially 457 of them. I understand you are constrained by telling us what the cost would be. I understand it is proprietary information. But $1.2 billion is a lot of money and the last thing we want to do is to go ahead with this project and find out that it is going to cost $1.2 billion more than you say it is going to cost. What kind of assurance can you give us that is not a correct number and that the number you are citing or quoting, I guess which is implicit in the $83 million flyaway cost, how do we know that it can be held to? How can we hold your feet to the fire? What assurance can you provide for us?

Mr. MCQUIEN. Well, first, General Electric is a very reputable company. Today, I hold a firm commitment from them to produce the engines on a prescribed schedule. The schedule that GE has provided us will support the PB–08 budget schedule that was discussed earlier. It will support that, although that is not the schedule that I bid. So I have all the confidence in the world——

Senator CARPER. What did you say, although what?

Mr. MCQUIEN. I did not bid, from Lockheed Martin's standpoint, the same schedule that is currently in the PB–08. We can discuss that now or we can discuss that later. I noticed it on one of your charts.

Senator CARPER. OK. Can you put that chart back up? On the one hand, we have the President's 2008 budget and you submitted a bid—the $83 million flyaway cost was submitted on a different——

Mr. MCQUIEN. I submitted that on May 17.

Senator CARPER. Is it the bottom line right here?

Mr. MCQUIEN. Yes, sir. You were saying Lots 3 and 4. That is the 7 and 10. Those are below the President's budget for 2008.

Then out in fiscal year 2014, well, we are below it again. We then make that up in the last lot by putting nine airplanes into that.

Senator CARPER. Why would you use this kind of ramp-up as opposed to the President's budget? I presume there is a reason?

Mr. MCQUIEN. Well, I think given 20/20 hindsight, that is a good question. I have been asking myself that. We used this rate—first off, we matched the Air Force's proposal, as discussed. They did submit us an RFP for the first—they asked us to bid the first three lots at a rate of one, three, and variable quantity five to eight. They then asked us to give them a capped cost for producing the remainders of the Bs and two Cs at a TBD build rate. The Air Force did not replicate that PB–08 rate at that time. That had given me some concern.

In the fall of 2006, as this was playing out, as was evident that the cost of this program was increasing, Lockheed Martin received an informal schedule from the Air Force suggesting we ought to look at that as a potential new way that would be implementable. The idea here undoubtedly, if you look at it, is to make sure we can stay within the future years defense plan before we have cost growth. We locked onto that informal submission and continued to use that rate in this submittal.

What I am prepared to do is, based on the General Electric proposal or contract with us, purchase order, we are prepared to update our proposal if that would be of value, which would lower our cost by another $150 million, that we would bid the actual PB–08 rate. We haven't made that up today just because it is another number in a large morass of numbers that keep getting exchanged between us, but we are prepared to make that one change.

Senator CARPER. OK. So would that $150 million come off of this $1.2 billion?

Mr. MCQUIEN. No, that would exacerbate that difference to make it $1.35 billion.

Senator CARPER. All right. How can we be assured—how can you assure us that you can buy engines from General Electric over the next dozen or more years at a price that does not include that $1.2 or $1.35 billion? What assurance can you provide for us?

Mr. MCQUIEN. Well, again, Lockheed Martin has stepped forward with a firm fixed-price offer of which we were willing to accept that risk. Again, the question that came up earlier, we are accepting that risk based on the aircraft being procured at the specified rate. That is the same risk that General Electric stepped up forward to us when they provided the proposal which we ultimately accepted.

I would say that General Electric pricing hasn't changed since late November 2006, although we just now did get the firm contract signed. It was an 11th hour, just before our last meeting, actually, with the Aeronautical Systems Center.

Senator CARPER. In your negotiations with the Air Force, have you been able to give them assurance that you are not going to be—either more material problems with the components that go into these engines that would cause GE to step back and say, we can't do it at the price that we thought we could. We need more money. And if that happens and you end up having to pay more, do you eat the cost?

Mr. MCQUIEN. That wouldn't be the case. If we were able to complete a proposal that we submitted and negotiated for a firm fixed price, if we were incorrect in the commitment with General Electric, that would be on Lockheed Martin.

Senator CARPER. What if the Congress, or a future Congress, decides not to support the President's budget, and that rarely happens around here, but what if it did. Is there some kind of protection, I guess, for the contractor? Do you have some kind of variable rate or quantity protection that can be built into a contract?

Mr. MCQUIEN. It could be built into. We stand ready to work with the Air Force to make that kind of determination, if that was what they would be interested in doing. We did not do that in our submittal of the proposal back in May. We just made it against a certain specified rate and said that is what we would go forward. Our intent in submitting the proposal was to try to provide a confidence in the estimate of the program against or close to the current baseline, demonstrating that a Nunn-McCurdy breach might be avoidable.

Senator CARPER. In our conversations with some of the Air Force leadership, some of whom are in the room today, we heard that Lockheed Martin had failed to provide a firm contract that didn't have all kinds of loopholes in it, that you actually install these 457 engines, or 432 plus spares, that whatever you proposed in writing had enough loopholes in it that it was not of great value. Let me just ask, how do you respond to that?

Mr. MCQUIEN. Well, I am surprised by the definition of loopholes. I have heard this over the last few weeks characterized as contract reopeners. It was discussed earlier that there is an Economic Price Adjustment clause in the contract. This is a standard clause found in many contracts that span long periods of time. So this is not an unusual clause. We have accepted in our pricing the risk—we have proposed to accept the pricing for a certain level of escalation. That escalation going forward is based on published indices by authorities in this field. If inflation were to change radically over the next—between now and 2021, then we have asked that the clause would self-adjust what is the price of the program. That is not unusual. We have found that in a number—that is in many contracts. That is in the current F–22 multi-year contract, as a matter of fact. So this is not a first time.

I clearly agree that there is a reopener provision if the build rate that we propose and General Electric proposed were to be changed. It is not practical at this point in time for me to be able to assume you could build 12 in 1 year and one the next year and the price wouldn't change. We are going to work—we have had some discussions at this time with the Aeronautical Systems Center at which this has been discussed. We just haven't—none of us, because of all the other priorities, had made this the number one item to try to solve at this time, but I believe we are going to. We are going to find, if we can find a meaningful variable quantity, we will find another price that we can step up to that gives the customer the kind of flexibility they are looking for.

Now, I will have to say that this is not like an ongoing production line where the Air Force might be buying aircraft while we are producing them for someone else. There are only 108 C–5s to be

modernized, so it is going to be—if the quantity variation varies widely, if it varies from 4 to 12, well, the price risk is going to get shifted significantly to us and we will have to reflect that into a contract price. That came up earlier in the discussions, I know, with Ms. Wright here. So that is something we will just need to work with with the Air Force. Again, we stand ready to do that and try to find a reasonable accommodation to meet what the requirements are.

Senator CARPER. I want to talk a little bit about the second major portion of the delta, the installation and other labor charges, touch labor stuff that we talked about earlier, the sort of assumptions.

Can we look at another couple of charts, please.

I would like to think you could go from 145,000 man hours to 123,000 to 111,000. I would like to think you could go down to 95,000 on the fourth aircraft. But if you have had the line shut down for 2 years, I presume that the folks who had been working on these first three, some will still be around, some will not. You must have some assumptions as to who is still there and who is not. The folks, in terms of being able to do stuff, the idea of working together as a team, training new people, you have to train new supervisors. How do you go realistically from 111,000 after a 2-year shutdown to 95,000?

Mr. MCQUIEN. Well, first, there is a set-back in learning, and so as a result of the gap in the production line, although we will be able to recall a number of the people that worked on this program, there is a setback in learning and we have acknowledged that probably we would start back around the mid-120s, 120,000 hours.

But we have, though, demonstrated that we changed the scope of the work. The work that was done on the first three airplanes was custom, I will say sort of by hand—it will all be by hand, but they were one-of-a-kind changes. As we move forward, under the development program, we have now redesigned the pylon installation that significantly changes the scope of the program. That is the 20,000 hours that you mentioned earlier on one of your charts.

So we have showed a change in the scope of the program that we believe will reduce the man hours to produce this aircraft by 20,000 hours. That would make an immediate——

Senator CARPER. Is this what you are talking about?

Mr. MCQUIEN. Yes, sir.

Senator CARPER. And is this 19,000, is that the difference between, say, Aircraft 3 and Aircraft 4?

Mr. MCQUIEN. No. We made a setback. Loss of learning took us back—I'd have to look, I want to say it is about 124,000 hours. Perhaps I have a piece of data here. What we said is the fourth airplane may cost us as much as 124,000 hours if we performed on the same type of work we were doing on the first three. However, because of the problems encountered on the first three on doing it one-of-a-kind, that wasn't a very effective way to do a production program where we would be doing up to 12 a year, so we redesigned that work. In redesigning it, we identified at least 19,600 hours of improvements. Most of these improvements get implemented once we go under contract.

Senator CARPER. So is what you are saying you have made an adjustment and you have assumed that this 111,000, because you lost people, retraining, that sort of thing, the 111,000 normally would be, what did you say, it would be 124,000?

Mr. MCQUIEN. A hundred-and-twenty-four, I want to believe is the number.

Senator CARPER. Would you come back to us——

Mr. MCQUIEN. I will come back and update you.

Senator CARPER. But it must be—this 19,000 or 20,000, if you add 20,000 to 95,000, you are up to 115,000. Would that be your readjusted——

Mr. MCQUIEN. What we did is we looked carefully at the work to try to decide, what is it going to take to do it, and we walked down that carefully with the customer to show how we would step back the learning, but then we would realize this savings of the 20,000 hours that would take us down to 104,000 hours. There is another 8,000 hours of additional savings we identified that could be applied to this program—or would be applied to this program, in our estimate. So we walked down that very carefully.

Senator CARPER. Seven thousand on top of the 19,600?

Mr. MCQUIEN. In the case of the first three airplanes, they did not go to the depot before they were delivered to Lockheed Martin. As a result of that, there was a significant amount of over and above work at the beginning of the program.

Senator CARPER. OK.

Mr. MCQUIEN. So we have assumed that the aircraft in the production program would go to the depot before they come to us and that there is probably 10 percent of that first learning set, 10 percent of those hours were attributable, in our judgment, to this over and above work that we had to do on these airplanes which we won't experience if the airplanes have gone to the depot ahead of time. So that is another, in this case, 11,000 hours almost that would have come out, adjusted. There are several adjustments.

Senator CARPER. Let me follow up while you are on this point. Is it realistic or unrealistic to assume that, particularly with a production ramp-up one, three, five, seven, nine aircraft, is it realistic to assume that in that kind of schedule you can—the Air Force has the flexibility to schedule an aircraft, the first aircraft, or the fourth lot, I guess, but the first aircraft in the depot, get it to RERP, and the next three through depot into RERP? Is that a realistic assumption? And I would ask the Air Force to answer that one on the record, if you would.

Mr. MCQUIEN. Well, I would have to say that I think this is one that General Schwartz might answer as the operator of the aircraft. To me that would be reasonable, but I am not the operator.

Senator CARPER. We are just asking. I appreciate the fact that General Schwartz and Secretary Payton are still here. Let me just ask you to answer that one for the record. How realistic is that assumption? If it is not a realistic assumption, then maybe the 11,000 are illusory. It would seem to me we ought to be smart enough to be able to do that with 108 aircraft out there.

The second half of this part of the delta, part of it is where do you start with aircraft No. 4, and the second part is the learning curve, the slope of the learning curve, and whether it—do we have

a chart that shows that again? We are just trying to figure out who is right. Is it 85 percent, as Lockheed Martin suggests? Is it 90 percent? Is it somewhere in between? We had a chart that we tried to do apples and apples and the one example we had was the AMP, the AMP process for the first 26 aircraft which showed a learning curve of about 84 percent.

In the middle, we are looking at—is there another chart on this particular issue, that maybe compares the 90 percent versus the 85 percent?

Where do you come up with this idea of 85 percent? What is the basis of it? It is one thing if you are building a new aircraft. Maybe when you first built the C–5s, maybe 90 percent was realistic. Is it realistic for a modernization process for an old airplane, an older airplane?

Mr. MCQUIEN. In my opinion, it is realistic that we could achieve the 85 percent curve. We have looked at that from our manufacturing experts and we believe at Lockheed Martin that you can achieve that. In fact, the data that we brought to the table to try to demonstrate that is what you have put on the table here that says as we perform the AMP contract, we are beating 85 percent.

In fact, the data that you have is a composite of the Dover line and the Travis line. You can see on that chart, you see a spike in there on set No. 6. That shows what the setback in learning was when you stood up a new production facility on the West Coast at Travis when we had been doing all——

Senator CARPER. Those folks out at Travis were bringing us down in Dover, weren't they?

Mr. MCQUIEN. No. They were working along, but there is always that setback. But they achieved an 84 percent across two sides. We certainly believe we are going to be able to achieve 85 percent.

But this doesn't seem to Lockheed Martin to be unreasonable. We are achieving something along 80 percent, or we have been arguing routinely that we should be able to achieve better than 80 percent on an F–22 in aircraft production. So in our minds, this is something that is doable.

Senator CARPER. OK. Dr. Coburn.

Senator COBURN. Contracting with the Air Force isn't new to Lockheed Martin, is it? It is not new.

Mr. MCQUIEN. Oh, no.

Senator COBURN. You all have lots of contracts with the Air Force?

Mr. MCQUIEN. Absolutely.

Senator COBURN. In how many other contracts for aircraft or similar defense items have you encountered a Nunn-Lugar breach? I mean, Nunn-McCurdy breach?

Mr. MCQUIEN. I personally have not encountered it before, so I am not aware of whether or not Lockheed Martin overall has experienced this.

Senator COBURN. OK.

Mr. MCQUIEN. Actually, we have experienced it at Aeronautics. There was a breach, I believe, on the F–35.

Senator COBURN. OK. I guess the thing I am having trouble getting around is where I have seen this type of overhaul before, which is in Oklahoma City on the KC–135s. We know those hours,

we know those costs, and we have seen tremendous improvement from the start of that program, even with variation in aircraft age and model and everything else, what we have seen is that.

How is it that we get to the point that you built the airplane and you are the ones that did the mods and now you are bringing forth information and the experts are saying you are way off and we think we are obligated under law to say you are way off? How is it that those assumptions got so far apart?

Mr. MCQUIEN. I don't think I could answer that. I would say the Air Force has a tremendous amount more data than Lockheed Martin, so they are applying their estimating methodology and coming to this conclusion. I am applying mine and coming to this conclusion.

What we tried to do when we submitted our proposal was to take that off the table by submitting a firm fixed-price proposal assuming the risk. If we were wrong, we would assume that risk. As was discussed, we have submitted the proposal for Lots 1 through 3 and we are in the process of negotiating that and hope to have that under contract by the end of February.

Currently, the Air Force is accepting the fact that we will assume the risk for the difference between that 95,000 hours and their assumed 116,000.

Senator CARPER. Would you say that last sentence again?

Mr. MCQUIEN. We are currently proceeding to negotiate the contract for Lots 1 through 3, which we have premised our pricing on the 95,000 hours. The Air Force is negotiating with us on the basis that they will let us assume that risk, even though they disagree, they believe that the cost should be higher. If Lockheed Martin is willing to accept that risk, they are willing to let us.

Senator COBURN. So is that something different than what you originally bid in terms of your assumption? In other words, we are not going to have an opener here for the basis on these hours? Is that what you are saying to us?

Mr. MCQUIEN. Yes. We are not going to have——

Senator COBURN. Given the dispute over the hours, the Air Force is willing to negotiate with saying, OK, you take the hours, but if you do, then you eat it?

Mr. MCQUIEN. That is right.

Senator COBURN. OK. So what about the other areas that are in dispute?

Mr. MCQUIEN. The engine? The engine, we would assume the same risk.

Senator COBURN. Has the Air Force agreed to do that, as well?

Mr. MCQUIEN. For the first three lots, yes.

Senator COBURN. Yes, but not forward?

Mr. MCQUIEN. Not forward on.

Senator COBURN. OK.

Mr. MCQUIEN. Now let me say on the Air Force's behalf, we have been discussing this. We projected Lot 4 and on pricing based on the first three lots. At this stage of the game, we have not provided them the level of data that they have been looking for to enter into a contract. However, estimating the cost of the program from a prediction standpoint is different than what data is required to do a

contract. We stand ready to go collect that data and provide it to the Air Force if they are willing to receive it.

Senator COBURN. Well, as Ms. Wright said, if Lockheed Martin comes with a firm fixed-price offer with variable build-outs and the Air Force gets to pick one, then the Truth-in-Accountability and all the other rules that apply to the contracting go out the window because you are assuming risk, right?

Mr. MCQUIEN. I would agree. Yes.

Senator COBURN. Yes. What is Lockheed Martin's position on that right now?

Mr. MCQUIEN. We stand ready, willing, and able to work with our customer to define those rates and go out and——

Senator COBURN. Generate that——

Mr. MCQUIEN [continuing]. On a firm fixed——

Senator COBURN. Here is the deal, guys. You can buy 20 over the next 3 years and 24 after that and 36 after that and here is the price, or you can buy two, two, two, two, two, 20, 20, 20, and here is the price, or you can buy 24, 24, 24 with a ramp-up to that and here is the price, right?

Mr. MCQUIEN. We are prepared to deal with whatever the quantities are.

Senator COBURN. Thank you.

Senator CARPER. I listened to what Dr. Coburn was asking and I listened to your answer. I just want to make sure we have this right. Is there some way you can wiggle out of this?

Mr. MCQUIEN. There is no way that I can get out of this at this point.

Senator CARPER. Let me ask you, did I hear you say that you are in a position to say, we believe it is 85 percent slope, this learning curve. We believe in 95,000 hours for the aircraft. And if we are wrong on Lots 1 through 3, we eat the price? We eat the cost?

Mr. MCQUIEN. Yes.

Senator CARPER. But on Lots 4 and beyond, what did you say?

Mr. MCQUIEN. We were supposed to do the same for Lots 4 and beyond, although without the supporting data, the Air Force has discounted that proposal and is assuming their projections for Lots 4 and beyond as opposed to our projections.

Senator CARPER. Between now and the end of the year, will you be working with the Air Force to firm up what you can do on Lots 4 through, whatever it is, 12?

Mr. MCQUIEN. I am certainly standing ready to do that.

Senator CARPER. Well, I would hope you would. OK.

Mr. McQuien, just stand at ease for a moment if you will and I will turn back to Mr. Bolkcom and ask, we have been grilling Mr. McQuien here. You have been good enough to stay here. Do you have any observations, any thoughts on what you have heard in this back and forth?

Mr. BOLKCOM. I think that there is a lot of devil in the details of the actual negotiation. What Mr. McQuien is saying is encouraging, but it really comes down to how that contract is really negotiated on the specifics of the EPA, for instance. I agree from my very limited experience that is a standard sort of clause, but depending on how it is written, how restrictive, and the con-

sequences, it could be an opener, as they say, or it could not. It really depends on the very detailed deliberations.

I don't know as I understood Senator Coburn's questions about the variable rates because the way I understand the concerns about risk is that if we agree to any rate, and I think we need to agree on a rate, that there is not a lot of confidence in that because, of course, the Air Force doesn't have total control over its budget. And the concern is if, and pick a lot, the rate deviates from the agreement, that would provide Lockheed Martin a legitimate reason to renegotiate and that is when the Air Force and the taxpayer could get stuck with the risk of the delta between the——

Senator CARPER. Let me just ask, is it possible if in a year when the President's budget called for nine aircraft being RERP-ed and we ended up providing enough money to do six or seven, is there a way to lock in ahead of time with Lockheed Martin like a "what if" clause? This is, well, what if we only do six or seven, what is the price going to be, and to be able to do that with some certainty?

Mr. BOLKCOM. Certainly, anything can be negotiated. I would come back to the point I tried to make earlier, which is this is not a multi-year procurement contract, and I think I heard Mr. McQuien really emphasize it in his verbal statement. These are options that the government can exercise or pass on. So it seems to me, based on that understanding, that there isn't a lot of risk in the worst-case scenario.

Senator CARPER. All right. I think we are mercifully coming to the end. Mr. McQuien, I want to thank you and others that are here, Mr. Schultz and others who are here on behalf of Lockheed Martin. You have made a number of assertions here today, your willingness to commit—commitments to be willing to negotiate in order to reduce these deltas and to make assurances and assuming costs if things don't work out as maybe anticipated that are encouraging.

As far as I know, you are honorable people and I am presuming you mean what you say and you are not trying to be deceitful or misleading in any way. But in order for us to have some comfort that these assurances are real, we need to be able to negotiate it out and the Air Force needs to be able to negotiate it out in a way that provides them comfort and, frankly coverage for when we come back on them for messing up, if there is a problem along the way.

I came here from a markup in another committee, the Commerce Committee. Among the bills that we were marking up there was a bill on an obscure issue of ballast cleaning. When the ships empty out their ballast, something we do a little bit in the Navy, ships empty out their ballast and the kind of pollution problems that can cause, especially on coastal waters. We had some folks who were in favor of the bill that was before us. There was an alterative.

I am sorry to say the two sides didn't spend nearly enough time working out their differences and we ended up with a blow-up at the markup. Instead of being able to report out with unanimity legislation to address an environmental issue that needs to be addressed, we ended up reporting out something and maybe leaving some bad feelings, but not that we didn't do good public policy. We

just didn't communicate well, and we are going to go to work between now and the time the bill comes to the floor to make sure that doesn't happen again.

There is a lot riding on this, and it is not just the money that is involved, although that is important. We are fighting a couple of wars, and as you all know, we have people whose lives are at risk over there. We just had in Delaware this past week the mother of one of our Iraq victims who took her own life in despair. So the victims aren't entirely those that fall in Iraq or Afghanistan or other places around the world. It is their families who take the loss in some cases in deeply personal ways. So there is a whole lot here.

The money that we waste on RERP-ing aircraft is money that we could spend buying MRAPs and getting them where they need to be. So there is a lot more than just the dollars to help us meet our needs around the globe. I am mindful of that and my colleagues are certainly mindful of that.

We need big aircraft and we need them now and we need them to be dependable. As much as I like those Russians, I am not sure that I want to be depending on them for a long period of time to continue to provide these aircraft at anything approaching a reasonable rate.

I will go back to what I said at the beginning. I came into this hearing thinking that if you can modernize C–5s, if you can actually build them at at least a 75 percent mission capable rate, and looking back at Secretary Payton's testimony, she seemed to think—and I think we are actually lifting the language from her—she indicated that there is nothing so far in the first three aircraft that have been RERP-ed that would suggest that they can't be at least 75 percent mission capable. But if you can deliver 108 aircraft at at least a 75 percent mission capable rate and you can do it with an assurance that the price will be along the lines that we talked about here, we would be foolish not to do that.

There are two things we need. We need for you to be able to hit the 75 percent or higher mission capable rate, and we need to be able to bring them in at the cost that you say that you can and to assume risk that you are certain that you are willing to do that in ways that provide us comfort and provide the Air Force comfort.

It is not all on you. It is not all on Lockheed Martin. A good deal of it is on the Air Force, as well.

I would just say to the Air Force, I would say to Lockheed Martin, we are pleased that you have come here today. I know for Lockheed Martin this was not something you wanted to do and you do so really at some risk. I said to our Air Force folks before, Dr. Coburn, as well, if we have any hint of retribution because they showed up today and said what they did, there will be hell to pay. I just hope that is locker room talk that has nothing, no validity to it.

We need to do this right and we need to get on with it, and I hope that whatever we have not been doing well the first part of this year, that we have learned from that and we learn maybe from some of the exchange that we have had in recent days, including today, that will enable us to get our act together and do what we need to do, what is in the best interest of our country.

General Schwartz, I saw you had your hand up there and I don't know if you want to give the benediction or not, but——

General SCHWARTZ. Would you allow me—I know it is not the norm——

Senator CARPER. Please. I would ask you to be fairly brief, but go ahead.

General SCHWARTZ. Sir, I would only like to make a final comment to put in your and Senator Coburn's calculus and the others here on the Hill, that another piece of comfort is the fundamental question about what happens to C–17 production. This is the other issue that we didn't have a chance to address, and all I will say is that I am hopeful, as you are, that we get the outcome we all desire. That will be good. What do we do with C–17 production, and my concern is that bit of insurance might expire if we don't deal with that issue properly.

Senator CARPER. All right. We chose to focus on the need for big aircraft to provide strategic airlift. As I said earlier, I am a big fan of the C–17. That is not what this is about. The question is, can these folks from Lockheed Martin deliver what they said they will deliver, their kind of quality, dependability, and their price that they assert that they can. I am not from Missouri, but you guys show me. My hope is that you can and that you will have that opportunity.

That having been said, this hearing is adjourned. Thank you all.

[Whereupon, at 6:15 p.m., the Subcommittee was adjourned.]

APPENDIX

Written Statement of

The Honorable Sue C. Payton

Assistant Secretary of the Air Force (Acquisition)

Before the Senate Homeland Security and Governmental Affairs Committee

Federal Financial Management, Government Information, Federal Services and

International Security Subcommittee

September 27, 2007

Mr. Chairman, Senator Coburn and distinguished committee members, thank you for the opportunity to appear before you today to discuss meeting the Nation's strategic airlift demands in the most cost effective manner. As the Assistant Secretary of the Air Force for Acquisition, I am honored to represent the Air Force along with General Schwartz, my customer and Combatant Commander of U.S. Transportation Command, on such a vital national defense topic. My statement will address the Acquisition community's progress to modernize and recapitalize our strategic airlift and tanker fleets and will highlight the C-17, C-5 and KC-X programs.

FLEET MODERNIZATION AND RECAPITALIZATION

The high operations tempo, of the past 17 years, has taken a toll on our airlift and air refueling aircraft. Both fleets are in need of modernization and recapitalization. We cannot allow capability gaps to negatively impact warfighters and the security of our nation and our allies. Older, less capable aircraft are also more expensive to operate and maintain. Retiring cost-prohibitive aircraft allows the nation to recapitalize and improve life cycle cost efficiencies. Upgrading our existing aircraft may provide a cost-effective modernization option, while preventing capability gaps during the long replacement cycle for large fleets. However, the decision to upgrade, replace, or pursue other options depends on near term funding constraints and cost comparisons of both investment and life-cycle operating costs to repair or replace old weapons systems with new weapon systems.

As the Air Force's Acquisition Executive, I have inherited several programs with cost growth challenges because programs are baselined for performance, cost, and schedule well in advance of when we can reasonably project the technical and schedule

issues that can drive costs out of control. It has therefore been my objective, informed by several GAO findings, to put affordability and cost control back into our weapon systems by insisting on better planning, better estimating, and well-defined achievable requirements to drive well-written Requests For Proposals (RFPs). These RFPs require maintenance data rights for organic maintenance and life cycle support; open systems architecture to allow rapid, affordable insertion of innovation; incentive and award fees that reward desirable contractor behavior; time certain development that avoids immature technology; funding to realistic, high confidence and accurate cost estimates; and open and transparent communication that results in fair and open competition.

C-5 AVIONICS MODERNIZATION PROGRAM (AMP) & RELIABILITY ENHANCEMENT AND RE-ENGINING PROGRAM (RERP)

Modernization of the C-5 fleet remains an Air Force priority to meet Combatant Commanders' requirements for on-time delivery of oversized and outsized cargo. This effort will bring needed capability to the warfighter through the year 2040, getting our troops and equipment to the fight by increasing the mission availability of C-5s with their unmatched outsized and oversized, roll-on/roll-off capability.

The C-5 modernization effort is a combination of two programs. The Avionics Modernization Program provides modernized avionics and allows the aircraft to meet increasingly stringent Communication Navigation System/Air Traffic Management (CNS/ATM) requirements worldwide, thus allowing the C-5 to fly in many places around the world that will otherwise be restricted to us. The second program is the Reliability Enhancement and Re-engining Program (RERP), which builds upon the C-5 AMP

modification. C-5 RERP replaces the propulsion system and improves the reliability of over 70 systems and components. Once a C-5 is both AMP- and RERP-modified, the fully modernized C-5 will be redesignated a C-5M.

The AMP modification is being accomplished with contractor production teams at Dover AFB, Delaware, and Travis AFB, California. Air Mobility Command (AMC) declared AMP Initial Operational Capability (IOC) on 1 February 2007, after delivery of the 16th AMP-modified aircraft to Dover AFB. IOC also ensured trained operations and maintenance personnel were in place while supplying initial spares to support the mission. Thirty (30) aircraft have been AMP-modified as of 19 September 07. Twenty-six (26) of those aircraft support the warfighter, three (3) support C-5 RERP System Development and Demonstration (SDD), and one (1) aircraft was lost due to the April 2006 crash. Currently, six (6) aircraft are undergoing modification at Dover AFB and Travis AFB (3 at each location). While the AMP suffered some program execution issues, technical challenges, and schedule delays during development, the AMP production is fully funded and on-schedule to complete the upgrade of the entire fleet in FY15.

RERP is currently in System Design and Development (SDD) with a Milestone C production decision scheduled for first quarter CY2008. The RERP test program is flying three modified aircraft—two C-5Bs and one C-5A. As of 18 September 2007, the test aircraft have flown over 515 hours on 165 flight test missions, and the SDD test program is approximately 58% complete and scheduled to complete in FY10. Technical performance has been positive and analysis to date indicates the C-5M will provide at least a 75% wartime Mission Capable Rate. The continued support of Congress to fully

fund the C-5 RERP development is essential to the success of the program.

The C-5 RERP has experienced program cost growth, most notably in the upcoming production program currently scheduled to begin in 2008 and conclude in 2021. The Air Force is evaluating cost growth to determine affordability and the way ahead for this program. C-5 RERP costs have increased due to development delays, budget cuts due to other AF priorities, and production cost increases in the areas of engines, specialty metals, pylons, and touch labor. The C-5 Program Office and the Air Force Cost Analysis Agency completed independent cost estimates and reconciled them into a Service Cost Position (SCP) on 5 September 2007. The SCP takes into account the 17 May 2007 industry production proposal (as amended on 28 August 2007), as well as Air Force budget constraints and other factors that impact cost. The SCP is based on the quantities in the FY2008 President's Budget.

Under the Truth in Negotiations Act (TINA), when dealing in a sole source environment, the contractor is required to certify that the proposal's cost and pricing data is current, complete, and accurate. The current industry proposal lacks the specificity and detail necessary for contractor certification or for the government to immediately enter into a contractual relationship. As a result, the company in late August converted its firm-fixed price proposal to Not-To-Exceed (NTE) prices for Lots 4 and beyond. We are working to get the necessary cost and pricing data for Lots 1 through 3.

The NTE element of the proposal is an initial ceiling cost for work that has not been fully scoped or negotiated. NTEs are often used in time-critical situations in conjunction with Undefinitized Contract Actions to allow a contractor to begin work prior to the completion of negotiations.

In addition, NTEs include "re-openers" that allow the contractor to adjust the NTE as unknown variables are defined and scoped. "Re-openers" can drive extensive price increases during the fact-finding and negotiation phases. Upon the completion of negotiations, the government and the contractor jointly come to an agreement on the total scope and price of the effort as well as the type of contract vehicle to be used. NTEs typically apply to a narrow scope of effort and do not address the total development costs that will be uncovered during negotiations. These prices will be negotiated as a firm fixed price at a later, to be determined date. These prices will be treated as ceiling costs that cannot be exceeded as long as the requirement and the proposed aircraft quantities remain unchanged. The NTEs would be invalidated, for example, should the Air Force change the number of aircraft to be modified in any given lot.

In the case of C-5 RERP, the initial results of the SCP indicate that the amount of industry's proposal omissions, "re-openers," and standard associated other government costs may exceed $4.2 billion. This is a sizable amount of risk to the taxpayer if both parties prematurely rush into a contractual relationship. Therefore, the Air Force is moving forward cautiously and scrutinizing the industry proposal to ensure the program risk is well understood and the program is properly scoped and budgeted for success to ensure a quality product is delivered to the warfighter. The SCP will be used as the basis for determining if the program has a Nunn-McCurdy breach, which requires a certification process.

The program office team, as well as the AFCAA, DCAA, and DCMA, have been working with industry since early this year to understand the proposal. Senior Air Force leaders have met with industry representatives to discuss the cost disparities between the

SCP and the NTE production proposal. Additionally, in light of this cost estimate, several Air Force offices are currently examining the various aspects of RERP to determine the most cost effective mix for the strategic airlift fleet. Air Force leadership will continue to work with DoD and Congressional stakeholders to determine the most prudent course for our nation's strategic airlift fleet.

C-17 PROCUREMENT

With regards to the C-17 program, we have accepted delivery of 168 C-17s. The original programmed buy of 180 aircraft was extended to 190 by the FY07 Bridge Supplemental. The supplemental provided 10 additional aircraft, which answered two concerns: our backup aircraft inventory (BAI) shortfall and wartime wear and tear. However, our nation is rapidly approaching a major C-17 production milestone with long-term implications to the mobility enterprise — the decision to terminate production.

In addition to the U.S. procurement of another ten C-17s in FY07, international sales have helped keep the C-17 production line intact. Sales of four aircraft to Australia and a fifth to the UK, along with Canada's recently signed letter of acceptance (LOA) for four C-17s, extend the production line to July 2009. Continued allied acquisition of C-17s strengthens coalition partnerships in Global War on Terrorism (GWOT). The Air Force is also working with the North Atlantic Treaty Organization (NATO) countries as they address the potential purchase of three aircraft. The C-17 is, and will continue to be, a key U.S. strategic airlift asset.

KC-X

The KC-X, the tanker replacement aircraft, is the Air Force's #1 acquisition priority and is currently in source selection. Our goal is to acquire the optimal platform

for the warfighter while garnering the best value for the taxpayer.

While the KC-X is primarily an air-refueling tanker, its multi-mission capabilities can supplement our inter/intra-theater airlift fleets, aid Civil Reserve Air Fleet (CRAF) transload operations, transport passengers, increase aeromedical evacuation options, and ultimately help transform our mobility landscape. Current Tanker units have traditionally "self-deployed" support and maintenance personnel as well as tools, spare parts, and required ground equipment. This not only allows efficient use of this platform, but frees up our airlift fleet to perform their intended missions, such as hauling outsized and oversized cargo or delivering troops to far-forward locations. The military rationale for tanker aircraft to maintain an airlift capability is clearly outlined in long-standing Joint Doctrine and follows a well-established precedent.

CONCLUSION

The dynamic and threatening environment in which the U.S. military operates requires a responsive air mobility enterprise. To meet the requirements of the National Security Strategy, and most importantly, to properly support our warfighters, we must continue to focus our efforts on the future. Air mobility is one of the Department of Defense's crown jewels. It provides the airlift and air refueling capability our leaders need to execute Day One options. From military actions, to natural disaster, to civilian emergencies, the nation's air mobility fleet is America's keystone to rapid movement. From long-distance strategic movements, to short-duration tactical airlift, to air refueling or aeromedical evacuation—air mobility demonstrates national resolve, provides for combat power, and saves lives.

The men and women in Air Force Acquisition take great pride in delivering on our promise to both Air Mobility Command and US Transportation Command to meet the modernized and recapitalized tanker and strategic airlift fleets needed. The Air Force appreciates the opportunity to discuss with the committee the status of the Nation's strategic airlift modernization and recapitalization programs. Thank you again for the opportunity to be here today and I look forward to your comments and questions.

Statement of

General Norton A. Schwartz, USAF

Commander, United States Transportation Command

Before the Senate Homeland Security and Governmental Affairs Committee

Federal Financial Management, Government Information, Federal Services, and International Security Subcommittee

September 27, 2007

Chairman Carper, Senator Coburn and distinguished committee members, thank you for the opportunity to appear before you to discuss strategic airlift, a critical capability for the Nation and our warfighters. Whether by air, land or sea, the United States Transportation Command (USTRANSCOM), serves as the "quarterback" of the Joint Deployment and Distribution Enterprise (JDDE), whose purpose is to project national security capabilities, provide end-to-end visibility of forces and sustainment in transit, and rapidly respond to support joint logistics requirements. Through our component commands, the Air Force's Air Mobility Command (AMC), the Navy's Military Sealift Command (MSC), the Army's Military Surface Deployment and Distribution Command (SDDC) and our national and commercial partners, we execute military and commercial transportation, terminal management, aerial refueling and global patient movement through the Defense Transportation System (DTS). In addition to our transportation mission and specifically the airlift piece pertaining to today's hearing, USTRANSCOM, as the Department of Defense (DOD) Distribution Process Owner (DPO), is leading a collaborative effort with JDDE partners across the defense logistics community to increase the precision, reliability and efficiency of the DOD supply chain. By increasing collaboration, employing expeditionary tools, streamlined systems, adapting our business models and ensuring an appropriate mix of lift assets we fulfill our obligations and "keep our promise" to our warfighters and the Nation, today and tomorrow.

AIRLIFT IN 2007

Ensuring the appropriate mix of lift assets is vitally important given the scope of what the airlift fleet provides across the globe. Our airlift requirements in support of the Global War on Terrorism (GWOT), Operation NOBLE EAGLE (ONE), Operation IRAQI FREEDOM (OIF) and Operation ENDURING FREEDOM (OEF) are noteworthy. Since the start of 2007, AMC has moved over 947,000 passengers on deployment, redeployment and rest and recuperation missions, an achievement accomplished in collaboration with our commercial industry partners, as they provide us with a cost efficient and effective means of moving our service personnel. This important balanced relationship with our commercial industry partners allowed organic aircraft to airlift 118,000 short

tons (stons) of vital cargo into the United States Central Command (USCENTCOM) theater.

The rapid and efficient transportation of Mine Resistant Ambush Protected (MRAP) vehicles from the United States into USCENTCOM is a top priority. In addition to the hundreds of MRAP vehicles acquired under the purview of the MRAP Joint Program Office, USTRANSCOM is also simultaneously moving other MRAP-like vehicles (such as RG-31 from South Africa) to Iraq and Afghanistan. Due to the critical nature of these life-saving vehicles we are currently delivering them predominately by strategic airlift.

Our ability to expand airlift capacity to support the increase in airlift requirements, especially in light of major force rotations, is a direct result of our commercial partner relationships. The use of contracted commercial aircraft expands USTRANSCOM's global capacity to transport outsized cargo such as the MRAP vehicle, while freeing up organic aircraft to satisfy other military unique/high priority requirements. Since April 17, 2007, 126 aircraft (60 percent commercially contracted and 40 percent organic USTRANSCOM assets) have airlifted 282 MRAP vehicles from Charleston Air Force Base, SC to theater. As of September 5, 2007, a total of more than 875 MRAP and MRAP-like vehicles (including 289 RG-31 vehicles from South Africa) have been delivered to USCENTCOM.

Despite the additional MRAP requirements, we continue to satisfy ongoing force rotations with up to 1,000 mobility sorties flown per day. This very high operations tempo equates to over 350,000 mobility aircraft departures per year or one every 90 seconds.

In addition to current USCENTCOM priorities, USTRANSCOM also supports other theaters including operations to the Antarctic continent as part of Operation DEEP FREEZE. Spanning from August to January and supported by the Air Force, Navy and Coast Guard for over fifty years, DEEP FREEZE is possibly the US military's most difficult peacetime mission. Strategic airlift support last year included 57 C-17 airlift missions, a record breaking number, from New Zealand to Antarctica, moving nearly 5,000 passengers and 4 million pounds of cargo. Additionally we flew over 400 LC-130 airlift missions on the Antarctic continent, moving over 1,000 passengers and 5 million pounds of

cargo. We also supported other airlift such as emergency aeromedical evacuations.

Perhaps the most important of all our missions, but the least heralded, is the movement of injured soldiers, sailors, marines, airmen and civilians from the battlefield or the far reaches of Antarctica to world-class medical treatment facilities. This is a complex, time-sensitive, process requiring close collaboration with doctors, military hospitals and our aero-medical evacuation crews to ensure that combat wounded or injured personnel move at exactly the correct time to the correct place - and this process works superbly. In 2007 over 7,700 patients were moved out of the USCENTCOM theater and over 11,000 patients were moved globally.

Our aging airborne tanker fleet, a key force multiplier, also performed at unprecedented levels. AMC tankers delivered over 110 million gallons of fuel to US and coalition aircraft in support of Operations OEF/OIF. They play a critical role in securing the skies over our cities in support of Operation Noble Eagle. Our tankers flew over 223 sorties and offloaded 1.6 million gallons of fuel to replenish over 530 combat air patrol fighters and support aircraft guarding against terrorist attack within our borders.

MAINTAINING AIRLIFT READINESS

As we look to the future, rapid global mobility will be a key enabler to the effectiveness of the joint force. As response times for forces shrink from weeks to hours, our ability to rapidly aggregate and then move operational capabilities forward will depend on versatile, ready and effective mobility forces.

The Mobility Capabilities Study (MCS), completed in 2005, concluded that the capability provided by the then programmed airlift fleet of 180 C-17s and 112 modernized and reliability improved C-5s support the National Military Strategy with acceptable risk. As such, the programmed fleet, fully modernized and augmented with the capability of the Civil Reserve Airlift Fleet (CRAF), provides sufficient airlift capacity to meet strategic and operational objectives during large-scale deployments, while supporting other high priority operations and supporting forward deployed forces.

USTRANSCOM needs the outsized and oversized capability provided by the fleet of C-17 and C-5 strategic airlift aircraft and relies on their viability to meet the airlift demands of our national defense strategy. The C-17 is, and will continue to be a key strategic airlift asset as we approach the end of the multi-year procurement program of 180 C-17s, with the Fiscal Year 2007 Bridge Supplemental extending the fleet to 190 aircraft. It is a highly productive platform with a departure reliability rate at approximately 92 percent and a mission capable (MC) rate at approximately 86 percent.

An essential companion to the C-17, necessary to meet known mobility requirements is the fleet of fully modernized C-5s. In contrast to the C-17, in FY 07 (through July 31, 2007) the C-5 had the lowest departure reliability and mission capable rates within the AMC fleet at about 80 percent and 54 percent respectfully. In addition to deficient departure reliability and MC rates, the C-5 cost per flying hour is the highest in the command with the high sustainment costs stemming from the propulsion and flight control systems. The C-5 modernization program was implemented to address these deficiencies.

Investment in C-5 modernization, consisting of the Avionics Modernization Program (AMP) and the Reliability Enhancement and Re-engining Program (RERP) will deliver needed capability for the warfighter through the year 2040. Such investment improves force closure and increases the number of available C-5s with unmatched outsized and oversized, roll-on / roll-off capability, and is offset by reduced cost of operation. The modernization includes avionics upgrades, new engines and other reliability enhancements to increase aircraft availability, enable access to international airspace and foreign airfields, while reducing fuel consumption and lowering operations costs.

The RERP test program is currently flying three modified aircraft, two C-5Bs and one C-5A, with excellent results, but we are concerned with rising costs of the modification program. The operational outcome of C-5 modernization will have a direct impact on the amount of capacity the C-17 will shoulder compared to other aircraft in the airlift mix.

In terms of organic capacity, too much "aluminum" is just as counterproductive as not enough. In other words, whether the C-5 RERP is totally or partially successful, the fleet mix between C-17s and C-5s should be calibrated as necessary to ensure we don't over-build the overall organic capacity to the detriment of other strategic necessities such as the modernization of the aging tanker fleet or sustaining the viability of our commercial partners, vital in both peacetime and at war. In short, we need to exercise the tradespace within the organic airlift fleet to maximize our organic airlift capabilities without sacrificing essential investment in KC-X or threatening the viability of our CRAF partners.

My top airlift priority remains to work with the Air Force to recapitalize our aging tanker fleet. The current fleet consists of 500 Eisenhower-era KC-135s and 59 Reagan-era KC-10s. The Air Force needs to recapitalize its KC-135 fleet with the next generation tanker, the KC-X, as well as retire those remaining KC-135s that are no longer able to fly or are mission ineffective. The KC-X must be a dual-mission aircraft capable of multi-point refueling, have significant cargo and passenger carrying capability, and be equipped with appropriate defensive systems. The KC-X will not only fulfill its primary refueling role, but also provide an array of enhanced mobility solutions. A tailored cargo and passenger carrying capability will multiply our transportation options and mitigate wear on the C-17 and C-5.

MAINTAINING PARTNERSHIPS

Critical to the success of any enterprise is mutually supporting relationships with partner organizations, and our enterprise is no different. A critical partner in our nation's ability to project and sustain forces is a viable CRAF fleet.

Together with our military airlifters, the ability to activate ready civilian crews and aircraft allows us to respond rapidly at the beginning of any contingency or natural disaster. Likewise, non-activated CRAF volunteers currently provide the long term capability to sustain our forces, conduct unit rotations, and provide safe and secure rest and recuperation flights, working hand in hand with our organic airlift fleet.

The continued success of CRAF relies upon the strength of our US-flagged airlines. Although the U.S. airline industry has recovered from the worst of its post-9/11 challenges, we must ensure sufficient incentives exist to continue our successful, voluntary partnership into the future.

We are already looking toward the post-OEF/OIF timeframe when wartime requirements will begin to subside. Given the eventual smaller overseas force posture and the need to maintain peacetime readiness of our organic fleet, the amount of peacetime business we can offer to CRAF carriers will likewise diminish. In order to maximize the leverage provided by the remaining business, we have proposed and encourage support for the Assured Business initiative, reflected in the current Senate version of the FY08 Authorization Bill. By changing the way in which we allocate peacetime business to our CRAF partners without adding to the cost of commercial airlift, this initiative will allow us to provide greater certainty in our annual contracts, providing improved incentives to all carriers for continued participation in the CRAF, especially to the smaller carriers who need such certainty to secure aircraft leases and aircrews for the next business year.

Finally, with regard to the CRAF program, it is essential that action be taken to reauthorize the Aviation War Risk Insurance program under Chapter 443 of title 49, which is set to expire at the end of March 2008. The ability of our CRAF partners to fly missions in support of operations in a combat theater like our current operations in Iraq and Afghanistan is completely dependent upon the replacement insurance coverage this program provides. Without such coverage, the CRAF program is at serious risk.

FINAL THOUGHTS

As the Geographic Combatant Commanders (GCC) reorient their capabilities and forces to be more agile in the Global War on Terrorism, to prepare for increasingly asymmetrical challenges around the world and to hedge against uncertainty in the longer term, so must USTRANSCOM rethink our capabilities, forces and processes. We are implementing enterprise-wide changes to ensure that our organization, its processes and procedures support GCC needs.

Our readiness and modernization initiatives will ensure the combatant commander's ability to swiftly engage and defeat America's enemies or provide

relief to populations in need. Air mobility is one of the DOD's crown jewels. It provides the airlift and air refueling capability our Nation needs, for military actions, response to natural disaster, or domestic emergencies. With an eye to the future, USTRANSCOM must field forces, systems and processes that move America's military might greater distances more quickly but with a business sense for cost, value and efficiency.

I could not be prouder of the USTRANSCOM team and our national partners. Today, we are supporting the GWOT while providing consistent precision and velocity to ensure delivery of combat forces and humanitarian relief in support of national objectives. Together we are transforming the military deployment and distribution system, ensuring our nation's ability to project national military power to engage America's enemies or support our friends whenever and wherever the need may arise. In all of this, a promise given by us will be a promise kept.

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UNTIL RELEASED BY
SENATE HOMELAND SECURITY COMMITTEE

STATEMENT OF

CHRISTOPHER BOLKCOM
SPECIALIST IN NATIONAL DEFENSE
CONGRESSIONAL RESEARCH SERVICE

BEFORE THE

SENATE HOMELAND SECURITY AND GOVERNMENT AFFAIRS COMMITTEE
SUBCOMMITTEE ON FEDERAL FINANCIAL MANAGEMENT, GOVERNMENT INFORMATION, FEDERAL SERVICES, AND INTERNATIONAL SECURITY

HEARING ON
COST EFFECTIVE AIRLIFT

SEPTEMBER 27, 2007
342 Dirksen SENATE OFFICE BUILDING

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SENATE HOMELAND SECURITY COMMITTEE

Mr. Chairman, distinguished members of the subcommittee, thank you for inviting me to speak with you today about cost effective airlift . As requested, I will address the issues pertaining to C-5 modernization and C-17 procurement and the pros and cons of pursuing each program.

As the C-17 production line wanes, pressure is building to procure more aircraft. In effect, this brings C-17 funding in direct competition with C-5 modernization. The main point I'd like to make today is that there are strong arguments for both programs and viewing them from an "either/or" perspective may not be necessary or constructive.

Broader trade-offs exist within the long-range airlift mission area. If, for example, the Air Force replaces its KC-135 aerial refueling aircraft with one that carried more cargo, fewer C-5s or C-17s might be acceptable. Because the C-17 can perform both long- and short-range airlift, it competes to some degree with the C-130 for funding and mission. Thus, decisions on C-130 recapitalization effect long-range airlift. Preferably, these airlift and aerial refueling programs can be developed, planned, funded, and executed in a joint, interdependent way.

Decisions on military airlift are also strongly influenced by the capabilities of very dissimilar programs such as fast sea lift ships, propositioned equipment, and employment of the Civil Reserve Air Fleet (CRAF). These programs are undergoing changes. Have the linkages to the C-5 and C-17 programs been considered?

From a strictly budgetary perspective, the C-5 and C-17 programs can be linked to, and traded against an even broader menu of programs. While many think only of budgetary trade-offs within a given account (e.g. airlift aircraft, infantry vehicles, surface ships), other, lower-priority programs outside the Air Force's airlift account could potentially be reduced if required to support C-5 vs C-17 funding decisions. Thus, it appears to be artificial, and to some perhaps even imprudent to make "live-or-die" decisions on the C-5 and C-17 programs as if they existed in a vacuum.

With that as an introduction, I'd like to spend the majority of my statement addressing whether DoD's plans to maintain and modernize its long-range heavy lift airlift fleet will meet the national military strategy, and if so, whether they will do so cost-effectively. Key discussion points include requirements, costs, budgeting, and capability, and risk.

Airlift Requirements to Meet the National Military Strategy

The number of C-17s that should be procured and the number of C-5s to be modernized are related to the overall airlift requirement, which is typically measured in millions of ton-miles per day (MTM/D). In March 2001, the Air Force announced the findings of its Mobility Requirements Study 05 (MRS-05). MRS-05's principal finding was that the goal set by the previous mobility study for an airlift fleet capable of moving 49.7 MTM/D of personnel and cargo was inadequate to meet the national military strategy. MRS-05 recommended an airlift fleet capable of 54.5 MTM/D. At that time, DOD's strategic airlift capability was approximately 44.7 MTM/D, nearly 10 MTM/D short of the MRS-05 goal.

The terrorist attacks of September 11, 2001, and the subsequent operation in Afghanistan led many to believe that the findings of the MRS-05 were outdated. Significant changes in the National Military Strategy were required, and a different strategy would likely

require different airlift capabilities. In June 2004 DOD began its first "post 9/11" review of transportation requirements. This Mobility Capabilities Study (MCS), once scheduled for completion in March 2005, was completed and briefed to Congress in February 2006.

Unlike past mobility studies, the MCS did not provide an estimate of airlift requirements in MTM/D. The MCS identified a need for between 292 and 383 strategic airlift aircraft which put the Air Force's program of record at the time of 292 aircraft (180 C-17s and 112 C-5s with engine and avionics upgrades) at the bottom of the range of aircraft necessary to meet National Military Strategy requirements with acceptable risk.[1] Subsequently, the 2006 Quadrennial Defense Review stated DoD's goal of maintaining 292 strategic airlift aircraft.[2] The terms "moderate" and "acceptable" are subjective, and subject to interpretation. A close examination of this classified study, and the acknowledgment that the projected force now includes 190 C-17s, could lead some to view the risk as "low."

The MCS caught many observers by surprise, who expected the study to project a growth in airlift needs, perhaps a requirement closer to 60 MTM/D than the 2000 estimate of 54.5 MTM/D.[3] Others speculated, however, that the MCS would not increase the 54.5 MTM/D requirement, because planners know that DoD cannot afford to purchase enough aircraft to provide this amount of airlift.[4] An "acceptable" risk does not argue for more aircraft as strongly as "high" or "unacceptable" risk. Those who hold this perspective imply that the MCS is not an unbiased study of requirements, but a compromise between what is needed and what can be achieved.

Many have criticized the MCS. In a September 14, 2005, letter to Defense Secretary Rumsfeld, for example, the GAO documented a number of shortcomings in the MCS' methodology.[5] Others criticized the study for not assessing intra-theater lift needs, and for focusing on "near term" capabilities rather than taking a longer view.[6] Some have called on DoD or an independent agency to conduct another mobility study to rectify the MCS' perceived shortcomings. DoD appears to be responding to these criticisms by executing a follow-on, "MCS-2006 study."[7]

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[1] "KC-X: The Next Mobility Platform, the Need for A Flexible Tanker." (White Paper). U.S. Air Force. Headquarters, Air Mobility Command. P.4.

[2] *Quadrennial Defense Review Report.* February 6, 2006. On-line at http://www.defenselink.mil/pubs/pdfs/QDR20060203.pdf

[3] Marc Selinger, "DoD Launching New Review of Transportation Needs," *Aerospace Daily,* Mar. 11, 2004.

[4] John Tirpak. "Air Mobility in the Doldrums." *Air Force Magazine.* August 2005.

[5] *Defense Transportation: Opportunities Exist to Enhance the Credibility of the Current and Future Mobility Capabilities Studies.* Government Accountability Office. September 14, 2005. William M. Solis, Director Defense Capabilities and Management.

[6] John T. Bennett. "Influential DoD Mobility Study's Focus on Intratheater Needs Questioned." *Inside the Air Force.* April 7, 2006.

[7] *Defense Transportation: Study Limitations Raise Questions about the Adequacy and Completeness of the Mobility Capabilities Study and Report.* Government Accountability Office. (GAO-06-938) September 2006. p.1.

How significant is a potential shortfall in airlift? Does it jeopardize current and future force projection capabilities? The actual U.S. airlift capabilities have met the stated MTM/D requirement only twice in the past 19 years.[8] During this time, the United States has successfully conducted military operations in Afghanistan, Southwest Asia, Bosnia and Kosovo. It can thus be argued that the airlift requirement set by MRS-05 and other studies is greater than is really needed, and less airlift is acceptable. A counter-argument is that airlift requirements are designed to satisfy a worst case scenario: executing two "near simultaneous" major combat operations. Adherents to this perspective say the 54.5 MTM/D requirement is justified, and the United States has been fortunate over the last 19 years not to have faced the worst-case scenario.

It may be difficult for Congress to evaluate DoD's airlift recapitalization plans because objective answers in MRS-05 and the MCS are either dated, unclear, or classified. Questions include: How much outsize/oversize airlift capacity is required, now that major state-on-state conventional warfare appears less likely than it did in the past (but for which DoD must still plan)? How many aircraft are required now that irregular warfare – which can occur less predictably, and frequently in theaters with limited infrastructure – appears more likely?

In attempt to provide Congress with greater clarity into airlift requirements, P.L. 109-364 Sec. 1034 required DoD to submit a report to Congress no later than February 1, 2007 defining airlift requirements in terms of million ton miles per day. In response to this requirement, DoD delivered a classified report to the congressional defense committees on February 27, 2007.

Costs

Although the metrics needed to objectively evaluate the number of C-17s or C-5s required are not clear, it is clear that C-17 procurement and C-5 modernization are directly competing for the same budget authority. In recent months, for example, senior Air Force officials have proposed purchasing 30 additional C-17s instead of modernizing 29 C-5As. It is argued that the life-cycle cost of these 30 additional C-17s would be offset by the life cycle cost savings accrued by not re-engining the C-5A fleet.

Many believe that at issue in this year's budget is how many C-17s to purchase and how many C-5As to modernize. As it did last year, the Air Force is proposing not to procure any C-17s in FY08; although two C-17s are on the Air Force's Unfunded Priority List (UPL). Boeing representatives say that depending on their success in negotiating near-term international sales of the C-17, it will require funding for between 14 and 18 Globemasters in FY08 or the production line will begin to shut down in January or February 2008 toward a complete shutdown in mid-2009.[9] The Air Force's stated plan is to modernize both C-5A and C-5B fleets with the Avionics Modernization Program (AMP), and Reliability Enhancement and Re-Engining Program (RERP). There has been speculation that as budgets become tighter, the Air Force may opt not to RERP the C-5A fleet. Recent press reports

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[8] Presentation by Brig. Gen. Robert Bishop to congressional staff, *Airlift Portion of MRS-05*, Mar. 28, 2001.

[9] Telephone conversation between CRS and Boeing officials. February 26, 2007. "Boeing Announces C-17 Line May End in mid-2009; Stops Procurement of Long-lead Parts." *News Release.* Boeing Integrated Defense Systems. March 2, 2007.

about RERP cost increases have added to this speculation.[10] The table below outlines some of the relevant cost and procurement information.

Table 1: C-5 Modernization Vs C-17 Procurement		
	Modernize C-5 Fleet	**Buy More C-17s**
Average Procurement Unit Cost[11]	$97 Million*	$280 Million
Est. Flying Hour Cost[12]	$23,075**	$11,330
Production Rate	~12 aircraft/ year	~15 aircraft/year
Aircraft Life Remaining	26,000 hours	30,000 hours

Notes
* These costs have and will likely fluctuate over time. The procurement cost of future C-17s will likely be lower than the average, as learning increases and fixed costs are amortized over a longer production run.
**Aircraft Reimbursable Rates (per Flying Hour) reflect amortization of modernization programs, but not procurement costs. Because the C-5 AMP and RERP modernization programs are in their early phases, these costs strongly affect the hourly cost to operate the C-5. The C-17 is not implementing a modernization plans on the scale of AMP and RERP.

Making an "apples-to-apples" comparison of C-5 and C-17 costs is complicated. The scope-time considered (e.g. Fly-away cost, procurement cost, life-cycle cost), rate of production assumed, and procurement method used (e.g. multi-year procurement, annual procurement, supplemental procurement) all effect cost estimates and comparisons. For example, it is estimated that the 10 C-17s procured via congressional ear marks cost approximately $20 million more per aircraft than C-17s procured via multi-year procurement contracts.[13] Some may question whether it is appropriate to compare these costs to those incurred by procurements included in annual Air Force budgets.

The Air Force decision to modernize all of its C-5 aircraft was informed by a March 2000 study by the Institute for Defense Analyses (IDA) on the cost and reliability implications of various C-17 and C-5 procurement options. IDA noted that earlier studies indicated that

> Upgrading the C-5 may be cost-effective if the C-5 is to be retained in the fleet long enough, the larger question of whether money spent for improving strategic airlift should be directed toward C-5 improvements or toward some other improvements, such as

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[10] See, for example, Carlo Munoz. "Air Force Mulling Future of Dueling C-5 Modernization Programs." *Inside the Air Force.* December 16, 2006. Amy Butler. "C-5 Reengining Cost Could Alter Program Course." *Aviation Week & Space Technology.* February 19, 2007.

[11] *Selected Acquisition Report (SAR)* Department of Defense OUSD(AT&L). Defense Acquisition Management Information Retrieval (DAMIR). C-17A, C-5AMP, C-5RERP.

[12] *Aircraft Reimbursement Rates (per Flying Hour) FY2007.* Air Force Cost Analysis Agency, Cost Factors Branch. Table A15-1.

[13] Conversation between SAF/AQQ and CRS. September 21, 2007.

adding more C-17s, or even some of both, is an issue.[14]

The IDA study examined nine different alternatives to modernizing the C-5 and C-17 fleets. It measured cost effectiveness in terms of the estimated life-cycle cost (LCC) for each alternative, and found that "...the least costly option is Alternative 6, a full upgrade to the C-5 fleet with no additional C-17s," and that "...the $5 billion required for the upgrades in Alt 6 more than pays for itself in reduced operating costs over the 40-year period examined."[15] The findings of the IDA study are summarized in the table below.

Table 2: Life-Cycle Cost (LCC) Estimates of Potential Alternatives to Modernizing the Strategic Airlift Fleet[1]

Altern-ative	MTM/D	C-5A upgrade	C-5B upgrade	# + C-17	LCC Con-stant $B	LCC Discounted $B	LCC Then-year $B
1	24.9	-	-	0	60.5	32.9	98.5
2	27.1	-	-	20	72.4	40.8	115.5
3	30.1	-	-	45	87.3	50.4	137.0
4	27.8	-	Full	20	70.2	40.4	110.6
5	30.7	-	Full	45	85.1	50.0	132.1
6	27.2	Full	Full	0	56.7	32.5	89.5
7	32.3	Full	Full	45	83.5	50.0	127.9
8	27.7	-	Full	75	80.2	49.0	120.9
9	27.9	-	-	132	88.3	55.4	129.3

Source: *Analysis of Alternatives for Out- and Over-Size Strategic Airlift: Reliability and Cost Analyses*. Institute for Defense Analyses. IDA Paper P-3500. March 2000. Tables 2 and 3 combined by CRS.

[1] All cost estimates expressed in $FY2000. Constant dollars allow comparisons over different time periods without inflation. Discounted dollars are adjusted to account for the year in which funds are expended. OMB discount factor of 2.9% per year used. Then-year dollars represent the estimated actual outlay of funds through 2040, including inflation.

IDA found that the LCC for a re-engined C-5 fleet is lower than one without re-engining and that the less costly re-engined C-5 fleet also has a higher MTM/D capacity. Air Force officials have recently argued for early retirement of some C-5As and perhaps C-5Bs. Based on IDA's findings, some would argue that it is prudent to many to maintain more C-5s in the inventory and to procure fewer new C-17s.

Air Force officials now expect the C-5 RERP program to cost as much as $60 million

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[14] *Analysis of Alternatives for Out- and Over-Size Strategic Airlift: Reliability and Cost Analyses*. Institute for Defense Analyses. IDA Paper P-3500. March 2000.p.2.

[15] *Ibid*. p.11.

per aircraft more than previously projected.[16] These reports appear to be somewhat at odds with official cost reports from the DoD comptroller. The December 2006 Select Acquisition Report (SAR) for the C-5 RERP showed average procurement cost growth of 2.9% over the current acquisition program baseline (APB) and 16% over the original APB. This rate of cost growth is significantly lower than 15% and 30% cost growth, respectively, that is required to trigger a Nunn-McCurdy breech notification.

The SAR notes that many of the factors that contributed to RERP current cost growth appear to be one-time management problems that will not affect future program costs.[17] Further, Lockheed Martin argues that current projections of RERP cost growth are driven in large part, by an Air Force decision to slow down RERP production and to extend it by two years. Because of slower production rates, for example, RERP propulsion system costs could increase, from $6.1 million per engine to $6.9 million. (The relationship between production rate and projected cost will be addressed in greater detail in the following section).

Noteworthy disagreement exists between the Air Force and Lockheed Martin on the potential future cost growth in the RERP program. In "then-year" dollars, the Air Force believes that the total RERP program will cost $16.1 billion. This figure compares very unfavorably to Lockheed Martin's projection of $11.6 billion and the most recent SAR's estimate of $11.3 billion for the entire RERP program. Lockheed Martin argues that if its cost estimates are proven correct that the RERP program will grow at rates below the Nunn-McCurdy threshold notification requirement and that the RERP program will fit within current long-term budgets.[18] The Air Force disagrees on both points.

The most significant difference between the Air Force and Lockheed Martin estimates of future RERP costs pertains to the approximately 500 engines that are to be procured. The Air Force and Lockheed Martin also disagree on the cost of engine pylons, and the cost of installation. The number of man-hours of touch labor for each C-5 (i.e. 95,000 hours vs. 100,000 hours) and the slope of the "labor learning curve" (i.e. 85% vs. 89%) is also debated.

It appears that Air Force officials who forecast significant C-5 RERP cost growth are obliged to reconcile their estimates with the relatively modest cost growth reflected in the SAR, and address Lockheed Martin's arguments. Further, once the cost growth forecasts are reconciled with official cost growth reports, it appears essential that Air Force officials explain how this growth would effect the IDA findings. Specifically, is the estimated cost of C-5 RERP sufficient to make C-5 fleet LCC more costly than alternative fleets with fewer C-5s and more C-17s?

Budgeting

Some suggest that retiring some number of C-5 aircraft early could make available funds to purchase additional C-17s. However, these funds do not "line up" effectively. C-17

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[16] Caitlin Harrington, "C-5 Re-Engining Too Costly, Says USAF." *Jane's Defense Weekly.* July 18, 2007.

[17] For example, on p. 4, the SAR notes that in addition to funding and engineering challenges, the RERP program was significantly delayed by Berry Amendment and Commercial Commodity determinations.

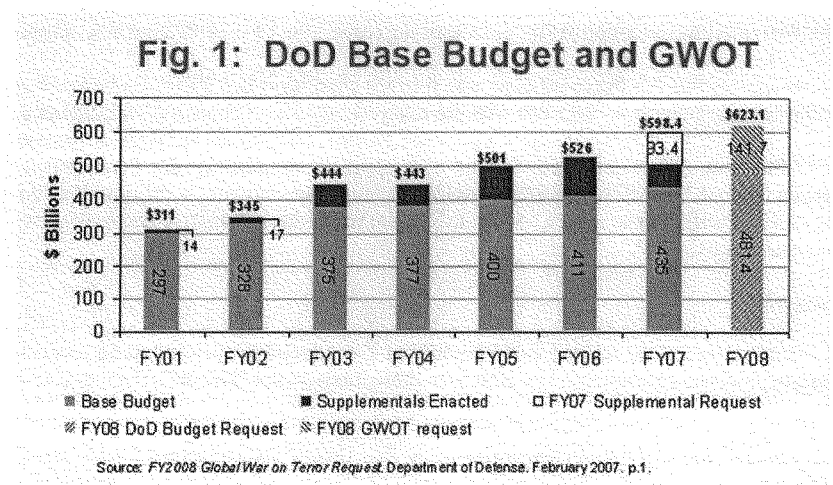
[18] *White Paper on C-5 Reliability Enhancement and Re-Engining Program (RERP) Costs* Lockheed Martin. Corp. Undated. Emailed to CRS on April 27, 2007

procurement funding is an FY08 issue, C-5 RERP procurement funds for FY08 are only $253 million, which is less than the cost of a single C-17. C-5 RERP funds in FY09 are $540 million, which is less than the cost of two C-17s. Significant C-5 RERP funds are not projected to be available until the end of the Future Years Defense Plan (FYDP). Therefore, if more C-17s are to be purchased in FY08, Congress and DoD will need to either find room in the Air Force's "base budget," or Congress will need to add funds to DoD's FY2008 Global War on Terror funding request. Some in the Air Force argue that because of noteworthy pressures elsewhere in the Air Force budget, additional C-17 procurement is only executable as an add to the FY08 GWOT request.[19]

As depicted in the figure below, defense appropriations exempted from budget caps (including "bridge funds" for overseas operations provided as separate titles in the regular defense appropriations bills) have grown considerably in recent years in both absolute terms and as a proportion of overall defense spending. According to some experts this growth

> ...reflects a progressive expansion of the kinds of equipment and operational support that both the Defense Department and Congress have agreed to consider as sufficiently urgent to warrant inclusion in emergency funding measures, even though the funding may not meet definitions either of the narrowly defined incremental costs of military operations, or of what constitutes an emergency by congressional standards.[20]

Decisions to add funds to DoD's FY08 GWOT request for C-17s are likely to be influenced by a wider debate on whether some of the large increase in weapons procurement requested in the FY07 supplemental goes beyond the expanded definition of war-related requirements that Congress has come to accept. Those who are opposed to expanded use of emergency supplementals, may argue that adding funds to the FY08 GWOT request is



Source: *FY2008 Global War on Terror Request*. Department of Defense. February 2007. p.1.

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[19] CRS interview with SAF/FML April 27, 2007.

[20] CRS Report for Congress RL33900. *FY2007 Supplemental Appropriations for Defense, Foreign Affairs, and Other Purposes*. Updated April 24, 2007. P.15.

inappropriate because the rational for doing so is not related to the immediate conflict. Instead, the arguments proffered by the Air Force pertain to long-term savings. Those in favor of expanded use of supplemental appropriations may point to congressional action on the FY07 supplemental, where Congress provided over $2 billion more than requested.

It may be that Congress may find good reason to add C-17 funds, or C-5 RERP funds to the Air Force base budget. As the following table suggests, significant savings might be incurred by keeping the C-5 RERP on a shorter production schedule.

Table 3: RERP Production Schedules & Cost Growth

	FY07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	Tot $B
PB 03	5	7	12	12	12	12	12	12	12	12						8.7
PB 06	1	3	5	7	9	12	12	12	12	12	12	12				8.9
PB 08		1	3	9	10	10	10	12	12	13	13	12	2			9.8
LM		1	3	5	7	10	10	10	12	12	13	13	12			11.6
AF 01/07		1	3	6	7	7	7	7	7	7	7	12	12	12	13	14.9
Key: PB = President's Budget, LM = Lockheed Martin, AF= U.S. Air Force																
Source: Lockheed Martin Aeronautics Company. September 10, 2007																

The most efficient rate of RERP production is 12 aircraft per year. Getting to 12 aircraft per-year and sustaining this rate of production for a longer period could potentially save, for example $6 billion, when comparing the PB 03 and most recent Air Force RERP profiles.[21] The challenge in achieving this cost-saving production schedule appears to be primarily budgetary. More money is required, it is argued, in the Air Force's air mobility account during the Future Years Defense Plan (FYDP) than currently exists. This may be true, but Congress could, of course, add funds to the Air Force's air mobility budget.

This potential budget increase doesn't necessarily require a net growth in DoD's base budget or its supplemental requests, and reinforces why supporting the C-5 and C-17 programs is not an "either/or" decision. There are a number of programs in the Air Force budget that could be leveraged as a "bill payer" for a more aggressive, and less costly RERP production schedule. A number of satellite programs, for example, may not have as high a priority as cost-effective airlift, and are also significantly over-budget. Also, it has been widely noted that the F-22 multi-year procurement contract is expected to save taxpayers $410 million compared to purchasing the same number of aircraft by three single-year procurement contracts.[22] Might these savings be invested in saving even more money by

[21] There are likely other factors beside production rate that affect the total program costs depicted in the last column of this table, making the degree of causality uncertain.

[22] Rebecca Christie. "DoD Letter To Congress Puts Lockheed Closer To F-22 Deal." *Wall Street*
(continued...)

conducting C-5 RERP at a more efficient rate?

Capabilities

Some argue that C-17 procurement should be increased at the C-5A's expense because of the growing need to engage terrorists and insurgents in theaters with limited aviation infrastructure. The Cold War model of using strategic cargo aircraft to move large amounts of materiel to forward U.S. bases, then moving it a second time to the theater of operations on smaller airlift aircraft is not efficient, they argue. The C-17 can do the job of both the C-5 (strategic airlift) and the C-130 Hercules (intra-theater airlift) and move war materiel directly from the United States into combat, if need be.

The C-17 has proven highly effective in the tactical airlift role. For example, in late 2004, military commanders increased intra-theater airlift capability to reduce the number of ground convoys exposed to ambush in Iraq and Afghanistan. C-17s were tasked to transition to the tactical airlift role along side C-130s to perform this mission. The effect of increased tactical airlift has been to "relieve nearly 3,500 vehicles and 9,000 convoy operators per month from having to travel treacherous Iraqi and Afghan roads."[23] Also, as a more modern aircraft, the C-17 also potentially offers more opportunity for upgrades and modifications than the C-5.

On the other hand, the C-5's unique capabilities argue for its continuation, potentially at the expense of additional C-17s. In a period where DoD's force posture is moving from forward basing to expeditionary, it may be unwise to prematurely retire aircraft in today's inventory. Although the C-5 is not as modern as the C-17, the Air Force's Fleet Viability Board found that the C-5A fleet — with appropriate investments — has at least 25 years of life remaining.[24] Thus, today's investments could potentially be recouped for decades. Current estimates of the per-aircraft cost of AMP and RERP are expected to be approximately one-third that of a new C-17, and the C-5 will carry twice the C-17's payload. The figure below provides a comparison of airlift capabilities.

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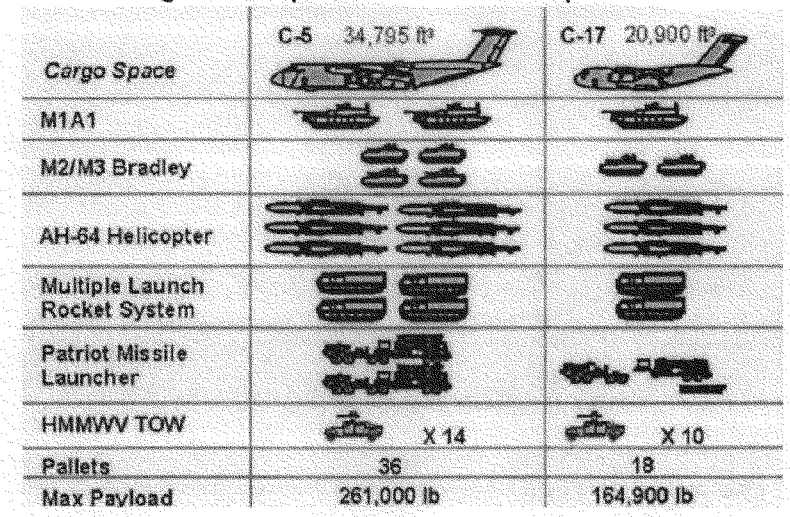
[22] (...continued)
Journal. July 8, 2007.

[23] Gen T. Michael Moseley, USAF, "CSAF's Vector: Air Mobility's Strategic Impact," May 23, 2007, http://www.af.mil/library/viewpoints/csaf.asp?id=324.

[24] Tech. Sgt. David A. Jablonski. "Air Force Fleet Viability Board releases C-5A Assessment," *Air Force Print News,* July 15, 2004. Amy Butler, "With a Little Help — And Cash — C-5As Can Fly For 25 More Years, Panel Says," *Defense Daily,* July 19, 2004.

Figure 2 Comparison of C-5 & C-17 Capabilities



Source: *FY06 Congressional Overview (C-5, C-130J).* "C-5 Operations During Iraqi Freedom." Lockheed Martin Aeronautics Company. p.18.

The C-5 also has superior load/off load capabilities. The upgraded aircraft (called the C-5M), is also expected to have greatly improved mission capable rates.[25] It may be noteworthy that during Operations Enduring Freedom and Iraqi Freedom, DoD leased Russian An-124 aircraft to carry outsize and oversize cargo because not enough C-5 aircraft were available.

The An-124 *Condor* is a strategic lift aircraft larger than, but comparable to the C-5. As Figure 3 below illustrates, the Air Force has spent $170 million since FY2002 for An-124 missions. It also appears that the number of An-124 missions is accelerating. FY07 figures already are on par with FY05 figures, and the fiscal year is not yet half over. While the C-5 may not be as modern as the C-17, or able to operate from as many runways, the fact that DOD has to outsource missions to Russian aircraft indicates that the C-5 still offers important capabilities that other U.S. aircraft may not be able to satisfy. Conversely, commercial contract air carriers play a key role in providing strategic airlift on a daily basis. The figure below shows DoD contracting for one An-24 sortie every three days. It is possible that these An-124 missions may be the result of the current availability of relative low-cost airlift near a busy theater of operations. Since the Air Force retired 14 C-5s in 2004 the number of An-124 missions have increased. Whether the C-5 retirement or on-going availability issues are causal or coincidental is unclear. (A description of the An-124 can be found at Appendix 1.)

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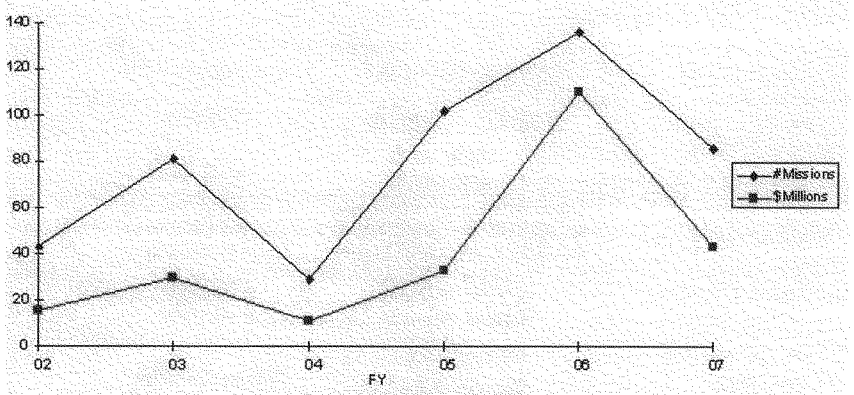
[25] David Hughes, "C5 Avionic and Engine Upgrades Rolling," *Aviation Week & Space Technology,* Oct. 25, 2004. *C-5 Galaxy Modernization*, FY2006 Point Paper, Lockheed Martin Corp, Jul. 2005.

Figure 3: Number and Cost of An-124 Missions Contracted by Air Mobility Command



TOTAL: 434 missions. $168,434,265.00

Source: USAF Air Mobility Command. International Airlift Procurement Branch. Feb. 23, 2007.

The potential cost and budgeting considerations of the Air Force's "30/30 proposal" have been discussed. Replacing 30 C-5 aircraft with 30 C-17s also presents airlift capability issues. Airlift capability can be measured in different ways, but it appears clear that on a one-for-one basis, the C-5 can carry more outsize cargo and more cargo pallets than the C-17. In many cases each C-5 can carry twice as much of a given piece of outsize cargo as the C-17.[26]

The C-5's advantage in size is offset, to a degree, by lower availability. Thus, Fig. 2 above does not compare accurately the two aircraft's capabilities over multiple sorties. The following table illustrates the effect the C-17's higher availability has on respective capabilities, and provides a simplified comparison of the capabilities of 30 C-5s and 30 C-17s.

[26] Outsize cargo is defined by DoD as cargo that exceeds the dimensions of oversized cargo and requires the use of a C-5 or C-17 aircraft or surface transportation. A single item that exceeds 1,000 inches long by 117 inches wide by 105 inches high in any one dimension.

Table 4: C-5 & C-17 Capabilities over 30 Sorties Considering Desired Mission Capable Rates		
	C-5M (75% MCR)	**C-17 (85% MCR)**
M1A1 Abrams	45	25
M2/M3 Bradley	90	51
AH-64 Apache	135	76
Patriot Missile Launcher	45	25
HMMWV TOW	315	255
Pallets	810	459
Max Payload	58,72,500 lb	42,04,950 lb

For many, potential cost and capability concerns intersect when reductions to the size of the C-5 fleet are discussed.. The Air Force's program of record maintains a fleet of over 100 C-5Ms through the 2040s. If the C-5As are not modernized, sooner or later the Air Force will be left with a fleet of approximately 50 C-5Ms.

A fleet size of 50 aircraft could create LD/HD (low density / high demand) challenges addressed briefly in this testimony in the context of the KC-X program. Both the 1997 and 2001 Quadrennial Defense Reviews identified the challenges of operating and maintaining small aircraft fleets that are heavily used in peacetime and in war. Both studies recommended changes to asset management that would reduce the prevalence of LD/HD aircraft fleets, and Air Force leaders have taken steps, such as implementing the Expeditionary Aerospace Force (EAF) construct, in part to mitigate the LD/HD problem.

As mentioned above, the C-5 can carry some cargo too big for the C-17, and approximately twice as much cargo generally as the C-17. These capabilities suggest that operational demand for C-5s could remain high, even as the fleet size decreases. Air Force leaders may wish to explain how, all other things being equal, operating a relatively small C-5 fleet will or will not create LD/HD challenges they are actively trying to resolve in other parts of the aerospace force.

Long-range airlift capabilities are not just confined to the C-5 and C-17. The Air Force's aerial refueling fleet also provides noteworthy long-range delivery of palletized cargo. As DoD and Congress consider options for recapitalizing the KC-135 fleet, the amount of airlift that could ultimately be provided could have important implications for the C-5 and C-17. The Air Force's 59 KC-10 *Extender* aerial refueling aircraft currently represent approximately 3% of DoD's organic airlift capability. The procurement of larger KC-X aircraft could increase the percentage of airlift capacity provided by the tanker fleet, and could potentially reduce the number of dedicated airlifters such as C-5s and C-17s. The procurement of smaller KC-X aircraft could potentially have the opposite effect. Gen. Schwartz has testified to the relationship between the amount of airlift provided by tankers and the strategic airlift fleet: "If I had an airplane that could carry passengers there with

defensive systems, like a new tanker, I would use that instead, and we would be able to better manage the workload on the C-17 fleet and apply it against the things that it does exceptionally well, moving cargo."[27]

"Bad Actors"

As stated earlier, the Air Force's program of record is to RERP and AMP all C-5As in the TAI (Total Aircraft Inventory). However, the Air Force has also taken action to reduce this inventory, such as retiring 14 aircraft in FY04. P.L. 108-136, Sec. 132 prohibits retiring any C-5A aircraft until the effectiveness of the C-5A AMP and RERP efforts have been determined through testing and evaluation and reported to Congress.

During deliberations on the FY2008 budget request, Air Force leaders have frequently requested permission to retire some number of C-5A aircraft independent of the test results on C-5A RERP and AMP. To support their request for permission to retire C-5As, Sec. Wynne and Gen. Moseley have testified that some subset of the C-5A fleet is composed of "bad actors" aircraft that are "hard broke" and are prime candidates for early retirement.

> GEN. MOSELEY: In a perfect world, we would like to be able to manage that inventory and divest ourselves of the bad-acting tail numbers, and some of them are bad actors; they're broke. A lot of the C-5As have low flight hours on them because they're broke and you can't fly them...If I could line up the best B model or the best A model at the head of a line, a 59-two and 49, and go to the back end of the line and begin to kill off the bad actors and replace them with something new, I would be very happy. That doesn't mean all of them; it doesn't mean that we class or block-retire airplanes, it just means let us get at the tail numbers that are bad actors.[28]

> SEC. WYNNE: There's some that are really bad actors. And I think if you gave us the right to manage the fleet, you would find that we would manage it in a way that would actually retain the best mission profiles....[29]

> SEC. WYNNE: I can tell you, sir, that right now some worry about the entirety of the C-5 fleet. There are two things we should know about this. First is that we don't -- we want to line up worst to best, and we think there are between 20, 25 and 30 of bad actors that we would like to retire.[30]

Some in Congress have appeared supportive of Sec. Wynne's and Gen. Moseley's "bad actor" testimony, and have requested that the Air Force provide a list of these "hard broke" aircraft, presumably to make a judgement on whether these aircraft should indeed be retired

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[27] Seapower Subcommittee Hearing on FY2007 Budget. *OpCit.*

[28] Hearing of the House Armed Services Committee on Fiscal Year 2008 National Defense Budget Request From the Department of the Air Force. February 28, 2007. 2118 Rayburn House Office Building. Congressional Transcript. Federal News Service, Inc.

[29] Ibid.

[30] Hearing on the Senate Armed Services Committee on Air Force Authorization Request for Fiscal Year 2008 and the Future Years Defense Program. March 20, 2007. 325 Russell Senate Office Building. Congressional Transcript. Federal News Service, Inc.

early.[31] Others in Congress have responded to the Air Force's "bad actor" statements negatively, expressing concern Congress has not received "factual data" on the health and performance of the C-5A fleet. These members oppose the retirement of any C-5As prior to testing and operational evaluation of fully modernized C-5A aircraft.[32]

To date, it does not appear that the Air Force has provided a list of "bad actor" C-5As to Congress. There may be several reasons why this list has not yet been provided. Perhaps the most prominent reason is that comparing the reliability, performance, and health of a large sample of aircraft is difficult. Despite a number of recognized measures, or "yard sticks" for measuring these attributes, picking a subset of C-5 aircraft that are the poorest performers is a subjective exercise inherently vulnerable to criticism and second-guessing.

CRS examined a number of C-5 reliability and maintainability statistics for the past three fiscal years and conducted hours of interviews with Air Mobility Command officials and Air Force officers currently or formerly in the C-5 fleet. CRS could find no obvious subset of the C-5 fleet that stood out as notably "bad actors." Reliability and availability measures studied included the amount of time spent in depot or otherwise unavailable due to maintenance, mission capable rate, and mission departure reliability.

Some argue that *all* of the C-5As could be considered bad actors. This suggestion does not appear to stand up to even passing scrutiny. The Air Force Fleet Viability Board , the Defense Science Board, the Institute for Defense Analyses have all endorsed the viability of the C-5A fleet. Further, C-5A performance and reliability is not uniformly inferior to C-5B performance. Over the past three years, for example, the C-5A fleet has averaged a higher mission departure reliability rate (83.1%) than the C-5B fleet 81.3%.

As of the summer of 2007, two C-5A aircraft are restricted from flight, and 12 are restricted in their flight load or flight profile due to a variety of maintenance or repair issues. Some suggest that these 14 aircraft are appropriate candidates for early retirement. Counter-arguments to retiring these aircraft include, first, that it is estimated to cost only $26.7 million to repair all 14 aircraft, and second, that eight of the 14 restricted aircraft require routine modifications to address human-error damage incurred during routine maintenance. These problems are minor, it is argued and easily addressed. They in and of themselves do not warrant early retirement. While this counter-argument appears sound, it also speaks to the value of conducting robust analysis of an aircraft's maintenance and performance history and projected future costs and challenges. A single-point snap shot of an aircraft's condition can be an incomplete and misleading description of it's health, and, in and of itself a poor foundation for making retirement decisions.

Incurring and Mitigating Risk

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[31] See for example dialogue between Reps. Marshall and Saxton and LtGen. Carol "Howie" Chandler. Hearing of the Air and Land Forces Subcommittee of the House Armed Services Committee on Air Force and Army Airlift and Aerial Refueling Fixed-Wing Aircraft Programs. March 7, 2007. 2118 Rayburn House Office Building. Congressional Transcript. Federal News Service, Inc.

[32] See for example, "Biden and Kennedy Continue Push to Keep C-5 Viable Part of Nation's Strategic Airlift." *Press Release*. March 26, 2007. Http://biden.senate.gov/newsroom

Debate over the number of C-5s to modernize and the number, if any, of additional C-17s to procure frequently touches upon the concept of risk. For example, when DoD officials defended the FY06 budget decision to end C-17 procurement, they argued that keeping the C-17 production line open "would be a smart thing to do" from a pure risk perspective, but, "the cost would be prohibitive" given the other airlift procurement programs that the Air Force plans."[33] In a 2006 study on mobility, the Defense Science Board (DSB) also considered risk an issue to consider in determining the total number of C-17s to purchase.

> The task force understands that each year of additional (C-17) production beyond 2008 would represent an additional $2.4 billion acquisition and $2-3 billion life cycle cost commitment, which the department must weigh against other war-fighting capabilities it could not acquire. However, in view of the prominence of organic strategic airlift in enabling rapid response to crises, the task force believes it is prudent to keep options open for the acquisition of additional C-17s.[34]

A key question during this legislative cycle is, how much risk does DoD incur by allowing the C-17 line to close? Conversely, how much additional security is purchased by keeping the C-17 line open? Perception of risk is inherently subjective, but a few observations may help policy makers make an informed assessment.

First, when planning for the C-17 line's end, the Air Force budgeted $650 million to be spent shutting down the line in a manner that would facilitate its restoration if necessary. The advantage of this strategy is that the government pays a one-time sum to hedge its bets. A disadvantage of "smart shutdown" is that more money will likely be required to re-start the line, if necessary, and doing so will take time. The monetary cost of storing and maintaining the tooling necessary to build C-17s in the future is relatively easy to quantify. The potential loss of human capital, as skilled worker retire, move to other Boeing programs, or leave Boeing for other jobs, is difficult to quantify, and potentially costly. Additionally, some believe it is likely that Boeing may sell its production site in Long Beach, CA when the C-17 line ends, which would lead to additional costs to restarting the C-17 production line at a new location.[35]

Purchasing aircraft predominantly in order to keep the line alive will safeguard rapid production capability, if required, but will also incur billions of dollars of costs over the aircraft's lifetime. A comparison of estimated costs over different time spans between "smart shutdown," followed by line restoration, and keeping the C-17 line open via additional purchases may be useful.

A second observation is that the potential risk incurred by ending C-17 production is not apportioned solely over the airlift fleet. Long-range cargo aircraft are only one component of a much larger military mobility system. While aircraft offer advantages over other transportation modes, such as speed and flexibility, these characteristics may

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[33] Michael Sirak. Senior DoD Officials Defend Decision To Halt C-17 Production At 180." *Defense Daily*. February 10, 2006.

[34] *Defense Science Board Task Force on Mobility*. Office of the Under Secretary of Defense (AT&L) September 2005. P.14.

[35] "C-17 Lobbying Picks up in Wake of Commerce Department Report." *Defense Industry Daily*. February 22, 2006.

potentially be offered by a mix of other assets. Assets that could potentially be used to augment the airlift fleet, and thus mitigate potential risk of ending C-17 production include increasing the use of the Civil Reserve Air Fleet (CRAF), increasing the use of pre-positioned equipment, and re-invigorating DoD's development of large, heavy-lift airships.

The Civil Reserve Air Fleet (CRAF) supports Department of Defense (DOD) airlift requirements in emergencies when the need for airlift exceeds the capability of military aircraft. The airlines contractually pledge aircraft to the various segments of CRAF, ready for activation when needed. To provide incentives for civil carriers to commit aircraft to the CRAF program and to assure the United States of adequate airlift reserves, the government makes peacetime airlift business available to civilian airlines that obligate aircraft to the CRAF. DoD offers business through the International Airlift Services.

The primary shortcoming of CRAF aircraft is that they are incapable of moving outsized and oversized cargo. The primary benefit that CRAF imparts is low cost. The Government Accountability Office (GAO) notes that CRAF provides up to half of the nation's long range airlift capability without the government having to buy additional aircraft, pay personnel costs, or maintain the aircraft during peacetime. GAO references the use of CRAF during Operation Desert Storm to illustrate its point:

> The use of CRAF aircraft during an activation is not free — DOD pays rates based on weighted average carrier costs — but the cost is minimal in comparison to the costs of acquiring and supporting aircraft, paying and training aircrew, and other expenses of maintaining standby military airlift capability. AMC paid the carriers about $1.5 billion for using their aircraft during the operation. Purchasing additional military aircraft to provide similar capability would cost from $15 to $50 billion, according to Air Force officials, depending on assumptions used for aircraft replacement cost.[36]

It appears that CRAF is capable of providing more capacity if required. In February 2003 it was reported that DoD's requirement for cargo and passenger aircraft was only approximately one half of what air carriers had committed to the CRAF program.[37] Recent events may suggest that a growing use of commercial aircraft for every-day DOD needs is already in evidence. In January 2005, for example, it was reported that commercial airlines moved twice as many U.S. troops overseas as they moved in January 2004.[38]

The efficacy of increasing the use of CRAF is a complicated calculation. Commercial aircraft cannot employ austere runways, for example, and take longer to load and unload than military air lifters. Currently, civilian aircraft do not employ defensive countermeasures such as flares, chaff, or directed infrared countermeasures. However, it appears clear that CRAF represents a "safety valve" or surge capability in airlift if more capability is required and no airlift production capability exists.

Both the Defense Science Board and the Congressional Budget Office (CBO) have

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[36] Military Readiness. Civil Reserve Air Fleet Can Respond as Planned, but Incentives May Need Revamping. General Accounting Office (GAO-03-278) December 2002. p.15.

[37] "CRAF Requirements and Commitments." *Air Force Magazine.* February 2003. P.28.

[38] Micheline Maynard. "Airlines Moving More Troops This Month." New York Times. January 25, 2005.

recommended that DoD improve its mobility capabilities by increased investments in afloat pre-positioning of equipment, not by large investments in fixed-wing long-range airlift. For example, the DSB found that

> investments now in intermediate staging bases, more and improved force and sustainment pre-positioning and high-speed, intratheater vessels capable of austere port access could add significant new capabilities to enable land force deployments and meet a variety of contingencies. These investments need to be *complemented* by incremental investments in aerial tankers and *possibly* in strategic airlift." (Emphasis added)[39]

Both the DSB and CBO found that pre-positioning equipment offered opportunities to increase the promptness of delivery, a key feature of airlift. For example, the DSB found "Pre-positioning is the sole component of the mobility system that can deliver employable heavy/medium land forces early in a campaign."[40] CBO wrote "Prepositioning sets of unit equipment offers greater improvements in the promptness of cargo deliveries than the other options that CBO examined" such as increasing airlift and fast sea-lift capabilities.[41] Further, "increasing the number of existing ships and aircraft would offer very limited improvements in the promptness of unit deliveries during large deployments."[42]

Further, there are some instances where fielding more aircraft would not increase mobility capabilities, but potentially exacerbate logistical choke-points. Often, the transportation problem is not too few aircraft, but too few airfields or infrastructure. A study by the Army's Military Traffic Management Command found that the biggest roadblock to achieving the service's deployment goals is the limited infrastructure at forward airfields.[43] Examples of infrastructure shortfalls include limited ramp space and loading/unloading equipment. In Operation Allied Force, as another example, "there were not enough air bases in the area immediately around Kosovo to support all the aircraft...."[44] The CBO made a similar observation "Aircraft offer rapid delivery of individual loads, but any attempt to significantly increase their total cargo deliveries to a distant theater would probably be hampered by constrained infrastructure at airfields, which is anticipated for many, if not most, future conflicts."[45]

Another potential strategy to mitigate the risk of shutting down the C-17 production line

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[39] *Defense Science Board Task Force on Mobility.* Office of the Under Secretary of Defense (AT&L) September 2005. P.4.

[40] *Defense Science Board Task Force on Mobility.* Office of the Under Secretary of Defense (AT&L) September 2005. P.10.

[41] *Options for Strategic Military Transportation Systems.* Congressional Budget Office. September 2005. P.x.

[42] *Options for Strategic Military Transportation Systems.* Congressional Budget Office. September 2005. P.x, xiii.

[43] Kim Burger, "Army Study: Poor Forward Airfields Jeopardize Deployment Goals," *Inside the Army*, Aug. 21, 2000.

[44] *Kosovo After Action Review.* Secretary of Defense William S. Cohen and Gen. Henry H. Shelton, Chairman of the Joint Chiefs of Staff. Senate Armed Services Committee, Oct. 14, 1999.

[45] *Options for Strategic Military Transportation Systems.* Congressional Budget Office. September 2005. P.x.

might be to re-invigorate DoD efforts to develop heavy-lift airships. Until cancelled by congressional appropriators in FY2006, the Defense Advanced Research Projects Agency (DARPA) was developing a hybrid airship capable of transporting up to 1,000 tons across international distances. Unlike traditional, cigar-shaped airships, a hybrid airship is shaped more like an aircraft's wing, to generate lift through aerodynamic forces. Advocates hope that such airships may potentially be capable of carrying a complete Army brigade directly from "the fort to the fight," overcoming logistic choke points and mitigating the effects of limited forward basing. The CBO study estimated that developing and procuring 14-16 heavy-lift airships would have the same life cycle cost as 21 C-17 aircraft ($11 billion) but would deliver cargo at a rate nearly three times greater. Airship detractors challenge their survivability and ability to operate in adverse weather.

Summary

In summary, while the C-5 and C-17 programs are very much related each program has specific merits worthy of being considered independently of the other platform. C-5 modernization and more specifically the RERP address the primary operational criticism of the C-5 – its reliability. The most current requirement as defined in the MCS call for the full C-5 fleet to be retained and for both AMP and RERP to be implemented across the remaining fleet. A fully modernized C-5 is expected to provide the unique capability to move bulk and outsize cargo through 2040. Additionally, decisions to pursue C-5 modernization were informed by independent analysis that identified a fully modernized fleet as integral to building the most cost-effective strategic airlift option. On the other hand, how serious cost growth will be in the C-5 RERP remains to be seen. In addition, it is unclear how much cost growth would have to take place to invalidate IDA's analysis of alternatives.

Likewise, the C-17 program has unique benefits as well. First, just as the C-5 possesses a unique ability to deliver large cargo loads and some unique outsize payload, the C-17 has become the backbone of our nation's airlift fleet due to its versatility. Not only does the C-17 perform well in the strategic role, but has proven its value in the tactical arena with its unique ability to deliver large, outsize payloads into austere fields. Additionally, continuing C-17 production provides a hedge against uncertainty currently associated with the C-5 RERP while also moving strategic airlift capability further up the continuum established by the most recent MCS – a study that has been widely criticized as being budget driven rather than requirement driven. Unfortunately, acquiring this capability requires tight budget dollars that will very difficult to locate with potentially effecting another critical defense program – potentially one with a currently validated requirement.

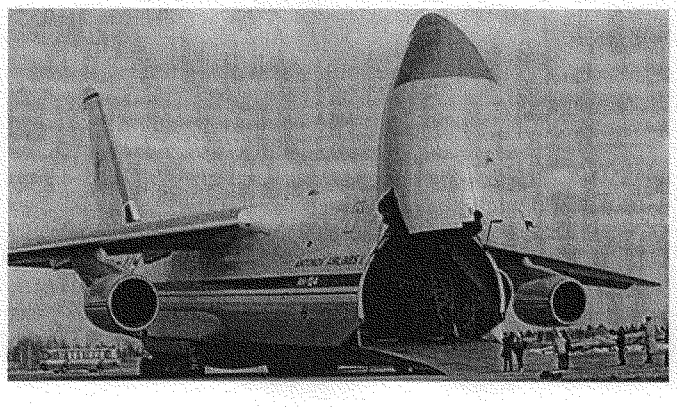
Mr. Chairman, this concludes my remarks. I appreciate the opportunity to appear before you, and look forward to any questions you or the other subcommittee members may have. Thank you.

Appendix 1

Description of An-124 *Condor* Heavy Lift Aircraft[46]

Country of Origin	Russia
Builder	Antenov
Wing Span	240 ft, 5 in (73.3 m)
Length	226 ft, 3 in (69 m)
Height	68 ft 2 in (20.78 m)
Empty Weight	385,000 lbs
Engine	4 - Lotarev D-18T, 229.9 kN thrust each
Cruising speed	430 kts
Range	2,900 nm
Service Ceiling	35,000 ft
Payload	88 passengers or approximately 330,000lbs cargo
Cargo Bay	36.5 m x 6.4 m x 4.4 m (1027.8 cu. m)
Crew	Six--seven with loadmaster

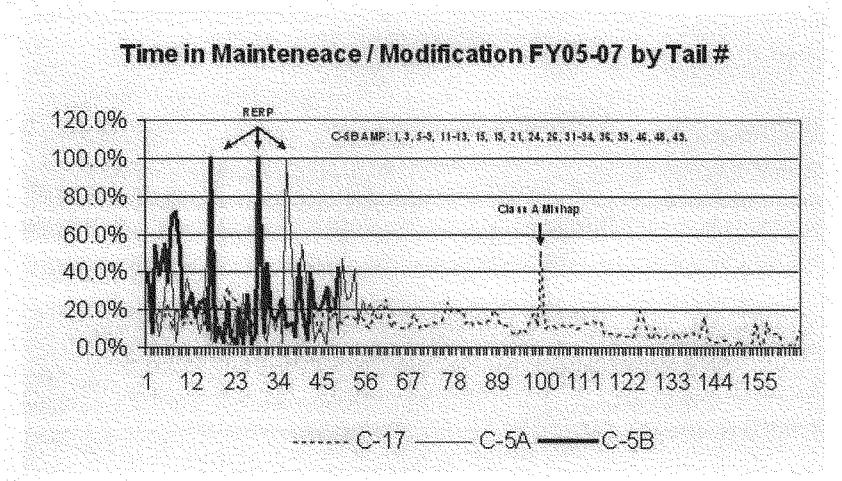
AN-124 Condor

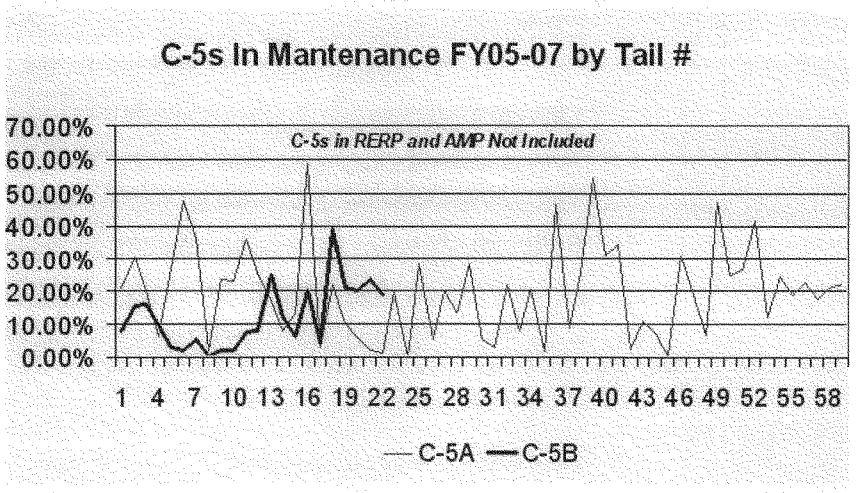


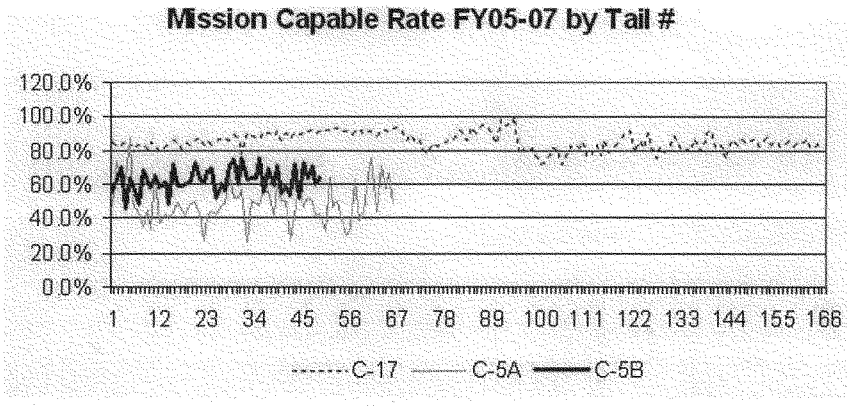
[46] Sources: FAS.org, Jane's All the World's Aircraft. Flight International, 3-9 October 2006.

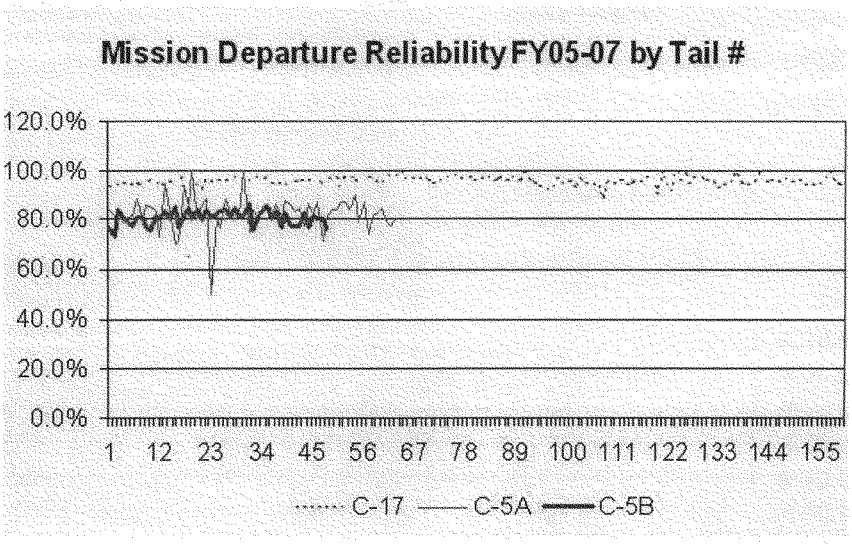
Appendix 2

C-5 and C-17 Availability, and Readiness Comparisons






Mission Capable Rate FY05-07 by Tail #
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
1 12 23 34 45 56 67 78 89 100 111 122 133 144 155 166
C-17
C-5A
C-5B


Mission Departure Reliability FY05-07 by Tail #
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
1 12 23 34 45 56 67 78 89 100 111 122 133 144 155
C-17
C-5A
C-5B

Comparison of C-5 Fleet for 3 Availability / Reliability Measures FY05-FY07

Worst C-5s for Depot %			
Tail #	Depot%	MCR	MXR
69000003	*58.5*	*27*	83.1
70000445	54.2	46.5	84.4
68000219	47.5	37.2	75
70000456	47.3	29.7	83.3
69000025	46.2	27.4	78.9
87000038	39.1	58.6	*75.5*
68000220	*36.5*	42.9	84.3
68000224	35.7	45.9	82.2
70000447	34.3	49.9	*83.5*
70000453	31.1	*47*	80
70000446	30.9	51.9	81.5
68000212	30.3	35.7	82.7
C-5A Fleet Avg.	21.3		

Worst C-5s for Mission Capable Rate			
	Depot%	MCR	MXR
69000014	5.6	26.4	87.3
69000003	58.6	*27*	81.1
69000025	46.2	27.4	78.9
70000456	47.4	29.7	85.6
70000451	7.1	33.1	78.9
68000215	6.1	33.8	82.2
70000457	24.9	34.5	73.2
68000212	30.3	35.7	82.7
68000219	47.6	37.2	75
70000460	41.5	38.9	83.6
70000455	6.8	39.3	85.6
68000221	2.3	39.7	81.5
C-5A Fleet Avg.		48.2	

Worst C-5s for Mission Departure Reliability			
	Depot%	MCR	MXR
70000168	0	59.1	50
70000461	12.6	44.6	70.1
70000462	24.7	65.3	71.4
69000010	1	65.9	71.4
84000059	63	62.3	73.1
70000457	24.9	34.5	73.2
69000020	22.1	42.6	74.6
68000219	47.6	37.2	75
85000005	51.3	58.2	75.6
87000029	15.1	62.8	75.6
87000045	42.3	59.6	75.8
67000174	0	48.8	76.9
C-5A Fleet Avg.			83.1

Tail Numbers in:

Italics = worse than average in all 3 categories

Bold = among the worst (not just below average) in two of the three categories

Bold and Background = among the worst in all three categories

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CRS Report for Congress

Strategic Airlift Modernization

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Summary

There is a consensus among policy makers that the Department of Defense (DOD) must maintain a robust and effective airlift fleet. There is disagreement, however, over how many aircraft are required, and of what type. DOD's latest mobility study finds that the Air Force's plans for its C-5 and C-17 airlift aircraft are sufficient to meet the national military strategy. Many outside observers, including some in Congress, argue that more airlift capability is required. This report will be updated.

Background

The ability to project military power over great distances is a central tenet of the U.S. national military strategy and the massive military buildup before Operation Desert Storm (the 1991 war with Iraq) highlighted the value of strategic airlift. U.S. aircraft moved over 500,000 troops and 543,548 tons of cargo.[1] Strategic airlift has also played a key role in recent conflicts. On April 10, 2003, the U.S. Transportation Command reported that it had exceeded its Operation Desert Storm airlift operations by flying 16,213 missions for the most recent war in Iraq, Operation Iraqi Freedom (OIF). Air mobility sorties made up the majority of the 28,500 total sorties that have been flown during OIF,[2] and C-17s executed a much publicized airdrop of the 173rd Airborne Brigade into northern Iraq. Other transportation modes, such as sealift, can deploy troops and equipment. The strongest argument for using airlift instead of other modes is speed.

Despite its importance, today's U.S. strategic airlift system is under stress. Over the past 10 years, the United States has reduced its Cold War infrastructure and closed two-thirds of its forward bases. Therefore, to maintain the same level of global engagement, U.S. forces must deploy more frequently and over greater distances. Even prior to the September 11, 2001, terrorist attacks and resulting conflicts, the Air Force estimated that it deployed four times more frequently than when it enjoyed the larger, Cold War

[1] *Gulf War Air Power Survey*, vol. V, (Washington: GPO, 1993), p. 76.

[2] Chuck Roberts, "C-130 Crews Keep The Supplies Coming," *Air Force News*, Apr. 16, 2003.

infrastructure.[3] General Charles T. Robertson, former Commanding General of the U.S. Transportation Command, testified that "Bottom line: This nation's number one defense transportation shortfall is its ailing and numerically inadequate strategic airlift fleet."[4]

Strategic Airlift Platforms. The U.S. strategic airlift force includes the C-5 Galaxy, and the C-17 Globemaster. Aerial refueling aircraft also contribute to airlift missions. The **C-5**, made by Lockheed Martin, is typified by its payload and range. One of the largest aircraft in the world, the C-5 can carry 160,000 lbs of cargo up to 3,730 nautical miles and has a maximum payload of 291,000 lbs. The C-5 can carry large and irregularly shaped cargo, such as the Army's 74-ton mobile scissors bridge, that no other U.S. aircraft can hold. Both ends of the C-5 open, facilitating rapid loading and off-loading. The C-5 has been plagued by reliability problems; its mission capable rate for 2000 was 58%. The Air Force operates 109 C-5s in the active, reserve, and national guard forces.[5] The C-5A was first deployed in 1969, and the C-5B, in 1980.

The **C-17**, made by Boeing, is DOD's most modern strategic airlifter. Because it can use short and unfinished runways and has high maneuverability on the ground, the C-17 can operate in environments traditionally confined to smaller airlifters. Thus, the C-17 can deliver its payload from the United States directly to forward bases near the battle. Like the C-5, the C-17 can carry outsize and oversize cargo like helicopters and missile launchers. Its maximum payload is 160,000 lbs, which it can carry up to 2,400 nautical miles. Current DOD plans call for the acquisition of 190. Modest international sales of the C-17 may keep the production line open for an additional year. The future of the C-17 production line is in jeopardy without Air Force purchases.

Strategic Airlift Requirements

DOD periodically studies the global threat environment, its military strategy, and the status of its airlift fleet, to determine the amount of future airlift that is required and to judge whether airlift modernization programs are sufficient. In June 2004 DOD began its first "post 9/11" review of transportation requirements. This Mobility Capabilities Study (MCS), was completed and briefed to Congress in February 2006.

The unclassified executive summary of the MCS notes that unlike past mobility studies, the MCS did not recommend an airlift requirement expressed in million ton miles per day (MTM/D). Instead, the MCS assessed the capabilities of the current and currently projected force. The MCS' principal finding was that the Air Force's program of record (180 C-17s and engine and avionics upgrades for the entire C-5 fleet) was sufficient to meet the National Military Strategy with acceptable risk.

The MCS findings caught many observers by surprise, who expected the study to project a growth in airlift needs — perhaps a requirement closer to 60 MTM/D — from

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[3] Maj. Gen. Howie Chandler, *Basic Air Force Structure and Expeditionary Aerospace Force (EAF) Operations,* Briefing to Congressional Air Force Caucus, Mar. 23, 2001, Bolling AFB.

[4] Gen. Charles T. Robertson Jr., USTRANSCOM. Senate Committee on Armed Services, Subcommittee on Seapower. Apr. 26, 2001, p. 21.

[5] U.S. Air Force Fact Sheet. *C-5 GALAXY.* [http://www.af.mil/factsheets/]

the previous estimate. The mobility study immediate prior to the MCS, the Mobility Requirements Study 2005 (MRS-05), which was completed in 2000, set the airlift requirement at 54.5 MTM/D.[6] Others speculated, however, that the MCS would not increase the 54.5 MTM/D requirement, because planners know that DOD cannot afford to purchase enough aircraft to provide this amount of airlift.[7] Those who hold this perspective imply that the MCS is not an unbiased study of requirements, but a compromise between what is needed, and what can likely be achieved.

Many have criticized the MCS. In September 2005 for example, the GAO documented a number of shortcomings in the MCS' methodology.[8] GAO followed-up this letter with a more detailed criticism in September 2006.[9] Others criticized the study for not assessing intra-theater lift needs, and for focusing on "near term" capabilities rather than taking a longer view.[10] Some have called on DOD or an independent agency to conduct another mobility study to rectify the MCS' perceived shortcomings. In September 2006 it was reported that the Air Force Air Mobility Command was again studying DOD's airlift needs. Some may interpret the Air Force's initiation of an airlift study so soon after the completion of the MCS as tacit acknowledgment of flaws in the MCS, and might be an attempt to ameliorate them.[11]

Some Options

At least five approaches have been suggested that might be pursued to address DOD's airlift capabilities and needs. Each option has strengths and weaknesses. These options are not mutually exclusive, and some might be pursued concurrently.

Option 1: Modernize C-5s and Purchase Additional C-17s. At issue is how many more C-17s to purchase and how many C-5s to upgrade. The current Air Force plan is to upgrade all C-5s. Some have argued that only the C-5Bs should be upgraded and the C-5As should be retired.

Cost is an important factor to consider when choosing between these alternatives, as is performance. The table above summarizes some of the factors to be weighed. Five additional factors merit discussion. First, the C-17 is the only U.S. strategic airlifter still in production. Purchasing additional aircraft beyond what is currently programmed would extend the production line's life, and may offer industrial base benefits. Second, purchasing additional C-17s and allowing the C-5 fleet to atrophy would lead to a

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[6] Marc Selinger, "DoD Launching New Review of Transportation Needs," *Aerospace Daily*, Mar. 11, 2004.

[7] John Tirpak. "Air Mobility in the Doldrums." *Air Force Magazine*. Aug. 2005.

[8] *Defense Transportation: Opportunities Exist to Enhance the Credibility of the Current and Future Mobility Capabilities Studies*. Government Accountability Office. Sept., 2005.

[9] *Defense Transportation: Study Limitations Raise Questions About the Adequacy and Completeness of the Mobility Capabilities Study and Report*. GAO. Sept. 2006.

[10] John T. Bennett. "Influential DoD Mobility Study's Focus on Intratheater Needs Questioned." *Inside the Air Force*. Apr. 7, 2006.

[11] Michael Fabey. "AF Formulating Mobility Plan." *Aerospace Daily*. Sept. 28, 2006.

homogeneous fleet. Some voice concern that a fleet composed entirely of one model of aircraft is less robust than a fleet composed of two types of aircraft. If one type of aircraft is grounded, the other can still fly. Others argue that homogeneous fleets offer potentially significant savings in operations and maintenance costs, and that the U.S. theater lift fleet has been almost entirely composed of one type of aircraft, the C-130, for years. Third, while the C-5 may have many hours of life remaining, it is an older aircraft than the C-17. Proponents of purchasing additional C-17s point out that this aircraft exploits newer technology that will make it easier and cheaper to maintain than the C-5, and offers greater opportunities for future upgrades and modernization. Fourth, the C-5's unique ability to carry very large equipment such as engineering equipment and Patriot missile batteries must be considered. DOD's C-5 inventory has not met demands to transport outsize/oversize cargo. Therefore, between 2003 and 2004, DOD contracted with Russia to provide the AN-124 heavy lift aircraft to fly over 200 missions.[12] Finally, the C-5 carries almost twice the payload of the C-17. Eliminating the 109 C-5s from the inventory removes the capacity of roughly 196 C-17s.

	Modernize C-5 Fleet	Buy More C-17s
Average Procurement Unit Cost[13]	$97 Million	$280 Million
Est. Flying Hour Cost[14]	$23,075	$11,330
Production Rate	~12 aircraft/ year	~15 aircraft/year
Aircraft Life Remaining	26,000 hours	30,000 hours
Mission Capable Rate	75%	78.6 - 85.9%
Max. Payload	261,000 lbs	164,900 lbs
Austere Runways	No	Yes

Option 2: Increased Use of Commercial Aircraft. DOD may wish to consider increased use of commercial aircraft, which offer many advantages over dedicated military aircraft. They are numerous, tend to have longer range, and they are less expensive than military aircraft. However, civilian aircraft also have limitations. They cannot carry oversize or outsize cargo, they cannot conduct special missions like airdrops, or support special operations. Also, they tend to congest airfields due to longer ground times, cargo handling equipment requirements, lack of roll on/roll off capability, and less ramp maneuverability.

It may be that DOD is already exploiting commercial aircraft to the maximum potential benefit. The Air Force indicates in the MRS-05 study that they could not use the 20.5 MTM/D of civilian airlift capability assigned for most of the halt phase of the wartime scenarios studied, due to the limitations listed above. Also, enemy use of

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[12] Gene Rector, "Russian Aircraft Getting U.S. C-5 Work," *Macon Telegraph,* Dec. 21, 2003. Cynthia Di Pasquale, "Russian Planes Expand U.S. Airlift Capability Strained During OIF, OEF," *Inside the Air Force,* Apr. 2, 2004.

[13] *Selected Acquisition Report (SAR)* Department of Defense OUSD(AT&L). Defense Acquisition Management Information Retrieval (DAMIR). C-17A, C-5AMP, C-5RERP.

[14] *Aircraft Reimbursement Rates (per Flying Hour) FY2007.* Air Force Cost Analysis Agency, Cost Factors Branch. Table A15-1.

weapons of mass destruction, such as chemical weapons, effectively deters civilian crews from entering conflict areas. One civil aircraft initiative that may have some utility for the military is the effort by Boeing, with the Air Force's endorsement, to market a civilian version of the C-17. Adding this aircraft to the Civil Reserve Air Fleet would address the shortcomings listed above. Whether there is a sufficient market for these aircraft to be commercially viable remains to be seen.

Option 3: Pursue Airships or Hybrid Airships. DOD is exploring the development and use of airships, or hybrid airships, to carry very large military payloads long distances. Airships, also called blimps, typically use helium to achieve lift and often resemble the elongated, cigar-shaped *Goodyear* blimp seen at major sporting events. Hybrid airships also use gas buoyancy for much of their lift, but are shaped like an aircraft wing to generate additional lift from aerodynamic forces. The airships currently being explored could potentially carry payloads on the order of 500 tons to intercontinental distances at speeds up to 100 miles per hour.

In addition to their very large payloads and long range, airships and hybrids may offer additional advantages applicable to the strategic airlift mission. They may not require as expensive and as specialized infrastructure as aircraft, and may be able to deliver their payloads near the conflict, rather than at ports or airfields miles to the rear, thus overcoming logistic choke points and mitigating the effects of limited forward basing. Airships and hybrids may be able to land on water, which could prove valuable in realizing the Department of the Navy's sea basing concept.

Option 4: Reduce the Airlift Demands. Another method for addressing current and forecast airlift shortfalls is to reduce the size, weight or amount of equipment to be moved. As part of their efforts to achieve a military transformation, all four services are exploring ways to become lighter, leaner, or more deployable.

A key facet of the Army plan is the Stryker Brigade Combat Team. It is composed of a mechanized infantry brigade of 3,500 personnel, 327 Stryker vehicles, 600 wheeled vehicles, field and air defense artillery, and engineering equipment. The Army wants to be able to move one Stryker Brigade anywhere in the world in 96 hours. It also wants to deploy one division in 120 hours and five divisions in 30 days. Presumably, a variety of pre-positioning and transportation modes would be exploited to meet this goal.

The Air Force's principal effort in organizational innovation is the Expeditionary Air Force Concept, or EAF. The purpose of the EAF is provide a structured and more responsive way to deploy capabilities. The EAF will organize much of the Air Force into 10 Aerospace Expeditionary Forces (AEF) that will include combat and support forces. Each AEF includes about 175 aircraft, 20,000 people, and 6,000 tons of equipment. The goal is to deploy one AEF anywhere in 48 hours and five AEFs in 15 days.

Although both of these organizational initiatives may have merit, it is not clear that either will reduce demands on the strategic airlift fleet. The amount and weight of equipment in a Stryker brigade, for example, may be less than in current Army organizations, but the desired speed of delivery is greater. Air Force analysts estimate that the early delivery of a Stryker Brigade and an AEF would require more airlift than moving legacy forces during over a longer period of time. Also, moving five Army divisions in 30 days may require more airlift than currently planned for the halt phases of two

MTWs.[15] The net effect the Service's plans to become lighter, leaner and more deployable may have on airlift may merit increased attention.

Option 5: Accept less Strategic Airlift Capability. The final option that may be considered is to operate within the current and projected airlift capabilities. There appear to be at least three arguments for this approach. First, there is some debate over the realism of MRS-05's plan for supporting two nearly simultaneous MTWs. General Ryan, for instance, was quoted saying "We will never have enough for two MTWs. I don't think we can afford it. We have a one-major theater war airlift force."[16] General Walter Kross, former commander of the Transportation Command also said "the airlift force available for the next decade will be one that can handle a single major regional contingency."[17] Furthermore, the actual U.S. airlift capabilities have been short of the stated MTM/D requirement for 11 of the last 13 years.[18] During this time, the United States has successfully conducted operations in South West Asia, Bosnia and Kosovo. It can thus be argued that the airlift requirement set by MRS-05 and other studies is greater than required. A counter argument is that airlift requirements are designed to satisfy a worst case scenario. Adherents to this perspective say the 54.5 MTM/D requirement is justified, and the United States has been fortunate over the last 13 years not to have faced the worst case scenario.

Second, it is argued that the MTM/D requirement can be lowered because strategic airlift capacity is not the limiting deployment factor. Instead, the ability to move forces may be limited by too few airfields and inadequate airfield infrastructure. Therefore, acquiring more strategic airlifters might not only fail to satisfy airlift shortcomings but employing them could actually exacerbate deployment problems. In Operation Allied Force, for instance, "there were not enough air bases in the area immediately around Kosovo to support all the aircraft..."[19] This finding is significant because this theater contains numerous airbases relative to other regions. Also, a study by the Army's Military Traffic Management Command found that the biggest roadblock to achieving the service's deployment goals is the limited infrastructure at forward airfields.[20] Examples of infrastructure shortfalls include limited ramp space and loading/unloading equipment.

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[15] Conversation with Air Mobility Command, SAF (LLW) and Deputy Chief of Staff for Plans and Programs, Global Mobility Division, Apr. 5, 2000.

[16] Linda de France, "Ryan: We Will Never Have Enough Lift for Two Regional Wars," Aerospace Daily, June 22, 2000.

[17] John Tirpak, "New Boss at Air Mobility Command," *Air Force Magazine*, Mar. 1997, p. 36.

[18] Presentation by Brig. Gen. Robert Bishop to congressional staff, *Airlift Portion of MRS-05*, Mar. 28, 2001.

[19] *Kosovo After Action Review*. Secretary of Defense William S. Cohen and Gen. Henry H. Shelton, Chairman of the Joint Chiefs of Staff. Senate Armed Services Committee, Oct. 14, 1999.

[20] Kim Burger, "Army Study: Poor Forward Airfields Jeopardize Deployment Goals," *Inside the Army*, Aug. 21, 2000.

Statement

for

Lockheed Martin Corporation

Testimony by Larry McQuien
Vice President Business Ventures
Lockheed Martin Aeronautics Company

Before The

United States Senate

Committee on

Homeland Security and Governmental Affairs

September 27, 2007 Hearing on

Cost Effective Airlift in the 21st Century

Executive Summary

Modernization of the C-5 Galaxy is a fiscally sound means of addressing United States strategic airlift requirements. The acquisition strategy for the C-5 Reliability Enhancement and Re-Engining Program (RERP) is to improve reliability, maintainability and availability while reducing total ownership costs. Current developmental testing indicates these goals are attainable. Lockheed Martin Corporation is committed in supporting its United States Air Force customer's decisions on modernization of its strategic airlift fleet. Lockheed Martin provided to the Air Force a firm fixed price commitment for the portion of the RERP to be performed by Lockheed Martin to demonstrate our confidence in the estimated cost for the program of record.

The Air Force will realize 4:1 savings in C-5 Operations and Support costs savings through 2040 – based on Lockheed Martin's estimate for the program, for every $1 invested in C-5 modernization the Air Force will save $4.

Operations and Support cost savings of $50B (then year dollars) ($20B base year 2000) through 2040 are achievable from the C-5 RERP modernization. Additional savings are also realizable through reduced fuel costs given the efficiency of the new General Electric CF6-80C2 propulsion system.

Mission Capability rate projections for the C-5M based on the improved reliability and maintainability of the modernized aircraft indicate that a 30% improvement is realizable in aircraft availability.

The C-5 has more than half of its useful structural life remaining – another 30 years -- and the RERP program is prudent to realize the investment in these aircraft rather than parking them in the Arizona desert.

Lockheed Martin submitted a firm fixed price proposal to the Air Force for RERP modernization of the C-5 fleet that specifically demonstrated Lockheed Martin could perform its portion of the RERP program for an average cost of $83M per aircraft. After estimating the other costs to be incurred on the program by the Air Force, our proposal indicates the average cost for modernization is between $108 and $118M per aircraft.

Lockheed Martin's proposal can be executed within the current Future Years Defense Plan (FYDP) through 2013. Beyond the FYDP, execution of Lockheed Martin's proposal would require new appropriations of at least $1.4B beyond the $9.8B currently budgeted for the total program. The total additional appropriations required would be dependent on changes in the other costs to be incurred by the Air Force over the original budget.

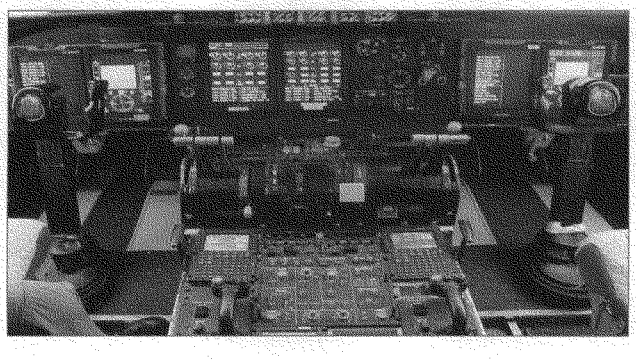
The effectiveness of mobility platforms can be measured against many different characteristics including such operational capabilities as the amount of material they move and the battlefield effects they create for the warfighter. United States fiscal constraints certainly shape airlift force structure. It is Lockheed Martin's opinion that C-5 modernization represents an excellent balance of operational capability framed within the reality today's budget constrained environment. The C-5 fleet is structurally sound, it is operationally relevant, and represents a good fiscal opportunity for the taxpayer.

The 2005 Mobility Capabilities Study (MCS) and 2006 Quadrennial Defense Review (QDR) affirmed modernization of the entire C-5 fleet as part of the Nation's strategic airlift solution. These studies identified a strategic airlift requirement to move 54.5 million ton miles of cargo daily and concluded that 112 C-5Ms and 180 C-17s would meet that requirement at an acceptable risk when combined with the Civil Reserve Air Fleet (CRAF). Congressional legislation raised the number of authorized aircraft from 292 to 299. This conclusion recognized the fact that the C5M (the designation for a modernized C-5 A/B/C) carried about twice the cargo as a C-17 and that the CRAF was not suitable for moving outsized and oversized cargo that could be carried by the C-5 and C-17. Increases in United States Army and United States Marine Corps troop strengths since those studies may place more requirements on strategic airlift requiring more aircraft to continue to meet the requirements at an acceptable risk level.

C-5 Modernization

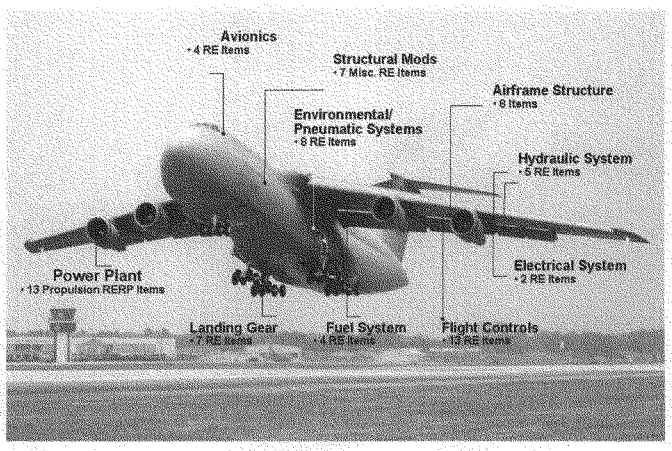
C-5 modernization is a two phased program including the Avionics Modernization Program (AMP) and the Reliability Enhancement and Re-Engining Program (RERP). .

Phase 1 AMP delivers a modern digital glass cockpit including communication, navigation, surveillance/air traffic management, and navigation/safety capability as directed by the DoD. AMP development is complete, operational testing and evaluation is complete, the Air Force has declared initial operational capability and Lockheed Martin has produced 28 upgraded aircraft.

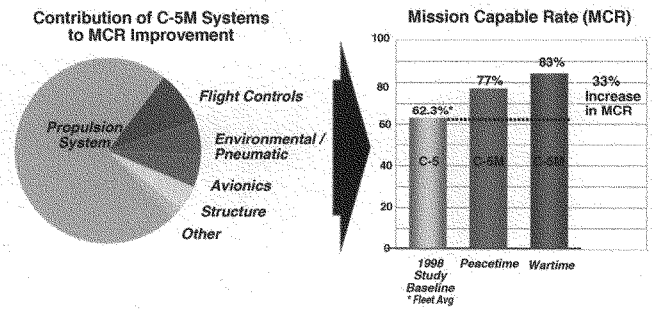


Phase 2 RERP is a comprehensive modernization effort (70+ initiatives) improving aircraft reliability, maintainability, and availability. RERP enables C-5s to achieve wartime mission requirements by increasing fleet availability, mission capability, departure reliability, while reducing total ownership costs. The AF's approved acquisition strategy supports AMP and RERP for all 111 aircraft. AMP + RERP = C-5M (modernized C-5). RERP is progressing very well with three C-5M Super Galaxies (2 former C-5Bs, 1 former C-5A) active in developmental

testing. As of 27 September, approximately 60% of developmental testing is complete with a plan to be complete by August 2008.



The centerpiece of the modernization program is the reliable, commercial General Electric (GE) CF6-80C2 (CF6) turbofan engine with increased takeoff thrust, stage-3 noise compliance and Federal Aviation Regulation pollution compliance. More importantly, this propulsion system has demonstrated outstanding reliability having accumulated more than 300 million flight hours in both commercial and military applications. The contribution of the various modernization improvements to the overall availability of the aircraft is set forth in the following figure along with the projected improvement in mission capability rate. Our analysis indicates that an improvement in mission capability rate for the C-5 of more than 30% over the 1998 baseline (or 26% over the 2005 data) is achievable with the RERP modification.



Cost Effectiveness

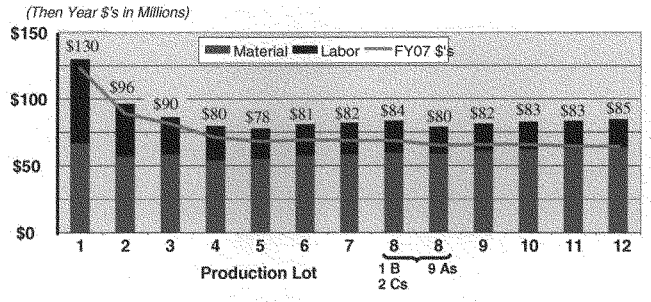
The RERP program achieves substantial tax dollar savings. Operations and Support (O&S) savings through 2040 are projected at $49.8B in TY dollars ($20.4B in base year 2000 dollars). Fuel savings of another $2B, or more, are also reasonably achievable given the fuel efficiency of the GE CF-6 propulsion system. Reduced total ownership costs of $37B to $38 in TY dollars are projected based on Lockheed Martin's proposal assuming the "other costs" to be incurred by the

Air Force are within 30 – 45% of Lockheed Martin's proposed costs. Recent discussions with the Air Force have suggested that their estimate of the "other costs" is 45% of our cost. These data show that $4 in O&S cost savings are achievable for every $1 invested based on Lockheed Martin's proposal assuming a range of 30 – 45% for the Air Force "other costs."

Our Proposal

In 2006, it became apparent that the cost to perform the RERP would exceed what the Air Force and Lockheed Martin had envisioned in 2001 when the program was authorized. Lockheed Martin provided the Air Force a firm fixed price (FFP) proposal on May 17, 2007 to modernize the remaining 108 C-5 aircraft. This proposal was submitted in response to a request for proposal (RFP) from the Air Force that requested firm pricing for lots 1 – 3 at aircraft lot quantities of 1, 3 5–8, and a not-to-exceed (NTE) price for the remaining C-5 B/C aircraft at to-be-determined aircraft lot quantities. Lockheed Martin restated its offer on August 28, 2007 changing the FFP option pricing for Lots 4 and beyond to firm NTE lot option commitments. We made this change given concerns voiced by the Air Force on the lack of supplier proposal substantiation for those lots. Lockheed Martin based its proposal for these lots on a firm proposal for the propulsion system and upon estimates for the remaining material costs based on the supplier proposals for Lots 1 – 3. The propulsion system represents about 50% of the material cost of the program. Lockheed Martin made the decision to commit to firm fixed prices to the Air Force based on its confidence in these data. As restated, Lockheed Martin committed to the Air Force to perform its portion of the RERP program, as proposed, for a price, no greater than $8.956B. The restated NTE prices for Lots 4 and beyond gave the Air Force the opportunity to negotiate lower values in the future while capping their exposure at the NTE amount. Lockheed Martin's offer included an economic price adjustment for any unusual inflation above that assumed in the proposal (the proposal was based on published inflation indices through 2020) and excluded unforeseeable impacts due to diminishing manufacturing sources beyond Lot 3 should manufacturers experience technical obsolescence concerns or change the focus of their business.

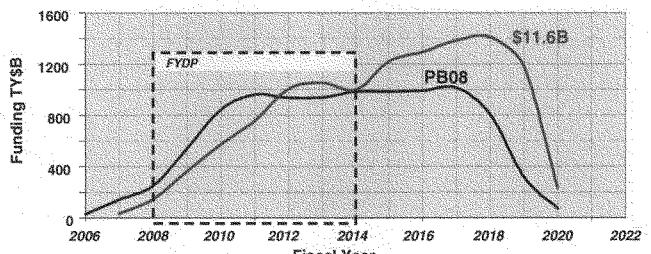
Lockheed Martin structured the proposal to ensure the Air Force had an accurate assessment of the cost for the RERP modernization program in connection with the Service's on-going discussions on the composition of the strategic airlift force structure. Lockheed Martins average per ship cost is about $83M, as depicted.



Proposed Lot Prices (TY$M)												
Lot	1	2	3	4	5	6	7	8	9	10	11	12
a/c	130.0	288.6	447.6	558.1	777.7	810.1	822.3	965.8	978.0	1,075.9	1083.8	1018.5
Spares/SE	18.8	34.6	37.3									

The bar chart depicts the per ship cost for Lockheed Martin's content while the table below sets out the proposed lot pricing. Lot 8 is split into two components in the bar chart merely to highlight the junction in the production program where the C-5As begin modernization. The average per ship total program price based on our proposal ranges from $107.8M to $119M depending on changes to the original budget for the "other costs"(such as training, spares, support equipment, over and above maintenance, program management) to be incurred by the Air Force. Lockheed Martin was requested to provide an estimate for a defined set of spares and support equipment in Lots 1 through 3 as set out in the above table, but Lockheed Martin was not asked to provide its estimate for these costs beyond Lot 3.

Lockheed Martin's offer does not require the Air Force to commit to modifying all C-5s, but gives them solid data to analyze various fleet mix options. The proposal was structured as an initial lot and 11 lot options based on specified lot quantities. The production build rate is shown in the following figure. Funding requirements based upon this rate when compared with the FYDP indicate sufficient funds exist across the FYDP to execute the program but the funding is not phased to coincide with Lockheed Martin production requirements. For the purpose of the following figure, Lockheed Martin assumed the Air Force "other costs" could be estimated as being 30% of Lockheed Martin's costs. We have recently learned that the Air Force estimate for these "other costs" is about 45% of our costs. It still appears that there are sufficient funds through the FYDP to execute the proposal but the phasing of those funds needs to be adjusted to coincide with the funding requirements. Additional appropriations of at least $1.4B are required post FYDP to execute our offer as well as a rephasing of the excess funds appropriated through the FYDP (total additional appropriations would be dependent upon changes to the other costs to be incurred by the Air Force over the original program budget).



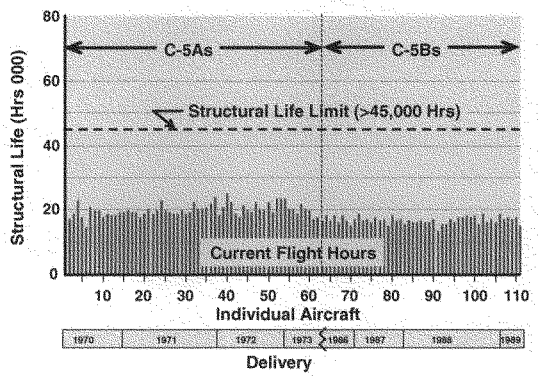
	Build Rate								Balance
APB/PB08		1	3	9	10	10	10	12	53
LM Proposal		1	3	5	7	10	10	12	50

			FYDP $M					
	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13
Funding Surplus/(Deficit)	$30.6	$109.7	$109.0	$177.8	$270.9	$208.5	($68.3)	($113.8)
Cumulative Surplus/(Deficit)	$30.6	$140.3	$249.2	$427.1	$698.0	$906.5	$838.2	$724.5

Airframe Structural Viability

Full scale structural tests and analysis have resulted in establishing a structural life of 45,000 hours for the C-5 airframe. These tests and analysis took advantage of the fact that the wing for the C-5B was redesigned prior to its production to address some structural life concerns revealed during the fatigue testing of the original C-5A. Lockheed Martin retrofitted all C-5As with the new wing in the late 80s. The 45,000 structural life greatly exceeds the Air Force planned usage between now and 2040, i.e. annual flying rates of 300 and 600 hours, respectively. The average flight hour usage for both the A and B fleets (the 2 C-5C's are A model aircraft modified to

transport outsized Space Cargo) has yet to reach the halfway mark as shown in the following figure. (The chart also depicts the fact that the aircraft are all consistently operating about the same from a flight hour perspective which is some evidence that there are no broken or worn-out aircraft in the fleet.)



The 2004 Air Force Fleet Viability Board examined the health of the C-5A fleet and found it *"assessed to be viable"* with *"no major structural life issues"*. The report also noted previous studies conducted by the Aeronautical Systems Center (Dr. Lincoln report) which showed the projected economical use of the C-5 to 2040 was quite feasible. In 2005 – 2006, the Air Force completed a 4-phased destructive inspection of C-5A 69-0004 to assess overall health of the early C-5As. This inspection revealed no significant structural issues that would undermine long-term C-5A fleet service. The C-5A was first Air Force aircraft built to MIL-STD-1568 corrosion prevention requirements, and there are no widespread corrosion issues in the fleet.
Test and analysis have shown that the structural life of the C-5A aircraft greatly exceeds the 2040 timeframe.

There are, however, some structural maintenance issues that may need to be addressed. These arise mainly from the use of –T6 temper aluminum alloys that were developed in the 1960's and later learned to be susceptible to stress corrosion cracking. The issue is well understood and these repairs are addressed today as maintenance actions on "as-needed" basis. An estimate of the cost for these repairs is summarized in the adjoining table, but not all aircraft need all of the repairs. Lockheed Martin has been working with WR-ALC on the potential for packaging the maintenance activities to minimize cost and aircraft down-time.

Aft Crown Skins	$8.5M
Contour Box Beam Fitting	$2.5M
Forward Opening Skin Repairs	$2.5M
Underfloor Bulkhead End Fittings	$2M - $5M
Torque Deck Panels (maintenance induced)	$1.5M

Lockheed Martin conducted a study in early 2007 to assess the impacts of sustained high operations tempo on the C-5 fleet over extended time. This study was undertaken given the tempo of the aircraft supporting Operational Iraqi Freedom and Operation Enduring Freedom. The C-5 A/Bs have been operated the last 3 years about 50% higher than the 300/600 hour planning numbers relied upon in current studies. The goal of the study was to define what effects these ops tempos would have on the 45,000 hour structural life associated with the RERP

configuration. The study concluded that the modernized C-5M safety limits were not exceeded until well after 2040 even at sustained higher ops tempos.

Summary

Modernized C-5Ms (regardless of whether they were originally C-5As/Bs) can effectively serve the United States strategic airlift requirements well beyond 2040. Modernizing the C-5 fleet remains the most fiscally sound solution for meeting the Nation's strategic airlift requirements by returning to the Air Force $4 for every $1 invested in the production program. Air Force acceptance of Lockheed Martin's offer would require additional Congressional appropriations in the 2014 – 2020 timeframe in an amount of at least $1.4B and as much as $3.1B depending on the amount of the "other costs" to be incurred by the Air Force. The C-5 airframe has more than half of its structural life remaining and it would be prudent to modernize these aircraft to protect the investment made by the government and the taxpayers and realize the C-5's full potential rather than parking them in the Arizona desert. The 2005 Mobility Capabilities Study (MCS) and 2006 Quadrennial Defense Review (QDR) affirmed modernization of the entire C-5 fleet as part of the Nation's strategic airlift solution. The C-5, unheralded, flew 25% of the Operation Iraqi Freedom airlift missions deploying for the war, yet delivered 50% of the cargo. The C-5M can continue providing exceptional capability through 2040. The increased funding required to complete the program would be a good investment in a superb aircraft.

Conclusion

Mr. Chairman, Lockheed Martin fully understands the challenges facing the Air Force and we intend to support the decisions of our customer. We appreciate the opportunity for an open and constructive dialogue regarding the merits of our proposal. The Air Force Program of Record supports C-5 fleet modernization and Lockheed Martin is committed to meeting its customer's requirement.

Post-Hearing Questions for the Record

Cost Effective Airlift in the 21st Century

September 27, 2007

Questions for the Record from Senator Thomas R. Carper

Larry McQuien, Vice President Business Ventures. Lockheed Martin

1. Do you believe the Air Force is basing its service cost estimate on the production profiles contained in the FY08 AF's budget submission/program of record, or is the AF using other production rates or assumptions that are driving higher program costs, particularly for the engines?

   Response: Yes, the Air Force has stated that they based their estimate on the production profile contained in the FY08 AF budget submission/program of record. I understand based on their statements during the hearing and during subsequent meetings that they risk adjusted their estimate to account for a potential change in the program of record given their experience with budget priorities changing over the course of a program.

2. Most of the cost differences between Lockheed Martin and the Air Force seem to be based on engine prices and the man-hours of labor to produce the jets. Is Lockheed Martin confident in its engine pricing and labor estimates? How would you explain differences between your estimates of labor costs and learning curves and those of the Air Force?

   Response: Lockheed Martin is confident in its estimates for the propulsion system and labor estimates. We based our estimate for the propulsion system upon pricing commitments made by General Electric. Lockheed Martin and General Electric executed a general purchase agreement for the procurement of the propulsion system at the rate specified by the program of record. The prices contained in that agreement are on average about $2.5M, in FY08 economics, lower than the prices relied upon by the Air Force in their estimate. We based our labor estimates upon actual labor hours recorded for the three aircraft modified during Systems Design and Development (SDD). Lockheed Martin is confident in committing to a 95,000 hour starting point for our labor costs on the first production aircraft modification. We assumed in our estimate that benefits derived from producibility improvements made since completion of the SDD modifications would offset the impact of a two year gap in production between modification of the last SDD aircraft and the first production aircraft. We also assumed in our estimate that we would achieve an 85% learning curve across production. We based this learning curve assumption on our experience on the C-Avionics Modernization Program (AMP) and on other Lockheed Martin production programs.

3. What documentation have you provided the Air Force to substantiate your labor estimates and do you believe they are reasonable? Who is fiscally liable if the actual labor costs turn out to be higher?

   Response: Lockheed Martin provided in our proposal to the Air Force documentation identifying the actual labor hours recorded during SDD and a detailed description of how we adjusted those actual hours for producibility improvements. This documentation was relied upon by Lockheed Martin in our program estimate. We also assumed in our estimate that the production aircraft would have been through regularly scheduled programmed depot maintenance (PDM) prior to induction into the Reliability Enhancement and Re-Engining Program. We relied upon this assumption in our estimate for a one time reduction in the labor hours for general maintenance that we experienced during SDD for those aircraft that had not been through PDM. Lockheed Martin proposed a firm fixed price contract for lots 1 – 3 and a not-to-exceed price on lots 4 – 12 to ensure the Air Force that Lockheed Martin accepted the risk for any difference between the actual labor costs incurred during production and the assumptions in Lockheed Martin's offer.

4. I can appreciate that the Air Force doesn't like program cost growth and expects contractors to keep their costs "in check." However, it seems very odd to me that when a defense contractor does exactly that, the Air Force questions that contractor's offer and seems to suggest that the real costs will be much higher. In your experience, have you ever experienced this on any other Air Force program, especially one where you offered a FFP contract?

   Response: No, I have not. Lockheed Martin proposed capping the Air Force's liability for the costs to be incurred by the Corporation in modifying the aircraft in accordance with the program of record. Our offer is predicated on a defined program build rate and in fairness, it contains provisions consistent with normal long-term undertakings that permit price adjustments for unforeseen economic changes and potential diminishing manufacturing sources (DMS). Lockheed Martin is only afforded an opportunity by the economic and DMS provisions to negotiate incidental price adjustments if we can substantiate the particular economic or DMS impact. If the build rate assumed in our proposal changes, the price for any unexercised production lot options would be subject to renegotiation, but no price changes would be realized for lots already under contract. Reliance on a defined build rate in pricing a production program is an ordinary and customary business practice. We believe our offer reasonably caps the Government's costs risk for the portion of the work to be performed by Lockheed Martin and our offer fairly allocates the program risks between Lockheed Martin and the Government.

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Air Force Policy On RERP?

"What we would like to do is to be able to run the avionics enhancement program…out on all of the remaining C-5s, and then run the Re-Engining Program on the C-5s that have the most life."

--Gen. Michael Moseley

Air Force Chief of Staff

Testimony before the Senate Armed Services Committee

March 20, 2007

A Cost Effective Production Schedule?

C-5 RERP

	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21
PB 03 $8.7B	5	7	12	12	12	12	12	12	12	12					
PB 06 $8.9B	1	3	5	7	9	12	12	12	12	12	12	12			
PB 08 $9.8B		1	3	9	10	10	10	12	12	13	13	12	3		
LM $11.6B		1	3	5	7	10	10	10	12	12	13	13	12		

What is the Air Force's Production Profile that they want Lockheed to use

Why does Lockheed's proposed production schedules deviate from the program of record for 2008?

Three Major Areas of RERP Cost Dispute

in billion $

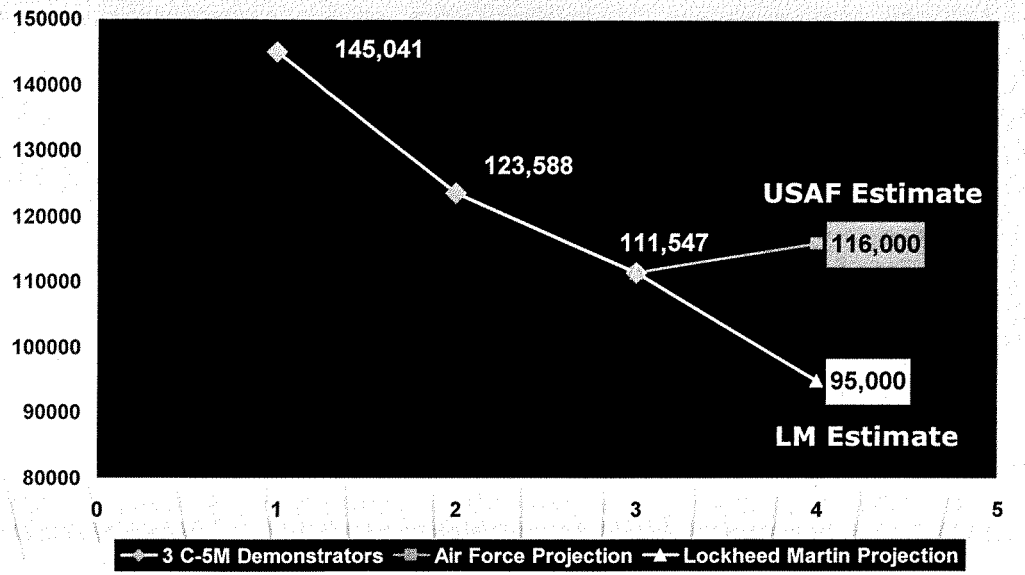
	USAF Est.	LM Est.	Difference
Propulsion System	$5.0B	$3.8B	*$1.2B*
Installation and Other LM Costs	$3.9B	$2.3B	*$1.6B*
Other RERP Costs (Overhead)	$4.3B	$2.7B	*$1.6B*
Total Cost	$13.2B	$8.8B	*$4.4B*

Propulsion System: Certification of subcontractor's price for the CF6-80C2 engine.

Installation and Other LM Costs: Disputes over learn rate and diminishing man hours for the touch labor of installing RERP.

Other RERP Cost: Center around disagreement of responsibility for certain areas of RERP overhead, including legacy repair costs.

Touch Labor Hours for C-5 RERP Per Aircraft



Air Force Estimate: 116,000 hours

- Includes learning loss from 29 month break in production.

Lockheed Martin Estimate: 95,000 hours

- Counters line break with improvements: -19,613 hrs

What is the middle ground?

Lockheed Projected Labor Improvements

Cost Improvement Initiative	Cost Improvement Hours
MSP Kitting	845
Wiring Harnesses	4,000
Flap Track	2,000
Re-sequence Planning and Crew Boards	4,200
Wing Leading Edge Wiring	1,120
A-25 Rack	883
A-41 Rack	1,117
Hardware Management	384
Pylon Fitting Laser Location Fixture	3,152
Shim Cell	160
Tower Fitting Drill Press	214
Web Re-design	1,538
Total	19,613

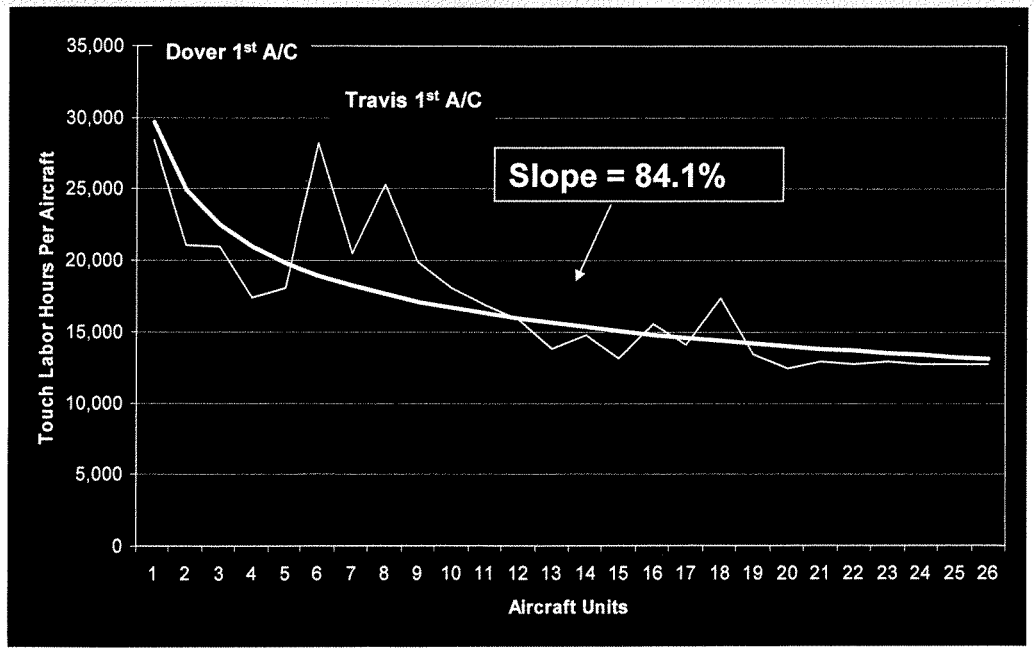
RERP Installation Learning Curve

- Lockheed Martin: 85%
- Air Force: 90%

Past examples

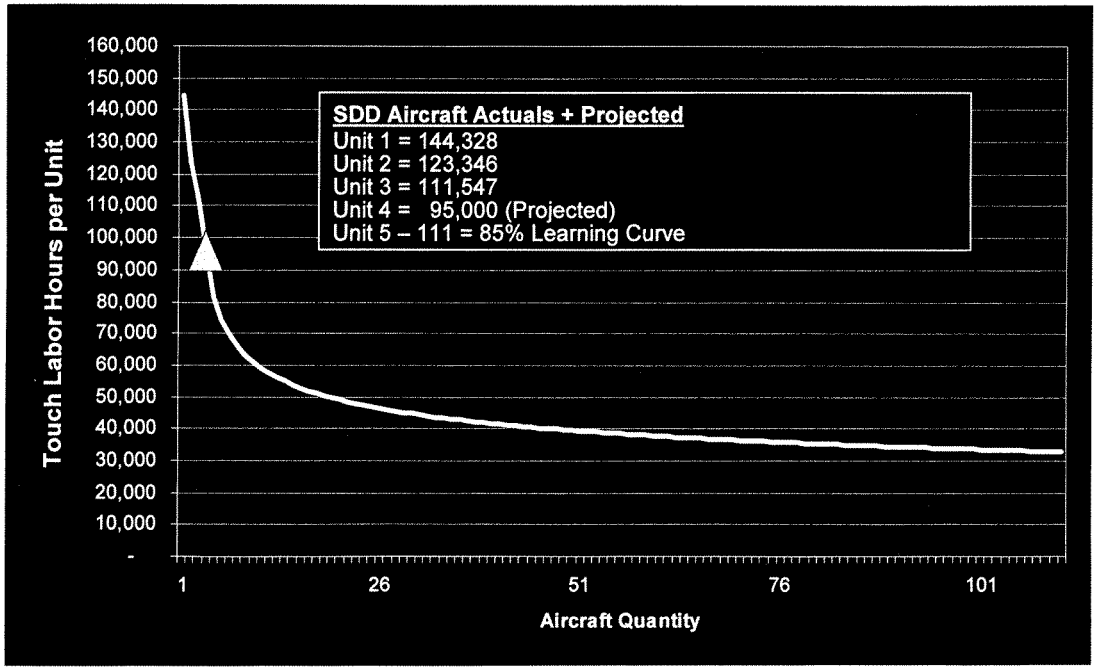
- C-5 AMP: 84.1% through first 26 aircraft (Contractor is Lockheed Martin).

Touch Labor Hours for C-5 AMP



Approximate Start (1st aircraft): ~28,500 hrs
After 26 aircraft: ~13,000 hrs

Lockheed Martin's Projection of RERP Touch Labor Hours per Unit



GE Responses to Questions From Senator Thomas Carper (D-DE)
On the C-5 Reliability Enhancement and Re-engining Program (RERP)

1. Has General Electric, directly or through Lockheed Martin, put forward a price to the Air Force for how much it will cost per engine for General Electric to produce the engines for the C-5 Reliability Enhancement and Re-engining program?

GE is a subcontractor to Lockheed Martin (LM) on the C-5 RERP program. As such, GE's contract is with LM, not the Air Force. This contract with LM provides a fixed base price (in June 2007 dollars) for the C-5 RERP propulsion system. This fixed base price is based on the yearly rates and schedule specified in the President's FY 2008 budget request. The contract includes yearly priced options for the entire 108 aircraft program. These yearly priced options are indexed for escalation.

2. Are the terms of this proposal binding? More specifically, if the Air Force accepted this price, is this a fixed price?

See answer to question 1. The terms and conditions of GE's contract with LM are legally binding.

3. If the cost of manufacturing these engines exceeds the price, who assumes liability?

See answer to question 1. GE's contract with LM is a "commercial type" contract. GE assumes the liability for any increase in cost above the negotiated fixed base price provided the propulsion system is procured at the yearly rates and schedule specified in the President's FY 2008 budget request.

4. In the event there is cost growth in excess of the quoted price, who determines and certifies whether the cost growth was the result of actions of General Electric or whether they were due to unforeseen cost growth of the materials and resources used in the manufacturing of the engine?

As noted in the answer to question 3, GE assumes the risk associated with cost growth, including unforeseen cost growth of materials. The propulsion system pricing is based on a 2007 base price plus escalation, which is tied to the US Government indices for both Labor and Industrial Commodities. It should be noted that while the propulsion system is comprised of a significant quantity of specialty metals, the industrial commodity index is relatively unaffected by specialty metals price increases. As such, GE is at risk for any future unforeseen specialty metals price increases above the commodity index provided the propulsion system is procured at the yearly rates and schedule specified in the President's FY 2008 budget request.

5. Please explain the processes and interactions involved with the Air Force and Lockheed in the event that the cost growth is due to increased and unforeseen material costs.

See answer to question 4. GE is responsible for any cost growth due to unforeseen material price increases provided the propulsion system is procured at the yearly rates and schedule specified in the President's FY 2008 budget request.

6. Does your price per engine cover all 108 aircraft or only for some of these aircraft? Will the price be binding—i.e. the risk will be upon General Electric—for all 108 aircraft?

GE's price covers all 108 aircraft and the price is binding provided the propulsion system is procured at the yearly rates and schedule specified in the President's FY 2008 budget request.

7. What benefit will the GE engines provide for the C-5 in terms of flight time, distance, and lift capability?

Lockheed Martin provided the answer to this question:

~12% improvement in mission capable (MC) rates in peacetime—this is equivalent to adding ~12-13 additional C-5s to daily peacetime availability. Wartime predicted MC rate is ~83%M with even greater availability improvements.

~20% improvement in million-ton-mile (MTM) capability over legacy C-5 fleet (according to AF: +26% C-5As, +14% C-5Bs) – This is the equivalent of adding ~22 C-5s to the fleet at no additional charge. This is essentially a "free" operational by-product of RERP equivalent to adding ~25 C-17 equivalents of capability without having to spend ~$7B to acquire those C-17s.

Legacy C-5s demonstrated ~12% lower cost per ton mile of delivered cargo than C-17s during Operation Iraqi Freedom/Operation Enduring Freedom deployment. Modernized C-5Ms will likely be 30-40% less expensive per ton-mile than C-17s. Legacy C-5s already carry an average of 66% more tonnage per mission than C-17s. Modernized C-5Ms will carry 2X the tonnage per mission.

Other benefits: Longer range, faster force closure, less tanker dependency, quieter operation, 2x improvement in global airfield access, 10% reduction in fuel consumption delivering $2B life cycle fuel savings, and 10x improvement in engine reliability.

8. *Please discuss how you determined the pricing of engine spares. What factors and methodology is used to calculate engine spares and is this different than the pricing estimates process you used for the initial engines?*

GE's contract with LM is a "commercial type" contract and, consistent with commercial pricing practices, spare engines are offered to customers under a General Terms Agreement at the list price that is prevailing at the time of purchase.

○