CRAF 2002 – AN ANALYSIS OF CRAF

PARTICIPATION SINCE SEPTEMBER 2001

GRADUATE RESEARCH PROJECT

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Abstract

This paper analyzes Civil Reserve Air Fleet (CRAF) participation prior to and after the terrorist attacks of 11 September 2001 to determine if the events of that day caused a change in air carrier participation. This research focuses on providing an unbiased analysis of the Civil Reserve Air Fleet program and the bearing these attacks had on the program. Specifically, the paper concentrates on carrier participation in each segment of the CRAF beginning in January 2001 and ending in May 2002. Additionally, historic material regarding the CRAF and a groundwork of the fiscal and economic landscape surrounding the commercial aviation industry prior to and since the events of 11 September 2001 are also presented. This paper evaluates information obtained through civilian and military transportation organization interviews, publications, and reports. Primary sources of information were: Air Mobility Command, United States Transportation Command, Defense Technical Information Center, and the Air Transport Association. The research shows a statistically significant increase in CRAF participation since September 2001. The significance and timing of this change indicates a correlation between the airlines' quest for business and an increase in aircraft in all three stages of the CRAF.

Chapter 1 – Introduction

The purpose of this research paper is to analyze Civil Reserve Air Fleet participation prior to and after the terrorist attacks of 11 September 2001 to determine if the events caused a change in air carrier participation.

Background

The terrorist events of 11 September 2001 have affected United States citizens and businesses in many ways. The total shutdown of the US air transportation system had a huge impact on the already troubled commercial air carrier business. The financial repercussions began with the total shutdown of business for three days, and continued after flying resumed with reduced schedules and low consumer demand. The airline industry turned to the government for financial support in the short term. Many questions remain in the aftermath. Faced with labor cutbacks, reduced schedules, and new security concerns how will the airlines look at the Civil Reserve Air Fleet program? Will carriers be more or less willing to participate? How does this attitude impact the CRAF incentive program? The goal of this paper is to take a critical look at the CRAF program, its history and organization as well as assess carrier participation over the past 17 months to look for changes in post September 2001 involvement.

Research Questions

1. **Primary Research Question**

   Did the number of air carriers participating in the CRAF change as a result of the events of 11 September 2001?

2. **Secondary Research Questions**

a. What is the history of the Civil Reserve Air Fleet and the National Airlift Policy?

b. How is the CRAF organized and what incentives fuel its participation?

c. What was the fiscal and economic landscape surrounding the commercial aviation industry prior to and since the events of 11 September 2001?

d. Analyze CRAF participation prior to and after 11 September 2001.

e. Assess the impact recent terrorist actions will have on the CRAF.

Scope

This research focuses on providing an unbiased analysis of the Civil Reserve Air Fleet program and the bearing the 11 September 2001 terrorists attacks had on the program. Specifically, the paper will focus on carrier participation in each segment of the CRAF beginning in January 2001 and ending in May 2002. Additionally, this paper will provide historic material regarding the CRAF to lay a foundation of understanding of the program.

Methodology

This paper incorporates and evaluates information obtained through civilian and military transportation organization interviews, publications, and reports. Primary sources of information for this paper include, but are not limited to, the following:

- Air Mobility Command (AMC)
- United States Transportation Command (USTRANSCOM)
- Defense Technical Information Center (DTIC)
- Air Transport Association (ATA)

Organization

Chapter two reviews the history of the Civil Reserve Air Fleet program from the days following World War II to its present state. Additionally, this chapter will discuss the development of the National Airlift Policy and the role it plays in the CRAF.

Chapter three describes the organization, operation, and incentive programs of the CRAF. After describing the stages and scope of participation this paper will look at the mobilization value program to provide insight as to what rewards carriers receive for participation in the CRAF. Then it will review the different programs that provide peace-time business opportunities to the airlines.

Chapter four addresses the airline economic landscape beginning in January of 2001. It will look at the state of the industry prior to 11 September 2001 and in the months following. In addition to assessing airline economic issues of the fall of 2001, the reaction of the US Congress to the request by the airlines for assistance will briefly be reviewed.

Chapter five looks at CRAF carrier participation. This analysis will use Headquarters Air Mobility Command, Directorate of Operations, Civil Air Division records to explore changes in airline membership in the CRAF. Chapter six will then summarize the findings of this research, and recommend additional research based on the results of this paper.

Chapter 2 – History of the Civil Air Reserve Fleet

Strategic Mobility

Strategic mobility is the capability to transport military forces from one theater of operations to another, in a timely manner. The ability to rapidly project the United States military is vital to our national security policy. The US strategic mobility concept is based on a triad of mutually dependent components: strategic airlift, propositioning, and strategic sealift. Each of these components presents distinctive capabilities and is subject to certain limitations. To fulfill its role in the national security strategy, the US military must be capable of deploying its military forces rapidly and sustaining them until the objectives have been attained. Our strategic mobility enables us to do this (Evans, 1993: 3).

Strategic sealift is the backbone of the mobility triad and is responsible for the sustainment of the deployed forces. Sealift excels in the movement of large, heavy and bulk items. Additionally, sealift is used to move sustainment supplies. In a major overseas deployment, sealift is typically responsible for the movement of 95 percent of the dry cargo and 99 percent of fuel. There are, however, several drawbacks to sealift. The locations of ports for loading and unloading make sealift less convenient than airlift. Furthermore, sealift is slow. It may take a ship two to three weeks to load, transit the seas, and then unload half way around the world (Evans, 1993: 3).

Prepositioning is the next segment of the strategic mobility triad. This method of mobility stores ammunition, equipment, rations, and supplies at key locations around the globe, accomplished either on land or on ship. When the need to deploy forces arises, the

prepositioned supplies are prepared for the deploying troops and then matched up with them once they arrive in theater. Prepositioning requires greater inventory, allowing multiple sets of equipment to be strategically placed around the world. The place utility of prepositioned stock can only benefit the locations where they are positioned, but on-load and transit times are eliminated or greatly reduced (Evans, 1993: 4).

The final leg of the triad is strategic airlift. Airlift is the primary method of moving troops and equipment during the early stages of a deployment because speed and agility are its trademark. While being the fastest and most flexible of the three legs it is also the most expensive. The US strategic airlift capability is composed of military and commercial aircraft. While the military, or organic, segment of strategic airlift is important, this research will only address the critical commercial aspect of strategic airlift. A review of the history of the relationship between the commercial aviation industry and the military begins this process (Evans, 1993: 4).

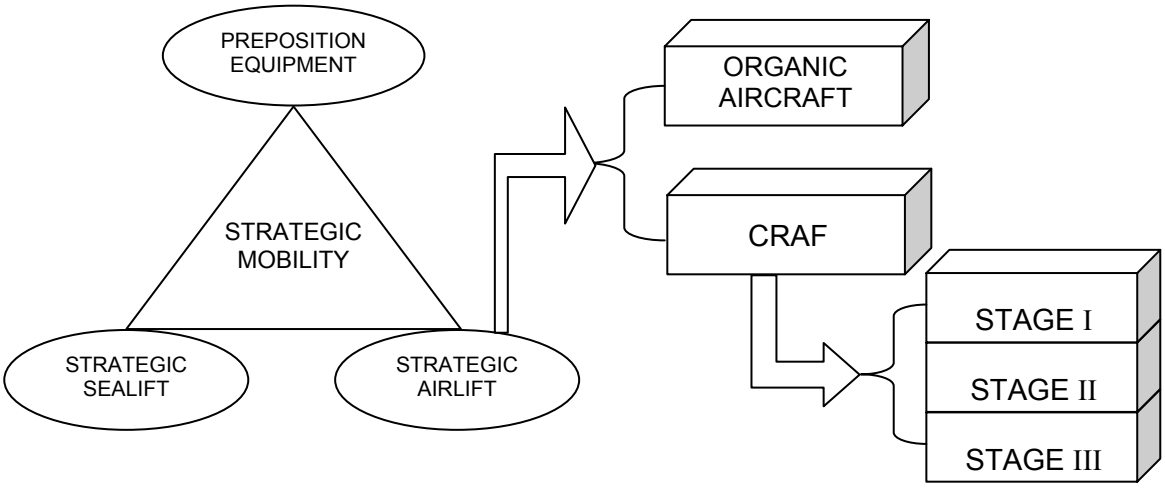

Figure 1 – The Strategic Triad

(Graper, 1998: 1A)

History of the Civil Air Reserve Fleet and the National Airlift Policy

The use of civilian aircraft by the military has a long and varied history. Today's Civil Reserve Air Fleet program can trace its roots back to World War II. During WWII the Air Corp Ferrying Command, forerunner of Air Mobility Command, did not have the resources to meet the wartime airlift demand. The commercial airlines stepped up to fill the gap where additional airlift was needed (Evans, 1993: 5). This shortfall in airlift continued into the Korean War when the airlines transported 67 percent of all passengers, 56 percent of all cargo, and 70 percent of the mail (Post, 1996: 6). It was then that the government decided to act and legislators began calling for a more formal national airlift policy. A number of commissions were formed to address these problems and to strengthen the US military's airlift capabilities.

The first meetings were held in 1948 when the Finletter Commission was formed. This group investigated the need to establish an air reserve to backfill military airlift during time of national emergency or war. The members determined that the current aviation industry in America was deficient in its cargo carrying capacity and not capable of augmenting the military during a time of national crisis. As a remedy, this commission saw a necessity to subsidize the commercial air cargo industry (Howard, 1996: 2).

In 1951, the Douglas Commission was charged to carry out a more comprehensive study of US wartime military airlift requirements. This time the group studied types of civilian aircraft, and assessed their military value and availability. The results of the commission's study were published as the Douglas Report. This report made the recommendation to divide the airlines into First Line and Second Line Reserves

with different requirements for each (Post, 1996: 7). Acting on the recommendation of the commission, President Truman, in March of 1951, issued Executive Order 10219, which stated:

> Assemble and analyze data on the requirements of civil air transportation and of the Department of Defense for aircraft of the types used by the civil carriers, and…to formulate such plans and programs, and initiate such actions as may be desirable to meet the requirements for civil air transportation and for the types of aircraft used by civil air carriers, including plans and programs for the transfer or assignment of aircraft from civil air carriers to the Department of Defense, when required to meet the needs of the armed forces as approved by the Director of Defense Mobilization, and to allocate aircraft of the type used by civil air carriers as required to meet the needs of the armed forces and to maintain essential civil routes and services (Post, 1996: 7).

The Military Air Transport Service (MATS) was charged with this undertaking. Representatives from civil air carriers responded to the MATS request to join the newly formed government-industry program called the Civil Reserve Air Fleet or CRAF. This group refined the Douglas Report and in December of 1951 signed a Memorandum of Understanding giving birth to the CRAF (Post, 1996: 7). The guidelines for this new relationship were then spelled out in *The Department of Defense Plan for the Civil Reserve Fleet* in March of 1952 (Reese, 2001: 15).

In 1953, President Eisenhower directed a review of the United States aviation policy. The result of this direction was two separate government documents. The first was *Civil Air Reserve Policy* written by the Air Coordinating Committee. This report stated that the government should "to the greatest extent practical, adjust its use of air transportation, so as to use existing unutilized capacity of US carriers." (Howard, 1996: 3) In addition, it stated that government agencies are often forced to base decisions on factors other than business.

The Hoover Commission released the other document titled *Report on Transportation*. The commission presented two main findings. First, all military airlift should be consolidated under one organization, MATS. Second, limit the MATS' peacetime operations to a level necessary to maintain minimum wartime readiness. In other words, peacetime operations of military airlift should be limited to the movement of personnel and cargo that cannot be moved by the commercial sector (Howard, 1996: 3).

The commercial aviation industry had found favor with Congress and garnered a considerable amount of the peacetime government transportation business. Moreover, they had found that transporting cargo and passengers for the government was a considerable source of revenue. This position was further strengthened when Congress directed, in the 1958 budget, that civil airlines transport 40 and 20 percent of MATS passenger and cargo requirements respectively (Howard, 1996: 4). This eased the concerns airlines had about losing business to the growing military air transportation system. The following year, however, the commercial carriers argued that the DoD was not obeying the Congressional directive. As a result of the ensuing hearings, the House Subcommittee on Military Operations laid a foundation for the first national airlift program. The Congress-directed policy that followed limited military air transportation missions to outsized cargo, security related items, or those in direct support of tactical operations, while allowing the commercial carriers to moving passengers and conventional cargo, even if the MATS missions had to fly empty (Evans, 1993: 6).

In 1960, a debate developed among the branches of service regarding mobility preparedness and the airlift support provided to all services. The House Armed Services Subcommittee reviewed the matter and found that MATS was allocating a majority of its

assets to the Strategic and Tactical Air Commands of the Air Force, leaving the other services looking to the civil sector for transportation support. As a result of these findings, President Eisenhower directed the DoD to increase its dependence on commercial airlift wherever possible (Evans, 1993: 7). Even though this would cost the DoD a lot of money, paying the airlines for services provided was considerably less costly than maintaining an organic fleet capable of providing an equivalent capacity (Serling, 1997: 297). Furthermore, these actions were aimed at ensuring the country maintain a viable commercial airline industry healthy enough to support the military during time of national emergency (Evans, 1993: 7).

The United States now had a framework to define a mutually supportive agreement between the civilian airlines and the military airlift system. This relationship has continued with only minor changes, and was reaffirmed in June of 1987 by President Reagan when he signed the National Airlift Policy directive (NSDD-280). See Appendix A for the full text of this directive. This directive states in part: "The national defense airlift objective is to ensure that military and civil airlift resources will be able to meet defense mobilization and deployment requirements in support of US defense and foreign policies. Military and commercial resources are equally important and interdependent in the fulfillment of this national objective." (Executive Order, 1987)

First Activation of the CRAF

On 18 August 1990 the Military Airlift Command (MAC) activated Stage One of the CRAF for the first time in its history. From CRAF Stage I, 17 long-range international passenger and 21 long-range international cargo aircraft were called to

action. The 38 aircraft were selected from 16 different carriers to minimized economic impact (Matthews, 1996: 42). Airlines also volunteered additional aircraft in hopes of preventing any further activation. This commercial augmentation provided MAC an additional 1,920 passenger seats and 490 tons of cargo capability per day (Matthews, 1996: 42). The primary purpose of this activation was the increase in passenger capability, needed to move troops to the Middle East to mate up with the propositioned stock. Overall, CRAF aircraft moved 60 percent of the troops and 25 percent of the cargo during the period of August 1990 through May 1991. Stage II of the CRAF was activated on 17 January 1991, bringing the total number of commercial aircraft available to MAC to 77 passenger and 39 cargo planes (Chenoweth, 1993: 13).

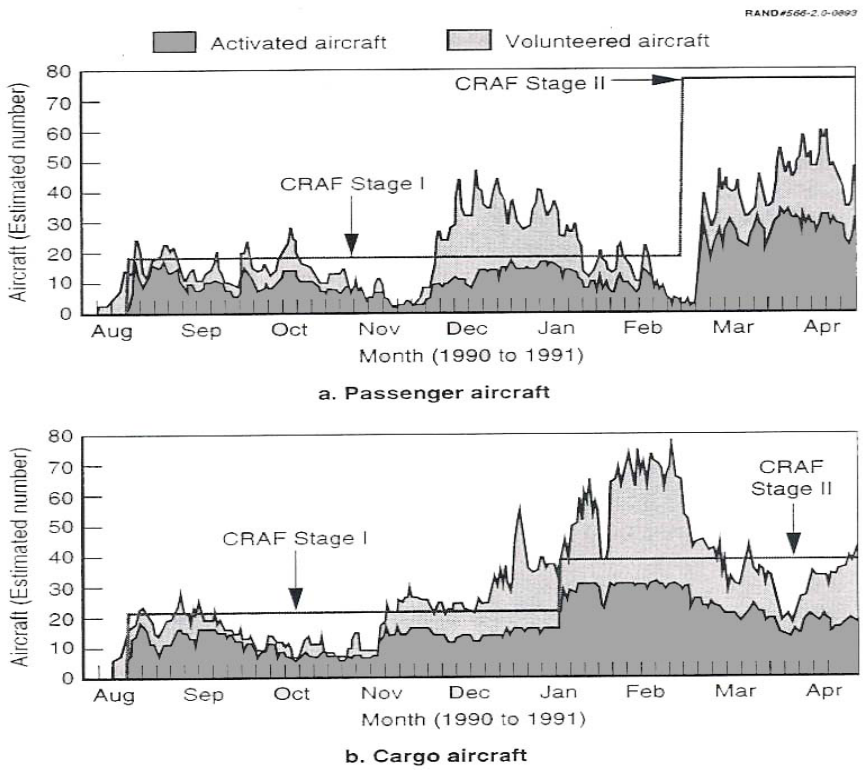

Figure 2 – Estimated Aircraft Used in Operation DESERT STORM

(Chenoweth, 1993: 14)

The crisis in the Middle East forced the airlines to make changes in their operations. These included rerouting, reduction, or elimination of routes in the region, and the prohibition of planes remaining overnight in the Mideast. Additionally, the conflict caused a marked increase in US fuel costs. The airlines then began to raise fares and impose a surcharge on passenger travel. Furthermore, insurance companies began increasing premiums on the airlines' war risk insurance, and when the CRAF was activated, many insurance companies canceled air carrier policies (Post, 1996: 24). The looming conflict, operating restrictions, and rising fuel and insurance costs resulted in predictions of a bad financial forecast for commercial aviation (Thomchick, 1993: 43).

Two government insurance programs exist to provide coverage to air carriers called to service for the country. The first is War Risk Insurance, established under Title XIII of the Federal Aviation Act of 1958. This program covers contract airline operations being carried out overseas, and only if other insurance is unavailable or if rates are unreasonably high. However, this program is not complete in its coverage and leaves the carriers vulnerable in three mission areas. First, insurance coverage applies only to mission legs flown outside the CONUS. Next, there are no provisions to cover air carrier ground operations set up to support these contract missions. Finally, crew life insurance is not covered (Evans, 1993: 27). These limitations placed a large amount of risk on the carriers.

To alleviate some of the financial risk, a stopgap plan was established. The DoD Indemnification Program was meant to fill in where Title XIII Insurance left off. Under the program, an airline could file a claim with the government to pay for losses not covered by Title XIII Insurance (Evans, 1993: 27). Following the Gulf War, Congress

made changes to the Title XIII Insurance Program, lowering the risk to air carriers for committing aircraft to national service and ensuring they would not be overly burdened financially with the loss of an aircraft (Daly, 1997: 7).

The effect of fuel prices on the cargo carriers was to a lesser degree since they are not as sensitive to increased fuel costs as the passenger carriers are since fuel costs make up less of the overall expense of operations in relationship to pickup, delivery, sorting and the cost of operating aircraft, but they were feeling the financial stress nonetheless. Initially, cargo rates remained unchanged, but as the conflict continued, cargo companies needed to increase revenue cover their operating cost. Route restrictions increased mileage and the loss of aircraft to CRAF activation, eventually led to the cargo carriers assessing a surcharge on shipments (Thomchick, 1993: 44).

Decreases in passenger volume, plus rerouting and cancellations, began to take its toll on the financial health of the air carriers. Delta Airlines was the first to report financial hardship when it posted its first loss in nearly ten years. Other airlines looked for relief through restructured operations, thus reducing their labor force. Some even sold route rights and hubs. Additionally, airlines began to apply to the Federal Aviation Administration's (FAA) war-risk insurance program (Thomchick, 1993: 44).

When the initial deployment was complete and the war began, the strategy at MAC turned to sustainment. The second stage of CRAF was partially activated in January of 1991 by the Secretary of Defense acting on the recommendation of the Commander in Chief of MAC. This activated 40 long-range commercial cargo planes. In addition, the airlines volunteered another 38 aircraft (Matthews, 1996: 43). The long

lead-time for the force build-up in the Mideast meant a full stage two CRAF activation was not necessary.

The use of CRAF during Desert Shield/Desert Storm provided an opportunity to evaluate the program to find out what worked and what did not. The CRAF proved itself as a key element in the strategic mobility triad. A RAND study of CRAF operations during Desert Shield/Desert Storm suggests three factors that point to the importance of the CRAF:

> 1. As more units return from overseas locations, future deployments could be just as intensive as ODS *[Operation DESERT STORM]*, especially if the period of deployment is substantially shorter.
>
> 2. Declining military budgets make cost-effective programs such as the CRAF more important.
>
> 3. CRAF performed well during Desert Shield and Desert Storm. It provided the military valuable additional capability and worked better than many expected for a first activation.
>
> (Chenoweth, 1993: 1)

Not only did the activation of the CRAF provide MAC with additional airlift capacity, it also provided the air carriers with much needed revenue. In 1992, the DoD, through the newly established Air Mobility Command (AMC), needed to ensure the CRAF program continued to flourish. This required an analysis of the incentive programs that exist to stimulate participation in CRAF.

Chapter 3 – CRAF Structure, Operation and Incentives

Structure of the Civil Air Reserve Fleet

The CRAF is divided into three distinct segments: international, national, and aeromedical evacuation. These three segments provide AMC the flexibility to provide a tailored response to actual lift requirements. Further distinction is made in the international and national segments. The international segment is subdivided into a Short-Range and Long-Range section, while the national segment is separated into domestic and Alaskan sections. Aircraft are assigned to segments based on performance and capability (Department of the Air Force, 2002: 11).

The long-range international section is the pivotal section of the CRAF and is intended to augment the organic military capabilities that exist with the C-5, C-17, and C-141 aircraft. Participating civil aircraft must be capable of transoceanic operations and would be used to transport both passengers and cargo for minor contingencies up through national defense emergencies.

Stages and Activation

The Civil Reserve Air Fleet, besides being organized in segments and sections, is further organized in stages, called into action when necessary. When signing up for CRAF, participants agree to commit specific aircraft to each of the different stages. Also, aircraft allocated to Stage I are automatically assigned to Stage II (Air Mobility Command Public Affairs Office, 1999).

Committed Expansion or Stage I focuses on long-range international airlift capability and can be used during minor regional contingencies when AMC organic airlift capability cannot simultaneously meet deployment airlift needs and its other commitments. Stage II, called Defense Airlift Emergency, is used during partial national mobilization to support US troops in a one major theater war (Department of the Air Force, 2002: 12).

The final level is Stage III, also known as National Emergency. This stage will be activated should the US declare a defense-oriented emergency or become involved in two major theater wars. The Commander in Chief of USTRANSCOM, with approval from the Secretary of Defense, may activate CRAF stages to augment military airlift when required. When any stage is activated, all aircraft allocated to that stage may be used (Department of the Air Force, 2002: 12).

CRAF Incentives

After the CRAF was activated during Operation DESERT SHIELD/STORM, many of the major carriers began to question their participation in CRAF. In fact, both American Airlines and United Airlines withdrew from the CRAF for a period of time, and other carriers decreased their participation to lower their potential risk of being activated. In order to maintain this critical portion of the nation's strategic mobility triad, the DoD determined that it was necessary to provide incentives to the airlines in order to encourage participation in the CRAF. Since that time, a number of incentive programs have been added to the CRAF contract. These incentives range from military airlift

contracts to ensuring other non-DoD federal government business to civilian use of military airfields (Daly, 1997: 7).

The largest in terms of monetary outlays is the issuance of peacetime contracts based on CRAF participation. This has always been the major portion of the CRAF contract since the inception of the program. By committing aircraft to the CRAF, the DoD guarantees a carrier a portion of business based on the mobilization value of its commitment - a number based on the amount of capability the airline has signed up to the CRAF. It is important to stress this business is guaranteed, and will consist of the airlift of government cargo and personnel. This amount of the military's airlift business is set-aside for commercial carriers, regardless of the workload of the military airlift forces. AMC calls this their "fixed buy" contract, and uses this on predictable channel missions to augment the organic fleet. When flying under the "fixed buy" contract, the whole aircraft is chartered, not just a portion of it (Glaze, 1998: 19). More details on Mobilization Values are provided later in this chapter.

In addition, membership in the CRAF allows a commercial air carrier to be eligible for other individual missions that are unforeseen at the time of the contract. These missions, bought under an "expansion buy" contract, are awarded to civilian airline companies when military airlift forces are unable to meet airlift needs. These missions are not guaranteed but still represent a substantial portion of the cash outlay, quite often exceeding the value of the "fixed buy" moneys for the year (Glaze, 1998: 20). Figure 3 shows the dollars AMC spent on fixed and expansion buy contracts over the last 10 years.

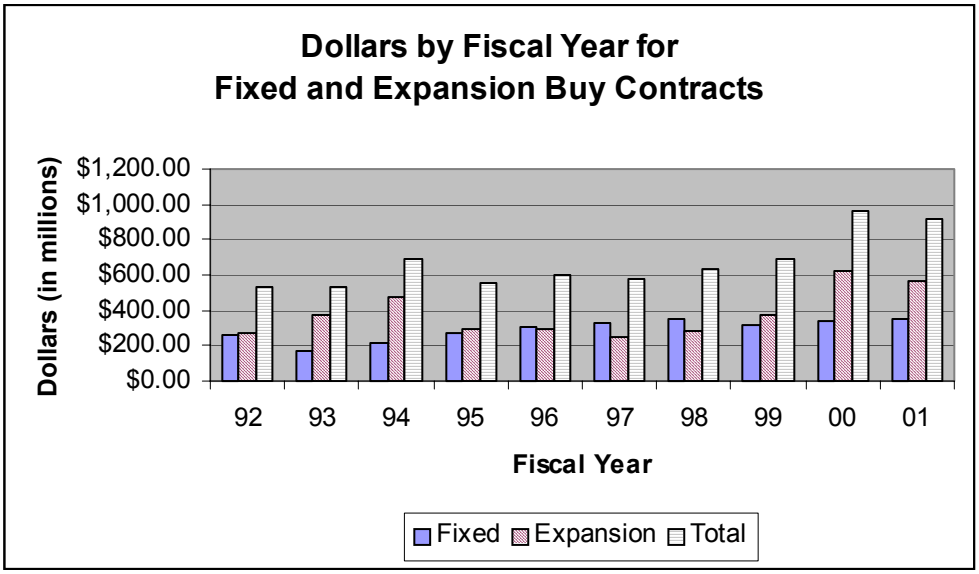

Figure 3 – Dollars by Fiscal Year for Fixed and Expansion Buy Contracts (Greene, 2002)

Another important CRAF incentive has been the General Services Administration (GSA) Domestic Small Package Contract. This contract, which allows for the shipping of federal and DoD packages of less than 150 pounds, is awarded to carriers based on price and service. The important note about this contract is that it was not linked to CRAF involvement until 1996, and now only CRAF carriers are considered when awarding these contracts (Glaze, 1998: 18).

Allowing CRAF carriers to list suitable military installations as preplanned alternates in case of poor weather at their destination is another incentive for CRAF participation. Civilian Access to Military Installations (CAMI) allows carriers to list these military airfields on flight plans requiring aircraft to carry less fuel, while meeting FAA regulations regarding weather diverts. There is a possibility that this program may expand to create joint use airfields in the future. Carriers are pushing for this option in

both CONUS and OCONUS locations, especially small package carriers like FedEx (Glaze, 1998: 22).

In addition, two other programs were added by Congress and managed by the General Services Administration (GSA) in the mid 90s to reward carriers for participating in the CRAF, highlighted below. Both programs were added and expanded since the Gulf War to convince major carriers to come back and stay in the CRAF. These two efforts enlisted a total government effort to support CRAF involvement.

GSA City Pair Program

The first of these is the GSA City Pairs Program, in which the GSA contracts government airfares over traveled city pair routes for the entire federal government. The General Services Administration developed the GSA City Pair Program (CPP) in 1980 to provide Federal Government travelers discounted airfare with no restrictions. However in 1994, when AMC failed to meet required capacities in all CRAF segments, the decision was made to pursue additional incentive for air carriers to boost CRAF participation. In 1995 the GSA initiated the link between CRAF enrollment and the CPP (Glaze, 1998: 18).

Under the new guidelines, only those airlines that participated in the CRAF were eligible for the CPP. The one exception to this was to allow air carriers who were technically disqualified from the CRAF to compete in the CPP with other CRAF members. Some airlines are ineligible to participate in the CRAF because of the program's aircraft and aircrew requirements, i.e., small airlines, with small aircraft fleets (Glaze, 1998: 18).

The 2002 City Pair Program contract was awarded to 14 US airlines and covers over 4,900 routes (4,269 domestic and 686 international). Table 1 shows the CPP awards for FY2002, sorted by estimated dollar value.

Table 1 – FY 2002 GSA City Pair Program Awards

Carrier	City Pairs	Estimated $ Value
Delta Airlines	894	$274,770,787
United Airlines	1,104	$274,640,918
American Airlines	883	$201,963,874
US Airways	673	$177,025,892
Northwest Airlines	358	$ 79,624,151
Continental Airlines	133	$ 37,006,734
Southwest Airlines	282	$ 29,675,262
America West Airlines	240	$ 28,685,446
Alaska Airlines	92	$ 24,084,274
TransWorld Airlines LLC	92	$ 10,126,227
Midwest Express	49	$ 9,880,948
Midway Airlines	117	$ 9,216,679
AirTran Airways	24	$ 4,295,970
American Trans Air	14	$ 1,930,705
TOTALS	**4,955**	**$1,162,927,867**

(General Services Administration, 2002)

Federal travelers on official business receive unrestricted coach fares at over 70 percent less that those offered the general public (General Services Administration, 2002). In addition to the cost savings for the government travelers, the CPP provides many other benefits including:

No advance purchase requirement
No minimum or maximum stay requirement
Tickets are fully refundable
No seating capacity controls or blackout periods
Fare price will not change during contract period (GSA, 2002)

The GSA projects the CPP will save the Federal Government approximately $3.0 billion in FY02. However, the government is not the only winner is this program. When a carrier is awarded a city pair, they are entitled to the government's business on that segment. They are awarded the route based on the cost and level of service provided; the best value wins. It is significant to note that the Department of Defense accounts for 80 percent of all official government travel.

Worldwide Express (WWX) Program

The other new initiative is Worldwide Express (WWX), another agreement with GSA. In WWX, GSA and AMC have teamed to create a worldwide, small package, time-definite delivery service. This program is similar to the GSA small package contract, only on a worldwide basis. As with the CPP, this program has consolidated all government business, not just that of the DoD, and is given exclusively to CRAF members.

Worldwide Express is the federal government's fast, reliable, time-definite, door-to-door express package service for high priority shipments. WWX began as a response to DoD customers' requests for express time-definite delivery of high priority parts. Innovative DoD supply chain programs such as lean logistics and 2-level maintenance demanded such service.

Additionally, official research indicated that there was a tremendous amount of cargo movement without government oversight and in-transit-visibility (ITV). In an effort to capture this movement, the DoD and GSA entered into a partnership to contract for the US Government an international small package delivery service. The acquisition

strategy for this service is a "best value" contract to purchase commercial service from express carriers (HQ AMC/DOY, 2002).

Activated 1 October 1998, the contract provides services by CRAF carriers to give the customer time-definite delivery, door-to-door delivery, ITV, and a host of other services for high-priority documents and packages weighing less than 150 pounds. Although this is a commercial service acquisition, WWX is tailored to meet the needs of the DoD warfighter, and it is also designed to provide international express delivery to any other federal agencies wanting or needing this type of service (USTC J4-BC, 2000: 30-31).

Program usage is mandatory for DoD shippers and for civil agencies listed in the contracts' appendix, "Mandatory Contract Users." The overarching goal was to leverage the US Government business base to provide the best rates and services for DoD customers. Government officials estimate that WWX saves anywhere from 40 to 60 million dollars per year (USTC J4-BC, 2000: 31).

The WWX-2 contract provides "Worldwide International Commercial Express Service" for DoD. Express service continues to include all of the services mentioned above. However, the WWX-2 contract is now a "worldwide" award meaning that all awarded carrier routes are available to DoD (HQ AMC/DOY, 2002).

The following is an example of the new term "worldwide." Under the previous WWX contract, service for a shipment from CONUS to US Virgin Islands is available only with FedEx, and a shipment from CONUS to Turkey is available with UPS or FedEx. Under the newly awarded worldwide WWX-2 contract, the DoD user has a choice of any of the three-awarded carriers (DHL, FedEx, or UPS) for the two shipment

options listed above. The cost of the program is dependent on the carrier selected and the destination (HQ AMC/DOY, 2002).

WWX-2 has been awarded to these three carriers without any lane or theater restrictions. Any route an awardee offers commercially is available for use to the eligible government user under this contract. Commercial routes available to the user are CONUS (includes Alaska, Hawaii, and Puerto Rico) to OCONUS (all international locations), OCONUS to CONUS (retrograde routes), and OCONUS to OCONUS (lateral routes). As mentioned earlier, CONUS to CONUS small package shipping is covered under the GSA domestic small package contract (HQ AMC/DOY, 2002).

WWX-2 is for expedited movement of high-priority cargo and if the shipper sends a package via WWX-2, the package will be delivered within the timeframe stated by the carrier. Therefore, there is no Required Delivery Date requirement for shipping via WWX-2. The program is limited to movement of only high transportation priority cargo requiring time definite delivery. As long as a shipper provides a viable fund cite and has a qualifying shipment, they should take advantage of WWX-2 (HQ AMC/DOY, 2002).

Mobilization Value

Another aspect that has encouraged CRAF involvement has been the flexibility of the mobilization value points system. If program incentives are sufficient to entice carriers to participate in the CRAF program, there must be a method to determine their relative value to AMC's mission. Specifically this is required to quantify real world deployment value to AMC of various aircraft and carriers. This process helps define

rates of compensation to the aircraft owners. Toward this end, AMC created the concept called Mobilization Value (MV) (Department of the Air Force, 2002: 18).

Mobilization Value is defined by AMC as the relative measure of the value that the Department of Defense places on commercial aircraft for meeting wartime requirements. Although the definition refers specifically to commercial platforms, the calculation of this value uses many of the same concepts and techniques as military airlift and tanker aircraft. All of these calculations are based on procedures defined in AMC Instruction 10-402, Civil Reserve Air Fleet Operations. This includes determining the aircraft's Productivity Factor (PF) and Productive Utilization Rate (PUR). These concepts are used to determine minimum aircraft performance for MV point calculation. For example, expectations on CRAF are to conduct their missions with a single inbound and single outbound leg. Since during the deployment, when CRAF would most likely be used, only the inbound leg would carry required cargo or passengers, this will be the only productive leg, resulting in a PF of 50 percent. Then positioning legs are factored in, resulting in an overall PF of 47 percent (Department of the Air Force, 2002: 18).

The productivity factor in turn impacts the utilization rate. For participation, CRAF aircraft are expected to maintain a minimum of 10 hours per day utilization rate. This rate is then used to calculate the Productive Utilization Rate by multiplying in the PF. This results in a PUR of 4.7 hours per day during which the carrier aircraft must provide useful cargo carrying flight time (Department of the Air Force, 2002: 18).

It is important to know where these calculations originate, because they become the basis of the MV bonuses that emphasize the various gaps in AMC airlift capability CRAF was designed to fill. Bonuses are then added to reward carriers for specific

aircraft capabilities. For example, a bonus of 20 percent of the MV value is added to aircraft capable of carrying its full payload on intercontinental flights of over 5000 miles nonstop (Department of the Air Force, 2002: 18). To emphasize the massive strategic backfill that CRAF provides, "each aircraft committed to the CRAF is normalized against the B747-100 characteristics of speed, payload, and utilization rate." (Daly, 1997: 16) There is an emphasis on passenger carrying capability as well. This makes sense in terms of organic AMC capability, which is designed for large scale, oversize cargo, not passenger movements.

Other bonus areas are focused on specific goals. A 100 percent bonus is awarded for a 767 in the Aeromedical segment, because of its ideal nature in filling a critical shortfall in AMC Aeromedical airlift capabilities. Moreover, AMC has purchased kits containing litters and other aeromedical equipment specifically built to fit 767 aircraft to convert them into flying hospitals (Air Mobility Command Public Affairs Office, 1999). Finally, MV points as a whole can be doubled for participation in CRAF Stage I, because of the greater potential for activation (Daly, 1997: 16). Thus, from an AMC viewpoint, MV is designed to effectively highlight those carriers and aircraft that best fill its wartime airlift shortfalls.

How then does the MV translate into real dollar gains for the various CRAF participants? Ironically, carriers do not see the added gains of their Mobilization Value during wartime activation. Instead, MV is a tool used to funnel peacetime missions to carriers, providing an ongoing incentive to remain CRAF participants. Based on historical data, about 50 percent of the overall CRAF fleet capacity is available for day-to-day taskings by AMC. This translates into roughly 20 aircraft per day (Daly, 1997:

15). AMC uses MV to allocate who gets this day-to-day business. In theory, a carrier will receive the same percentage of business as his mobilization points make up of the overall AMC MV.

Teaming Agreements

Obviously, real world dynamics can limit how quickly specific carriers can respond to short notice AMC needs. Thus, the concept of joint carrier 'teams' has developed where carriers can join their efforts together and form a single organization in terms of taskings generated based on their collective MV. The arrangement, originally created in 1987 under the name Joint Ventures, is now known as Teaming Agreements (Glaze, 1998: 35). In fact, under this structure, carriers can trade or even sell off their MV generated business by transferring or selling their MV points to other carriers. This option was added in 1994, and did not restrict with whom the carriers could trade MV points (Glaze, 1998: 37). This is where CRAF participation can be a true business asset. For example, by promising aircraft to CRAF, and then selling off the additional peacetime business, a larger carrier can generate additional revenue, without actually changing its business model or operations. On the other hand, a smaller carrier can buy MV points, which will result in a guarantee of government business for a relatively steady stream of revenue, without exposing itself to the potential risk and disruption of a CRAF activation that could put a carrier of its size out of business. See Appendix B for the current list of CRAF teaming arrangements.

Ironically, portions of this program were victims of their own success. From 1994 to 1997, CRAF participation increased by 80 percent, eventually exceeding DoD

requirements (Glaze, 1998: 38). As a result, the MV sell off option between non-team members was reduced to only those MV points assigned to Aeromedical segments. Thus, the Teaming Agreements became even more attractive, with the number of teams increasing by 22 percent in one year alone (Glaze, 1998: 38). However, for the smaller carrier who did not wanted to become part of a Teaming Agreement, there was now limited incentive for them to participate in CRAF, as these smaller firms were the ones most exposed if CRAF was activated. These concerns resulted in AMC amending the program again, this time to allow CRAF participants who are not team members to still be able to sell or trade their MV points to other carriers. Team members are still restricted to trades among their team members. This has resulted in a more level playing field for the smaller carrier, resulting in a wider range of participation in the industry.

Since MV represents a true business asset or liability from a commercial point of view, it is not surprising to note that different carriers take totally different approaches to CRAF participation. For example, the two major US cargo carriers take the extreme opposite stance on levels of participation. Federal Express has committed 100 percent of its wide body assets to CRAF, while United Parcel Service had chosen to only sign up the minimum number of aircraft required to participate (Daly, 1997: 18). Another factor in this decision process is that by law no carrier's revenue from DoD customers can exceed 40 percent of their total revenue. Teaming diversification also is a critical decision for carriers. MV is awarded in terms of both cargo and passenger loads. If a carrier transports cargo only, it will forfeit its passenger portion of its AMC allocation. By teaming with a passenger-only carrier, both companies can retain full values of their respective AMC allocations.

However, there are also business drawbacks to participation in a Teaming Agreement. The primary concern is liability. All team members are legally liable for any contract default by another member of the team. While this clause has never been exercised, it still exposes carriers to legal actions based on the actions of others. Thus team members must be very cautious when allowing new members to join their team. MV points allow the carriers to be rewarded based on their level of participation in the CRAF program.

This chapter has highlighted the major incentives of the CRAF program mainly focusing on the post Gulf War changes. These included Teaming Agreements, GSA City Pairs, and Worldwide Express. These changes were necessary to ensure the CRAF program met its participation goals.

Chapter 4 – Airline Economic Review

The events of September 11th will not be soon forgotten. These acts of terrorism have forever changed the American way of life. There are far reaching social and economic ramifications from the attacks themselves and from the changes we have made to the way we look at life, the way we work and the way we play. In this chapter the airline economic landscape prior to and after 11 September 2001 will be reviewed. Additionally, the operational effects of a four-day shutdown to the commercial airline system will be covered. These two areas are directly related to the actions taken by Congress in the immediate aftermath of the terrorist attacks.

Pre-September 11th

One of the most dramatic, and highly publicized, stories resulting from the terrorist attacks comes from the US commercial aviation industry. The airlines claimed to suffer large passenger decreases due to the nature of the attacks, thus causing severe financial distress. However, the complete grounding of all commercial flights for nearly four days may not be the only cause of strife in commercial aviation. The airlines were experiencing fiscal difficulties prior to September 11th. As early as the first quarter of 2001, the US major air carriers were showing their first net loss in nearly five years. This was not only the first quarterly loss since the last recession, but was also the largest loss since 1992. Perhaps the weak economy had finally begun to catch up with the airline industry, or more accurately, most of the industry, since Southwest Airlines, and to a

lesser extent Continental Airlines, had managed to remain in the black (O'Toole, 2001c: 121).

Following the poor showing from the first quarter, economists began making predictions of industry-wide losses for the entire year of 2001. In June, Sam Buttrick, airline analyst at UBS Warburg said, "if current revenue trends persist, with no further deterioration, the airline industry will lose money this year" (O'Toole, 2001c: 121). Was this setting the stage for the airline industry as a whole to begin looking for a way out of their financial troubles?

As the year continued, so did the fiscal plight of the air carriers. The second quarter brought the worst performance in the industry since 1992, and analysts on Wall Street warned the end to this trend was not in sight. Second quarter losses topped $400M and it was only the third time in the last 30 years that US air carriers posted a loss for the June quarter. Sam Buttrick soon predicted third and forth quarter performance would also be poor (O'Toole, 2001b: 121).

Not only has the overall US economic downturn taken a toll on the airline industry, but there was also a more notable shift in business travel during that time period. Business travel declined in both the first and second quarters of 2001. Corporate America has continued to find other ways to do business. Technology is taking the place of tickets. Continued improvements in video and Internet-based conferencing technologies are reducing the necessity and expense of air travel for the businessman. This is costing the airlines severely since the majority of airline revenue is generated by the more expensive business airfares. Michael Lineberg, an airline analyst for Merrill Lynch, suggests the main reason for losses in the second quarter is the 15 to 20 percent

drop in business travel. Moreover, this trend may not reverse soon. Slumping profits are causing companies to take a closer look at corporate travel budgets (O'Toole, 2001b: 121).

September 11th

During the hours immediately following the attacks, the Department of Transportation initiated SCATANA, the Secure Control of Air Traffic and Navigation Aids. SCATANA is a Department of Defense, Department of Transportation, and Federal Communication Commission plan used to provide an effective means of controlling US airspace during an Air Defense Emergency. An Air Defense Emergency is initiated when an attack on the continental United States, Alaska, Canada, or Greenland by aircraft or missile is probable, imminent, or taking place. The intent of initiating SCATANA is to first gain control of all civil and military aircraft flying within, entering or departing US airspace. Second, it limits air traffic, consistent with air defense requirements. The final aspect of SCATANA is the selective control of ground-based navigation aids to deny the enemy reliable navigation guidance. It is the combination of these three principles that gives NORAD, the North American Aerospace Defense Command, the ability to manage the airspace over the US and Canada in time of crisis (FAA, 2001: Appendix 7, Sec IV).

The government-directed grounding of all non-essential aircraft (i.e. all non-military aircraft) caused major ripples in the commercial aviation pond. Within two to three hours, all commercial aircraft were on the ground and the skies were open to only military aircraft. With the industry shut down, all airline officials could do was sit down,

develop new corporate strategies, wait for the airways to reopen, and try to figure a way out of their suddenly increasing financial problems. The already dismal fiscal picture for the airline industry now had more misfortune. First, with aircraft grounded for four days, the revenue hungry airlines were starved for income from passenger fares. Passenger airlines spend about $340 million per day in fixed costs, which means for four days, it lost 1.36 billion dollars. Secondly, the declining passenger levels industry-wide would now further suffer from the public fears following these terrorist actions. Airlines estimated a 40 percent drop in passenger loads following the restart of business, resulting in $3.36 billion in additional losses. Also, the cargo carriers figured a $300 million loss, bringing total industry losses to nearly $5 billion (The Air Transport Association of America, 2001).

Post-September 11th

The downward spiral that began in the first quarter was now out of control because of the attacks. The airlines knew cuts were necessary prior to the September 11, but these actions were either contractually or politically impossible for carriers to perform (Pinkham, 2001: 49). Now that the landscape of passenger travel had been altered, the airlines seized the opportunity to make much needed strategic adjustments. For example, most airlines eliminated service to some locations, United Airlines eliminated its shuttle service, while US Airways, United Airlines, American Airlines, and Continental Airlines all accelerated fleet changes and aircraft phase-outs. Some critics charged that changes were minimized in areas sensitive to congressional supporters of the airlines. Now, more

than ever, the air carriers needed the support of industry-friendly senators and representatives (Pinkham, 2001: 49).

These changes were not well received by the unions. Union leaders believed many of the cuts enacted by the airlines were planned well in advance. Furthermore, the unions felt powerless in the whole process of airline cutbacks. Airline management affected change through the use of the "force majeure" clause in the labor contracts (Field, 2001: 43). This clause allows companies to deviate from their binding contracts with the unions during times of war, or due to "Acts of God." (Yale University Library, 2000) Management's decision to exercise the "force majeure" clause had the unions between a rock and a hard place. The unions could try to file grievances against the airlines for falsely using the clause. On the other hand, they had to be cautious not to appear unpatriotic during a time of national emergency (Field, 2001: 44).

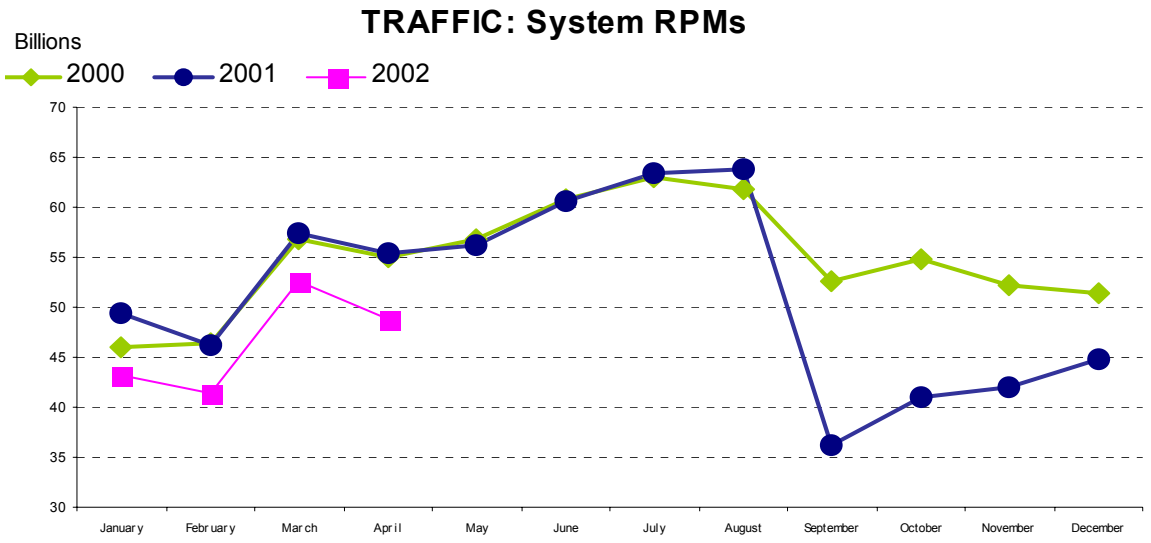

Figure 4 – Domestic Revenue Passenger Miles

(Air Transport Association, 2002a: 2)

Several interesting observations can be made from the April 2002 Traffic Summary in Figure 4. This chart summarizes system revenue passenger miles, and is published by the Air Transport Association. A revenue passenger mile is one paying passenger transported one mile and is the aviation industry term used to quantify business volume (Air Transport Association, 2002b). First, note the similarities in the overall trends between both 2000 and 2001. The up and down slopes are remarkably comparable and the overall slopes of the lines, except for the September anomaly, are very much alike. Secondly, observe the recovery during the month of October. Is this picture due to September 11, or a part of the normal cycle of business for the airline industry? (Air Transport Association, 2002c)

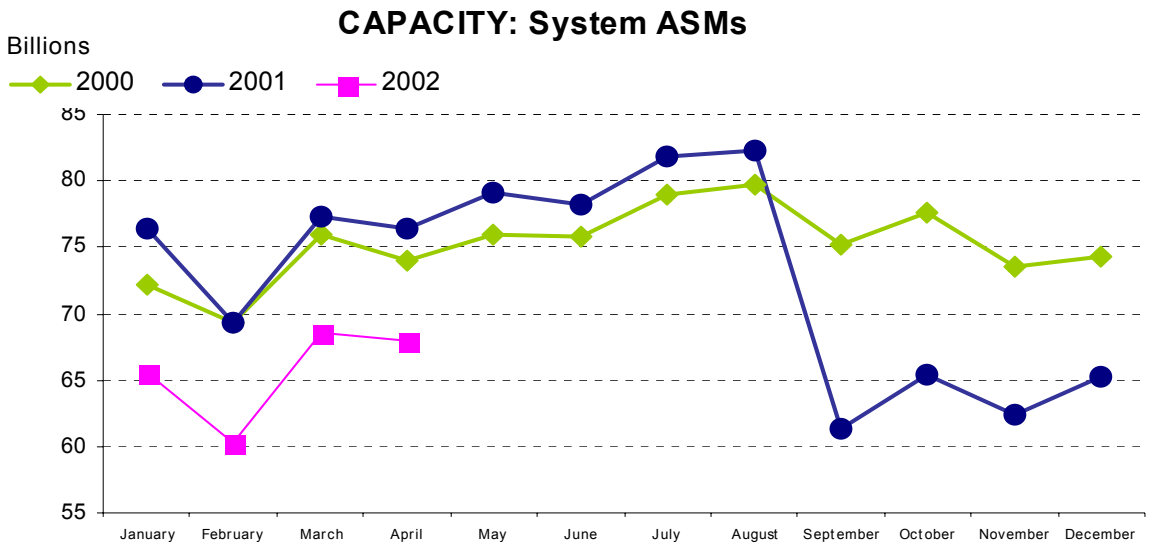

Figure 5 – Domestic Available Seat Miles

(Air Transport Association, 2002a: 2)

Available seat miles (ASM) are similar to RPM except they measure one seat transported one mile, the seat can be empty or full (Air Transport Association, 2002b). An examination of Figure 5 points to an overall increase in ASM during the second and

third quarters of 2001. Following September 2001, although lower by approximately 20 percent, the trends are surprisingly similar to previous years.

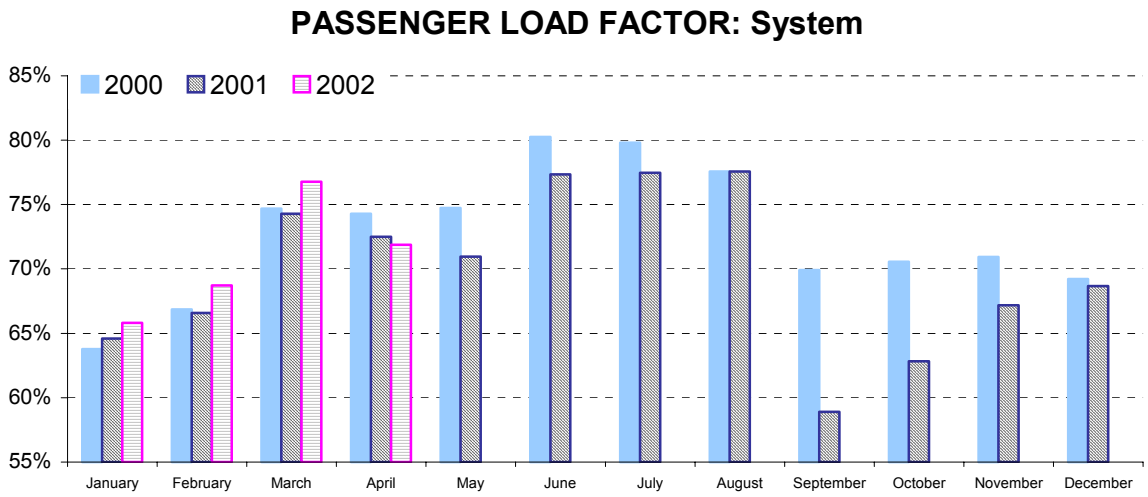

Figure 6 – Domestic Passenger Load Factor

(Air Transport Association, 2002a: 2)

Domestic passenger load factor, in Figure 6, is a measure of the percent of total seats filled by paying passengers (Air Transport Association, 2002b). This figure shows a steady increase in passenger travel the first quarter of 2001 and a steady trend during the summer. Then there is the large drop in September 2001 followed by an upward trend until March 2002. Observe that the December 2001 load factor is nearly recovered the previous year's value. It is also important to understand since the spring holidays fell in March this year, March 2002 is higher than previous years and April 2002. Finally it is significant to note that while the load factors have crept up, the airlines are operating a reduced schedule. This means fewer passengers on less planes results in a quicker perceived recovery (Air Transport Association, 2002c).

Congressional Bailout

There are many questions, which surfaced in the aftermath of Congressional bailout. Did the airlines really require the rapid bailout by the government or did they simply seize an opportunity for some quick cash? The major industry players, through the Air Transport Association, did some quick math following the attacks and subsequent shutdown. How accurate were these analyses and was there too much haste in pleading their case to Congress for monetary assistance? In reality, not counting the shutdown days, is the overall financial situation all that different now than it was before 11 September? According to *Airline Business*, a "back of the envelope" computation produced a revenue loss of $1.1 billion for the four-day shutdown. Estimating the cash lost is more difficult. Carriers would not have incurred the variable costs related to daily operations, but there were significant fixed costs that continued to accumulate (O'Toole, 2001a: 83).

Ten days following the terrorist attacks, with the country trying to recover from the aftermath and the testimony over, Congress passed the Air Transportation Safety and System Stabilization Act. The law provides the airline industry with 5 billion dollars in upfront cash, plus an additional 15 billion dollars in government-backed loan guarantees. The law also established the Air Transportation Stabilization Board to review and approve the federal credit application for loan guarantees. This board is composed of the Secretaries of Transportation and Treasury, and the Chairman of the Federal Reserve Board (*Congressional Record*, 2001a: H5894).

It only took the Senate two weeks to realize what it had done in letting the airline bailout package fly through Congress. The *Congressional Record*, on 3 October 2001,

indicates that some legislators believe additional steps are necessary to make the airlines accountable for the unprecedented inflow of taxpayer monies. Senate members were also concerned with the disbursement of the taxpayer's funds to airlines. In addition, there was a realization by Congress that the airline industry is going to be reshaped in the next few years and this money package could act as a major influence (*Congressional Record*, 2001b: S10144).

Although originally focused on the short-term requirement to get the public back in the air, Congress now recognized possible ramifications to their actions following the attacks in September. The large airlines are attempting to steer the disbursement of the loan guarantees, which could mean trouble for the smaller carriers, and ultimately the American public (*Congressional Record*, 2001b: S10144). The immense responsibility of weighing airline requests with the future of the industry lies with the Air Transportation Stabilization Board.

Chapter 5 – CRAF Data Analysis

The shutdown of the nation's aviation industry following the attacks of 11 September had many implications on the way airlines conduct business. Planning and implementing changes in security requirements, stimulating passengers to travel by air again, and developing a plan for financial recovery are all at the top of airline business agendas. For this research, I focused on the financial recovery problem and, in particular, how government business may or may not affect the recovery process since September 2001.

To that end, I wanted to determine if there had been a significant change in CRAF participation since September 2001. Did the air carriers' quest for business lead them to the government once again? Since contracts are awarded based on mobilization value and mobilization points are awarded for CRAF participation, I looked at the AMC HQ Form 312 data for any changes in carrier participation.

Data Preparation

HQ AMC Directorate of Operations, Civil Air Division (HQ AMC/DOF) publishes the Civil Reserve Air Fleet (CRAF) Capability Summary, AMC HQ Form 312, to present the current status of the CRAF. This form is published quarterly or more frequently if there is a change in CRAF participation. This data consists of aircraft participation numbers by carrier and CRAF segment. The form also contains a summary of CRAF capability and overall aircraft summary.

Since I was limited to eight months of data in the Post-September 2001 subset, I chose to select eight months for the Pre-September subset to analyze two equal subsets. Therefore, the time frame for this study was January 2001 through May 2002. During this time HQ AMC/DOF published an AMC HQ Form 312 for the following months: January, February, April, July, October, November of 2001, and January and April of 2002. See Appendix C for this data. For any given month, the data I used was either as published or, if not published, I assumed it was the same as the latest published month, since the form 312 is not published monthly. For example, since no AMC HQ Form 312 was issued for March of 2001 the data for March was the same as February.

To look for possible changes in participation I divided the data set into two subsets of eight months each. The Pre-September 2001 set consisted of January to August 2001 and the Post-September 2001 subset consisted of October 2001 to May 2002. Each subset included data for each CRAF segment (i.e. Long Range International Passenger, Aeromedical Evacuation, etc.), and Aircraft Summary. Note that September 2001 data was not considered for two reasons. First, no data was published for the month and second it was the event or trigger month and therefore used to separate the pre and post data subsets. The data gathered was not randomly selected and covered the entire population of months for the study period and assumed to be normally distributed.

Statistical Analysis

My null hypothesis was that the difference of the means of the number of aircraft participating in the CRAF (post and pre September) would equal zero. The alternate hypothesis was that the difference of the means was not equal to zero.

$$H_0 : (\mu_{post} - \mu_{pre}) = 0$$

$$H_A : (\mu_{post} - \mu_{pre}) \neq 0$$

Where: $\mu_{post} =$ Mean of Post-September data subset

$\mu_{pre} =$ Mean of Pre-September data subset

Figure 7 – Statements of Null and Alternate Hypothesis

Because the data set consisted of less than 30 data points, I chose the *t* Test as my test statistic to assess this hypothesis. Using a 95 percent significance level I selected α = .05 or $\alpha/2$ =.025 and utilized a two-tailed *t* test. We have n = 8 in each subset with (n-1) degrees of freedom yielding 8-1=7 DF for each or 14 DF total. The rejection region for this test will be a *t* greater than value of *t* selected from critical *t* table for α for where $t_{.025}$ = 2.145 (McClave, et al., 2001: 989).

$$|t| > t_{\alpha}$$

Figure 8 – *t* Test

I used JMP version 4.0.4 statistic software to analyze the Pre-September 2001 and Post-September 2001 data (Sall, 2001). Using the Fit Y by X one-way analysis of variance I computed for each data subset a mean, difference of means, and *t* statistic (Reynolds, 2002).

The results of this analysis are presented in the following sections separated first by CRAF segment, and then by CRAF Aircraft Summary. In each section there is a spreadsheet showing the results of the statistical analysis where the results are broken down by stage (i.e. Stage I). The spreadsheets list the Pre-September 2001 aircraft mean, Post-September 2001 aircraft mean, the difference of the means, the computed *t* value, whether the null hypothesis was rejected or accepted, and if there was a significant change. An item was identified as significantly changed, with 95 percent confidence, if the null hypothesis was rejected.

CRAF Segments

In Table 2 we see a significant increase in all stages of the Long Range International Passenger segment, and in Stage II of the Short Range International segment. While in Stage I and II of the Long Range International Cargo segment, Stage III of the Aeromedical segment, and in Stage III of the Domestic Service segment a significant decrease was observed.

There were several unique outcomes from the *t* test analysis. First, the observed data in Stage II Long Range International Cargo was constant within each subset but different between the subsets. This resulted in no standard deviation for each subset and therefore the inability to compute a *t* value for this item. However, there was a change that was significant. We also see that there was no change in Aeromedical Evacuation Stage II between the two periods, which also resulted in no standard deviation and the inability to compute a *t* value. Short Range International, Aeromedical Evacuation, Domestic Service, and Alaskan Segments do not have CRAF commitments to Stage I.

Furthermore the Domestic Service segment does not have a CRAF commitment to Stage II.

Table 2 – Segment Statistical Data

Segment	Pre Aircraft Mean	Post Aircraft Mean	Differences of Means	t Test	Reject or Accept H_0	Significant Change?
LRIP Stage I	45.000	50.875	5.880	47.000	REJECT	YES
LRIP Stage II	132.000	136.500	4.500	9.000	REJECT	YES
LRIP Stage III	386.625	549.250	72.625	75.824	REJECT	YES
LRIC Stage I	33.875	29.000	-4.875	-39.000	REJECT	YES
LRIC Stage II	81.000	74.000	-7.000	**	N/A	YES
LRIC Stage III	205.000	205.625	0.625	1.667	ACCEPT	NO
SRI Stage I *	N/A	N/A	N/A	N/A	N/A	N/A
SRI Stage II	18.000	23.500	5.500	11.881	REJECT	YES
SRI Stage III	90.625	89.500	-1.125	-1.125	ACCEPT	NO
AE Stage I *	N/A	N/A	N/A	N/A	N/A	N/A
AE Stage II	25.000	25.000	0.000	**	N/A	N/A
AE Stage III	56.125	31.000	-25.125	-201.000	REJECT	YES
DS Stage I *	N/A	N/A	N/A	N/A	N/A	N/A
DS Stage II *	N/A	N/A	N/A	N/A	N/A	N/A
DS Stage III	69.000	36.000	-33.000	-50.408	REJECT	YES
Alaska Stage I *	N/A	N/A	N/A	N/A	N/A	N/A
Alaska Stage II	4.750	4.000	-0.750	-2.049	ACCEPT	NO
Alaska Stage III	4.750	4.000	-0.750	-2.049	ACCEPT	NO

* Segment not part of this stage
** Standard Deviation equal to zero, t values cannot be calculated

Once the statistical analysis was completed, I selected each segment/stage combination that proved to have a significant change and charted the data to obtain a graphical representation of the trends. The vertical dashed line on each of the charts represents the trigger event, September 2001. These charts can be found in Appendix D.

To explain the decrease of aircraft in the Long Range International Cargo segment I did looked deeper into the data on the HQ AMC Form 312s. What I found was that most carriers had increased their participation, however a carrier with 5, 13, and 31

aircraft in each Stage I, II and III respectively, had dropped out of the CRAF. Upon further investigation I learned that Emery Worldwide Airlines suspended operations on 13 August 2001 (CNF Inc, 2001). With an explanation for a significant decrease in the Long Range International Cargo segment, I decided to remove Emery Worldwide Airlines from the data set and rerun the statistical assessment on this segment. The results from this reevaluation are displayed in Table 3. We now see a significant increase in aircraft participating in this segment. A graphical representation of this reevaluation is in Appendix E.

Table 3 – Long Range International Cargo without Emery Worldwide

Segment	Pre Aircraft Mean	Post Aircraft Mean	Differences of Means	t Test	Reject or Accept H_0	Significant Change?
LRIC Stage I	28.875	29.000	0.125	1.000	ACCEPT	NO
LRIC Stage II	68.000	74.000	6.000	**	N/A	YES
LRIC Stage III	174.000	205.625	31.625	84.333	REJECT	YES

** Standard Deviation equal to zero, t value cannot be calculated

Next I probed into the Aeromedical Evacuation segment decrease. The form 312 data shows that TWA withdrew its 767 aircraft from this segment following the AMR Corporation's acquisition of TWA. Further investigation reveled that during the acquisition, AMR Corporation took nine of TWA's sixteen 767s. However, since the engines on the nine TWA aircraft were different than the American Airlines 767 engines, those nine aircraft were scheduled for short-term replacement to eliminate the complexity of maintaining a unique fleet of planes (AMR Corp., 2001: 23-25). With these facts in mind, I removed TWA from the data set and reran the tests on the Aeromedical Evacuation segment. The results from the new analysis are in Table 4. Even with TWA

removed from the Aeromedical Evacuation segment, a significant decrease in participation was still occured.

Table 4 – Aeromedical Evacuation without TWA

Segment	Pre Aircraft Mean	Post Aircraft Mean	Differences of Means	t Test	Reject or Accept H_0	Significant Change?
AE Stage I *	N/A	N/A	N/A	N/A	N/A	N/A
AE Stage II	24.000	25.000	1.000	**	N/A	NO
AE Stage III	53.125	31.000	-22.125	-177.000	REJECT	YES

* Segment not part of this stage
** Standard Deviation equal to zero, t values cannot be calculated

Aircraft Summary

We finally look at the aircraft summary data to see if any significant changes took place. The aircraft summary data from the AMC HQ Form 312s captures the total number of aircraft participating in all segments of the CRAF and is broken down by stage.

Table 5 – Aircraft Summary Statistical Data

Aircraft Summary	Pre Aircraft Mean	Post Aircraft Mean	Differences of Means	t Test	Reject or Accept H_0	Significant Change?
Stage I	78.875	79.875	1	5.657	REJECT	YES
Stage II	260.750	263	2.25	3.1	REJECT	YES
Stage III	812.125	825.375	13.25	5.081	REJECT	YES

We see a significant change in overall aircraft participation for the entire CRAF. In fact there was an overall increase in participation even though there were only significant changes in eight of the thirteen segment/stage combinations. Figure 17,

Figure 18, and Figure 19 in Appendix D graphically depict the changes in each of the three aircraft summary data sets.

Chapter 6 – Conclusions

Research Results

Referring back to the research questions posited in chapter 1, we see that there has been a statistically significant change in aircraft participating in all three stages of the CRAF in the eight months following 11 September 2001. The timing of theses changes in participation suggests that they are related. The decreases in number of aircraft in a particular segment and stage cannot be explained by the findings of this research. However I do propose the following explanation for the increases that were observed.

The change in participation might be attributed to several different factors. The first cause I present is the sense of patriotism. A carrier may simply feel it part of their duty as American companies to commit aircraft to the CRAF. It seems favorable to do your part for the war on terrorism, as the nation rallies, following the attacks on the United States. Secondly, it could have been a result of a change in corporate management or strategy. A particular company may have decided to join or change the number of aircraft it has committed to the CRAF due to a shift in corporate policy, for instance financial reasons. As stated in chapter 3, air carriers are provided incentives for committing aircraft to the CRAF. These incentives range from participation in the GSA City Pair and Worldwide Express small package programs to the awarding of contracts for fixed and expansion buy airlift missions. The latter of these incentives, contract airlift missions, is awarded based on Mobilization Values Points, which are directly related to the number and type of aircraft a carrier has committed to the CRAF. Even though these two factors seem most likely, there could be other reasons.

It is also important to note that while changes in five of the segment/stage combinations were not significant on their own, when looking at all segments and stages would contribute to a cumulatively significant change in CRAF participation.

Shortfalls and Limitations

There are several shortfalls in the research presented in this paper. First, the small set of data resulted in having to use a *t* value, which consequently produces a wider interval to achieve a 95 percent level of confidence than would have been required if *z* values were used. Secondly, if the assumption that the data is normally distributed were not correct, the test interval would be invalid.

Several other limitations were imposed on this research, both by me and circumstances beyond my control. First, the Pre-September 2001 subset was artificially limited to eight months to match the finite number of months that have past since September 2001. This constraint provided an equal number of data points to both the pre and post data subsets. On the other hand, this limitation also reduced the introduction of fluctuations caused by internal and external factors that may have influenced CRAF participation over time including: change in aircraft fleet, going out of business, change in management, or adjustment to AMC's requirement. Additionally, since the application period for the government backed loans had not yet passed at the time of publication of this paper, a correlation between the amount of money an airline received from the government and its CRAF participation trend could not be assessed.

Recommendations for Future Research

Throughout this study I have seen opportunities for additional research on this topic. The first area for further research would be to expand the data set to cover more months before and after September 2001. This larger data set would better capture long-range trends in CRAF participation, plus using data that spans the change in the government fiscal year may identify any effect this may have on changes in CRAF participation.

It would also be beneficial to study the changes in CRAF participation by individual air carriers to determine a relationship between financial losses, government bailout money, government loan guarantees, Mobilization Value Points (CRAF participation) and government contracts. This comparison could not be conducted at this time due to the fact that the deadline for airlines to submit applications for loan guarantees in not until 28 June 2002 (Office of Management and Budget, 2001).

Summary

The chapters leading to the data analysis have focused on the Secondary Research Questions. Chapter two reviewed the history of the Civil Reserve Air Fleet and the National Airlift Policy. We looked at the early days of the Civil Reserve Air Fleet, the evolution of the nation's reliance on commercial augmentation in time of national emergency, and the reaffirmation of this policy by President Reagan. Chapter three described the structure of the CRAF, how it is organized, what incentives exist to reward participation, and how these incentives are managed through Mobilization Value Points. Next chapter four reviewed the fiscal and economic landscape surrounding the

commercial aviation industry prior to and since the events of 11 September 2001. It also examined the role Congress played in the airline recovery.

Once the foundation was laid, the data was presented and examined in chapter five. The statistical analyses confirmed a significant change occurred in eight of the thirteen segment/stage combinations. In addition, the assessment of the CRAF aircraft summary data revealed a significant increase in each of the three CRAF Stages. It is the significance and timing of these changes that points to a correlation between the airlines' quest for business and an increase in participating aircraft in all three stages of the CRAF. This in turn leads to the inference that the recent terrorist actions on the US did have a significant effect on CRAF participation.

Appendix A – National Airlift Policy

THE WHITE HOUSE
WASHINGTON
June 24, 1987

MEMORANDUM FOR:
THE SECRETARY OF STATE
THE SECRETARY OF DEFENSE
THE SECRETARY OF COMMERCE
THE SECRETARY OF TRANSPORTATION
THE DIRECTOR, OFFICE OF MANAGEMENT AND BUDGET
THE ADMINISTRATOR, NATIONAL AERONAUTICS AND SPACE ADMINSTRATION
THE DIRECTOR, FEDERAL EMERGENCY MANAGEMENT AGENCY

SUBJECT: National Airlift Policy

The President has approved the attached NSDD on National Airlift Policy.

FOR THE PRESIDENT:
/s/

Colin L. Powell
Deputy Assistant to the President
for National Security Affairs

Attachment

NSDD-280

THE WHITE HOUSE
WASHINGTON
June 24, 1987

NATIONAL SECURITY DECISION
DIRECTIVE NUMBER 280

NATIONAL AIRLIFT POLICY

The United States' national airlift capability is provided from military and commercial air carrier resources. The national defense airlift objective is to ensure that military and civil airlift resources will be able to meet defense mobilization and deployment requirements in support of US defense and foreign policies. Military and commercial resources are equally important and interdependent in the fulfillment of this national objective.

Our basic national security strategy recognizes the importance of strategic lift, and the need to reduce current shortfalls. The broad purpose of this directive is to provide a framework for implementing actions in both the private and public sectors that will enable the US efficiently and effectively to meet established requirements for airlift in both peacetime and in the event of crisis or war. Toward this end, the following policy guidelines are established:

1. United States policies shall be designed to strengthen and improve the organic airlift capability of the Department of Defense and, where appropriate, enhance the mobilization base of the U.S. commercial air carrier industry. A U.S. commercial air carrier is an air carrier holding a certificate issued pursuant to section 401 of the Federal Aviation Act of 1958, as amended.

2. The goal of the United States Government is to maintain in peacetime organic military airlift resources, manned, equipped, trained and operated to ensure the capability to meet approved requirements for military airlift in wartime, contingencies, and emergencies. Minimum utilization rates shall be established within the Department of Defense which will provide for levels of operation and training sufficient to realize this goal.

3. The Department of Defense shall determine which airlift requirements must move in military airlift manned and operated by military crows because of special military considerations, security, or because of limiting physical characteristics such as size, density, or dangerous properties; and which airlift requirements can be appropriately fulfilled by commercial air carriers.

4. The commercial air carrier industry will be relied upon to provide the airlift capability required beyond that available in the organic military airlift fleet. It is therefore the policy of the United States to recognize the interdependence of

military and civilian airlift capabilities in meeting wartime airlift requirements, and to protect those national security interests contained within the commercial air carrier industry.

5. During peacetime, Department of Defense requirements for passenger and/or cargo airlift augmentation shall be satisfied by the procurement of airlift from commercial air carriers participating in the Civil Reserve Air Fleet program, to the extent that the Department of Defense determines that such airlift is suitable and responsive to the military requirement. Consistent with the requirement to maintain the proficiency and operational readiness of organic military airlift, the Department of Defense shall establish appropriate levels for peacetime cargo airlift augmentation in order to promote the effectiveness of the Civil Reserve Air Fleet and provide training within the military airlift system.

6. Short-term airlift capability required to meet contingency requirements which might be considered minor surges shall be provided by increased utilization of aircraft in the organic sector, as well as by the increased utilization of the commercial air carriers regularly providing service to the Department of Defense.

7. United States Government policies should provide a framework for dialogue and cooperation with our national aviation industry. It is of particular importance that the aviation industry be apprised by the Department of Defense of long-term requirements for airlift in support of national defense. The Department of Defense and the Department of Transportation shall jointly develop policies and programs to increase participation in the Civil Reserve Air Fleet and promote the incorporation of national defense features in commercial aircraft. Government policies should also support research programs, which promote the development of technologically advanced transport aircraft and related equipment.

8. The Department of State and other appropriate agencies shall ensure that international agreements and federal policies and regulations governing foreign air carriers foster fair competition, safeguard important US economic rights, and protect US national security interests in commercial cargo capabilities. Such agencies should also promote among US friends and allies an appreciation of the importance of intercontinental airlift and other transportation capabilities, and work to obtain further commitments from such countries and foreign air carriers in support of our mutual security interests.

9. United States aviation policy, both international and domestic, shall be designed to strengthen the nation's airlift capability and where appropriate promote the global position of the United States aviation industry.

The Department of State, the Department of Defense, the Department of Commerce, the Department of Transportation, the Federal Emergency Management Agency, and the National Aeronautics and Space Administration shall provide leadership within the executive branch in implementing these objectives.

This directive replaces the Presidentially approved Courses of Action contained in the February 1960 Department of Defense study, The Role of Military Air Transport Service in Peace and War.

/s/
Ronald Reagan

(Executive Order, 1987)

Appendix B – CRAF Carriers

Table 6 – CRAF Participants by Segment

International			
	Long Range		**Short Range**
	American Airlines		Alaska Airlines
P	American Trans Air		Am Tram Air
A	Contenental Airlines		Champion Air
S	Delta Airlines		DHL Airways
S	Hawaiian Airlines		Evergreen International
E	North American Airlines		Lynden Air
N	Northwest Airlines		Miami Air International
G	Omni Air International		North American
E	TWA Airlines,[LLC]*		Pan American
R	United Airlines		Spirit Airlines
	US Airways		Sunworld International
	World Airways		
	Air Transport International		
	Airborne Express		
	Arrow Air		
C	Atlas Air		
A	DHL Airways		
R	Evergreen International		
G	Federal Express		
O	Gemini Air Cargo		
	Northwest Airlines		
	Polar Air Cargo		
	UPS Airlines		
	World Airways		

National		
Domestic Service		**Alaskan**
America West		Lynden Air
Frontier		Northern Air
Jet Blue		
Midwest Express		
Southwest Airlines		

Aeromedical Evacuation
Delta Airlines
US Airways

As of April 2002 (Van Horn, 2002)

Table 7 – CRAF Teaming Arrangements

Federal Express Charter Programs Teaming Arrangement
American Trans Air, Inc.
Federal Express Corporation
Gemini Air Cargo, Inc.
Omni Air International, Inc.
Polar Air Cargo, Inc.

North American Airlines Contractor Team
American Airlines
Continental Airlines, Inc.
Delta Air Lines, Inc.
Evergreen International Airlines, Inc.
North American Airlines, Inc.
Northwest Airlines, Inc.
Trans World Airlines Inc
United Parcel Service Co.
US Airways, Inc.
World Airways, Inc.

Miami Air Team
Miami Air
Alaska Airlines

As of April 2002 (Greene, 2002)

Appendix C – AMC Form 312 Data

Table 8 – Pre-September 2001 Form 312 Data

Air Carrier	January-01			February-01			April-01			July-01		
	I	II	III	I	II	III	I	II	III	I	II	III
International Long Range Passenger												
American Airlines	6	29	90	6	29	90	6	29	90	6	29	90
Contenental Airlines	3	11	46	3	11	46	3	11	46	3	11	46
Delta Airlines	4	15	39	4	15	39	4	15	39	4	15	39
North American Airlines	1	1	2	1	1	2	1	1	2	1	1	2
Northwest Airlines	5	19	65	5	19	65	5	19	64	5	19	64
TWA Airlines,[LLC]*	1	6	22	1	6	22	1	6	22	1	6	22
World Airways	2	3	5	2	3	5	2	3	5	2	3	5
American Trans Air	15	17	32	15	17	32	15	17	32	15	17	29
Omni Air International	1	2	4	1	2	4	1	2	4	1	2	4
US Airways	0	0	0	0	0	0	0	0	0	0	0	0
Hawaiian Airlines	1	3	6	1	3	6	1	3	6	1	3	6
United Airlines	6	26	77	6	26	77	6	26	77	6	26	77
Total	45	132	388	45	132	388	45	132	387	45	132	384
International Long Range Cargo												
Emery Worldwide	5	13	31	5	13	31	5	13	31	5	13	31
Evergreen International	2	4	9	2	4	9	2	4	9	2	4	9
UPS Airlines	1	3	7	1	3	7	1	3	7	1	3	7
Northwest Airlines	1	4	10	1	4	10	1	4	10	1	4	10
World Airways	2	2	4	2	2	4	2	2	4	2	2	4
Federal Express Airlines	12	34	92	13	34	92	13	34	92	13	34	92
Gemini Air Cargo	2	5	13	2	5	13	2	5	13	2	5	13
Polar Air Cargo	4	8	20	4	8	20	4	8	20	4	8	20
Airborne Express	0	0	0	0	0	0	0	0	0	0	0	0
Air Transport International	1	3	8	1	3	8	1	3	8	1	3	8
Arrow Air	0	0	0	0	0	0	0	0	0	0	0	0
Atlas Air	1	3	8	1	3	8	1	3	8	1	3	8
DHL Airways	1	1	2	1	1	2	1	1	2	1	1	2
United Airlines	1	1	1	1	1	1	1	1	1	1	1	1
Total	33	81	205	34	81	205	34	81	205	34	81	205
International Short Range												
Am Tram Air	-	3	24	-	3	24	-	3	24	-	4	23
Evergreen International	-	0	0	-	0	0	-	0	0	-	0	0
North American	-	0	2	-	0	2	-	0	2	-	0	2
Alaska Airlines	-	5	36	-	5	36	-	5	36	-	5	36
Miami Air International	-	2	8	-	2	8	-	2	8	-	2	8
Champion Air	-	0	0	-	0	0	-	0	0	-	0	0
DHL Airways	-	3	3	-	3	3	-	3	3	-	3	3
Lynden Air	-	1	1	-	1	1	-	1	1	-	1	1
Pan American	-	0	0	-	2	7	-	2	7	-	2	7
Spirit Airlines	-	2	9	-	2	9	-	2	9	-	2	9
Sun Counrty	-	0	0	-	0	0	-	0	0	-	0	0
Sunworld International	-	0	0	-	0	2	-	0	2	-	0	2
Total	-	16	83	-	18	92	-	18	92	-	19	91
Aeromedical Evacuation												
Delta Airlines	-	19	42	-	19	42	-	19	42	-	19	42
TWA*	-	1	3	-	1	3	-	1	3	-	1	3
US Airways	-	5	12	-	5	11	-	5	11	-	5	11
Total	-	25	57	-	25	56	-	25	56	-	25	56
Domestic Service												
America West	-	0	19	-	0	19	-	0	19	-	0	19
Frontier	-	0	0	-	0	0	-	0	0	-	0	4
Midwest Express	-	0	5	-	0	5	-	0	5	-	0	5
Southwest Airlines	-	0	44	-	0	44	-	0	44	-	0	44
Total	-	0	68	-	0	68	-	0	68	-	0	72
Alaskan												
Lynden Air	-	2	2	-	2	2	-	2	2	-	2	2
Northern Air	-	2	2	-	2	2	-	2	2	-	2	2
Reeve Aleutian	-	2	2	-	2	2	-	0	0	-	0	0
Total	-	6	6	-	6	6	-	4	4	-	4	4
GRAND TOTAL	78	260	807	79	262	815	79	260	812	79	261	812

	January-01			February-01			April-01			July-01		
	I	II	III	I	II	III	I	II	III	I	II	III
Capability [MTM]												
Domestic Services Cargo		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Domestic Services Pax		0.00	11.38		0.00	11.30		0.00	11.30		0.00	11.97
Alaskan		0.34	0.34		0.34	0.34		0.17	0.17		0.17	0.17
SRI Cargo		0.14	0.14		0.14	0.14		0.14	0.14		0.14	0.14
SRI Pax		2.01	13.37		2.54	16.00		2.54	16.00		2.92	16.97
Aeromedical Evacuation		9.92	22.58		9.92	22.23		9.92	22.23		9.92	22.23
LRI Pax	21.45	61.89	161.88	21.45	61.89	161.88	21.45	61.89	161.20	21.45	61.89	160.34
Narrow Body Cargo	0.33	0.73	2.40	0.33	0.72	2.39	0.33	0.72	2.39	0.35	0.75	2.31
Wide Body Cargo	3.05	7.61	16.91	3.24	7.74	17.43	3.24	7.74	17.43	3.24	7.74	17.43
Wide Body Cargo Bulk/Over	5.16	12.31	26.52	5.50	13.02	28.84	5.50	13.02	28.84	5.18	12.30	26.55
LRI Cargo	5.48	13.04	28.92	5.83	13.74	31.23	5.83	13.74	31.23	5.53	13.05	28.86

Aircraft Summary												
Domestic Services Cargo		0	0		0	0		0	0		0	0
Domestic Services Pax		0	68		0	68		0	68		0	72
Alaskan		6	6		6	6		4	4		4	4
SRI Pax		12	79		14	88		14	88		15	87
SRI Cargo		4	4		4	4		4	4		4	4
Aeromedical Evacuation		25	57		25	56		25	56		25	56
LRI Pax	45	132	388	45	132	388	45	132	387	45	132	384
LRI Cargo	33	81	205	34	81	205	34	81	205	34	81	205
TOTAL CRAF	78	260	807	79	262	815	79	260	812	79	261	812

B747-100 Equivalents												
Aeromedical Evacuation		13.96	31.78		13.96	31.29		13.96	31.29		13.96	31.29
LRI Pax	30.20	87.13	227.91	30.20	87.13	227.91	30.20	87.13	226.95	30.20	87.13	225.74
LRI Cargo	32.16	76.51	169.65	32.28	76.38	169.16	32.28	76.38	169.16	32.44	76.54	169.29
TOTAL	62.36	177.60	429.34	62.48	177.47	428.36	62.48	177.47	427.40	62.64	177.63	426.32

(Van Horn, 2002)

Table 9 – Post-September 2001 Form 312 Data

Air Carrier	October-01			November-01			January-02			April-02		
	I	II	III	I	II	III	I	II	III	I	II	III
International Long Range Passenger												
American Airlines	5	22	90	5	22	90	5	22	90	5	22	90
Contenental Airlines	4	12	68	4	12	68	4	12	68	4	12	68
Delta Airlines	4	18	68	4	18	68	4	18	68	4	18	68
North American Airlines	1	1	2	1	1	2	1	1	2	1	1	2
Northwest Airlines	4	17	66	4	17	62	4	17	62	4	17	62
TWA Airlines,[LLC]*	2	6	25	2	6	25	2	6	25	2	6	25
World Airways	5	5	8	5	5	8	5	5	8	5	5	8
American Trans Air	16	24	34	16	24	35	16	24	35	16	24	35
Omni Air International	2	3	5	2	3	5	2	3	5	2	3	5
US Airways	0	0	0	1	4	9	1	4	9	1	4	9
Hawaiian Airlines	2	4	6	2	4	6	2	4	6	2	4	6
United Airlines	5	21	82	5	21	82	5	21	82	5	21	82
Total	50	133	454	51	137	460	51	137	460	51	137	460
International Long Range Cargo												
Emery Worldwide	0	0	0	0	0	0	0	0	0	0	0	0
Evergreen International	3	4	10	3	4	10	3	4	10	3	4	10
UPS Airlines	1	5	10	1	5	10	1	5	10	1	5	10
Northwest Airlines	2	5	12	2	5	12	2	5	12	2	5	12
World Airways	1	2	2	1	2	2	1	2	2	1	2	2
Federal Express Airlines	7	29	103	7	29	100	7	29	100	7	29	101
Gemini Air Cargo	3	6	15	3	6	15	3	6	15	3	6	15
Polar Air Cargo	3	6	15	3	6	15	3	6	15	3	6	15
Airborne Express	1	2	3	1	2	3	1	2	3	1	2	3
Air Transport International	2	3	5	2	3	5	2	3	5	2	3	5
Arrow Air	2	3	7	2	3	7	2	3	7	2	3	7
Atlas Air	3	8	24	3	8	24	3	8	24	3	8	24
DHL Airways	1	1	2	1	1	2	1	1	2	1	1	2
United Airlines	0	0	0	0	0	0	0	0	0	0	0	0
Total	29	74	208	29	74	205	29	74	205	29	74	206
International Short Range												
Am Tram Air	-	5	25	-	5	18	-	5	18	-	5	18
Evergreen International	-	3	3	-	3	3	-	3	3	-	3	3
North American	-	0	2	-	0	2	-	0	2	-	0	2
Alaska Airlines	-	6	37	-	6	37	-	6	37	-	6	37
Miami Air International	-	4	8	-	4	8	-	4	8	-	4	8
Champion Air	-	0	4	-	0	4	-	0	4	-	0	4
DHL Airways	-	3	3	-	3	3	-	3	3	-	3	3
Lynden Air	-	1	1	-	1	1	-	1	1	-	1	1
Pan American	-	1	7	-	1	7	-	1	7	-	1	7
Spirit Airlines	-	0	0	-	0	0	-	0	0	-	2	15
Sun Counrty	-	0	2	-	0	2	-	0	0	-	0	0
Sunworld International	-	0	2	-	0	1	-	0	1	-	0	1
Total	-	23	94	-	23	86	-	23	84	-	25	99
Aeromedical Evacuation												
Delta Airlines	-	17	20	-	17	20	-	17	20	-	17	20
TWA*	-	0	0	-	0	0	-	0	0	-	0	0
US Airways	-	8	11	-	8	11	-	8	11	-	8	11
Total	-	25	31	-	25	31	-	25	31	-	25	31
Domestic Service												
America West	-	0	10	-	0	10	-	0	10	-	0	10
Frontier	-	0	2	-	0	2	-	0	2	-	0	3
Midwest Express	-	0	2	-	0	2	-	0	2	-	0	2
Southwest Airlines	-	0	22	-	0	22	-	0	22	-	0	21
Total	-	0	36	-	0	36	-	0	36	-	0	36
Alaskan												
Lynden Air	-	2	2	-	2	2	-	2	2	-	2	2
Northern Air	-	2	2	-	2	2	-	2	2	-	2	2
Reeve Aleutian	-	0	0	-	0	0	-	0	0	-	0	0
Total	-	4	4	-	4	4	-	4	4	-	4	4
GRAND TOTAL	79	259	827	80	263	822	80	263	820	80	265	836

	October-01			November-01			January-02			April-02		
	I	II	III	I	II	III	I	II	III	I	II	III
Capability [MTM]												
Domestic Services Cargo		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Domestic Services Pax		0.00	6.14		0.00	6.03		0.00	6.04		0.00	6.04
Alaskan		0.17	0.17		0.17	0.17		0.17	0.17		0.17	0.17
SRI Cargo		0.29	0.29		0.29	0.29		0.29	0.29		0.29	0.29
SRI Pax		2.35	15.67		2.38	14.23		2.38	13.84		2.67	16.17
Aeromedical Evacuation		9.74	12.02		9.74	12.02		9.74	12.02		9.74	12.02
LRI Pax	23.10	62.20	188.72	23.61	62.23	192.04	23.61	64.23	192.04	23.61	64.23	192.04
Narrow Body Cargo	0.23	0.38	0.76	0.23	0.38	0.76	0.23	0.38	0.76	0.23	0.38	0.76
Wide Body Cargo	2.75	7.56	19.93	2.77	7.58	19.66	2.77	7.58	19.66	2.77	7.58	19.76
Wide Body Cargo Bulk/Over	4.86	12.63	30.72	5.02	12.80	30.44	5.02	12.80	30.44	5.02	12.80	30.76
LRI Cargo	5.09	13.01	31.48	5.25	13.18	31.20	5.25	13.18	31.20	5.25	13.18	31.52
Aircraft Summary												
Domestic Services Cargo		0	0		0	0		0	0		0	0
Domestic Services Pax		0	36		0	36		0	36		0	36
Alaskan		4	4		4	4		4	4		4	4
SRI Pax		13	84		13	76		13	74		15	89
SRI Cargo		10	10		10	10		10	10		10	10
Aeromedical Evacuation		25	31		25	31		25	31		25	31
LRI Pax	50	133	454	51	137	460	51	137	460	51	137	460
LRI Cargo	29	74	208	29	74	205	29	74	205	29	74	206
TOTAL CRAF	79	259	827	80	263	822	80	263	820	80	265	836
B747-100 Equivalents												
Aeromedical Evacuation		13.72	16.93		13.72	16.93		13.72	16.93		13.72	16.93
LRI Pax	32.52	87.56	265.69	33.24	90.42	270.37	33.24	90.42	270.37	33.24	90.42	270.37
LRI Cargo	30.82	77.30	185.67	30.82	77.30	183.03	30.82	77.30	183.03	30.82	77.30	184.88
TOTAL	63.34	178.58	468.29	64.06	181.44	470.33	64.06	181.44	470.33	64.06	181.44	472.18

(Van Horn, 2002)

Appendix D – Significant Change Charts

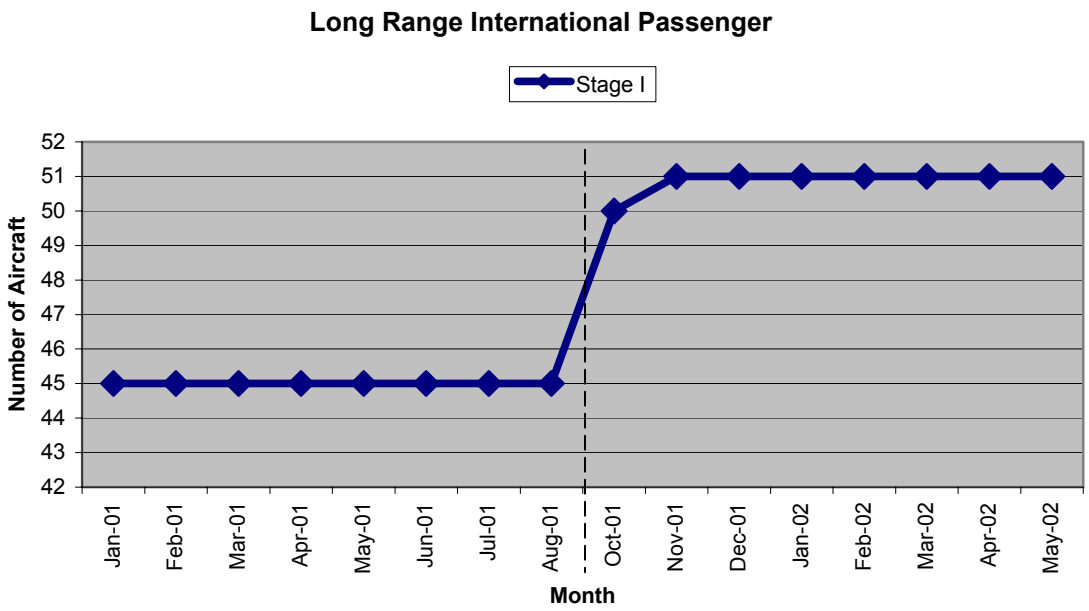

Figure 9 – Long Range International Passenger Stage I Change

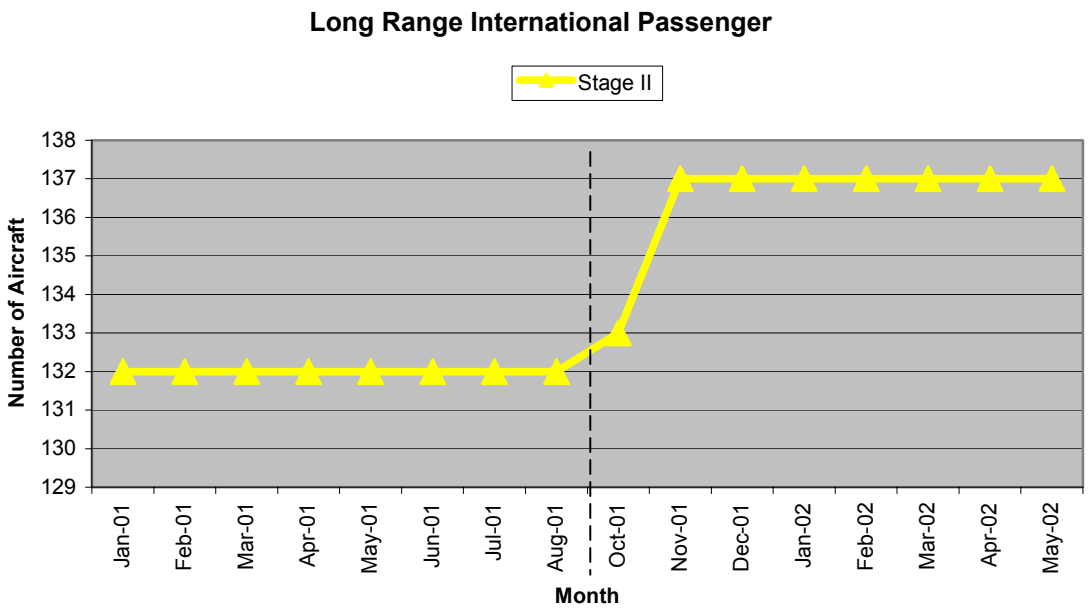

Figure 10 – Long Range International Passenger Stage II Change

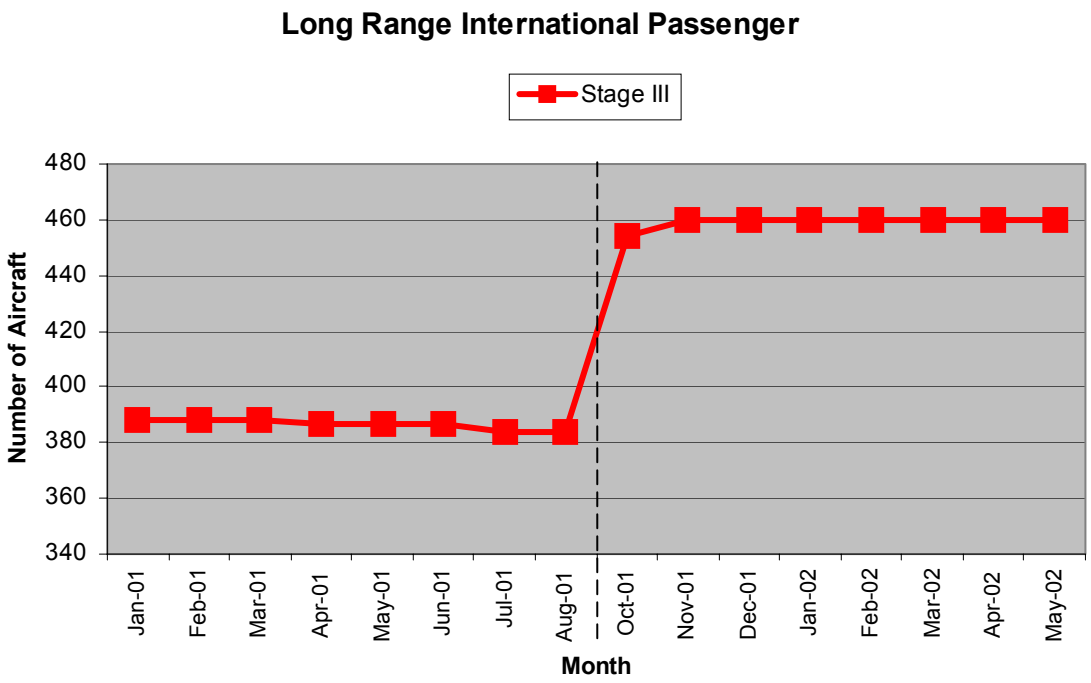

Figure 11 – Long Range International Passenger Stage III Change

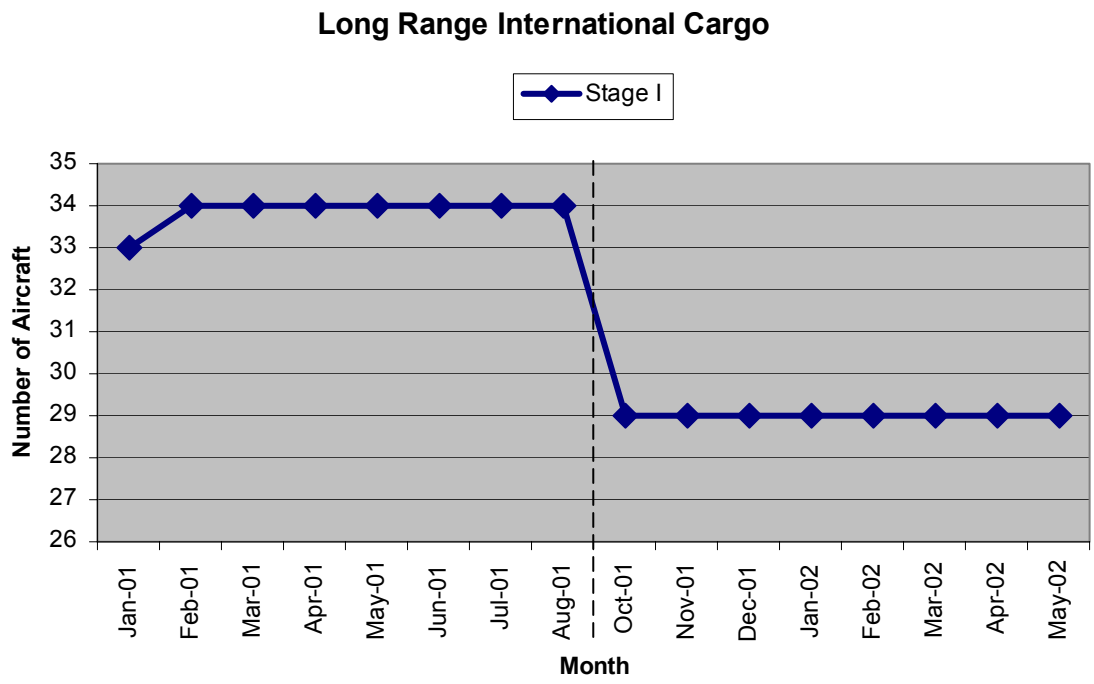

Figure 12 – Long Range International Cargo Stage I Change

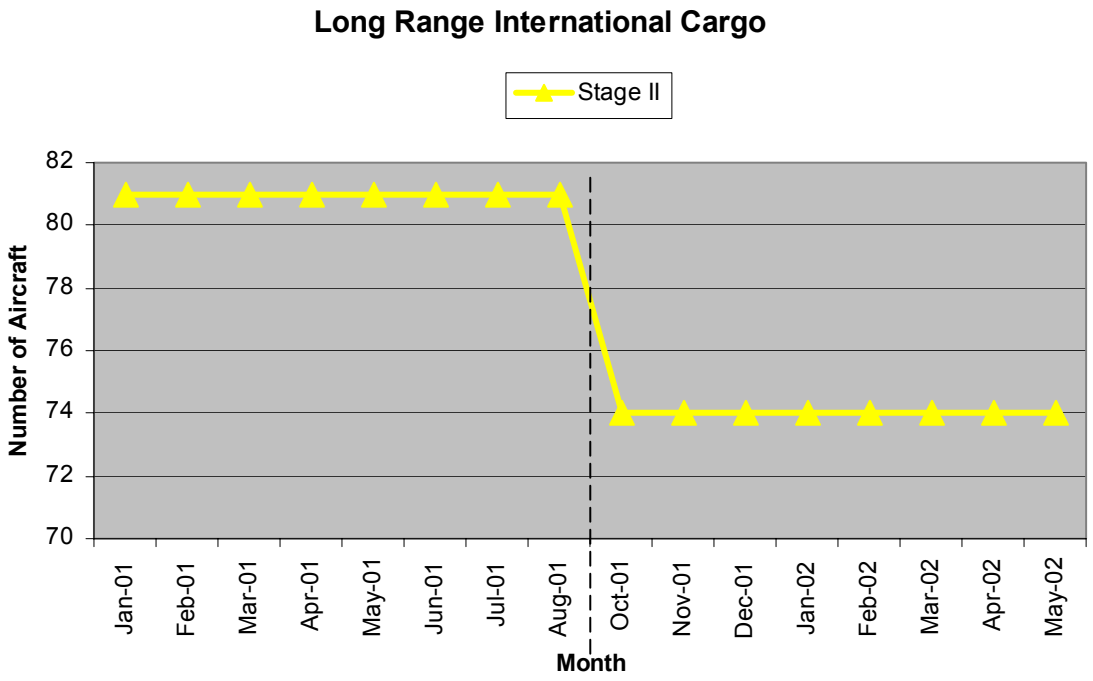

Figure 13 – Long Range International Cargo Stage II Change

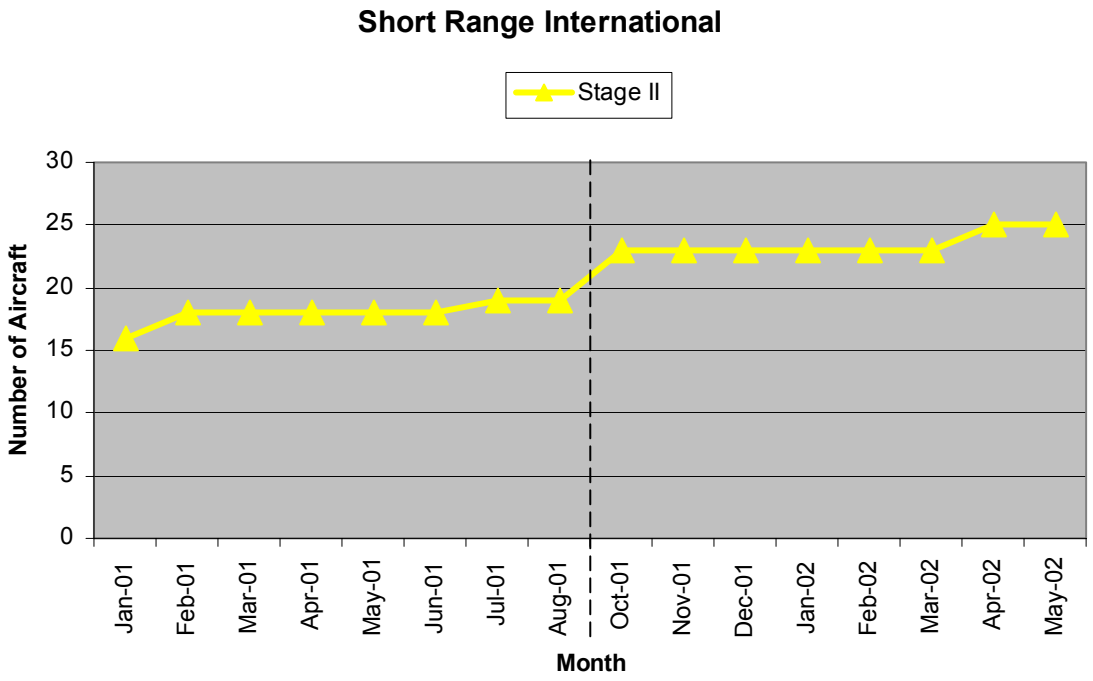

Figure 14 – Short Range International Stage II Change

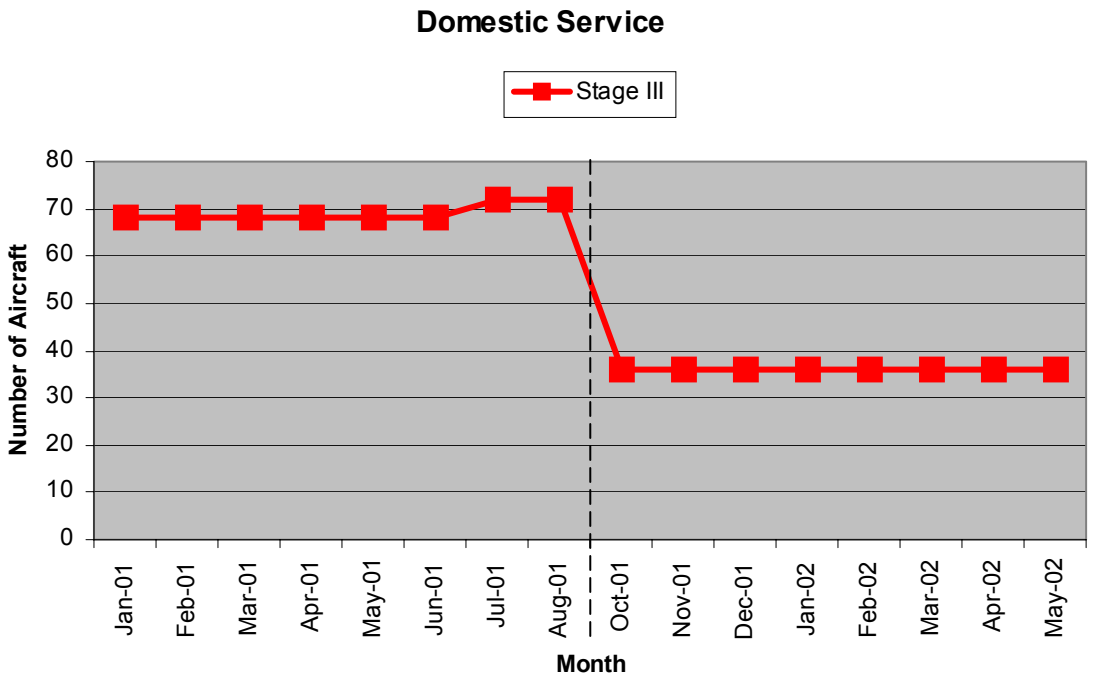

Figure 15 – Domestic Service Stage III Change

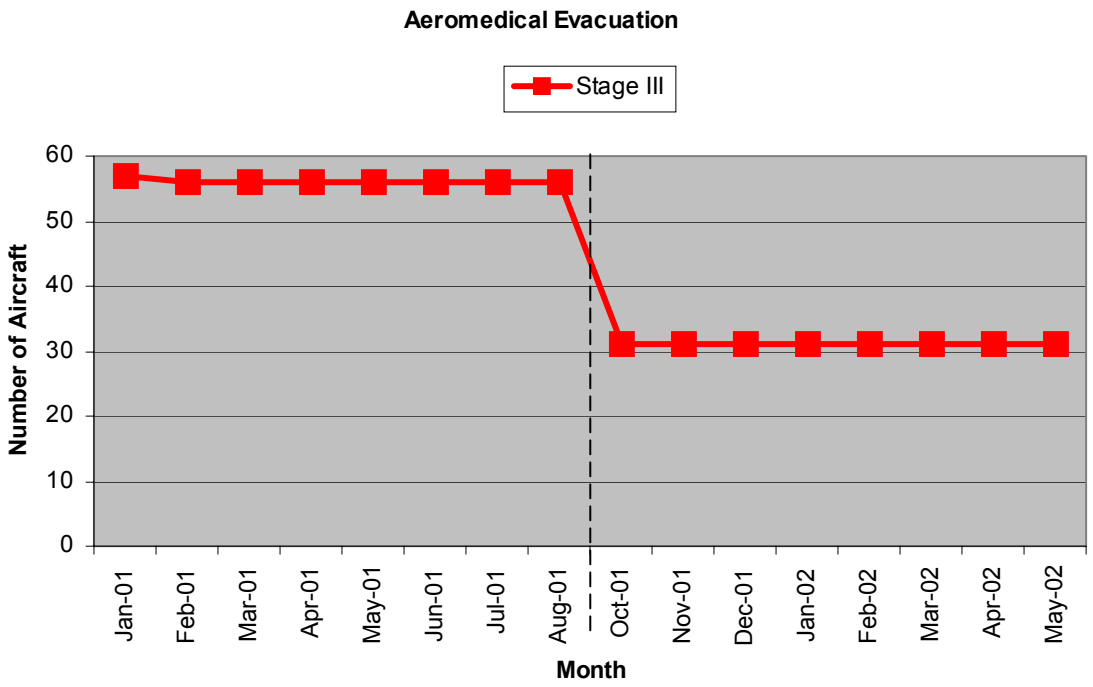

Figure 16 – Aeromedical Evacuation Stage III Change

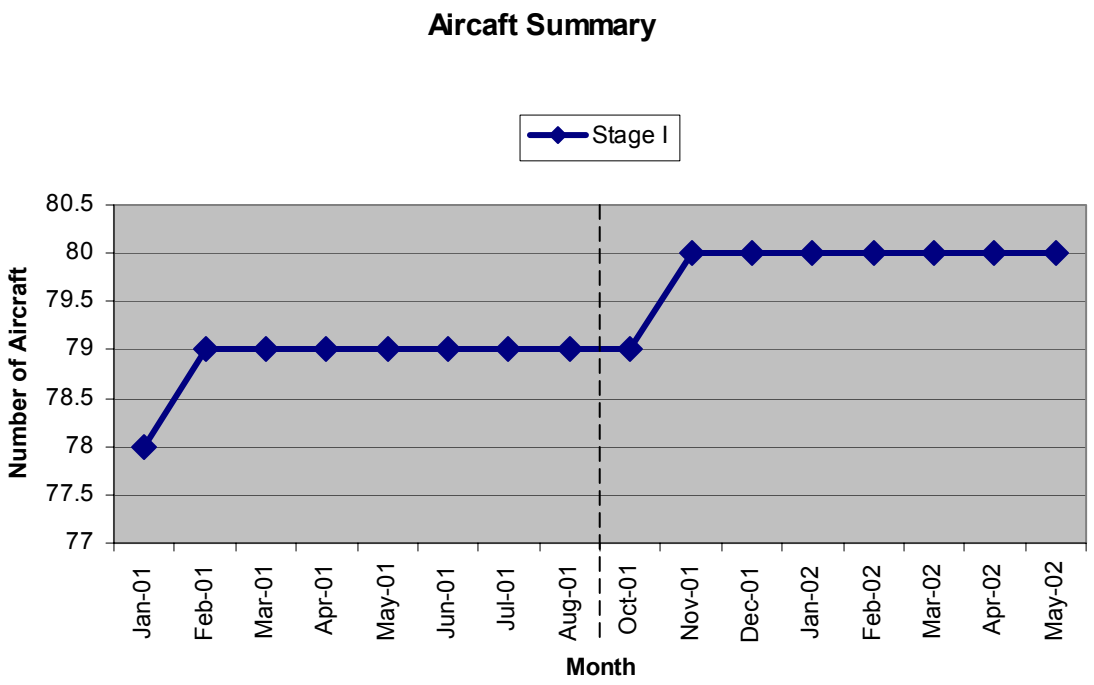

Figure 17 – Aircraft Summary Stage I Change

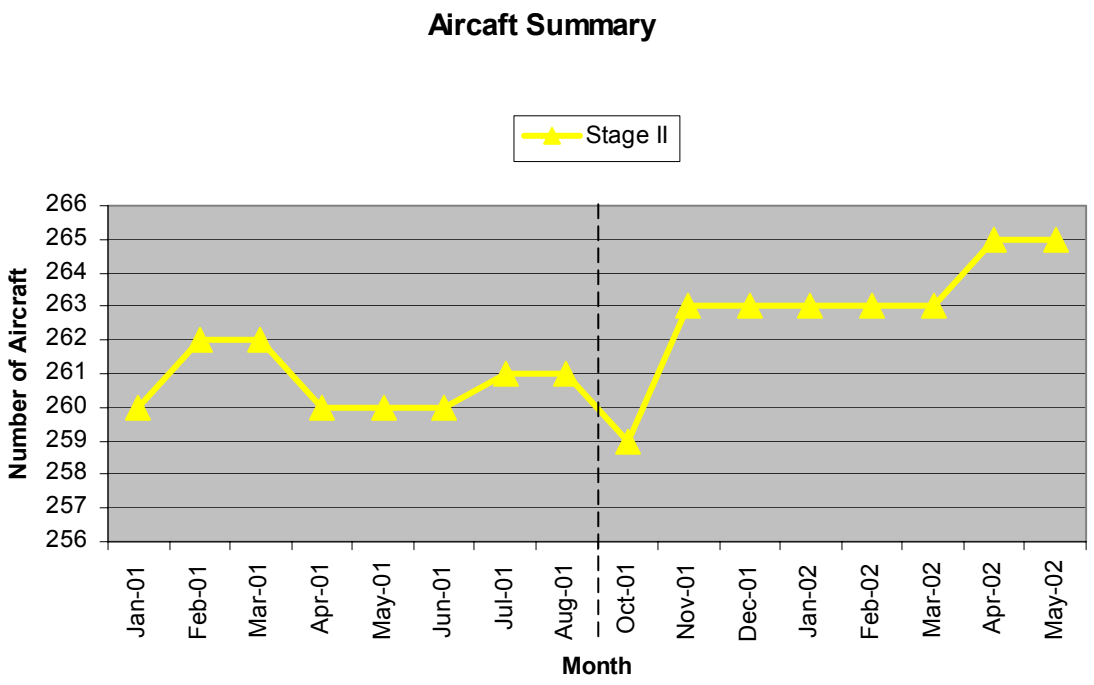

Figure 18 – Aircraft Summary Stage II Change

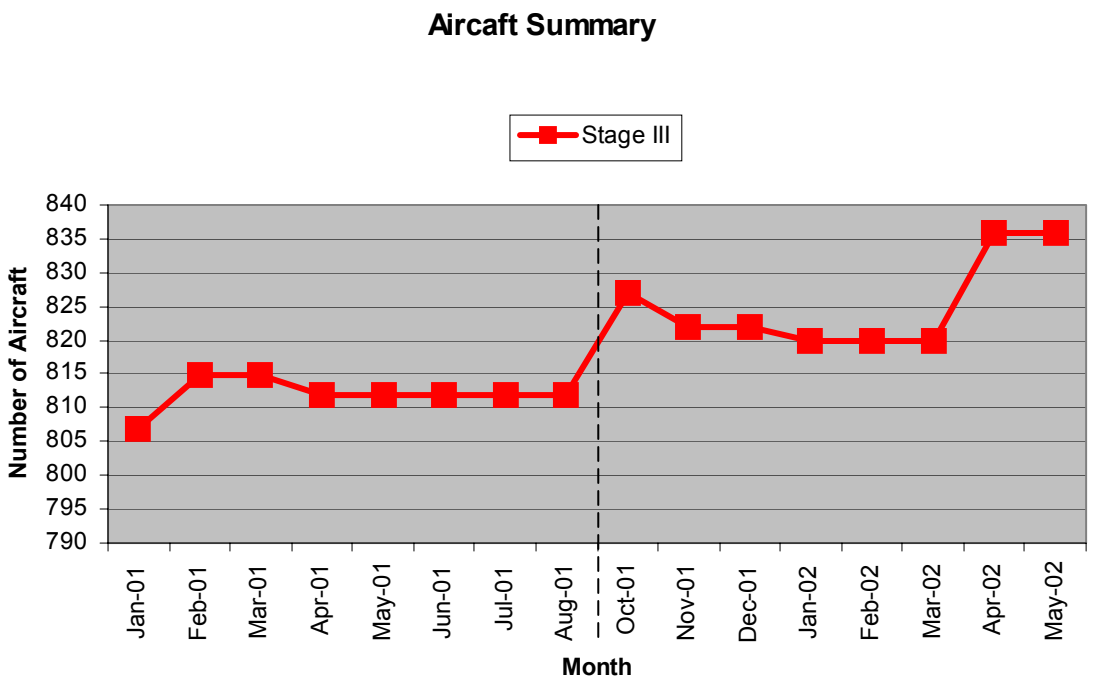

Figure 19 – Aircraft Summary Stage III Change

Appendix E – Emery Worldwide Airlines Case

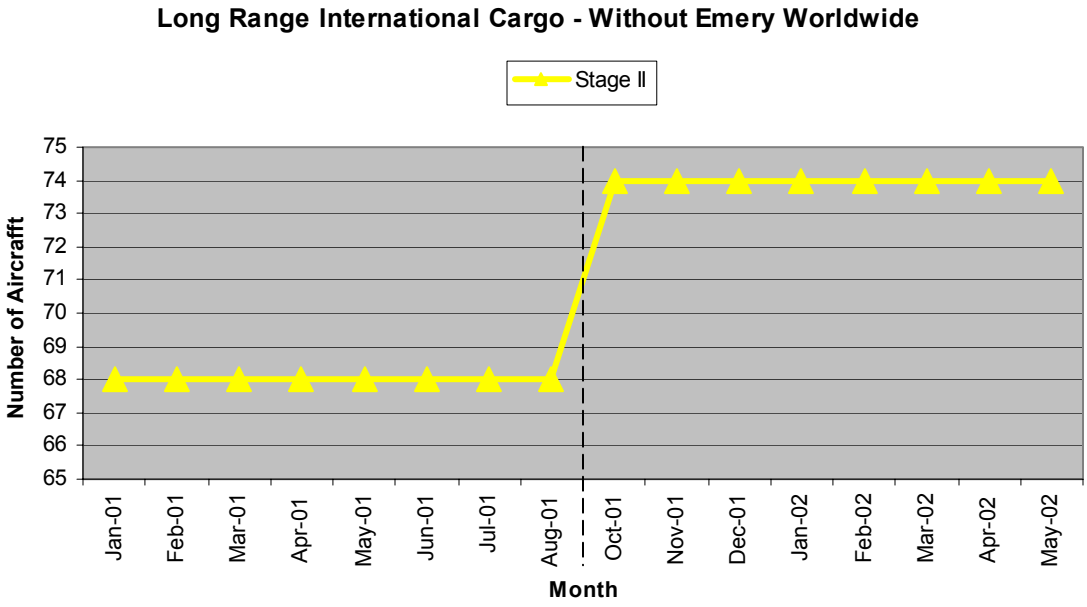

Figure 20 – Long Range International Cargo Stage II without Emery Worldwide

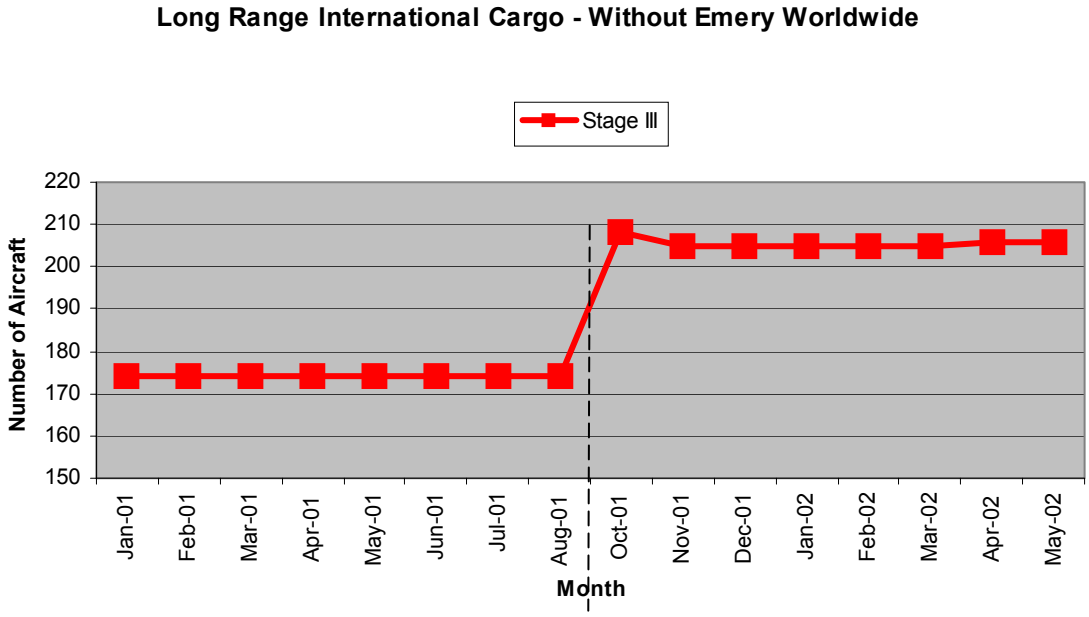

Figure 21 – Long Range International Cargo Stage III without Emery Worldwide

Abbreviations

AE	Aeromedical Evacuation
AMC	Air Mobility Command
ASM	Available Seat Miles
CAMI	Civilian Access to Military Installations
CINC	Commander in Chief
CPP	City Pairs Program
CONUS	Continental United States
CRAF	Civil Reserve Air Fleet
DF	Degrees of Freedom
DOD	Department of Defense
DOT	Department of Transportation
FAA	Federal Aviation Administration
FY	Fiscal Year
GSA	General Services Administration
LLC	Limited Liability Company
ITV	In transit Visibility
MAC	Military Airlift Command
MATS	Military Air Transport Service
MOU	Memorandum of Understanding
MTM	Million Ton Miles
MPM	Million Passenger Miles
MTM/D	Million Ton Miles per Day
MV	Mobilization Value
PF	Productivity Factor
PUR	Productive Utilization Rate
OCONUS	Outside Continental United Stated
RPM	Revenue Passenger Miles
TRANSCOM	United States Transportation Command
USAF	United States Air Force
WWX	Worldwide Express

Glossary

Available Seat Miles (ASM) -
The airlines measure of capacity; it is one seat carried one mile. The seat can either be occupied or empty (Airline Monitor, 2001).

Limited Liability Company (LLC) -
The LLC is not a partnership or a corporation. It is a distinct business entity that offers an alternative to partnerships and corporations by combining the corporate advantages of limited liability with the partnership advantage of pass-through taxation (Business Filings Incorporated, 2002).

Load Factor (LF) -
This is a fundamental measurement of how efficiently an airline is utilizing its capacity and is expressed as the percentage of RPM to ASM (Airline Monitor, 2001).

Million Ton Miles per Day (MTM/D) -
A Planning factor based on an aircraft utilization rate, block speed (average ground speed), average payload weight and a standard productivity factor (Harris, 1997).

Outsized Cargo -
An air transportable item that exceeds 83.3 feet (1000 inches) in length, 9.75 feet (117 inches) in width, or 8.75 feet (205 inches) in height (Harris, 1997).

Oversized Cargo -
An air transportable item that exceeds the useable dimensions of a standard 463L pallet and can be up to 90.8 feet (1090 inches) in length, 9.75 feet (117 inches) in width, and 8.75 feet (105 inches) in height (Harris, 1997).

Pallet -
A 463L pallet measures 88 inches by 108 inches and is designed to be loaded to 96 inches high. Any cargo item that exceeds these dimensions is considered outsized or oversized (Harris, 1997).

Revenue Passenger Miles (RPM) -
A measure of airline traffic and is expressed as one passenger carried one mile. RPM and traffic are interchangeable. Outside the United States substitute Kilometers (K) for Miles (M) in this measure (Airline Monitor, 2001).

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14. ABSTRACT

This paper analyzes Civil Reserve Air Fleet (CRAF) participation prior to and after the terrorist attacks of 11 September 2001 to determine if the events of that day caused a change in air carrier participation. This research focuses on providing an unbiased analysis of the Civil Reserve Air Fleet program and the bearing these attacks had on the program. Specifically, the paper concentrates on carrier participation in each segment of the CRAF beginning in January 2001 and ending in May 2002. Additionally, historic material regarding the CRAF and a groundwork of the fiscal and economic landscape surrounding the commercial aviation industry prior to and since the events of 11 September 2001 are also presented. This paper evaluates information obtained through civilian and military transportation organization interviews, publications, and reports. Primary sources of information were: Air Mobility Command, United States Transportation Command, Defense Technical Information Center, and the Air Transport Association. The research shows a statistically significant increase in CRAF participation since September 2001. The significance and timing of this change indicates a correlation between the airlines' quest for business and an increase in aircraft in all three stages of the CRAF.

15. SUBJECT TERMS
Civil Reserve Air Fleet, CRAF, 11 September 2001, National Airlift Policy, Terrorist Attacks, Airline Economics, Mobilization Value, Air Mobility Command, AMC, GSA City Pairs Program, WWX

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