RAND

The Civil Reserve Air Fleet and Operation Desert Shield/ Desert Storm

Issues for the Future

Mary E. Chenoweth

Project AIR FORCE

The research reported here was sponsored by the United States Air Force under Contract F49620-91-C-0003. Further information may be obtained from the Strategic Planning Division, Directorate of Plans, Hq USAF.

Library of Congress Cataloging in Publication Data

Chenoweth, Mary E.
The Civil Reserve Air Fleet and Operation Desert Shield/Desert Storm : issues for the future / Mary E. Chenoweth.
p. cm.
"Prepared for the United States Air Force"
"MR-298-AF."
Includes bibliographical references.
ISBN 0-8330-1437-4
1. Civil air reserve fleet. 2. Persian Gulf War, 1991—Aerial operations, American. 3. Persian Gulf War, 1991—Transportation. I. RAND II. United States. Air Force. III. Title.
UC333.C473 1993
358.4'137'0973—dc20 93-28795
CIP

Published 1993 by RAND
1700 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138
To obtain information about RAND studies or to order documents,
call Distribution Services, (310) 393-0411, extension 6686

RAND

The Civil Reserve Air Fleet and Operation Desert Shield/ Desert Storm

Issues for the Future

Mary E. Chenoweth

Prepared for the
United States Air Force

Project AIR FORCE

Preface

This Monograph reports research on the use of the Civil Reserve Air Fleet (CRAF) during Operation Desert Shield and Desert Storm. This work identified and described key issues that resulted from the use of commercial airlift during the operation. It relies on interviews conducted with individuals actually involved in the CRAF operation. This research is part of a larger study documented in "Strategic Airlift in Operation Desert Shield: An Analysis of Operational Efficiency "

This report is the sixteenth of a set that documents the results of the RAND Project AIR FORCE study of the Desert Storm air campaign. The study began in March 1991 under the sponsorship of the Air Force Vice Chief of Staff. Its objectives are to describe and assess (1) the effectiveness of air missions in Desert Storm at both the strategic and tactical levels in terms of the initial and evolving campaign objectives, (2) the use of air power as the major instrument of achieving the withdrawal of Iraqi forces from Kuwait and the implications of this use for future Air Force doctrine, missions, systems, logistic needs, force modernization, and research and development (R&D), and (3) the doctrine for planning and executing Desert Storm in terms of the doctrine for joint U.S. and allied operations.

Other documents deal with intelligence support for battle damage assessment (BDA) and targeting, Command, Control, Communications & Intelligence (C3I), United States Central Air Force's (CENTAF's) Master Attack Plan, Close Air Support (CAS)/Battlefield Air Interdiction (BAI) operations, the Joint Forces Air Component Command (JFACC) and air campaign planning, munitions support for USAF aircraft, logistics and other support for USAF tactical aircraft, composite wing operations, air attacks against the Iraqi army in the Kuwaiti Theater of Operations (KTO), the Air Force rapid response process for streamlined acquisition during Desert Shield and Desert Storm, and F-117A operations.

The report should be useful to Air Force, Department of Defense, and other government officials who are concerned with the use of CRAF airlift in Operation Desert Shield and Desert Storm and proposed incentives for airline participation in the CRAF.

Contents

Figures

Tables

Summary

Shortly after midnight on August 18, 1990 (Zulu time), the Military Airlift Command (MAC) activated the Civil Reserve Air Fleet (CRAF) for the first time in its history.[1] This action gave MAC access to 17 commercial long-range international passenger jets and 21 long-range cargo transports. Volunteered aircraft boosted MAC's capability even higher. Five months later, on January 17, 1991 (Zulu time), MAC sent the airlines another activation message, this time without warning. It announced the call-up of additional aircraft by activating the second stage of the CRAF program. With both stages, the military could use up to 77 passenger and 39 cargo commercial aircraft in addition to volunteered airlift.

MAC used CRAF assets—both activated and volunteered—from August 1990 to May 1991 to support the massive deployment of U.S. troops and supplies to the Gulf region, sustain the operation, and return them home again. Long-range international commercial aircraft and crews flew more than 5000 missions for MAC. In fact, more than 60 percent of the troops and 25 percent of the cargo airlifted into or out of the theater went by airliners. Perhaps the single most important lesson learned from recent experience is that CRAF works. But the operation also indicates that some changes are necessary to ensure a robust CRAF for the future.

Initial Problems

During the period shortly before and after the activation, difficulties were experienced in coordinating programs designed to support a CRAF activation. Gaps and uncertainties in government-sponsored liability insurance for military missions complicated the initial start-up of flights. Hardworking military and civilian personnel helped alleviate some of these problems in August 1990, but other issues continued even after the CRAF deactivation. This situation will improve when the DoD can link the needed insurance programs to the CRAF and volunteered airlift for military missions. Both the Air Mobility Command

[1]The Military Airlift Command (MAC), deactivated on June 1, 1992, was renamed the Air Mobility Command (AMC). Because MAC was the organization in charge of CRAF missions during Desert Shield and Desert Storm, its name is used when referring to the period preceding June 1, 1992. AMC is used to refer to the current organization or when discussing future policies. See "Commands in Transition," *AIR FORCE Magazine*, May 1992, p. 53.

(AMC)—MAC's successor organization overseeing the nation's military airlift responsibilities—and involved civilian agencies are continuing to work this issue. Legislation will be needed to modify the current policy.

Complications in CRAF missions transporting hazardous materials were experienced, particularly early in the operation. Two factors contributed to the complexity: (1) some airlines lacked experience in handling these cargoes, and (2) too few airports permitted these flights. When using uncertified carriers, government-furnished couriers had to supervise loading and then travel with the aircraft. Unfamiliarity with procedures led to delays. Because of the limited number of airports, fewer routes were available to airlines; thus some had to develop capabilities in new locations.

AMC decided not to require that all airlines be certified to transport hazardous materials; instead it has addressed the key reason for problems during ODS. AMC also intends to continue identifying domestic civilian airfields that will accept commercial flights carrying hazardous materials. This process was started before Desert Shield. International airport agreements are also necessary.

Cargo Operations

The lack of information on commercial flights contributed to problems for contract air cargo missions. Information gaps in the decision support system used to monitor flights in progress did not always capture up-to-date data on CRAF missions. Consequently, ground crews did not always prepare pallets on time or of the correct dimensions for a given commercial aircraft. Also MAC had to consider assigning missions to CRAF aircraft based on rules of fairness or tying business opportunities back to the level of CRAF commitment.

Since the end of the war, AMC has established an automated datalink between the reporting system used by the airlines and the military's flight information database. MAC was in the process of developing this capability before the start of ODS, but it still needed all the airlines to agree on a standard reporting format.

Other problems that emerged during the operation concerned military airfield congestion during peak periods of cargo movement. Many cargo missions flew out of Dover and McGuire AFBs. Bad weather, ground equipment availability, and increased traffic combined to increase waiting time on the ground at these airfields. At least one airline received approval to load cargo at one of its commercial hubs located relatively near these air bases. By dispersing cargo to a nearby commercial airfield, these flights had shorter ground time delays. Also

some traffic was rerouted from an already congested military airfield. This concept may offer more benefits than costs and deserves further consideration.

Planning and Communications

The airlines identified a need for more effective communication capabilities between their air crews and military command and control in the theater. Shortly after the war began, coalition forces commanded the skies, which drastically reduced any danger to commercial airliners in theater air space. In this particular operation, opposing forces fortunately could not exploit this shortfall. Perhaps during this operation not having secure or readily available communications with theater command and control affected morale only, rather than true crew safety. But there is no guarantee this result will hold true in the future. AMC is studying new ways of developing a secure communications capability that is either based on an encryption-decryption military device carried on board the aircraft or on satellite technology the FAA and the industry may adopt. In either case, AMC will need additional funding. It is very important that the nation support the command's effort to address this issue.

Problems Expanding Airlift Capability

While projected cargo lift requirements were growing quickly, MAC explored the possibility of expanding a commercial airlift capability through nontraditional means. The command pursued the use of foreign-owned commercial lift as one possibility. While MAC succeeded in securing access to foreign airlift through negotiated contracts (that were not exercised) with two airlines, the planning process took time and uncovered some ambiguity in existing laws. Existing agreements between the U.S. and other countries for the use of foreign commercial aircraft to deploy U.S. troops and equipment did not cover this operation; therefore, MAC could not use them. As learned from this situation, quicker final negotiations will be possible when our allies gain a better understanding of the contractual agreements between the U.S. military and commercial air carriers.

Other capabilities were formally inaccessible because of their association with a Stage III activation only. These include the aeromedical evacuation (medevac) aircraft used to transport injured troops and the Senior Lodger program designed to help carriers secure logistics support in areas where some airlines do not have sufficient resources. A more flexible approach to a call-up would alleviate this

concern. Indeed, AMC can now call up medevac aircraft during a Stage II activation. Senior Lodgers remain in Stage III.

Incentive Options

Paradoxically, now that the CRAF has proven itself as an important strategic airlift capability, budgetary constraints and reduced peacetime lift requirements weaken traditional incentives for program participation. An unchecked erosion in overall incentives could undermine airline commitments of aircraft. With the memory of activation still fresh, viable incentives are all the more important. To maintain a strong CRAF, AMC is trying to pursue innovative means of providing incentives.

As U.S. forces return home from overseas, channel air traffic requirements will fall off. Consequently, the CRAF peacetime military business will decrease. One partial solution to this problem is to pool non-DoD government air service requirements with AMC's demand for a peacetime airlift. This effort would offset the drop in military requirements appreciably and would enhance CRAF participation by allowing only those airlines in the CRAF to compete for these contracts. AMC will need cooperation from other agencies in pursuing this possibility.

Another indirect financial incentive available to AMC is to reward CRAF commitments with route entitlements. Many airlines would like greater access to foreign routes and markets. The U.S. government could condition its assistance in government-to-government negotiations on airline participation in the CRAF. This action would cost the taxpayers essentially nothing. In the short term, these benefits could provide incentives to airlines reluctant to commit resources to AMC. The unanswered question is how long they could continue to encourage participation. Not all incentives must be directly financial to work. Joint use of military airfields is one example. In future years, some of the busiest airports will have trouble keeping up with the demand for landing rights and slots. In these situations, alternative airfields will become an attractive option. Under the concept AMC is exploring, the command could link airline access to military airfields to a commitment of resources to CRAF.

These areas are just a few that offer incentives for carriers to maintain or increase their commitment to the CRAF. Other important options include reducing the impact of a future activation and employing new ways of increasing volunteerism before and after an activation.

Conclusions

The CRAF activation during Desert Shield provided the first real opportunity to see what worked in the program, what did not work as well, and what remains to be done. Because participation is voluntary, AMC has the important task of realigning incentives and disincentives to ensure continued airline commitments. For some of the changes that the command intends to explore (and perhaps adopt) to succeed, sustained Air Force and non-DoD support will be necessary. These changes will take time to develop and implement fully. Because the CRAF remains a sound military and cost-effective principle, this investment is good for AMC in particular and for the nation as a whole.

Acknowledgments

The cooperation and help from many people made this study possible. Interviews and CRAF mission data formed core elements of the research. We met with CRAF experts at Headquarters Military Airlift Command (HQ MAC) and later Headquarters Air Mobility Command (HQ AMC), as well as the airlines. During Desert Shield, we interviewed individuals at two Army units—the 24th Infantry Division (Mechanized) and the 3rd Armored Cavalry Regiment—that used CRAF airlift to move their troops and supplies to the Gulf region. We are grateful to Paul Killingsworth, a project member, for sharing information from his interviews with the 21st Numbered Air Force at McGuire Air Force Base.

From conversations with CRAF analysts from HQ AMC, we obtained material from the Air Force's perspective. We visited personnel in plans and operations, contract airlift, as well as pricing.

Special thanks go to Colonel Ronald Priddy (Retired), Colonel Lawrence Lacey, Colonel Jerry Grant (Retired), and their aides for contributions, both direct and indirect. Colonel Priddy and his assistant, Major Thomas Fraley, have our deep gratitude and respect for providing comments and context to many key events that we could not have learned elsewhere. Colonel Priddy also provided us with the bulk of the material on future CRAF incentives that are discussed in Section 8. Others at AMC contributed significantly. We thank Colonel Lacey, Lieutenant Colonel Nelson Wilt, and Mr. Ronald Van Horn within the CRAF cell; Mr. Thomas Cygan, Ms. Lou Koch, Mr. John Wright, and Major Jill Hamilton in contract airlift; Mr. Dale Huegan in pricing; Colonel Stephen Gordon in plans and operations; Colonel Michael Engel in mobility; and Lieutenant Colonel Dwight Moore in legal affairs. Major Hamilton helped us on numerous occasions by providing key airlift data.

We are very grateful to the airlines and to their associations for sharing with us some of their impressions and perspective of the operation. In particular, we are indebted to Mr. Edward Driscoll, National Air Carriers' Association, and Mr. Paul Hyman, Air Transport Association of America, for their comments and willingness to arrange several conferences with member airlines. Through these meetings as well as others, we met with airline representatives whose positions ranged from vice president to operations systems analyst.

Special thanks go to several RAND people who were key to this research. Dr. John Lund, the airlift task leader, believed in the importance of this work from the start. He provided continual encouragement, as well as the resources to carry the project forward. Natalie Crawford, the program director and project leader, took an active interest in this research. Her continued support and enthusiasm certainly enabled the completion of this work. Laura Zakaras, a communications analyst, contributed importantly by providing valuable structural insights. Finally, Dr. Christopher Bowie, the reviewer, performed one of the most important roles by providing many helpful and constructive comments and suggestions on substance and style. This document profited from his expert eye with regard to military transport issues in general and the CRAF in particular.

Acronyms

ACL	Allowable Cabin Load
ALCE	Airlift Control Element
AMC	Air Mobility Command
AOR	Area of Responsibility
APOD	Aerial Port of Debarkation
APOE	Aerial Port of Embarkation
ARINC	Aeronautical Radio, Inc.
ATA	Air Transport Association of America
BAI	Battlefield Air Interdiction
BDA	Battle Damage Assessment
C3I	Command, Control, Communications, and Intelligence
CAS	Close Air Support
CAT	Crisis Action Team
CENTAF	United States Central Air Force
CENTCOM	United States Central Command
CEO	Chief Executive Officer
CINC MAC	Commander in Chief, MAC
CINC USTRANSCOM	Commander in Chief, U.S. Transportation Command
CONUS	Continental United States
CRAF	Civil Reserve Air Fleet
DoT	Department of Transportation
EC	European Community
FAA	Federal Aviation Administration
GDSS	Global Decision Support System
HQMAC	Headquarters Military Airlift Command

JFACC	Joint Forces Air Component Command
JFK	John F. Kennedy International Airport
KTO	Kuwaiti Theater of Operations
MAC	Military Airlift Command
MATS	Military Air Transport Service
MHE	Material Handling Equipment
MOG	Maximum Number of Aircraft on the Ground
MoU	Memorandum of Understanding
MRE	Meals, Ready to Eat
MV	Mobilization Value
NACA	National Air Carriers' Association
NAF	Numbered Air Force
NAPCAP	NATO Allied Precommitted Civil Aircraft Program
ODS	Operation Desert Shield/Storm
OSD	Office of the Secretary of Defense
R&D	Research and Development
ST	short ton
USTRANSCOM	U.S. Transportation Command
WASP	War Air Service Program

1. Introduction

Background

The Military Airlift Command (MAC) activated the Civil Reserve Air Fleet (CRAF) for the first time at the start of Operation Desert Shield (ODS). The command used CRAF-committed assets as well as some volunteered commercial aircraft from August 1990 to May 1991 to support the nation's most massive transport operation ever. In flying U.S. troops and supplies to the Gulf region and bringing them home, long-range international commercial aircraft and crews flew more than 5,000 military missions.[1] More than 60 percent of the troops and 25 percent of the cargo airlifted into or out of the theater went by contract airlift, and most of those commercial resources were committed to the CRAF.

Overall, the CRAF operation was a success, especially considering that the Gulf crisis represented the first-time activation of the program. Although the air service contract MAC signed with participating airlines successfully anticipated many of the difficulties that could arise when so many aircraft were called into service, the operation highlighted some unanticipated issues as well. Some of these issues were well outside any contract and were more in the policy arena; these need further attention.

Three general trends suggest why the CRAF is now more important than ever and why the nation should care about addressing issues raised during the operation.

1. As more units return home from overseas locations, future deployments could be just as intensive as ODS, 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.

[1] As of February 1991, CRAF missions numbered more than 3,000 to MAC's nearly 12,000, thus making up more than 25 percent of the missions.

These three issues provide strong incentives for the nation to address and resolve the real and potential problems raised during the Gulf operation. While the command now managing the CRAF, the Air Mobility Command (AMC), moved aggressively ahead in many areas after the war, some solutions still require wider Air Force support, and indeed even the U.S. government's cooperation.

Objectives

This research was part of a larger "lessons learned" effort aimed at documenting issues that surfaced in the airlift effort of Operation Desert Shield and Desert Storm (ODS).[2] Consonant with this spirit was our examination of the CRAF. Desert Shield marked the first time MAC activated the program. Airlift requirements may not diminish at the same pace as other downsizing. In fact, as our military forces come home from overseas bases, the need for an expanded airlift may become more important. Given this trend, the nation needs to understand and implement those improvements that help guarantee continued participation of U.S. airlines as an important source of inexpensive lift.

Approach

A series of interviews with MAC and airline representatives, along with detailed mission data, provided much of the foundation for this research. These interviews occurred in three stages: the fall of 1990, the summer of 1991, and the summer of 1992.

To learn the operation from the military's perspective, we met with MAC and Army personnel. On two separate occasions we spoke with individuals at HQ MAC who were at the heart of the CRAF operations during Desert Shield and Desert Storm. CRAF mission data came from the contract air services office at Scott Air Force Base. We also met with transportation personnel at two military units, which were among the earliest users of CRAF lift: the 24th Infantry Division (Mechanized) and the 3rd Armored Cavalry Regiment.

Our sense of the airlines' perspective came from several different sources: two U.S. airline associations, the Air Transport Association (ATA) of America and the National Air Carriers' Association (NACA), in addition to individual airline representatives.

---

[2]The parent document is *Project AIR FORCE Analysis of the Air War in the Gulf: An Assessment of Strategic Airlift Operational Efficiency*, by John Lund, Ruth Berg, and Corinne Replogle, R-4269/4-AF, RAND, 1993.

More than 25 airlines lifted numerous military units to the Gulf. We limited our interviews to a subset of those for practical reasons. This study assumed that those we interviewed reasonably approximated the larger population. Even though the sampled group represented some of the most important CRAF participants, it is worth remembering that each airline operated under different corporate constraints and experienced different problems. Also each military unit deploying on CRAF aircraft did so at different times under different conditions. Thus some of the issues we discuss pertained to some carriers and units more than others while others pertained to most, if not all. Likewise, perceptions between the airlines and MAC sometimes differed. This phenomenon naturally leads to the question of whether or not problems existed (if impressions were not shared by both MAC and the airlines). If either the airlines or MAC felt strongly that certain problems persistently hindered them from performing their mission, we noted them.

Organization

This document has eight sections. Readers not familiar with how the CRAF works will find a description of the program in Section 1. It briefly covers CRAF's history, who may participate, how it was organized at the start of Desert Shield, and how it is activated, along with respective assets. Section 2 describes the chronology of events as they pertain to the CRAF. Issues that emerged from the operation appear in succeeding sections. Section 3 goes into problems that immediately surfaced with the initial activation of the CRAF in August 1990. Section 4 looks at problems that contributed to the suboptimal use of CRAF resources. Section 5 discusses transition to war and in-theater problems. Section 6 highlights issues pertaining to other commercial airlift resources considered as emergency capability. Sections 5 and 6 contain examples of potential problem areas that did not actually hurt operations in ODS but could in future crises under certain conditions. Section 7 goes into incentive problems that if not addressed could spell trouble for the CRAF, just at a time when contract airlift proved its military worth. Finally, Section 8 presents conclusions and recommendations.

2. How CRAF Works

Background

The CRAF was created because of delays in establishing contracts with airlines at the start of the Korean War. A shortfall in military strategic transports relative to the demand for airlift forced the nation to look to the airlines for help, as it had done during World War II for the same reasons.[1] Following the Second World War, several Air Force–sponsored studies recommended that a formal program be established between the military and the airlines to provide the military with extra airlift capability.[2]

In February 1951, President Truman issued the executive order that led to the creation of the Civil Reserve Air Fleet (CRAF).[3] The order tasked the Department of Commerce in conjunction with the Department of Defense to formulate a plan to provide contingency airlift capabilities for the nation. A Memorandum of Understanding (MoU), signed by the two secretaries, stated CRAF policies. In March 1952, the Secretary of the Air Force released a document describing the new program to airline top executives. Some consider this event the true kickoff date of the CRAF.[4]

The role of the Department of Commerce with the CRAF shifted to the Department of Transportation (DoT) when this agency was established. Today, DoT and DoD work together to assign U.S. aircraft to the CRAF. DoT may use all U.S. aircraft not in the CRAF as part of its War Air Service Program (WASP) in times of emergencies to keep vital sectors of the economy working. This coordination avoids any potential double-counting of resources. DoD may activate those resources the airlines commit to the CRAF under conditions described later. Thus, under the "right" circumstances, the airlines could be in a

---

[1]In 1950, the U.S. Military Air Transport Service (MATS), the MAC analog, could assign only 100 of its 295 transporters to the Pacific Command to airlift U.S. troops and supplies to the Korean theater. Other worldwide obligations claimed the remaining force. Between June 25th and August 10th, MATS chartered 66 commercial transports to help in executing the airlift operation. Canada contributed nine aircraft, and Belgium offered three others. See "Korean Airlift: Flying Pipeline," *Interavia*, 5(11), 1950, pp. 552–553.

[2]Brown, Major Kirk L., *History of the Civil Reserve Air Fleet (1952–1986)*, Report No. 87-0360, Air Command and Staff College, Air University, Maxwell AFB, AL, April 1987.

[3]Ibid., p. 12.

[4]Interview with Major Thomas Fraley in September 1992.

position of having to fly for either DoD or DoT. With either program, the airlines retain ownership and direct operational control over their aircraft.

Carriers wishing to join the CRAF offer militarily useful aircraft to AMC and each signs a contract with the government. Currently these contracts cover one year and entitle AMC to use these aircraft and commercial crews if the CRAF is activated.[5] Based on its projected airlift requirements, AMC assigns aircraft to Stages I, II, or III as well as to a particular segment or category of mission. An airline's commitment of aircraft and crews to Stage I entitles the company to a share of the DoD's peacetime airlift business. Planners try to assign at least one aircraft to Stage I from each airline offering assets to that stage.

For years the military's peacetime lift business was the traditional incentive used to encourage CRAF participation. The airline that contributed more top-of-the-line aircraft, particularly wide-body cargo jets, received more of the available business. In recent years MAC allowed airlines to pool committed assets under joint venture arrangements to gain a collective larger or preferred share of the business. MAC then left it up to group members to decide how to apportion the business the joint venture won.

In the near future, AMC is projecting a decrease in its requirements for peacetime contract airlift. Planned force reductions, relocation of units from abroad to stateside bases, and overall budget cuts all will cause a reduction in the lift requirements.[6] This scenario was already unfolding in the summer of 1990. Before the Iraqis invaded Kuwait, MAC had informed the airlines to expect reductions and cancellations of some peacetime business in the then current and near-term awards. That trend was interrupted, of course, with Desert Shield and Desert Storm but is expected to continue once again.

The CRAF multiyear contract in effect during the Gulf operation expired in October 1992.[7] The airlines then signed an agreement with AMC that covered the period of negotiations over terms of a new contract. The result of this effort, an annual contract, began on October 1, 1993. One example of change pertains to airline commitment of aircraft to CRAF. It is still binding and must meet with AMC's approval, but the period of commitment is more flexible than before.

---

[5]An aircraft is militarily useful if it can carry cargo and/or passengers over distances and to locations in which AMC may operate. For instance, wide-bodied aircraft capable of long-distance flight, along with four crews per transport, are militarily useful. See "CRAF Segments" on page 8 for more detail.

[6]The surge in military lift requirements brought on by Desert Shield and Desert Storm generally was not enough to overcome the staggering financial losses the industry faced in its commercial operations during the same period.

[7]This multiyear agreement for the first time replaced the previous annual airlift agreement MAC signed with the airlines.

Functional Description

Command and Control

When MAC activated the CRAF, it assumed mission control of the flight while the airlines retained all operational control of their aircraft and crews. Companies oversaw the positioning of the aircraft and crews, monitored their flights, and controlled all aspects of the execution of the flight. MAC planned the mission, decided which type of aircraft it needed from which airline, and the particulars of the mission itself (time, location, etc.). Once the commercial aircraft was airborne, MAC handed off responsibility of monitoring the CRAF mission to the appropriate numbered air force, for example, the 21st NAF at McGuire AFB for transatlantic flights. However, MAC still needed updated information on in-progress flights to integrate CRAF missions with other MAC activities. Key information on these flights included departure and arrival times, expected routes, cargoes carried, etc. The military monitored flights either directly, such as noting when aircraft landed and took off from a military airfield, or indirectly at other times through updated information from the airlines themselves.

In their contract, the carriers agreed to provide MAC specific numbers and types of aircraft, along with four crews without military reserve status per aircraft. In addition, the contract allowed MAC the use of these aircraft up to 10 hours per day (the usage ratio was computed on fleet average, not on the basis of an individual transport). The airlines had to arrange for technical stops between onload and offload sites and ground support at nonmilitary airfields, subject to MAC's approval. These stops allowed for crew changes, refueling, and intelligence briefings, depending on the particular airfield.

Had a Stage III activation occurred, MAC could have augmented ground service support at selected commercial airfields with a carrier designated beforehand that was relatively rich in ground support capability at a given location. MAC called these carriers Senior Lodgers. If activated, these airlines would assist transiting CRAF aircraft whose airlines are not well equipped with support services at a particular airport. MAC provided ground support at military airfields.

CRAF Stages

MAC assigns aircraft committed to the CRAF to one or more of the program's three stages. Aircraft assigned to Stage I automatically also belong to Stage II, etc. Because of special conditions, the number of aircraft in each stage may

change slightly over time. Under the agreement in effect during ODS, MAC required the airlines to commit aircraft at the start of the contract to enable them the best chance of winning the military's business.[8] From these commitments, MAC then assigned aircraft to the three stages.

The command uses the three stages to provide a tailored response to the actual lift requirement. With this method, no more aircraft are called than necessary. Stage I activates just a handful of aircraft from any one airline (thus addressing the concern about a potentially lopsided loss of market share for any one airline). Stage II turns over slightly more aircraft to MAC but still allows the airline to continue normal business operations. Stage III is quite different. It involves many more aircraft, and the loss of these assets from regular schedules or charters would significantly disrupt airline operations.

Under the rules for activating the CRAF:

- **Stage I** is called by the Commander in Chief, MAC (CINC MAC). In early August 1990, 38 long-range international aircraft were committed to this stage to support shortfalls in military airlift with two more still being transitioned from Stage II to Stage I.[9] Crews and aircraft must be at the designated onload site within 24 hours of mission notification.
- **Stage II** is activated by the Secretary of Defense. At the time of the operation, 187 long-range and short-range international aircraft were available for Stage II, as well as some shorter-range cargo transports. The emphasis in this stage is still on long-range international aircraft. Crews and aircraft report for duty within 24 hours of mission notification.
- **Stage III** is also called by the Secretary of Defense after the President or Congress authorizes a national defense emergency or national emergency. Full mobilization of the CRAF—then totaling 506 aircraft, including aeromedical evacuation (medevac) and cargo-convertible aircraft—may occur once an emergency is declared. Crews and aircraft have 48 hours to report to the designated onload site. The carriers have more time to respond because of the large number of aircraft involved.

---

[8]The new contract allows AMC and the airlines to agree on aircraft commitments according to a mutually acceptable schedule.

[9]The July 1990 CRAF Summary showed a total of 40 aircraft committed to Stage I. MAC was in the process of moving two aircraft from Stage II to Stage I in early August and would have completed the move before the end of the reporting quarter (September). At the beginning of August, however, only 38 aircraft were technically available.

CRAF Segments

AMC broadly organizes the CRAF by stage, segment, and activation authority.[10] Table 1 shows the number of aircraft committed as of July 1990 to each stage, as well as mission segment.[11] Long-range international aircraft to support strategic airlift objectives make up the largest requirement for aircraft. Each successive stage activation would give MAC access to 40, 116, and 393 long-range international aircraft, respectively. The number of aircraft for Stages II and III are cumulative. For instance, the 116 long-range capable aircraft available in Stage II include the 40 transports committed to Stage I, just as the 393 long-range international aircraft in Stage III include the 116 from Stage II, etc.

Table 1

CRAF Aircraft by Stage as of July 1990

	Number of Aircraft		
Mission Segment	Stage I	Stage II	Stage III
Passenger			
Long-range international	17	77	252
Short-range international		21	28
Cargo			
Long-range international	21	39	141
Short-range international		2	6
Aeromedical			31
Domestic cargo		44	44
Alaskan cargo		4	4
Total cumulative aircraft	38	187	506

NOTE: Data were current as of July 1990. During the third quarter (July to September), MAC intended to move two aircraft from Stage II to Stage I, bringing the total number of Stage I aircraft to 40. On August 17, 1990, with final approval from all carriers in Stage I still not granted, it called up only 17 passenger and 21 cargo aircraft.

[10]"Segment" is the term used by the military to describe the classes of aircraft and missions within the three CRAF stages.

[11]"Civil Reserve Air Fleet (CRAF) Capability Summary," HQ MAC/XOC, Form 312, July 1990.

AMC assigns aircraft to one of five mission segments:[12]

1. Long-range international aircraft make up the largest category and represent critical strategic lift capability. These aircraft will transport passengers and cargo from one theater to another or across oceans.
2. Short-range international aircraft—both passenger and cargo—support short-range airlift operations from CONUS to relatively close offshore locations or between particular Pacific islands.
3. Narrow-bodied cargo aircraft in the domestic segment support domestic air logistical pipeline operations.
4. The Alaskan segment calls for cargo aircraft able to weather severe northern flying conditions.
5. The newer medevac mission employs modern, smaller, wide-bodied aircraft, such as the B-767 to airlift casualties on an intertheater basis, for example between the theater and Europe or the United States.

Had MAC activated all stages and all missions of the CRAF in the summer of 1990, up to 506 aircraft could have been called to assist in executing military missions.[13]

AMC tries to persuade the airlines to commit as many of the long-range international U.S. aircraft as possible to the CRAF, particularly cargo transports because there are fewer of them in commercial fleets than passenger jets and the military often can use as much cargo lift as it can get. Also AMC would like to see those aircraft committed to Stages I and II. Even in its hope of maximizing CRAF's capability, AMC still needs to balance this request against the ultimate health of the airline. AMC will not allow an airline to volunteer its entire fleet to the CRAF.[14] This policy tries to prevent airlines from depending too much on the government for their business.

---

[12]AMC currently is studying a reclassification of CRAF segments that would retain broad elements of these five missions, plus perhaps additional ones.

[13]Chenoweth, Mary, *The Civil Reserve Air Fleet: An Example of the Use of Commercial Assets to Expand Military Capabilities During Contingencies*, RAND, N-2838-AF, June 1990, pp. 29 30.

[14]Communications with AMC on August 22, 1991.

3. Contribution to ODS

Before Desert Shield, the military only used contract airlift on a volunteer basis through peacetime expansion contracts. This policy was used even before 1952. Commercial aircraft flew missions during World War II, the Berlin airlift crisis, Korean War, and even the Vietnam War. In the late 1970s, commercial aircraft lifted U.S. dependents from Tehran before the takeover of the U.S. embassy in Iran. Most recently AMC bought voluntary airlift from airlines within the CRAF to support UN food efforts in Somalia under Operation Restore Hope.

The airlift requirement in Desert Shield differed from all other examples of commercial lift assistance in its size and scope. Before, the requirement had built up slowly enough to enable the peacetime process of buying commercial airlift to keep pace with the growing need. At the start of Desert Shield, volunteered airlift could not keep up with the ever multiplying requirement for more strategic airlift. Higher commercial insurance rates, discussed more in the next section, and spiraling fuel costs provided even more reason to activate the CRAF because the military covered both of these expenses with the activation.

The next subsection details how CRAF contributed to Desert Shield and Desert Storm operations. It begins with a chronology of events that are relevant to the CRAF, such as the activation of Stages I and II, cargo and passengers moved, and missions flown.

Chronology

Nine days following the Iraqi invasion of Kuwait on August 2, 1990, MAC sent a message to CRAF carriers warning them to prepare for a possible Stage I or II activation. The message asked companies to verify their Title XIII insurance on aircraft volunteered to DoD or to the first two stages of the CRAF.[1]

Following President Bush's decision to send troops to the Gulf, the resulting airlift requirement already had MAC buying more airlift from CRAF carriers. These volunteers were already flying when the warning message went out. In response to MAC's earlier request, airlines participating in the program were

[1]On August 11, the following warning message went out to CRAF carriers across the ARINC lines: "The HQ MAC Crisis Action Team has been activated. . . . It is possible that one of the stages of the Civil Reserve Air Fleet will be activated. . . "

said to offer the military use of between 6 to 10 passenger aircraft and about 10 to 15 cargo jets. Mission data show that at least nine aircraft of each type were flying before the CRAF activation.[2] Within days the passenger airlift requirement rapidly grew to much more than available military resources could handle. MAC needed its organic capability to move cargo.

On August 17, General H. T. Johnson, the Commander in Chief of the U.S. Transportation Command (CINC USTRANSCOM) and the Commander in Chief of the Military Airlift Command (CINCMAC), issued the decision to activate CRAF Stage I. This result marked the program's first-time activation. (See Figure 1 for chronology—dates are given in Eastern Standard Time.)

The CRAF activation message went out to the carriers across the telecommunications network owned and operated by Aeronautical Radio, Inc. (ARINC). The airlines routinely use this unclassified commercial network for their own purposes, but MAC accessed it to deliver instructions and receive updated information from the carriers. Shortly after midnight on August 18 (Greenwich Mean Time), 38 aircraft came under MAC mission control.[3] This action gave the military access to 17 commercial long-range international passenger jets and 21 cargo transports, also capable of long-range international flights.[4] Volunteered aircraft boosted the actual number of available aircraft even further.

The activation of CRAF Stage I occurred during Phase I of Operation Desert Shield. The United States, under the authority of the United Nations Security Council, moved to organize a multinational coalition with enough force to deter further Iraqi aggression. To build up its forces quickly, the U.S. military initiated an aggressive airlift of troops and key equipment.

Most of the U.S. troops deployed in Phase I came from locations within the continental U.S. (CONUS). Distances between the U.S. and Saudi Arabia, the main theater of operations, along with hot summer temperatures at many airfields that affected maximum payload limits, combined to overwhelm MAC's airlift capability. Airline officials realized that the rapid rise in commercial insurance rates was an important factor in holding down the number of carriers

---

[2]The data do not specify aircraft tail numbers; thus it is entirely possible the airlines volunteered more than just these 18 aircraft.

[3]The message that went out to the airlines across ARINC on August 17 (EST) read: "The Commander in Chief of Military Airlift Command . . . has . . . activated CRAF Stage 1, effectively 0001Z, 18 Aug 90."

[4]Had the activation occurred slightly later, the total number of aircraft in Stage I might have summed to 40. At that time, planners were in the process of transferring two aircraft from Stage II to Stage I. All other CRAF participants must approve of the change, and MAC was in the process of working through this process at the start of Operation Desert Shield.

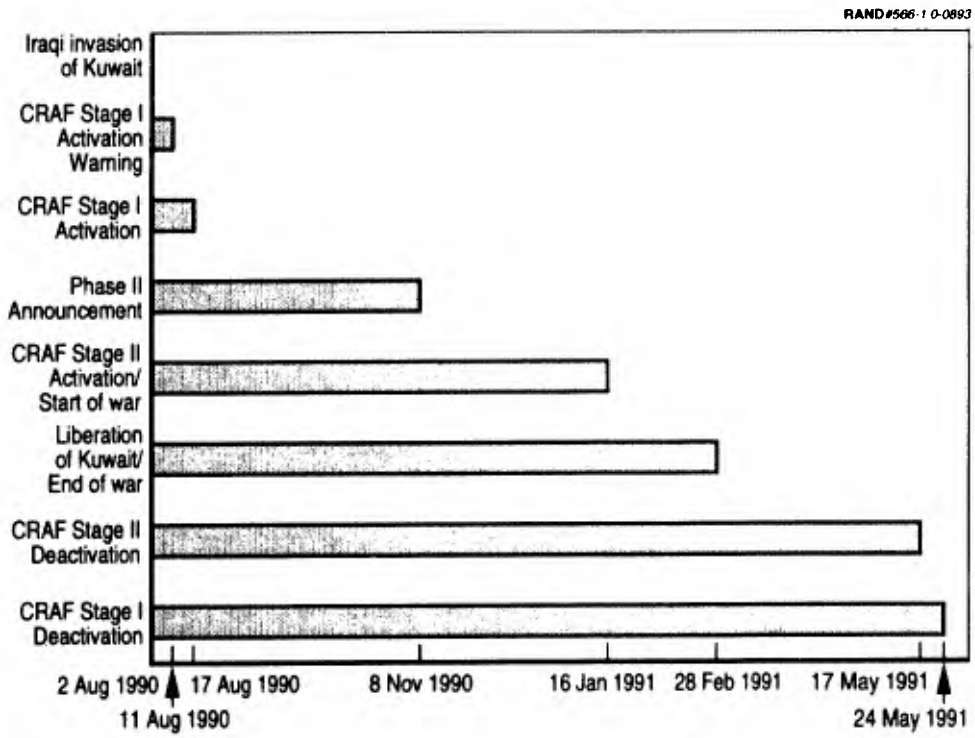


Figure 1—Key ODS Events for the CRAF

volunteering for the earliest Desert Shield missions. The lack of passenger lift finally led MAC to activate CRAF Stage I.

Phase II of the operation occurred in the autumn of 1990. On November 8, 1990, President Bush announced the deployment of reinforcements to allow for "adequate offensive military options should that be necessary."[5] This second phase primarily moved U.S. forces stationed in Germany, but it also marked resupply operations such as the sustained movement of mail, meals ready to eat (MREs), munitions from CONUS, and spares. The announcement also called up additional air national guard units and reserves to move from CONUS to the theater.

With the added burden of Phase II requirements, MAC's airlift requirement mushroomed in November and December 1990. Cargo backlogs grew at alarming rates at various aerial ports of embarkation (APOEs). MAC cited several contributing factors to these backlogs, including cold weather conditions at U.S. and European airfields, saturation conditions at aerial ports of

[5]"A Chronology of Events," *Desert Storm Almanac Supplement, Military Technology Magazine*, June 1991, pp. 118–136.

debarkation (APODs), and a tendency of some airlift users to push cargo by air that should have gone by sea at a lower priority.

Sometime in late November or early December, MAC polled the CRAF airlines for their reaction to a possible Stage II activation. MAC wanted to plan for access to more cargo transports and crews beyond those already flying and those in the CRAF Stage I. The carriers wanted a delay in activating more CRAF aircraft, citing an anticipated negative impact on their Christmas season business if MAC called up more of their most capable aircraft, particularly the cargo aircraft MAC wanted.

Beginning in August, the Gulf crisis disrupted airline traffic and sent fuel prices soaring. The airlines had counted on the Christmas demand to counter some of the decline in commercial air traffic caused by the start of Desert Shield. (The holiday season usually involves a sizable volume demand for package air deliveries requiring cargo aircraft). Some of the officials we interviewed believed that lobbying by the airlines may have helped stave off a December activation. AMC discounts this report on the grounds that its true requirement for cargo transports did not develop until January, after the end of the season. Whatever the case, it did not occur. Cargo airlift did, however, pick up around January 10, 1991. With the United Nations resolution that gave Iraq until January 15 to pull its forces out of Kuwait, MAC had to get as much of the cargo and troops into the theater as possible before the deadline. As January 15th approached, MAC used all the Stage I and volunteered cargo aircraft over which it had control, but still it needed more.

Minutes after the start of the air campaign on January 17, 1991 (0230Z),[6] MAC sent the airlines another activation message, this time without warning. On January 17, 1991 at 0240Z (January 16 EST), MAC announced the call-up of Stage II aircraft and told the airlines to ready long-range international cargo aircraft only.[7] The call-up of Stage II brought the total number of aircraft technically activated in both stages to 77 passenger and 39 cargo aircraft, although only the 17 Stage I passenger aircraft and the 39 Stage I and II cargo aircraft had to report for duty.

Volunteered aircraft again boosted MAC's capability. During January and February 1991, available CRAF cargo aircraft—including Stage II and

---

[6]*Desert Shield and Desert Storm: A Chronology and Troop List of the 1990/1991 Persian Gulf Crisis*, Strategic Studies Institute, U.S. Army War College, 25 March 1991.

[7]Key parts of the message read: "The Secretary of Defense has declared an airlift emergency effective 0240Z, 17 Jan 91. . . . [T]he Government may exercise its option to increase the services . . . to the full capacity of your aircraft volunteered to CRAF Stage 2. . . "

volunteered transports—numbered between 55 and 75.[8] Volunteered airlift helped considerably throughout both stages of activation, particularly with cargo aircraft (see Figure 2). Volunteered cargo aircraft nearly equaled the number of activated aircraft actually flying missions.

Immediately following the end of the war, MAC made use of the Stage II passenger aircraft. It relied on Stage I and II passenger airliners to redeploy

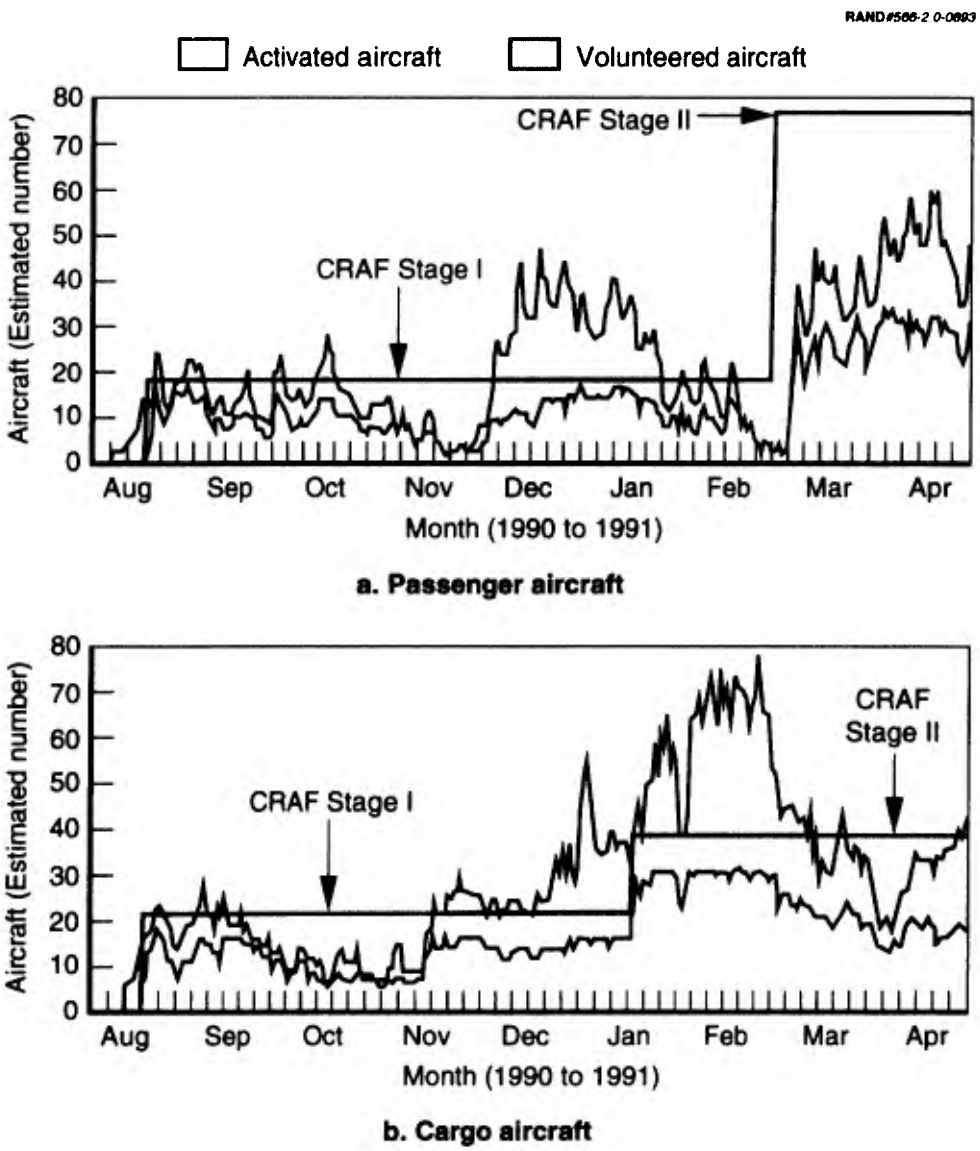


Figure 2—Estimated Aircraft Used: Activated and Volunteered Commercial Transports

[8]Communications with HQ MAC, August 22, 1991.

troops from the theater back to their home bases. Proportionately more troops flew home on CRAF aircraft than were airlifted into the theater before the war. In April, MAC used between 40 and 50 passenger aircraft comprising Stage I and II aircraft as well as volunteers.[9] These numbers suggest that the redeployment requirement did not strain the available passenger capacity since MAC had access to up to 77 aircraft—17 from Stage I and 60 more from Stage II.

By about May 10th, it was clear USTRANSCOM's projections for the redeployment requirements fell below activated CRAF capability. When the military determined the number of passengers still left in the theater did not warrant continued activation, the airlines soon regained their assets. The decision to deactivate occurred quickly and without much warning. On May 17, MAC deactivated CRAF Stage II, followed a week later with a Stage I deactivation on May 24.[10]

CRAF Operations

More than 60 percent of the passengers airlifted in support of ODS between August 1990 and February 1991 flew on CRAF aircraft (see Figure 3a). During the same period, CRAF airliners carried about 25 percent of all the cargo MAC moved by air (see Figure 3b).

The data show two distinct phases of passenger movement: Phase I from August to November, with a peak in August and gradually tapering off in November, followed by Phase II and the war from November to February. Concentrated activity occurred during December and January.

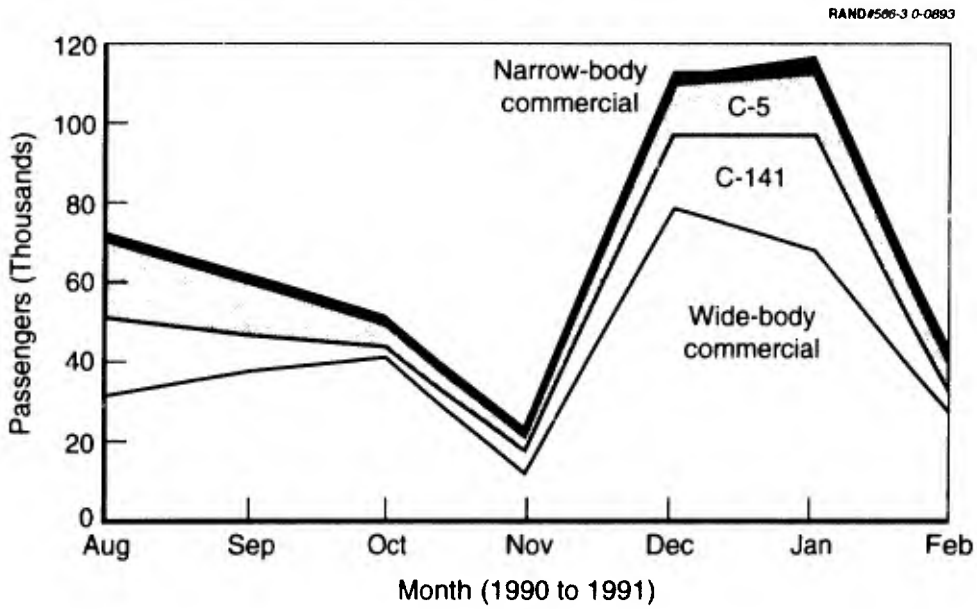
Nearly all the troops that flew on commercial transports went by wide-body aircraft.[11] While this statistic is not surprising—after all, most MAC planning scenarios with a CRAF activation assumed commercial jets carried most of the passengers—more noteworthy is the number of passengers that flew on military transports. Planning factors for the CRAF often cited an estimate of a 95-percent troop airlift rate by CRAF, but this figure assumed a Stage III activation. All prewar passenger movement depended only on Stage I and volunteered aircraft.

---

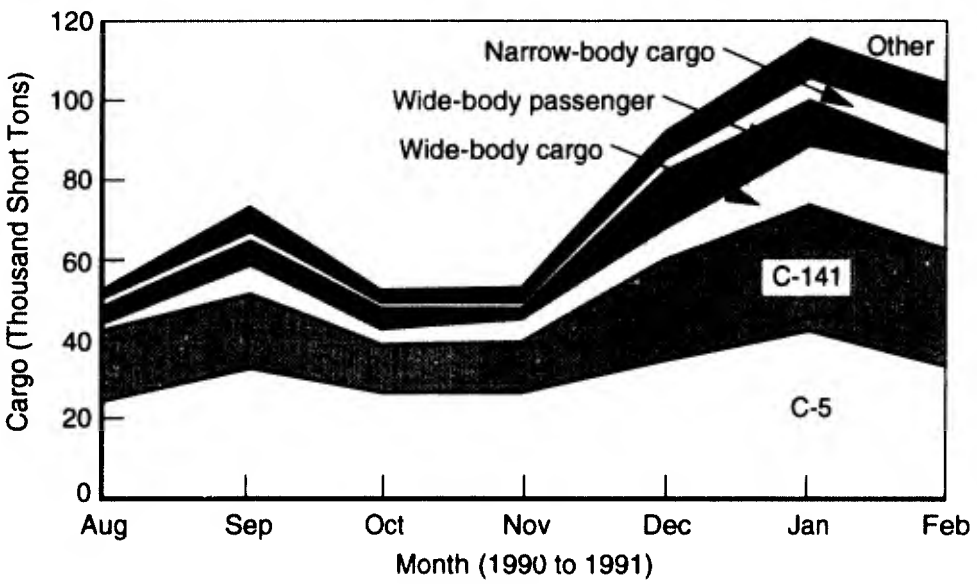
[9]Communications with HQ MAC, December 31, 1991.

[10]Communications with HQ MAC, August 22, 1992.

[11]Wide-body aircraft include the B-747, L-1011, and DC-10. Both the DC-8 and B-707 represent narrow-body aircraft that are capable of long-range international flights.



a. Passengers moved



b. Cargo moved

Figure 3—MAC Airlift Operations

Cargo moved by MAC peaked in September 1990 and January 1991. The biggest push came in January with the start of the war and the concomitant activation of Stage II cargo transports. Cargo flown on organic transports increased even more during this time. As expected, organic transports carried most of the freight airlifted to the theater.

Commercial carriers were credited for moving almost as much cargo in passenger aircraft as cargo transports. Much of that weight came from baggage carried by the troops. For about one month, several carriers temporarily converted their passenger aircraft to a cargo configuration by installing plywood planks. Because of the lack of rails, these missions required grueling hours of hand-loading. Despite using these aircraft for non-ODS missions, ground time operations were so inefficient and manpower intensive that MAC soon abandoned this approach during the operation and later permanently.

Another means of showing how MAC used CRAF aircraft is to look at the mission data according to primary route. The missions can be grouped into categories: CONUS to the area of responsibility (AOR) or theater, Europe to the theater, CONUS to Europe, etc. It becomes readily clear that MAC preferred using CRAF aircraft to fly the transatlantic corridor from CONUS to the AOR and from the AOR to CONUS both in terms of missions (Figure 4) as well as actual cargo (Figure 5) and passengers (Figure 6).

Three explanations may account for MAC's preference in using CRAF assets to fly the transatlantic missions. These are detailed in later sections. First, wide-body aircraft such as the B-747 carry more passengers and bulk cargo pallets than the C-141 in a similar configuration. It made sense to use high-capacity CRAF aircraft for the longest missions. Second, constraints at civilian European airfields cut down the number of daily flights that could transit feasibly through the airport. Airport restrictions such as daylight-only operations and the maximum number of aircraft on the ground (MOG) regulations, which were more stringent than at military airfields in Europe, played important roles in limiting flights. Third, during the war the airlines requested that their aircraft operate into and out of the theater only during daylight hours. Taking all these considerations into account, MAC without doubt achieved greater cargo and passenger airflow rates by using CRAF and organic assets the way it did.

Troop redeployments began in earnest in March 1991, after the end of the war. Passenger missions peaked in April. Until the end of the war, MAC required missions from the cargo aircraft only (of the activated Stage II assets). Redeployment demands for passenger airlift finally pressed Stage II passenger jets into service as well. In fact, during the three-month redeployment period from March to May, commercial aircraft lifted more troops from the region than they brought in during the preceding seven months of Desert Shield and Desert Storm. Cargo missions continued in both directions after the war: to the Gulf to resupply the remaining troops, and from the Gulf to homebase locations. Cargo redeployment missions peaked in April. By mid-May, cargo and passenger

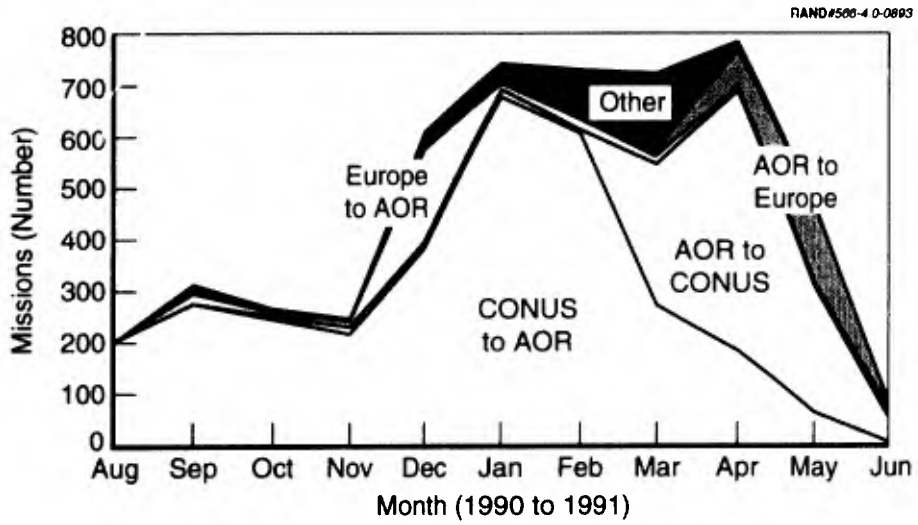


Figure 4—Number of CRAF Missions by Destination

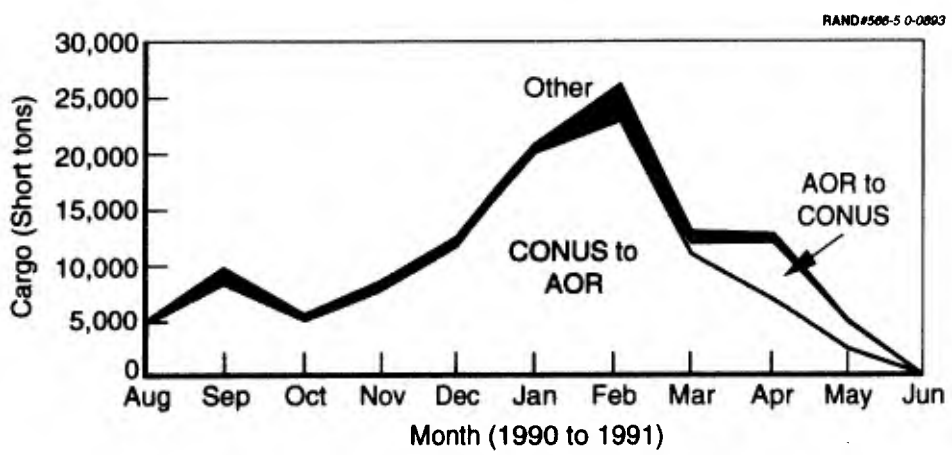


Figure 5—Number of Cargo Tons Moved by CRAF

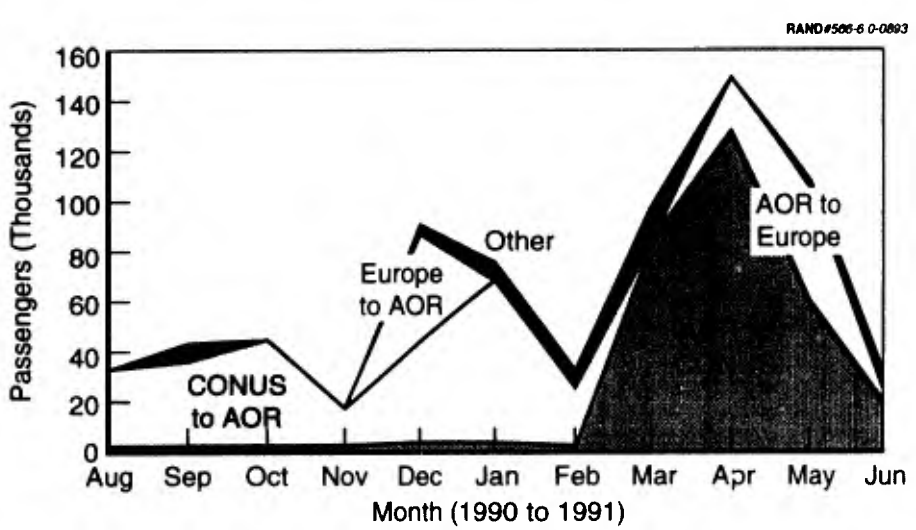


Figure 6—Number of Passengers Moved by CRAF

requirements had fallen off dramatically. MAC deactivated both stages of the CRAF before the end of May.

While all the people we interviewed agreed without reservation that the use of commercial aircraft during ODS was successful and every company readily admitted they were proud to participate, both the airlines and MAC agreed that some issues needed further attention. The next sections highlight areas that either AMC or the airlines (or both) believed needs resolution for future operations. These areas include: initial problems, longer leadtimes and a more efficient use of resources, planning and communications difficulties, questions of access to greater commercial airlift, and appropriate incentives for a strong and capable CRAF.

4. Initial Problems

The people we interviewed agreed on two points regarding the start-up of the CRAF program in August. First, many were impressed by how well the operation began, given its first-time activation. Second, all recalled problems with understanding the subtleties and complexities of government-provided hull insurance. Company representatives, DoT personnel, and CRAF officials worked through start-up problems in the two types of insurance offered (described later in this section). The learning process included such basics as what these programs did and did not cover, as well as overcoming hazardous material cargo difficulties.

Well-defined, modern insurance policies that both company and government officials understand are fundamental to successful CRAF operations, particularly in the earliest days. The importance of the government's insurance policy cannot be overstated. Replacement costs for new, wide-body commercial aircraft start well above 100 million dollars. Not surprisingly, airlines do not want to fly underinsured. During the operation and for some legs of the mission, gaps in government insurance occurred regularly, although full realization of this fact came much later for many airlines.

MAC also learned valuable lessons pertaining to the special considerations of hazardous material ("haz mat") missions. These flights uncovered important problems that need further attention. AMC is continuing to make progress both in the areas of insurance and haz mat, but it cannot resolve all of these issues alone. Much depends on the cooperation from other government agencies, the Congress, and in some cases, foreign governments.

Insurance

Insurance problems and uncertainties led to considerable confusion at the beginning of Operation Desert Shield. Several airline representatives blamed problems with government-sponsored insurance as the reason why they did not volunteer more lift before the activation of CRAF Stage I. Even after activation, some issues lingered. The airlift requirements for Desert Shield made a CRAF call-up inevitable. Future operations may not. Resolving insurance issues is essential before the next time AMC wishes to use commercial aircraft to support military missions.

During the first month of Desert Shield, commercial insurance rates made flying to the Gulf region increasingly cost-prohibitive. With this type of market condition, the government has the authority to step in and underwrite missions performed in the national interest. The government used two insurance programs managed by separate agencies to cover CRAF missions. MAC did not have activation authority over either. Thus, CRAF activation did not start the clock automatically with either program. Even after both programs started, gaps in the coverage exposed companies to potential risks.

Title XIII Insurance

War Risk Insurance under Title XIII of the Federal Aviation Act of 1958 within the Department of Transportation covers contract air operations conducted in the national interest. On August 10, one week before the CRAF Stage I activation, DoT activated the Title XIII insurance program.[1] This event marked the first time DoT used the war risk insurance with a CRAF activation that soon followed, which may explain the unanticipated problems.

Title XIII offers two kinds of insurance: premium and nonpremium. Non-premium coverage applied during ODS.[2] As a condition of their airlift services contract with DoD, CRAF participants must maintain nonpremium insurance coverage. An airline pays the Federal Aviation Agency (FAA) $200 for every transport they commit to the CRAF—an amount that makes the plane eligible for government-provided nonpremium insurance for as long as the airline owns or leases it.

DoD Indemnification

Airlines received indemnification against nonwar risk losses through the DoD Indemnification Program,[3] on August 17, 1990, the same day MAC activated CRAF Stage I.[4] This program was brought on line as the carriers learned more about what was and was not covered under Title XIII; volunteerism reportedly

---

[1]Interview with Lieutenant Colonel Dwight Moore, September 1992.

[2]Premium insurance covers other types of air services if no company will offer commercial insurance to an airline. For instance, it applied to air service operations in the aftermath of several foreign terrorist incidents in 1986. Additional security measures recommended by the FAA allowed these carriers to once again get commercial insurance.

[3]War risk relates to acts of war, not to accidental damage incurred while conducting a mission. An exploding missile relates to war risk; a fuel truck that causes an explosion does not.

[4]"Memorandum of Decision for Indemnification of Air Carriers (P.L. 85-804) Performing Missions in Support of Desert Shield under MAC Air Transportation Contracts or When the Civil Reserve Air Fleet (CRAF) is Activated," Secretary of the Air Force Donald B. Rice, August 17, 1990.

fell off. MAC successfully petitioned Secretary of the Air Force Donald B. Rice to grant indemnification for CRAF missions conducted in support of Desert Shield.[5] MAC acted very wisely. According to AMC working notes on insurance issues, when CRAF was activated commercial insurers immediately canceled their policies with many carriers. Others gave the airlines a short notification period (e.g., one week) before suspending coverage.[6]

According to the terms of indemnification, DoD's coverage applied from the start of a mission until the aircraft returned to regular commercial operations or DoD missions other than those supporting the operation. Like the Federal Aviation Administration's (FAA's) insurance, DoD required that the airlines maintain any commercial insurance not yet canceled or cost-prohibitive. AMC reimbursed carriers for extra insurance costs they incurred, up to $300,000 per trip. Two reasons account for this last requirement. First, the government agreed to match the terms of the carrier's established policies of insurance; thus it needed the policy as a basis for those terms.[7] Second, airlines successfully collected on some claims made to their commercial insurers for damages incurred during these missions. In one case in Saudi Arabia, striking birds destroyed a million-dollar engine on a commercial aircraft. Because the damage was not war-related, the private insurer paid.

On January 19, 1991, just days after the CRAF Stage II activation, Secretary Rice authorized indemnification a second time.[8] He amended his earlier Memorandum of Decision to account for the additional carriers and aircraft involved in supporting the new phase of the crisis, Desert Storm.

Title XIII Problems During the Operation

Liability Gaps. Important liability gaps existed with Title XIII insurance. For starters, the insurance did not cover domestic point-to-point flights. Carriers often stopped at least once in the U.S. after picking up initial loads either to refuel or even to pick up additional cargo and troops. Also, it was not clear whether the insurance applied to ground support mishaps within CONUS or whether it covered onboard spares. The insurance related only to aircraft operations and covered ramp-to-ramp activities. It did not cover events

---

[5]Public Law 85-804, as amended, and Executive Order 10789 gave the Secretary authority to grant indemnification.

[6]"Airlift Services in Contingencies and War," HQ AMC, no date (generated in 1992).

[7]One AMC attorney observed that at the time of activation many airlines seemed unaware of the provisions in their policies and did not know precisely what they carried. This is no longer the case.

[8]"Memorandum of Decision: Amendment 1 to Memorandum of Decision dated August 17, 1990," Donald B. Rice, Secretary of the Air Force, January 19, 1991.

conducted on the ground, such as refueling, catering service, and en route maintenance. Carriers operated in and out of Dhahran and Riyadh, Saudi Arabia, which were within striking distance of the Iraqi surface-to-surface missiles and where ground accidents and damage could occur. The gaps and ambiguities caused the carriers serious concern.

The five-year reauthorization of Title XIII insurance, occurring in October 1992, fixed some but not all these problems. For instance, the insurance now covers domestic segments of a military mission. Where gaps remain, new DoD indemnification policies will address most of the significant problems but not all that the airlines would like to see resolved.

Title XIII Insurance Approval. Some airline officials commented on the initial procedures DoT used to approve Title XIII insurance and later modified. They objected to authorizations done for missions on a tail-by-tail basis and even mission-by-mission. DoD and DoT adjusted these requirements within weeks, after hearing these comments from the industry. It is worth noting the solution here, if only to highlight the need to incorporate such solutions formally into any future program. The activation of the Title XIII nonpremium program, which applied to Desert Shield, requires three specifications: the President must indicate that air operations are in the national interest, the operations have to be international in nature, and the FAA must determine that commercial insurance is not available on reasonable terms and conditions.[9] The FAA determines whether a flight requires DoT-backed insurance by calling insurance companies, getting price quotes, calculating whether the flight would be profitable under the quoted rates, and approving the insurance if the answer was no.[10]

In the earliest days, DoT reportedly asked the airlines to provide them with up to three cost quotes from insurance carriers for each mission and aircraft (by tail number). If for any reason the airline needed to swap aircraft, it had to repeat the entire procedure. Responding to objections—which may have applied to volunteered aircraft more than any other—DoT moved quickly to a policy of providing approval for weeks of coverage, good for any CRAF mission and for certain types of aircraft, rather than on the individual planes themselves. The solution worked well.

---

[9]*Title XIII Aviation Insurance Program: Questions and Answers,* U.S. Department of Transportation, Federal Aviation Administration, Office of Aviation Policy and Plans, FAA-APO-89-10, August 1989.

[10]The FAA may insure any risk of an aircraft previously covered by commercial insurance but no longer, either because the rates are unaffordable or not offered at all. The coverage includes insurance against the loss of the aircraft as well as persons and property on board, up to the maximum amount of commercial insurance carried by the airline.

Commercial Return Flights Not Included. Title XIII insurance applies only to aircraft returning empty to their commercial operations or carrying military loads on the return flight. Airlines cited passed-up business opportunities because the government did not insure any commercial back haul or return portion of the trip. Any company conducting commercial operations out of the Gulf region would pay hefty insurance rates, if they were available at all.

Both the government and the airlines have much to win or lose on this issue. Certainly the government has no obligation to maximize a company's business opportunities during a crisis. Perhaps it is even unreasonable to ask the taxpayer to underwrite risky missions over which the government has little control. Airline representatives, however, indicated a strong preference for taking advantage of the potential back haul business on one-way CRAF missions.

In October 1992 when Congress reauthorized the Title XIII insurance program again, it did not change the back haul policy. The government will continue to avoid covering commercial flights returning from a military mission. Given the enormous liability implied by a more liberal policy, this decision probably will remain.

DoD Indemnification Problems

Warsaw Convention Treaty Liability Limits. The Warsaw Convention Treaty, originally signed in 1921 by the United States and other countries and modified several times since then, is the legal basis for the conduct of international air travel. Among other things, it sets liability limits for passenger travel if companies adhere to certain rules. For instance, the treaty requires airlines to inform its passengers of the liability limits before the flight begins, currently $75,000 per passenger, and to present the option of purchasing additional coverage. If the carrier fails to implement this procedure, it no longer enjoys liability protection. Thus CRAF carriers technically had to issue tickets and insurance options to their military passengers before takeoff to avoid unlimited liability in the event of an accident.

When conducting peacetime CRAF missions, MAC provides the airlines with boarding passes or tickets to give to their military passengers (MAC Form 148), along with commercial insurance packets. Under normal conditions, these forms are readily available. During Desert Shield, and especially at the non-MAC loading sites, tickets and forms sometimes ran out or were not received; thus they could not be given to the boarding troops.

In response to the lack of forms, some airlines delayed flights until the optional insurance packets arrived; others reportedly flew anyway. Fortunately, no accidents occurred. After Desert Storm, the airlines pushed to resolve this problem for future operations. AMC agreed and wants DoD to include it in indemnification protection for carriers if they cannot issue tickets or insurance options before takeoff through no fault of their own.

Personal Life Insurance Suspensions. Uncertainty remains over the government's ability, under existing law, to match the terms for life insurance that crew members take out for themselves. Many commercial policies contain a war risk clause that suspends the insurance under CRAF activation conditions. Others require higher premiums. Pilots who can earn as much as $175,000 annually often carry sizable life insurance policies. Without any other coverage, in the event of an accident during a CRAF activation the amount guaranteed ($75,000) under the Warsaw Convention Treaty also applies to crews. Crew members understandably did not want to fly underinsured. In fact, some airlines reported difficulty in getting crews to fly during the war because of this problem.

Several companies resorted to paying extra premiums for their employees' insurance policies still in effect. Later they requested reimbursement from AMC, which they reportedly obtained.[11] AMC agrees that the problem needs to be resolved. The nation was fortunate during Desert Shield and Desert Storm. If the U.S. had not commanded the skies in the theater and if any commercial crews had been harmed, CRAF participation could have been severely affected. AMC indicated that it will work with Congress to change legislation to address this issue.

Potential Delays in Claim Collection. DoD's indemnification program is underfunded, which is not surprising, since, according to *The New York Times*, DoD last offered indemnification four decades ago during the Korean War.[12] Even though the U.S. government underwrote CRAF missions, potential delays in trying to collect payments concerned more than one airline. According to AMC, commercial insurers typically settle claims with the airlines within 48 hours. Because carrier operating expenses are quite high, running in the hundred of thousands of dollars, cash flow is an important business consideration. As one representative said, the airlines cannot afford to wait for months until they get paid. They indicated concern over the time it could take to get funds appropriated to this program. The airlines would like to see some time

---

[11] Interview with Lieutenant Colonel Dwight Moore, HQ AMC, September 1992.

[12] Weiner, Eric, "U.S. Insurance Offered For Mideast Transport," *The New York Times*, September 5, 1990, Section D, p. 6.

payment guarantee for both DoD indemnification and Title XIII insurance. Reasonable reimbursement schedules certainly are understandable. If the government wants access to these strategic assets, then it needs support to fund these accounts under emergency conditions. Policies to facilitate reimbursement also show the government's good faith with the airlines. AMC wants to resolve this problem and is continuing to work with DoT and the Congress.

Multiple Insurance Programs

Airline representatives said that they preferred to work with a single insurance policy, rather than two (Title XIII insurance and DoD indemnification), particularly if both come into effect on different dates. Some suggest lifting the Title XIII insurance altogether from DoT and including it with the DoD indemnification program. Others have proposed the reverse.

Historically, DoT has been responsibe for Title XIII insurance because assistance could be needed by others besides the military. Even during Desert Shield, the State Department requested flights to get Americans out of the theater.[13] In the past, the FAA also provided airlines with premium insurance (not appropriate for CRAF missions) when commercial insurers suddenly denied them coverage, such as in response to terrorist incidents. Such cases also do not involve the military and may concern an airline not in CRAF. Finally, DoD must assume responsibility as an insurer of last resort for those areas not covered by the DoT for military missions.

AMC and the FAA indicate they plan to continue the two programs but will change both to address some of the former programs' shortcomings. To reduce the time needed to activate the DoD indemnification program, AMC wants indemnification procedures to kick in automatically at the loss of commercial insurance in the case of a CRAF activation. It also wants these procedures to apply to volunteered lift for crises not involving a CRAF activation or for aircraft not yet activated.

It certainly makes sense for the government to include volunteered assets under its insurance umbrella. During Desert Shield, non-CRAF aircraft and volunteers helped MAC to avoid calling up higher stages of the CRAF. Finally, if the government decides to operate both programs for future military missions like those performed during Desert Shield, both should be activated at the same time and as early as possible.

---

[13]Also, some services operating to Israel received help from DoT when airlines could not get commercial insurance on their own.

Hazardous Materials

FAA regulations require that airlines have qualified crews and certified aircraft for moving hazardous materials. Military units required the airlift of a whole host of hazardous materials, including explosives, flammable liquids and solids, oxidizing materials, and corrosive material, such as acids and lyes. In all, DoT identifies nine classes of hazardous materials.[14] Explosives are in the first class; three subclasses cover materials from bombs and munitions to ammunition for personal weapons.[15]

Lack of Certification

At the start of the operation, some airlines in the CRAF lacked certification to handle hazardous materials, which complicated MAC's ability to move these loads on commercial aircraft. Carriers involved in transporting these cargoes for the military during peacetime held the proper credentials, but not all airlines in the CRAF regularly fly haz mat. CRAF's activation highlighted a problem linked to information systems that made it difficult for MAC to match these missions only with certified carriers. FAA haz mat regulations cover everything from the mix of materials that can go on the same flight to required packaging, labeling, and positioning, as well as handling emergencies, such as fires.

During ODS, MAC could not assign haz mat missions only to those carriers with prior certification because it did not have sufficient visibility or control over the type of cargo at the loading site. Military units moving hazardous materials on commercial aircraft used the next arriving airliner, regardless of its qualifications. MAC had to buy missions based on a general requirement and needed air crews to pick up whatever load was ready next.

The command initiated a workaround, though imperfect, for carriers that had the much needed lift capability but not the proper qualifications. It was certainly better than other options. Flying in another carrier with proper certification represented an intolerable waste of time, money, and manpower. Using certified experts from one airline to help with another carrier would not work because of the potential liability issues involved (if the advice led to problems, then who was responsible?). Instead, MAC supplied DoD couriers expert in hazardous materials regulations who rode onboard to oversee loading and unloading

---

[14]See Title 49, Code of Federal Regulations (Transportation), Parts 170–179.

[15]*Transportation Reference Data*, Field Manual 55-15, HQ Department of the Army, Washington, D.C., 9 June 1986.

operations. This solution just had one problem. To avoid potential delays, the airlift user had to know whether the next arriving commercial jet needed couriers and if so, the user had to call in advance for experts to meet the plane. Units did not always know that a courier had to be contacted if the airline lacked certification; often they were not even sure what type of aircraft to expect, who owned it, and consequently whether the mission needed an expert. Flights that came in unannounced or in a different order than anticipated compounded the problem.

Mixed Loads

Under normal circumstances and by regulation, haz mat loads would go on cargo aircraft only, to avoid having haz mat and passengers on the same flight. MAC could not always comply, however, and had to obtain waivers. Some units, such as the 82nd Airborne Division, were deployed by air and flew with rockets and grenades by their side.[16] The military mission requires that the unit be ready to fight soon after the plane lands in the theater. Even so, flight attendants reported unease over hand grenades stowed in seat pockets and loaded weapons in overhead compartments, on the floor, or wherever the troops could find space. Several CRAF crews reportedly were not prepared for this situation and refused to fly the mission. Sometimes the airline brought in new crews, but the missions went, nevertheless.

Units normally carried explosives in the cargo hold. Deploying units commonly required their troops to empty their personal weapons of ammunition and have them inspected before boarding. Sometimes the extra processing led to boarding delays.

Too Few Airfields for Commercial Hazardous Material Missions

Within the U.S. At the start of Desert Shield, MAC had few domestic civilian airfields designated as technical stops for CRAF flights carrying hazardous materials. Aircraft can fly in or out of military bases with haz mat onboard with no problem, but these flights often needed another stop in the U.S. to refuel or change crews before flying across the Atlantic Ocean. At these stops, MAC preferred the airlines to use commercial airfields to reduce traffic at often already congested military bases. Unfortunately, commercial airfields permitting haz mat flights were not readily available in the earliest days of the deployment.

[16]MAC received DoT waivers in these cases. The practice goes against normal regulations governing hazardous materials.

To procure commercial haz mat stops, MAC got help from as high as the Commander-in-Chief's office. Under the auspices of the President's office, MAC reportedly sent out inquiries to numerous airports, requesting their permission to operate commercial flights carrying hazardous materials through their facilities.[17] The replies were mostly affirmative.

The FAA, within the DoT, has the authority and responsibility to enforce regulations governing the air movement of haz mat. It conducted hurried surveys of the airfields whose authorities said they would accept these particular flights. Officials had to look for remote parking spaces away from terminal areas as well as evaluate the local disaster response program. Airfields located in remote areas did not require as extensive evacuation plans as those located closer to population centers, but all needed adequate fire departments.

In addition to Bangor, Maine, which already permitted flights, the FAA approved several airfields on the east coast (Baltimore, Maryland; and Atlantic City, New Jersey). On the west coast, the Seattle-Tacoma Airport, located in Washington, was approved. The FAA still granted waivers for the use of some of these airfields since their evaluations were not as complete as normally required.

European Stops. Commercial flights carrying haz mat could stop at several European airfields, although not all were civilian. CRAF missions could use Mildenhall AFB in the UK, Ramstein AFB or Rhein-Main AFB in Germany, among others. If crews wanted to transit commercial airfields, they could fly into Frankfurt, Germany, as well as an airport outside of Brussels, Belgium.

Foreign airfields that permitted haz mat flights often placed restrictions on the makeup of the haz mat loads. For instance, some German commercial airfields placed stringent limits on the amount of explosives an aircraft could carry. This restriction, coupled with daylight-only hours of operation, reduced the number of these flights accessing these airports. At other places, restrictions at military airfields on the number of parking spaces open to aircraft carrying hazardous cargoes effectively metered flights, even though aircraft could have relatively more hazardous materials on board.

A Few Mistakes Occurred. MAC identified only about three incidents as a result of hazardous materials violations, but none involved problems beyond landing at the wrong airport. To effect a crew change, one flight mistakenly brought a B-747 carrying hazardous materials into New York City's John F. Kennedy Airport. Airfield authorities quickly called MAC to register complaints. In

[17]Interview with Colonel Ronald Priddy, September 1992.

another case, a small airline flying voluntarily for the military reportedly landed short of its destination (Mildenhall AFB, a military base in the UK) because of weather-related congestion. The flight stayed only a short time at Heathrow International, one of the world's busiest metropolitan airports.[18]

Potential Solutions

Although AMC considered a requirement that would have forced all future CRAF participants to be certified to carry hazardous materials, in the end, it decided against it. Not all airlines carry this type of cargo in their commercial operations nor do they opt to move it for the military in peacetime. These companies opposed a certification requirement on the grounds that it would drive up the cost of participating in the CRAF. Besides, the root of the problem really was with the information systems, not with the carriers. AMC found these arguments compelling and believes that recent changes to key information systems will help it to avoid similar problems in the future. The command says it will not require airlines to hold haz mat certification as a condition of participation in the CRAF.[19]

With regard to flying into airfields not permitting haz mat loads, MAC worked closely with the airlines to ensure that mistakes were not repeated. Indeed, it reported few further incidents. MAC's successor organization, AMC, said it learned from the experience and intends to make instructions clearer in the new contract. The command also indicated it will work with the FAA to approve more U.S. airfields for use during a CRAF airlift operation. Working with U.S. allies to permit similar flights under emergency conditions is also a worthy goal.

---

[18]A flight involving a military transport might account for a third incident. Information comes from a September 1992 interview with Major Fraley and Colonel Priddy.

[19]Communications with HQ AMC, November 1993.

5. Cargo Operations

Unlike insurance and hazardous material problems that were somewhat resolved as Desert Shield progressed, other categories of problems persisted throughout the operation. Of those lingering problems, practices aggravating CRAF cargo operations proved among the most troubling to the airlines and arguably affected MAC's actual lift rate. Airfield congestion problems worsened significantly during Phase II of Desert Shield, particularly at key APOEs such as Dover AFB and McGuire AFB, as well as at APODs, such as Dhahran, Saudi Arabia. The airlines warn the same events probably will occur in future scenarios but have also offered suggestions to mitigate these problems. Some inefficiencies occurred because certain operating constraints were not anticipated well enough beforehand. In the future these problems need to be addressed and considered in CRAF operational planning policies.

Aerial Port Operations

Early on in the deployment, MAC set up aerial ports to act as departure hubs at several U.S. military bases—APOEs. It funneled more than 50 percent of the CRAF cargo missions through Dover AFB or McGuire AFB, both located on the east coast of the U.S.[1] Units deploying from eastern locations trucked some of their cargo to these APOEs, where ground crews palletized the bulk cargo for loading onto MAC and commercial transports. Three other locations processed more than another 30 percent of the CRAF cargo flights, including Tinker AFB, Norfolk Naval Air Station (NAS), and a civilian operation run from the John F. Kennedy (JFK) International Airport.[2] The civilian operation, developed in response to congestion problems at Dover AFB, is discussed later in this section. Almost 85 percent of all CRAF cargo missions flown from the beginning of Desert Shield to the end of the Gulf war originated from one of these five airfields.

---

[1]Dover AFB received 655 cargo missions and McGuire AFB 369 cargo missions from August 8, 1990 to February 28, 1991. Figure 7 shows the weekly totals from actual missions counted in terms of the first day of actual flight. MAC contract data were used for the compilations.

[2]MAC operated 388 CRAF cargo missions from Tinker AFB; 170 cargo missions from Chambers Field, Norfolk, NAS; and 42 missions from the JFK International Airport. Figure 7 shows weekly totals actual missions counted in terms of the first day of actual flight. MAC contract data were used for the calculations.

At the terminus of these one-way missions, Dhahran, Saudi Arabia, represented the main APOD. In setting up these hubs, MAC effectively channeled significant traffic over a few routes. Routine flights meant that eventually MAC could give the airlines projected lift requirements. Beginning in November, requirements were released up to one month in advance.

By conducting much of the cargo operation through hubs, a more efficient operation than transporting directly from unit airfields resulted. Cargo also was transported directly. Some of the CRAF cargo missions and most of the passenger flights often embarked directly from Army or Marine airfields as well as nearby airfields. Channel missions certainly had the advantage of greater reliability, but they had their downside as well.

Cargo Backlogs

As Desert Shield progressed, particularly near the end of Phase II, the cargo lift requirement reportedly mushroomed at a few military APOEs. The data in Figure 7 indirectly support this claim. From December 23 to 30, commercial lift missions at McGuire AFB increased by 54 percent. Dover AFB saw a whopping increase in cargo missions of more 100 percent in just two weeks. This type of CRAF mission climbed 60 percent during the week of January 6 and yet another 47 percent during the week of January 13. Two other locations, Tinker AFB and Norfolk NAS, showed a surge in CRAF flights occurring later in January, rising steadily after the first several weeks.

Phase II, which took place from early November 1990 to mid-January 1991, required the deployment of additional forces from Europe and CONUS. CENTCOM wanted all of these units in the theater before the January 15th deadline. No one knew whether hostilities, if they occurred, would choke off CRAF flights. Sustainment operations were already well under way with the routine lift of foodstuffs, mail, and high-priority supplies. The demand for cargo lift increased dramatically just as other factors combined to hinder lift efforts. By early January, thousands of tons of cargo waited at the ports. Bad winter weather at both McGuire and Dover AFBs contributed to flight delays. As the missions increased, more and more aircraft vied for the same fueling trucks and ground crews.

These conditions all combined to create congestion. MAC finally sent teams to the worst-affected airfields to assess the situation. They reported that a fair amount of cargo was labeled inappropriately as high priority. In the end, some cargo waiting for airlift was transported by sea. (The command also encouraged all services to monitor the problem closely.) MAC appealed to the airlines again

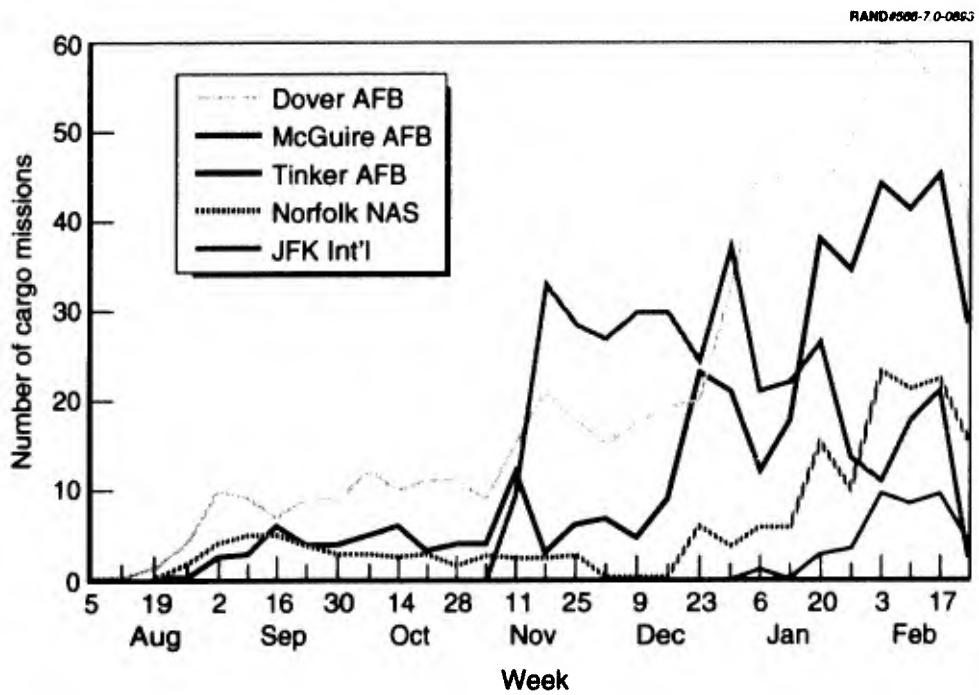


Figure 7—Nearly 85 Percent of the CRAF Cargo Missions Operated from Five Airfields from August 5, 1990 to February 28, 1991

for more volunteer lift. Ultimately, the response of the airlines was not great enough because MAC activated CRAF Stage II on January 16.

Although CRAF was not involved with increased demand in cargo lift, some of its cargo-related problems must have contributed to APOE congestion. The CRAF cargo missions had unique problems and several solutions that are noted here. For example, the airlines initiated some innovative work-arounds that potentially could lead to interim policy changes until information system improvements occur.

Nonstandard CRAF Pallet Requirements

The unique difference of CRAF missions from military missions was in the area of numerous pallet requirements depending on aircraft type. As a consequence of pallets built for the wrong aircraft, the airlines recalled loading delays of up to 24 to 36 hours at Dover and McGuire AFB. CRAF mission data show that MAC canceled at least two missions and reawarded another in early September and October. These delays occurred because the cargo was built for a different aircraft than the one scheduled to pick up the load. In at least 20 other cases, aircraft waited on the ground while loaders either tore down pallets and rebuilt

them because they would not fit or built them only after the delayed cargo arrived.[3] Because the data did not identify all delay sources, these numbers no doubt are conservative estimates.

Ground crews and troops built pallets before aircraft arrivals to turn flights around faster. Typically problems did not involve the commercial system of rails and locks that differs from the military's, even though the respective pallet size each uses is not the same. The commercial loading system adjusts to accept different platform sizes and can accommodate the military's standard 463L pallet.[4]

For loads assigned to the CRAF, ground crews needed to know the exact aircraft model and series if they wanted to build packages only once. Varying cabin dimensions among aircraft types drive the differences in pallet size, shape, and height. As one example, Table 2 indicates how commercial aircraft differ from

Table 2

Capacity Planning Factors for Military and Commercial Aircraft

Aircraft	Maximum Passenger Load[a]	Maximum Military Pallets	Maximum Pallet Height (inches)	Allowable Cabin Load (STs)
Military				
C-130	90	6	76 to 96	12.5
C-141	208	13	76 to 96	36
C-5	73 to 267[b]	36	70 to 96	50 to 102.5[c]
Commercial				
B-747	364[d]	32 to 36	94 to 118	89.9 to 99.1
DC-10	242	30	78 to 82	55.2 to 69
DC-8	165 to 219	13 to 18	75 to 79	26 to 47.3
B-707	165	13	75 to 79[e]	29.9
L-1011	238 to 273			

[a]Unless indicated otherwise, a range of values represents capabilities over a series of aircraft types; for example, the B-747 aircraft type encompasses the B-747-100/200/SP models.

[b]The C-5 transports 73 passengers in a normal contingency and can also carry 267 passengers in the cargo compartment.

[c]In peacetime, the C-5 carries up to 50 tons of cargo; in wartime, it can carry more than double that amount, up to 102.5 tons of cargo.

[d]The passenger limit of the B-747SP is 266.

[e]The B-707C can accommodate pallet heights of up to 85 inches.

[3]These missions were set back by a median time of 4.2 hours (or an average time of 7.9 hours).

[4]In at least six missions, the airline caused the delays because it turned aircraft around from commercial flights and had to reconfigure the plane first to accept military pallets.

one another (and from other military aircraft). Only the largest, the B-747, accommodates the profile easiest to build—the squared-off rectangular shape. Pallet profiles for all other aircraft adhere to nonregular dimensions across the top surface. Except for the B-747, crews must build different pallets not just for a particular plane but for a particular *position* on the plane.

To illustrate how the lack of information on expected aircraft types made pallet preparation so much more difficult, Figure 8 presents pallet profile requirements for four CRAF airliner types: the B-747, DC-10, DC-8, and B-707. All are long-range international cargo jets. The schematic shows actual proportional requirements in two dimensions, as given in standard Army transportation manuals.[5] Of the eleven contours shown, eight are unique. Note, for example, the DC-8, which has three different profiles depending on the pallet's intended position in the aircraft.

Lack of Flight Information

As already mentioned, to successfully prepare cargo destined for a CRAF aircraft, personnel had to know the types of aircraft to anticipate and their arrival sequence. Unfortunately the military often lacked up-to-date information on CRAF missions, particularly in the opening days of the operation—for reasons discussed later. MAC was aware of this problem and came up with a partial solution in the absence of better information systems that the command says it has since resolved.

Initially MAC assigned most CRAF cargo missions operating through McGuire or Dover AFB to B-747s. Given the potential configuration complications with other aircraft models and the B-747's roomy interior, this practice certainly made sense if these two factors were considered. This practice, however, did not take into account a key CRAF principle, namely, business entitlements.

MAC's policy of allocating missions, as understood by the airlines, would give carriers a similar share of military flights analogous to their peacetime business—i.e., according to mobilization value (MV) points. These points are accrued on the basis of the military value of the offered aircraft and the airline's willingness to commit assets to earlier CRAF stages. Companies with more MV points were entitled to more missions. Some airlines not operating the largest cargo aircraft protested the preference for the B-747 on the grounds of fairness. Going beyond the entitlement issue, they argued that they had canceled commercial contracts to

[5]*Transportation Reference Data*, Field Manual 55-15, HQ Department of the Army, Washington D.C., 9 June 1986, pp. 2-27, 2-28.

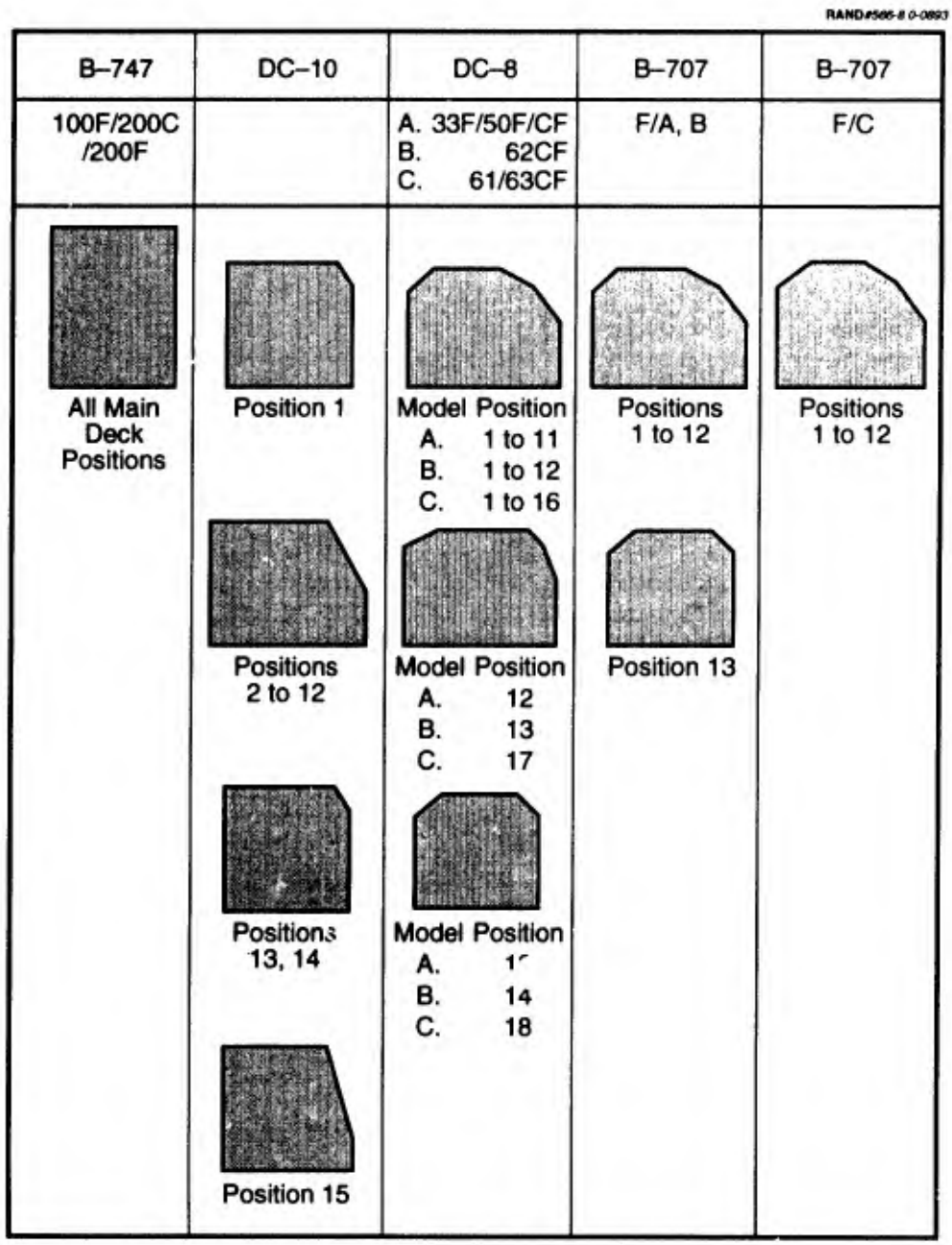


Figure 8—Commercial Pallet Profiles

make their aircraft available for military missions, only to find them underutilized.

MAC addressed both problems—a persistent lack of prior notification of expected aircraft type and the entitlement issue—by sending different kinds of CRAF aircraft to different airfields, while maintaining some balance in the

overall business. Thus, MAC expanded the use of other long-range international aircraft but mitigated palletizing problems that random assignments would generate. Familiarity with aircraft types did grow. Over time, loading crews reportedly became accustomed not just to an aircraft type but to a particular airline's aircraft type, even down to the tail number.

As long as the CRAF is a voluntary program, the need for ensuring a fair share of the business remains. Having more detailed information on CRAF aircraft pallet restrictions and better information systems on anticipated aircraft schedules would greatly reduce future potential problems.

Too Little Material Handling Equipment

The lack or late arrival of material handling equipment (MHE) at some loading and unloading sites caused flight delays. At the start of Desert Shield, considerable effort went into coordinating MHE with CRAF missions, to the point of tying up valuable military airlift assets just to get needed assets in place. One of the earliest passenger flights to Saudi Arabia reportedly waited on the tarmac for hours until a military transport brought in a passenger ladder. Mission delay information reported numerous mechanical breakdowns with the equipment servicing CRAF aircraft that exacerbated the shortage of equipment problem.

The MHE problem was never resolved adequately with either commercial or military aircraft.[6] The parent document to this one underscores this point.[7] The MAC Crisis Action Team (CAT), the mission control team at Scott AFB who directed the operation, assigned one group of exerts just to coordinate MHE movements. A loader capable of loading and unloading a wide-body aircraft, such as the 60K loader, takes hours to disassemble and reassemble and fits only on a military transport. Thus moving MHE from place to place consumed human and lift resources as well as caused delays in movements.

Aircraft capability is affected by inadequate loading equipment in two ways. First, the military must tie up some of its aircraft to position MHE in the right places if it is not distributed correctly. Second, the lack of MHE can create bottlenecks in ground crew operations and lead to delays in loading and unloading aircraft. There are few alternatives to adequate MHE capability.

---

[6]Initially, insufficient MHE was distributed to the right places and in the right numbers. MAC had to closely coordinate getting this equipment to Dhahran on C-5s, C-141s and C-130s before they could allow wide-bodied cargo aircraft to enter the theater.

[7]See R-4269/4-AF, pp. 45–47.

Because MHE is much less expensive than any of the aircraft used in ODS, it should not be a constraining factor in air flows. Simply put, the Air Force must buy sufficient ground equipment to match its future airlift requirements.

Convertible Cargo Capability Used

Cargo Convertibility. Cargo backlog problems led to heroic attempts in the use of passenger aircraft converted for cargo missions. The most obvious candidates for this approach were the 18 Pan American cargo convertible aircraft committed to CRAF Stage III. Unfortunately because these assets were in Stage III, MAC could not use them unless this last stage was activated or unless Pan Am volunteered the aircraft.

When the command first asked if Pan Am would offer the miiitary the use of these assets before a Stage III activation, Pan Am refused. MAC continued negotiations. Ultimately Pan Am signed a contract with MAC in which the military offered to pay for the costs of converting four aircraft from the normal passenger configuration to cargo and back again, along with a guarantee of a minimum number of missions.

Before the operation ended, Pan Am declared bankruptcy. MAC went to court to retain access to these aircraft or receive reimbursement of costs still owed by the airline because of their early retirement. As a consequence of the bankruptcy, Pan Am did not convert these aircraft back to their passenger configuration. This issue is continuing in bankruptcy court. (Delta Air Lines now owns some of Pan Am's aircraft and has agreed to commit them to the CRAF.)

Plywood CRAF. MAC employed another concept calling for additional cargo capability from passenger aircraft called the Plywood CRAF. Years before the operation, MAC invested in plywood kits for the purposes actually used during Desert Storm. Before the second-stage activation, MAC converted two passenger aircraft to a pseudo-cargo configuration by removing the seats and installing plywood flooring in the main cabin. The plywood served both as reinforcement and a flat surface. The plywood CRAF configuration lacked rails or loading devices to facilitate pallet movement within the aircraft. Consequently, crews hand-carried bulk packages onboard. Not surprisingly, more than 10 hours were needed to load and secure an entire cabin load. These operations were so manpower-intensive and time-consuming, MAC abandoned them quickly.[8] To be fair, the military tried this policy during the period of greatest cargo capability

[8]The missions were not sent to Southwest Asia but to areas outside the theater.

requirements. After ODS, AMC decided to eliminate the plywood CRAF concept altogether.

Increased Operational Efficiencies

Since some of MAC's practices through Phase I and others throughout the entire operation differed dramatically from normal airline operating conditions, many CRAF participants became frustrated even as they understood the source of the problem. Because of the rapidly shifting military threat and CENTCOM's frequent change in priorities, MAC often received lift requirements only four to five days before the units were deployed. Given such short notice, MAC could do very little but pass on short leadtimes to the airlines, who had no choice but to respond. Organic transporters faced the same problem.

Airlines say that their business requires them to operate with razor-thin inefficiencies. To make money for the company, an aircraft must be in the air on productive flights many hours a day. Short leadtimes often made aircraft and personnel scheduling and positioning inefficient. In terms of personnel, many of the airline unions required their management to buy blocks of crew time 30 to 45 days in advance. Since MAC's estimates did not extend that far in the future, especially in the earliest days, and represented no firm commitment in any case, flying CRAF missions meant the airlines had to gamble on missions that might or might not materialize, but they had to honor the commitment nevertheless.[9] Short leadtimes and required responsiveness led often to "deadheading" crews, or flying two sets of crewmembers per flight—one to fly the aircraft to a technical stop and another to fly the aircraft onward. With more leadtime, airlines argued they could position aircraft and crews more productively. This topic is detailed in a later section.

Greater Use of Commercial Airfields

In early January at the height of cargo backlogs, the congestion of aircraft at some APOEs (such as Dover AFB) was so great that MAC gave Federal Express the go-ahead to move military cargo out of Dover and load it at one of the airline's hubs—the JFK International Airport in New York City. The delays at Dover AFB that led to long wait times on the ground were caused primarily by weather-related problems. Federal Express determined that it would derive more benefit

[9]In the end, the gamble probably paid off for some airlines. The real issue behind short leadtimes and what the government should ask of the airlines has to do with fairness and reasonable risks, not whether some analysts guessed better than others.

from turning its aircraft faster and flying more missions than it cost the airline to transship the cargo from one state to another and load the cargo with its own equipment at one of its hubs. By allowing an airline in the CRAF to move some of the military cargo operation to a commercial facility, MAC benefited from the additional ground services and loading equipment offered by the civilian airfield operation, while at the same time relieving some of the congestion at an extremely busy APOE.

At the end of the war, Federal Express further developed this idea and proposed a new concept for delivering cargo. The proposed policy would allow CRAF-participating airlines to pick up cargo at designated sites and integrate it into the company's normal operations. Thus the airline would guarantee a specified delivery date but could process the cargo in the most efficient means available to the company's internal operations. AMC reported interest in analyzing this concept further; however, some representatives we interviewed expressed several reservations.

Of greatest concern with this concept is AMC's need to maintain cargo visibility and control over its cargo at all times. Moreover, the APOE still assumes responsibility for cargo that is diverted to a commercial airfield and might be reluctant to approve of such a plan, except as needed. Once cargoes were loaded and airborne during ODS, the airlines were not contractually required to alter their destination. As a courtesy and when practical, airlines cooperated with MAC and often landed at different APODs than those originally assigned. The need for visibility follows naturally from a control requirement. AMC says it needs visibility so that it can redirect or assign new priorities at any time up until flight time, while ensuring property control.

Information systems in operation during Desert Shield and Desert Storm offered very little visibility over many phases of the transportation pipeline, but it is certainly reasonable to set this as a goal for a new concept. It is also consistent for AMC to stipulate goals for commercial carriers that the military expects to achieve itself. The military plans to invest in information systems to give greater visibility over various in-transit segments. When these systems are operational in the future, the military will have greater visibility over all military transportation operations, including the CRAF's.

Another aspect of this proposal concerns who should profit from greater efficiency and lower costs. Some within AMC would like to hold profitability for distributed cargo delivery (as opposed to point-to-point delivery) to some level commensurate with current practices. Thus, if this new concept would reduce

shipment costs to the airline dramatically, some experts would like to see a similar drop in the price the military pays for these flights.

The concern that airlines could profit more from the proposed concept than they do today has an unintended effect. If an airline knows where its cargo is at all times, delivers within the specified time, receives the same compensation for the transaction, but can cut costs by using a different process, then an incentive exists for the airline to continue to operate within the CRAF. As traditional incentives shrink, AMC will want to pursue innovative, new incentives. Perhaps this concept falls within such a category. However, combining military and other commercial cargoes on a single flight invites liability complications that would need to be addressed. This topic is discussed later in this report.

Dispersing cargo to other airfields has the benefit of augmenting air flow under congested APOE conditions by taking advantage of the existing commercial infrastructure. The use of civilian airfields would provide AMC with additional ground support services (both equipment and crews). Commercial crews and aircraft personnel could operate out of their home base airfields—an arrangement the airlines prefer for cost reasons and turn rate.

This concept requires further analysis to determine overall benefits and costs. For instance, some cost analysis is necessary to better understand the implications for security requirements, positioning ALCE elements, etc., at civilian airfields.

Narrow-Body CRAF Aircraft

According to MAC, narrow-bodied long-range international aircraft, such as the DC-8, operated with lower "yields" relative to wide-bodied commercial aircraft.[10] Mission data supported this. Several factors appear relevant, including runway dimensions, types of cargo carried, and the role assumed by these aircraft.

Not all Army or Marine airfields could accommodate wide-bodied B-747s for passenger flights, and many times troops boarded from these sites. In addition, the services prefer to maintain unit integrity when deploying personnel so that they move whole units as much as possible. The requirement to board passengers by groups that vary in size can affect the number of passengers per flight. A few unoccupied passenger seats on a narrow-bodied aircraft will have a

[10]"Pax and Payload," HQ MAC Briefing entitled *Six Months of Desert Shield/Storm*, Lt Col Bill Ewing, MAC/XPY (Command Analysis Group), January 1991.

more pronounced effect on the ratio of actual passengers to allowable cabin load (ACL) compared to a wide-bodied aircraft.

Cargo DC-8s were more common in Desert Shield and Desert Storm than those with a passenger configuration. Again for airfields that could not accept large aircraft, narrow-bodied cargo aircraft were used although they cannot be loaded as efficiently as their larger counterparts. Loading doors on smaller aircraft are obviously also smaller; thus pallet handling becomes more cumbersome. In addition, cabin dimensions in narrow-bodied aircraft require stricter pallet profiles to accommodate the curvature of the aircraft.

Narrow-bodied aircraft often picked up the last of a unit's assets, resulting in less than full loads. Sometimes units did not state their requirements adequately or they overestimated their need for aircraft. CRAF aircraft assigned to pick up the last of a unit might arrive only to find the passengers and cargo had already gone on another aircraft. This situation also would reduce overall "yield." These smaller-capacity aircraft proved to be a favorite for mail delivery. They usually flew with full loads but not always. Because mail was so important for troop morale, MAC had the aircraft go out on time, regardless of load volume. Also mail is bulky but not dense. An aircraft carrying a full mail load may appear underutilized on a weight basis. The DC-8 also routinely carried hazardous materials requiring special loading considerations, which can lead to underloading on the basis of weight and/or volume. These cargoes often required space between pallets to assure safety. The use of larger aircraft would have been even less efficient.

Inadequate communications exacerbated some of the problems described in this section. For instance, unannounced arrivals of many CRAF flights compounded complications arising from irregular pallet configuration requirements. Ground crews cannot build pallets correctly if they do not know the type of aircraft to expect or its arrival time. As described in the next section, command and control of flights were among the worst recurring problems that MAC and the airlines had to face and probably would resurface if not adequately resolved.

6. Command, Control, Communications, and Planning

Desert Shield and Desert Storm highlighted the importance of good command and control for all aircraft, including commercial transports. In fact, the presence or absence of adequate communications in future operations may affect the willingness of the CRAF to fly into theater areas. Improvements in these areas will do more than just boost the morale of air crews—they also will help to address some of the problems noted earlier, such as unannounced flight arrivals to onload sites.

Problems related to planning gaps or the lack of procedures to cope with certain problems eroded some CRAF crews' confidence. In particular, problems arose that undermined a smooth transition to war and that dealt with potential chemical and biological exposure.

Communications Before the War

Command and control issues for CRAF flights that occurred at the beginning of ODS were never adequately resolved and actually grew as the airlift continued. Commercial pilots believed that their assigned radio frequencies were not always monitored by the military because military ground personnel did not always respond to CRAF crews. A gap existed between what commercial crews believed they needed and what they received. In the theater itself, the military created a vast communications network where little existed before. While this operation accommodated a slower buildup of commercially compatible systems, had conditions not favored the allied forces, the buildup could have hampered CRAF flights.

CRAF-Compatible Theater Communications

Dedicated ground equipment in the theater for CRAF crews to communicate with their operations centers did not exist until some months after CRAF Stage I activation. In response to the carriers' request for dedicated communications, and with MAC's approval and promise to reimburse the costs, Federal Express coordinated the installation of a system in Saudi Arabia for all carriers to use. After landing in the theater, crews wanted to communicate with their operations'

home base to receive updated instructions and weather reports, as well as to transmit information about the aircraft and flight. A company called SITA operates the commercial communications network used by crews operating in the South West Asian region. The network is similar to ARINC and even links to ARINC; however, it does not contract for services with government entities, such as MAC or the Saudi government. Therefore, commercial sponsorship was required. Connectivity caused part of the delay in installing a SITA capability. While Federal Express could contract with SITA, the network still had to link up with the on-the-ground lines. The required Saudi approval added to the delays. Reportedly by November, a dedicated commercial capability was operational. The need to establish dedicated ground communications quickly is important wherever the infrastructure is relatively undeveloped.

Flight Following

The command and control system used during the operation, the Global Decision Support System (GDSS) did not incorporate CRAF flight information provided by airline systems automatically. The airlines provided mission reports to the military by ARINC. Even though MAC was testing an electronic capability to translate ARINC information to the GDSS system, connectivity did not exist at the time of the operation. (An automated interface between ARINC and GDSS now exists.) During the operation, without an automatic datalink, personnel had to enter CRAF flight information manually. If the data were not entered soon enough, information gaps resulted. The Air Force gave more attention to this problem as its importance became more apparent.

HQ MAC assumed the responsibility of tracking CRAF missions until they were airborne. Once the flight commenced, MAC handed off responsibility to one of the numbered Air Forces (NAF). The 21st NAF, headquartered at McGuire AFB, monitored all military flights including CRAF missions taking an Atlantic route from CONUS to the theater. The 22nd NAF, located at Travis AFB, monitored the smaller number of flights taking Pacific routes.

MAC often had incomplete information on flights in progress. On an hour-by-hour basis, MAC often did not know the status of these flights; thus commercial aircraft could arrive at their onload sites or final destinations with little or no advance notice. Crews were expected to radio in their flight number and expected time of arrival to the airfield when they were two hours away from landing and again 30 minutes before touching down. Airlift coordinators assigned to a military onload site depended on MAC for schedules. If the information system did not contain updated, accurate data on schedules, airlift

users might first learn about an approaching flight only minutes before it arrived and then had to react quickly to avoid delays.

Unanticipated arrivals raised problems for everyone—MAC, the airlines, and the users of the airlift. Without prior notice of when or what aircraft would arrive, cargo and passengers were not always ready. At times it meant breaking down pallets or regrouping troops appropriate for the dimensions of the CRAF aircraft sitting on the ramp, rather than the one expected. Ground crews not anticipating aircraft were less prepared for a fast turnaround. The commander at Fort Stewart, home of the 24th Infantry Division (Mechanized), reportedly dealt with passenger flight uncertainty by processing large numbers of troops, and housing them in shelters adjacent to the airfield, ready to board at a moment's notice. Not all airfields have large waiting areas, however.

As the operation neared the beginning of the war, commercial crews wanted to fly into the theater during daylight hours and preferably fly out again before nightfall. This preference intensified when Iraqi Scud missile attacks commenced after the war began. The attacks occurred mostly after nightfall. Coordinating theater arrival times required close flight monitoring.

The solution to the problem of updating the Air Force's information system was incompatible connectivity between commercial and military systems, something AMC recognized and actively pursued to completion. CRAF officials developed a standardized reporting format that all airlines agreed to and say that they have fully implemented an automatic updating capability. This improvement is significant because it means that better coordination is possible in the future with AMC, the airlift users, themselves, and airfield personnel.

Airlift Control Elements

The Airlift Control Elements (ALCEs)—now called Tactical Airlift Control Elements—set up by MAC in European airfields, such as Brussels (Belgium), Rhein-Main (Germany), Rome (Italy), Zaragoza and Rota (Spain), helped reduce unannounced arrivals into the theater. The ALCEs, in place by November, functioned as a MAC command and control element and contributed importantly to information updates. One of the functions of the ALCE was to supply intelligence briefings to the CRAF crews. Crews received information about the air space they could use once in the theater, radio frequencies to use for announcing their arrival, and conditions to expect at airfields. Interest in these briefings increased considerably after the war began.

Because CRAF missions started the last part of their trip to the theater from European locations, the ALCEs located at these airfields supplied the GDSS with the latest information on a CRAF mission. (Missions landing at military installations also had this advantage.) Because of the long ranges and long hours in the air for each segment of the mission, delays not captured by the GDSS database could throw off a mission's estimated time of arrival in the theater by hours. Airfields in the theater experienced some of the highest rates of ground saturation in the entire operation. Greater predictability of arrival times helped ground crews turn the aircraft around faster and shorten the time spent in the theater, which became more important as tensions increased.

Airlines were responsible for developing contingency plans in case the military declared an emergency in the theater and called for mission diversions, but it was the military's responsibility to get that message to airborne crews. Each airline drew up alternative routes for crews in the event they had to abort the mission because of theater conditions. Because encrypted, secure communications did not exist between CRAF flights and theater command and control, the military sent all messages to commercial crews "in the clear," i.e., across civilian radio frequencies. This procedure worked well during ODS because coalition forces achieved air superiority within days of the war's outbreak. If the allies had not commanded the skies, the military would have needed more secure capabilities that were not available at the time and still are not.

Initially, some airlines felt the intelligence briefings were inadequate. Crews believed too little information was supplied. Also what they were told in Europe did not always correspond to the actual conditions in the theater. Part of this problem occurred because of the lack of cockpit communications updates, the long distances between the briefing locations and the theater, and the friction of war.

One oft repeated comment involved a perceived lack of response with the frequencies that crews were given to use but that did not always produce responses. MAC officials offered several explanations. En route communications for flights crossing the Mediterranean Sea were often assigned to Navy ships in those waters. To avoid giving away their position, normally operators on these vessels would not respond to a crew, except in the case of an emergency. MAC officials emphasized that all frequencies in the theater were monitored, but they allowed that perhaps not all calls were acknowledged, depending on the level of activity for a given station. They believed, however, that this situation happened only rarely. On a few occasions, updated information on frequency changes may not have been received uniformly

throughout the system, such as in intelligence briefings, but these were rare according to MAC.

Crews described en route communications as "poor." Until coalition forces gained air superiority over the airspace around theater airfields, concern over unsecured communications remained high and did not entirely dissipate until later in the campaign. Intelligence briefings informed crews that if a threatening situation developed while they were airborne, the military would notify them and vector them into safer areas. During the period leading up to the war, some crews were not confident they would be warned in time.

The Transition to War

Planned procedures during the transition to war called for CRAF operations to "stop, look, then start up again." As soon as MAC received news confirming the start of the air war, it ordered all CRAF actions to stop and asked the airlines to account for their aircraft and crews, particularly those airborne. Several hours later, with all resources accounted for, MAC started up operations again. The command followed this policy for several nights in a row, then discontinued it when officials realized the "off again, on again" instructions caused too much havoc in schedules and air flows, particularly in the theater. [1] MAC returned to continuous operations. Flying missions on a non-stop basis while the war escalated placed a high premium on good and timely communications. It implicitly assumed that MAC could alert CRAF flight decks to potential dangers effectively and vector them away from threatened areas.

Before Desert Shield began, MAC demonstrated the technical feasibility of using an encryption-decryption device, the KL43, on a commercial aircraft. Another government agency had donated the equipment to MAC when it upgraded to a newer technology. For these devices to work on board CRAF aircraft, special cables and attachments were needed. Unfortunately, the hardware required differed across aircraft models. If that weren't enough, some carriers reportedly objected to these modifications because of the extra weight implied. By the start of the operation, MAC had not decided on how to proceed.

Since ODS, AMC continued to study how to provide a secure communications capability that will work, is cost-effective, and that the airlines will accept. Its own analysis indicates promise in using the Global Positioning Satellite system, should the industry and the FAA, themselves, decide to use it for future

[1]Communications with HQ MAC, August 22, 1991.

commercial air operations. If AMC pursued a satellite communications option, it may mean less modification to the aircraft. Whatever choice the command makes, it must also purchase sufficient ground equipment for itself that can communicate with commercial aircraft; also it must provide some ongoing training.

CRAF carriers flew near "harm's way." Scud missiles threatened airfields distant from the front, especially at night. The data in Figure 9 show that while most missile attacks occurred near the start of the war, they continued throughout its duration.[2] MAC's assessment of the carriers' vulnerability shifted over time as it became clear that surface-to-surface missiles could target Riyadh, located more than 100 miles from Saudi Arabia's northern border. At that time, coalition forces were uncertain as to whether Iraqi warheads contained chemical or biological weapons, which could have posed a threat to entire airfields. With this situation in mind, the following is an anecdote of the potential risk CRAF air crews took in ODS. Soon after January 17, one CRAF flight had landed in Dhahran, finished offloading its passengers, and was in the middle of refueling when a red alert went off, signaling incoming Scuds. Procedures at that point called for quitting all action and going airborne as quickly as possible. With too little fuel to leave the theater, we were told the crew headed for Riyadh. On their

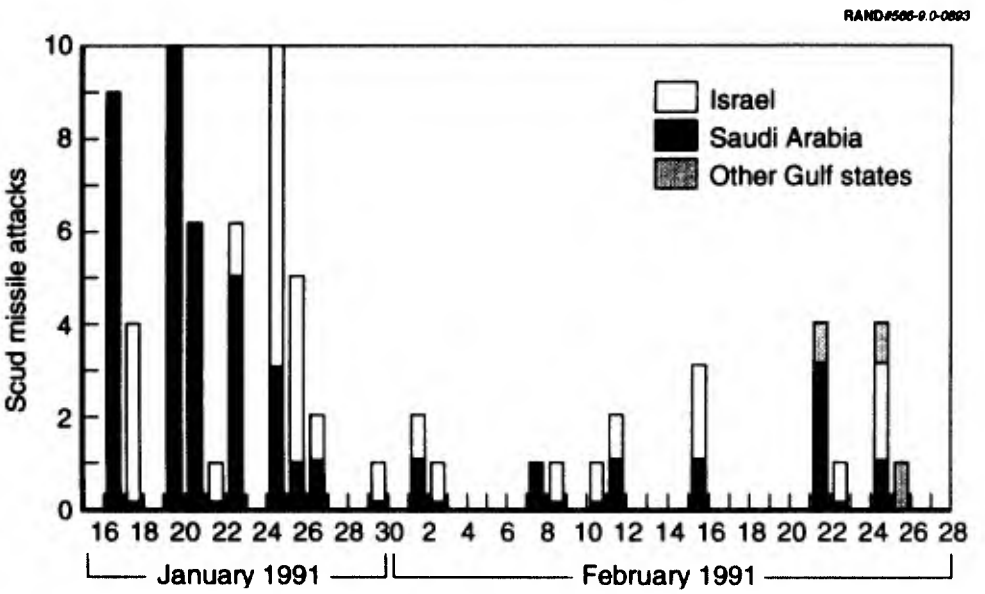


Figure 9—Scud Missile Attacks Posed Greatest Threat to Saudi Arabia, Israel, and Gulf States During Start of Operation Desert Storm

[2]Attack data come from *New York Times* articles dating from January 1991 to March 1991.

approach to the Riyadh airfield, another Scud alert sounded. This time, running too low on fuel to divert elsewhere, the crew was forced to land and run for shelter.

Many carriers were uncomfortable with news blackouts between their last stop in Europe and their final destination in Saudi Arabia. Crews felt they did not know what they were flying into. For instance, a crew might receive a briefing in Europe that a Condition Orange was in effect, indicating an imminent Scud attack. The crew might go ahead and launch the last leg of the flight after briefers indicated the military would update them by a certain point along the route. In some cases if the crew did not receive any information, it would divert automatically to another airfield, say to Cairo, Egypt, rather than continuing to Dhahran. This action interrupted CRAF air operations to a point that MAC called in all the airlines and asked them to refrain from altering planned routes and schedules.

Inadequate up-to-date situation reporting to CRAF crews raised anxieties and affected morale. Not surprisingly, as morale suffered, volunteerism fell in some companies. In some cases with fewer crew members willing to fly under these conditions, airlines resorted to using management to fly missions. In others, cash incentives were used. One airline even suggested that MAC require uniform management and labor rates for all CRAF missions, although this view was not widely shared among the carriers.

Protective Equipment for CRAF Crews

By the time CRAF crews flew from Europe to the theater, about a seven-hour flight, conditions at the aerial port of debarkation were sometimes quite different from reports received in Europe. One problem exacerbated by this time delay and the lack of updated information closer to the theater concerned the lack of chemical protection gear for CRAF crews during the earlier part of the operation. Crews felt it was unreasonable for the military to expect them to fly in the theater without this equipment while troops onboard the same aircraft had theirs. Initially, crews were met as soon as they landed by ground personnel with protective suits.

One drawback to this policy was the inevitable chance of an alarm going off at an airfield announcing an imminent missile attack while crews were still waiting for their chemical protection suits. One commercial crew reported such an experience. Immediately after they landed, the alarm signaled a possible attack. All personnel ran for shelter using the closest vehicle at hand. Someone sped off

in the truck containing protection gear intended for the arriving crew. Fortunately for this crew, since chemical weapons were not used the suits were not needed. This type of experience adversely affected morale.

The lack of information and untimely updates on the threat situation were constant sore points until some of the worst problems eased. Eventually the military supplied additional chemical suits and allocated them to CRAF missions. Crews received chemical suits before they left airports in Europe; while in Europe on their way home, they gave them to the next inbound crew. The airlines believe their crews received better protection as time went on, although one CEO went so far as to say: "The problem of chemical protection was never solved. It was the biggest problem in the whole operation."

The lack of clothing to shield against chemical and biological exposure could adversely affect CRAF crew morale for other operations. With the possibility of a more lethal threat in the future, some crews may be reluctant to fly into areas perceived as potentially hostile. While military policy would bar the use of commercial aircraft in a known hostile area, the crewmembers would not be reassured if they were among the very few exposed to such a lethal threat during the first use of these weapons in a war. Because crews fly voluntarily, any real unease over personal safety could significantly impact crew availability for future military missions involving CRAF aircraft that fly near or in harm's way.

The real threat, if any, is on the ground if an attack were to include chemical weapons. Thus MAC's eventual policy of giving the equipment to crews outside the theater seems very sensible. Several CRAF officials remarked that training ought to precede the use of these suits and that most crews did not receive sufficient training. This observation argues for more peacetime chemical protection training with commercial crews, or at the very least, for some training as part of a CRAF activation. Additionally, the lack of suits must be addressed by the services. CRAF crews should enjoy a measure of protection commensurate to the risk the nation asks them to assume.

The above issue really only applies to situations in which the threat has not yet, but could, progress into chemical or biological warfare. Analysts believe more and more countries will acquire this capability over time. With time the likelihood increases that future conflicts could involve this potential threat. Thus this issue remains relevant for the CRAF.

European Deployment Operations

Deployment Procedures

Because the existing deployment mobility plans were inadequate for troops stationed in Europe, moving these personnel to the Gulf area became very complicated.[3] Units stationed in Europe had planned primarily for scenarios involving reinforcements sent from CONUS, rather than for their own deployment. When a unit deploys, it organizes its equipment and supplies in movable modules. Since plans were not well developed for deploying these forces, planners developed schedules as best they could—often resorting to labor-intensive methods and real-time communications.

In addition to the challenge of modularizing equipment, troop deployment had to be coordinated with the arrival of the unit's equipment in theater. Information on ship schedules and even ship contents was uncertain, which effectively reduced the lead time available to airlift troops. Consequently, troops often had very little warning of their deployment, which made for less orderly operations.

European Airfield Constraints

Deployment from Europe was qualitatively different from deployment from CONUS. Key civilian airfields in Germany strictly limited or restricted night operations. Germany also had more stringent requirements than elsewhere in Europe on the maximum number of aircraft on the ground at any one time. Security at all European airports, and to an extent those in the U.S., increased because of concerns over potential terrorism and added to delays. These constraints combined to limit the number of flights moving through Europe. Since many of the troops waiting to ship out were stationed in Germany, it became a key country during this period.

The number of missions allowed into and out of Europe during Phase II of the deployment decreased further because of delays in the theater. If flights were delayed in Saudi Arabia, outbound aircraft schedules could interfere with inbound flights. Minimizing delays while in the theater was a high priority. One aim was to prevent aircraft from being on the ground too long. If there were known delays in the Gulf area, flights inbound from CONUS to Europe or those

[3]The redeployment effort reportedly was worse than the deployment operation. The problem concerned the lack of crews prepared to receive troops back home or to take care of them while transiting through airfields. Reportedly, airfields were left in a mess.

departing from Europe to the Gulf were rescheduled. This policy allowed faster turnaround of missions in the theater, but the effect was felt system-wide.

The onset of the war affected scheduling further. With the advent of Scud attacks, some crews did not want to fly into the theater at night. Daylight operations appeared safer since most of the attacks occurred at night. Takeoff delays in Europe could cause crews to arrive in the theater during darkness. Understandably, some crews became nervous and sometimes were reluctant to fly.

7. Pursuing Extra Airlift Capability

During the opening days of Desert Storm, much uncertainty existed over the direction the war would take. In looking ahead of the actual lift need, MAC investigated how additional capability could be acquired if the airlift requirement suddenly mushroomed. As part of its analysis, MAC looked beyond the conventional capability offered by CRAF Stages II and III. In the process, the command uncovered relevant issues that could pertain to future scenarios involving the CRAF. MAC analyzed commercial aircraft not in the CRAF. Some questions were raised that concerned whether some of the aircraft and capabilities available only during a Stage III activation should be available earlier.

First, MAC investigated the feasibility and level of interest in contracting for cargo airlift with commercial airlines associated with our NATO allies. Second, an almost successful attempt was made to gain aeromedical evacuation assets without activating Stage III. Airline executives who own aircraft useful for this type of mission continued negotiating with MAC over volunteering these assets for Desert Storm. Fortunately these aircraft never were really needed because casualties remained very low. Several airlines favored activating carriers in the CRAF designated as Senior Lodgers to provide ground services at particular airfields on a reimbursable basis. Under the contract then in force, MAC could only activate these carriers by calling up CRAF Stage III.

Contracting Foreign Airlift

Foreign Airlift Proposed

Both the projections for cargo requirements for the period approaching Desert Storm and the cargo backlog from November and December were reasons for the CRAF planners to investigate secondary sources for strategic cargo airlift. MAC had not yet decided to activate CRAF Stage II. A second-stage activation obviously offered sizable additional lift capability, but MAC wanted to analyze all available options. DoD gave the go-ahead for MAC to explore the use of foreign airlift but required that the command offer foreign carriers the same air service rate used in CRAF (identical to the peacetime rate). Informed of MAC's intent to buy foreign lift to cover cargo capability shortfalls, CRAF carriers said

they preferred activating Stage II instead but wanted the military to wait until after the Christmas season.

The use of foreign contract airlift raised policy issues concerning which airlift to use first. DoD handed down three priority-of-use rules.

1. MAC had to use donated or volunteered airlift, whether from U.S. or foreign sources.
2. MAC had to use all of its organic force structure, as well as the CRAF.
3. MAC could contract for foreign capability.

MAC's internal study uncovered several important policy questions that posed problems with the third option—buying foreign airlift. Near the end of the war, the command entered into contractual agreements with two foreign airlines. The war ended before MAC had to decide whether to use this lift.

While looking beyond the U.S. commercial capability, MAC naturally considered existing government-to-government agreements signed by the U.S. and many of its NATO partners. The NATO Allied Precommitted Civil Aircraft Program (NAPCAP) offers access to foreign long-range international commercial aircraft for use in the defense of Europe. CRAF officials pointed out the NAPCAP agreements did not apply during ODS because the conflict fell outside of Europe. Even so, MAC's efforts to contract additional lift from foreign sources indicate that related issues remain. MAC did establish contracts with several foreign carriers, but it took time. Developing policy that might reduce this leadtime could be important for future operations.

Existing MOUs Did Not Apply

The NATO NAPCAP refers to a collection of bilateral agreements between the U.S. and individual NATO allied countries on commercial airlift capability. Most of the details are classified. Unclassified information indicates that under certain circumstances, our allies have agreed to assist a U.S. deployment of troops and equipment to Europe with their long-range international airliners and crews.

These memoranda of understanding (MOUs) do not describe in detail how these foreign-owned aircraft become available to U.S. airlift planners, and they depend greatly on European governments and NATO itself to facilitate this transition. If conditions led to the activation of these agreements and the U.S. asked for foreign airlift assistance to deploy troops to Europe, there is no doubt that the respective flag carriers would respond. A future scenario involving foreign

airlift could fall outside of Europe and, therefore, outside the NAPCAP agreements. Consequently, if a similar situation arises as during ODS, the remaining issue is to find ways to minimize the time needed to contract for foreign airlift with interested parties.

MAC considered using foreign carriers to fly regular channel missions outside of the theater. In this case, any immediate danger to the foreign carrier would be minimized, freeing up much-needed U.S. lift capacity. At high-level discussions between the U.S. and European governments during the Gulf operation, some leaders approved the use of their flag carriers. These carriers, however, reportedly either declined participation or expressed restrained interest.

Foreign carriers had little interest in flying for MAC for a number of reasons. Company CEOs reportedly feared having their airlines become targets for terrorism. They believed the CRAF rates were too low. Some sought to minimize costs and preferred not flying to U.S. airfields located far from the company's existing operations or where they had no corporate interest for services in the future. Reluctance to fly did not mean these carriers did not bargain. The worldwide slump in air travel demand affected foreign carriers as well, and some airlines at least were willing to listen to the MAC offer. In early 1991, CRAF personnel polled foreign carriers to ascertain their interest in flying U.S. military missions. Direct negotiations began after MAC's interest in contracting business with the airlines was briefed to personnel from foreign carriers. Each carrier bargained from a different position and offered its respective requirements for participation. Some airlines were interested in insurance levels different from Title XIII insurance. Others wanted to fly under better airlift rates or receive 50 percent of their payment up front before offering the use of their aircraft. Still others wanted to incorporate their own particular conditions into the agreement.

MAC offered foreign carriers rates that were the same as or below CRAF rates. Over time, as the dollar gained strength against other currencies, particularly in February, interest in flying for MAC increased. To simplify matters and make the problem more tractable, MAC used much of the front end of the CRAF contract as a template for these new agreements. Within a few weeks, the command successfully concluded contracts with two airlines, Cargo Lux (Luxembourg) and Martin Air (the Netherlands). Like the CRAF agreement, MAC would assume mission command and control, but operational command and control would always remain with the crew and the airline.

Legislation Governing Policy

The Gulf war highlighted the need to look into legislation that could conflict with CRAF policy. The "Fly America Act" allows the government to buy foreign airlift only when it exhausts other U.S. capability. However, AMC officials say that these required conditions are not clear. For instance, it is not clear whether the MAC must first activate CRAF Stage III or whether it must use all domestic aircraft in WASP before it can seek contracted foreign lift. This issue arose during a deliberation of where MAC might find additional capability if needed. DoD had not called Stage III (nor would it). Also it favored the use of foreign airlift over calling up all CRAF aircraft. CRAF airlines agreed.

MAC explored agreements with foreign carriers and planned to use the policy of buying foreign lift from the lowest bidder. In a case where domestic capability (which it would try to interpret from existing law) was exhausted, MAC would opt for foreign airlift over domestic carriers volunteering extra lift if overseas corporations agreed to fly at a lower rate than the CRAF airlift rate. Underbidding was not a likely outcome, however.

Foreign Government-Sponsored Airlift Used

Foreign carriers flew a number of MAC missions in ODS, but costs were paid by their respective governments.[1] Other governments participated by directly paying U.S. airlines to fly missions for MAC. Alitalia flew more than 20 cargo missions between Rhein-Main and Dhahran. Cargo Lux offered aircraft at no charge to the U.S. government. Korean Airlines offered the free use of a B-747 cargo aircraft that flew on average twice a week between the East Coast and Saudi Arabia for nine months. The government of Japan chartered a U.S. airline, Evergreen Airlines, to carry cargo for MAC. In this last case, cargo had to meet certain conditions—nonlethal, no explosives, no weapons, etc. These flights flew on average four times a week for more than six months.[2]

Notably Kuwait, itself, offered the use of a few long-range international passenger aircraft that escaped Iraqi seizure. The Gulf state offered to fly, at no expense to MAC, troops from the U.S. to Dhahran. The mission progressed to

---

[1]In some cases, foreign governments did not insure the mission segment conducted within the theater. In these cases, the U.S. government agreed to provide coverage for this part of the mission. In other cases, carriers flew to locations just outside of the theater. U.S. transports were used to move these cargoes to theater airfields. These flights differed from MAC's intended use of foreign lift in that the aircraft were offered for a particular mission.

[2]Once the war started, Japan would not pay insurance for missions operating within a certain distance from the theater. It would pay for all legs except the distance between Cairo and Saudi Arabia. MAC assumed the unfurnished costs for those missions.

the point of boarding troops, only to have them deplane when Office of the Secretary of State (OSD) halted the passenger operation. DoD decided to allow foreign carriers only to conduct cargo missions. One Kuwaiti B-747 passenger aircraft made one cargo flight to the theater, carrying cargo in its lower lobe. MAC decided against using these aircraft further on the grounds of efficiency and in the face of constrained ground resources.

The attempt to contract for foreign commercial airlift points out the need to continue working on this issue. During a crisis, time is needed to work out a contractual agreement. This time must be minimized. Also, ambiguities over the "Fly America Act," which AMC is pursuing, should be cleared up to enable AMC to plan its backup lift options.

Medical Evacuation Missions

In planning for the movement of potential casualties from Europe to CONUS, MAC asked the airlines to volunteer the use of their aeromedical evacuation aircraft. Under the CRAF contract then in force, these aircraft were committed only to Stage III. Unless MAC activated Stage III, the best the command could hope for was for the airlines to volunteer these aircraft. A Stage III activation was considered unlikely. MAC entered negotiations with Delta, TWA, and American for the voluntary use of their B-767s. Although the war ended before all parties could agree to the terms, CRAF officials believed the airlines would have signed a contract allowing their use in the event U.S. casualties developed.

Two fundamental issues prevented the agreement: liability and compensation. Both involved complex negotiations that covered new ground. MAC only introduced the medevac mission in 1990 and had not worked through all the implementation issues when Desert Shield began. The B-767s committed to this mission are modern wide-body aircraft. They are smaller than other wide-bodies but have lower operating costs. To prepare an aircraft for this mission, an airline must remove the seats and install a kit that will convert the aircraft into a flying hospital ward, complete with oxygen and other life support equipment. Although designed for quick and easy installation, only one prototype kit existed when Desert Shield began. MAC decided to push for faster production of only the most essential features and successfully worked out an arrangement with the builder. By the end of the war, ten kits were built.

The airlines were not at all sanguine about the new mission. Uncertainty remained over liability issues. Questions remained over whether an airline was protected against unlimited liability for passengers who were unable to

understand the terms of the Warsaw Convention Treaty. As mentioned earlier, the treaty limits the airline's liability for passengers on international flights as long as the passengers are offered the choice of purchasing additional insurance. Two problems arose. The treaty obviously did not consider the possibility of transporting passengers unable to understand these choices or who were unconscious. If the military decided to assume this liability instead, all parties had to craft the language and changes had to occur in either the DoT insurance—Title XIII—or the DoD indemnification program. Medevac missions were not covered by either one.

The second major issue, compensation, revolved around negotiations on the worth of these flights. The CRAF contract contained air service rates for passenger seat miles and ton miles for cargo. Rates for patient litters, which were neither of the previous two, were not covered. AMC's approach would have based CRAF rates on leasing these aircraft. Also, very little cost data were available for MAC to derive a fair price.

Of the two unresolved issues—liability and compensation—the airlines seemed most concerned about the liability unknowns. They were also concerned over unfamiliarity with the mission itself. Concerns over crew inexperience with onboard oxygen were discussed several times during these interviews. ODS occurred well before MAC and the airlines had time to work through trial missions.

Since Desert Storm, AMC has decided these aircraft were important enough to move from Stage III to Stage II. The command believes a crisis involving only a Stage I activation is not likely to create casualties or the necessity for these aircraft. It continues to work through the thorny issues of liability and compensation and has made substantial progress.

Senior Lodger and Logistics

Some carriers expressed doubt as to whether the Senior Lodger concept is relevant today, although this view was not universally shared. Typically a CRAF Senior Lodger is an air carrier with a large presence at a particular civilian airfield. Consequently, this airline would have extensive ground service capabilities relative to other companies. Under host nation support agreements, a foreign carrier in the host country also could have the responsibility for ground services. One task of Senior Lodgers during peacetime is to conduct a survey of the ground service capabilities at their assigned airfield.

The primary rationale for having a Senior Lodger is to help CRAF carriers that lack an adequate international base of operations to gain access to ground services in unfamiliar airfields. Most U.S. carriers operate globally, though their hubs may not be developed or distributed uniformly. Some smaller airlines in the CRAF did not have a large worldwide presence during ODS. Since the CRAF contract called for the activation of the Senior Lodger only in Stage III, none were activated during ODS.

MAC polled the airlines to determine whether it needed to ask for volunteers. Most companies that did not have well-developed ground service operations either beefed up their own capability at European airfields where they already operated or bought services on their own initiative from another airline. The policy of AMC is that the government should not get too involved with commercial ground servicing in civilian airfields as long as the airlines can make their own arrangements. The Senior Lodger becomes more important as the number of aircraft involved in the operation increases. AMC reviewed the activation stage it should assign the Senior Lodger; in the end, they decided to keep it at Stage III.[3]

Some problems peculiar to commercial aircraft ground operations within the theater seemed to persist throughout the operation. For instance, one problem reportedly never resolved concerned "creature comforts," such as lavatory servicing, catering, and water supplies. Not enough equipment was available to provide these services. The airlines are quick to point out these problems were more annoying than burdensome but only because the number of casualties and evacuees was so low. If the U.S. forces had suffered more casualties that needed transporting, the absence of water and pumping capabilities could have been a much larger problem.

The world is changing. The airline industry is consolidating into a set of fewer carriers that will have weathered tough financial times. The air traffic that existed before the Gulf war still has not fully rebounded. At the same time, budget pressures on AMC and the overall downsizing of U.S. forces mean that fewer channel mission requirements exist for CRAF aircraft during peacetime. With memories of CRAF operations still fresh in everyone's minds, tough market conditions and fewer military peacetime requirements, incentives for airlines to participate in the CRAF have taken a direct hit. Ironically, all this change comes when the CRAF has proven itself to be an essential strategic airlift asset. Improved incentives to maintain participation in the program are critical.

---

[3]Communications with MAC, August 22, 1991.

8. CRAF Incentives

The first-time activation of the CRAF in ODS, coupled with the reduction in peacetime airlift requirements, raises concerns over whether U.S. airlines will commit fewer aircraft to the CRAF in the future. Recent memories of life under activation and eroding incentives could lead to an effect on the level of carrier participation unless new and innovative alternatives are considered.

Scaled-down peacetime business expected in coming years could affect the traditional incentive to participate. Carriers continue to assess their future role in CRAF with the new multiyear contract. As of July 1993, CRAF-committed aircraft totaled 476, down from the 506 during ODS.[1] Airlines that conducted sizable business with MAC several years ago acknowledge they cannot count on that business in the future. But other innovative ways of rewarding airlines and encouraging them to participate do exist. CRAF officials give this problem high priority; in fact, AMC began looking into most of the concepts discussed in this section even before the start of Desert Shield.

To ensure a strong and viable CRAF in the future, a strong strategic airlift capability that includes top-of-the-line commercial aircraft committed to assist U.S. defense forces will require national resolve. The program depends on incentives to draw in volunteers. Given understandable risk aversion particularly now that airline chief executive officers recognize that a CRAF activation could recur, incentives are very important. Not all the new incentives under consideration by AMC are directly cash-related. Some, however, could require the support and cooperation of other governmental agencies. As a nation, we must decide how important we consider CRAF to be in our national defense and then support it accordingly.

This section presents several options for increasing incentives for CRAF participation. It discusses several concepts that AMC studied after the war, including their pros and cons, but does not offer any analysis of their cost or feasibility.

---

[1]Civil Reserve Air Fleet (CRAF) Capability Summary, Form 312, HQAMC, July 1, 1993.

DoD Peacetime Business

Worldwide political changes and a reduction in our armed forces will cut the demand for military peacetime airlift in the coming years. This reduction was already evident in the summer of 1990 when carriers received warnings from MAC to expect cutbacks in regular cargo traffic. Under provisions of the CRAF contract, MAC could cancel CRAF peacetime missions without penalty as long as airlines were given sufficient advance notice.

AMC contracts with airlines in the CRAF in advance only for business that it can safely guarantee. For requirements exceeding the fixed or known requirement, AMC makes expansion buys as the need arises. Both the dollar amount of the expansion business and the airline to which it is awarded are less certain than with the fixed buy. The data in Table 3 illustrate the expected decrease in international military airlift requirements over the next couple of years.[2] Desert Shield and Desert Storm provided an unanticipated boost in military contract lift requirements during FY91 that accounts for the increase over this period. Looking at the succeeding years, expected requirements will drop. Thus as more and more troops return to CONUS and the need for a contingency airlift capability rises, incentives continue to drop. This situation is unfortunate and perplexing.

Faced with known peacetime lift reductions, MAC was investigating other incentives during the summer of 1991. One approach to stemming the fall in military contract lift is to pool all government air service requirements together and award the business on the basis of CRAF entitlements only. Currently non-

Table 3

Actual and Projected CRAF International Airlift Business

		Actual or Estimated Actual	
Fiscal Year	Fixed Buy ($M)	($M)	Change from previous year (percent)
1990	209	536	
1991	253	1931	
1992	236	475	
1993	218	420	-11.6
1994	204	360	-14.3
1995	176	320	-11.1

[2]Figures are based on AMC historical data for FY90-91 and projections for part of FY92 to FY95. Presented by General Johnston to the Secretary of the Air Force in March 1992.

DoD government agencies secure their air service requirements directly with the airlines on a cost-competitive basis.

Not all airlines want to see an aggregation of government service requirements. By coupling this other business to the CRAF, those airlines interested in bidding for these fares would be required to have a sizable commitment to the CRAF in its earliest activation stages. Of course, this outcome is precisely the intent of such a proposal.

One implication of the above concept is that bids no longer would be judged on cost and route structure alone—a policy that non-DoD agencies may decide not to resist. Government lift business, however, is big money. With a larger peacetime requirement and presumably more airlines interested in winning business, opportunities exist to retain a healthy incentive for airlines to commit assets to the CRAF.[3]

Increased Access to Foreign Markets

The CRAF office within AMC maintains a keen interest in preserving as much of the militarily useful aircraft in U.S. commercial fleets as possible. Although an airline would not decide to buy an aircraft based on DoD peacetime business, this business does provide marginal incentives. That is to say, military business might reinforce the choice to invest in a long-range international jet to meet a growing market demand, but it would not be the driving factor. To the extent this marginal benefit figures in the decision to invest in militarily useful equipment, the CRAF contributes to maintaining the national airlift mobilization base.

Currently market forces are working to shrink the commercial mobilization base or those aircraft particularly valued by AMC. This base decreases when airlines merge and reduce redundant routes and services. As long as this trend continues, fleets will decrease. Despite this trend, the industry is at an important crossroads. Companies are retiring aging aircraft, deciding how to position themselves over the next decade, and in addition making huge, new investments in new aircraft. Within the last two and one half years, announcements of large aircraft orders have indicated a major turnover of assets in U.S. fleets. Recent economic conditions, however, led to scaling back some of these buys. Some of the new wide-body international aircraft on order have smaller capacities than those they are replacing, and they cost less to operate.

---

[3]Communications with HQ MAC, 22 August 1991.

Because DoD business represents only a marginal influence on investment decisions and the prevailing market forces continue to push airlines toward more efficient, modern fleets, AMC's influence on the mobilization base must become more innovative. If DoD business cannot help as much as it once did to preserve capability, then any government assistance that promotes U.S. competitiveness in the international market could offset this decline.

One concept under past consideration was for the government through bilateral negotiations to work toward lower trade barriers in other countries. The government could couple benefits accruing from access to new markets by making these privileges available to airlines participating in the CRAF. The DoT Office of Policy and International Affairs oversees issues pertaining to international trade agreements that involve the aviation industry. One example would be when a foreign government permits an airline to fly goods into and out of the country and conduct limited commerce on the ground. As an example, an airline in the cargo business could develop a ground distribution network in a foreign country that would collect goods at or distribute them from the air terminal, thus potentially increasing commercial business in today's most profitable markets.

All governments control the number of airlines allowed to conduct business in this manner. Extending bilateral routes in some markets could impact U.S. airlines positively—particularly the growing air cargo market in the North Pacific. The wide-body freighters preferred by AMC are servicing this route. By linking CRAF to this process, the government could be more attentive to airlines committing resources in the CRAF while helping to preserve U.S. strategic commercial airlift assets.

This issue is fraught with many complications. Countries with whom we negotiate generally want similar concessions in kind for favorable agreements. Even while these negotiations are difficult and time-consuming, the airlines strongly prefer proactive government involvement on this issue. U.S. government involvement may occur regardless. By coupling any benefits to CRAF participation, a real incentive would be provided to commit assets to potential military use, particularly to airlines operating much-valued long-range cargo aircraft.

Joint Use of Military Airfields

The expected demand for commercial passenger and cargo air services during the next two decades probably will lead to increased congestion at commercial

airports worldwide unless existing facilities increase their capacities or new ones are built.[4] The International Civil Aviation Organization (ICAO) suggests worldwide investments of up to $250 to 350 billion are needed by the year 2010. In the U.S. alone, estimates of additional airport capacity needed total 200 to 300 percent. Existing alternatives to mitigate some of the congestion cost considerably less while at the same time provide CRAF incentives.

In many locations, a few airlines dominate a particular airport (they have access to more gates or slots). As one example, Delta Air Lines makes up 85 percent of Atlanta's operations.[5] This dominant presence effectively meters the traffic between congested destinations that typically also offer attractive markets. These two factors—growing congestion at existing airfields and the tendency for a few airlines to dominate important airports—explain why expanding operations by using military airfields is a potentially important CRAF incentive.

The military can offer the use of its airfields in one of two ways. The first does not affect CRAF incentives. Local communities can gain the government's approval for allowing commercial aircraft to operate from a particular military airfield. Under these "dual-use" conditions, all airlines compete equally for the right to use the airfield. The second condition does offer new incentives. Instead of making arrangements with a local government entity, DoD could work directly with the airlines in extending operating rights to a military airfield. In this "joint-use" case, the federal government could base landing rights on the extent of a carrier's participation in the CRAF.

Access to key military airfields, both within the U.S. and in other countries where U.S. forces are based, is of real interest to the airlines. For example, Scott AFB provides nearby landing slots for companies that want to expand air cargo operations in the St. Louis area. The offer to allow airlines access to foreign military airfields used by U.S. forces presents further interesting possibilities and complications. Reportedly carriers have great interest in gaining greater access to Pacific Rim markets. In the face of industry's increasing demands for airport access, particularly at key locations, the joint use concept offers a potentially attractive business opportunity. If AMC grants access commensurate to the carrier's level of commitment to the program, joint use offers a real financial incentive at relatively little cost to the government.

---

[4]"Goold, Ian, Graham Warwick, Julian Moxon, Douglas Barrie, Paul Phelan, Charles Tyler, "Conspicuous Congestion," *Flight International*, 8-14 July 1992, pp. 29-37.

[5]Ibid.

Reciprocal Auxiliary Airlift Capability

One airline-sponsored proposal is a reverse CRAF program in which the Air Force would fly commercial cargo missions during the industry's busiest seasons, such as the Christmas–New Year period. This arose because at peak periods, some airlines find they cannot lease or buy enough temporary commercial airlift capability from the private sector to meet demand, particularly for cargo. These companies cannot justify buying aircraft to meet the periodic high requirements because the demands are too short lived. Instead, they buy excess capacity for very brief periods.

In return for committing cargo aircraft in the CRAF, airlines could benefit from buying Air Force services for short periods. During this time, organic transports might fly domestic routes to free commercial aircraft for international business. According to AMC, this concept has severe problems. Experts interviewed voiced strong misgivings about getting involved in the marketplace. The Air Force thinks these organic flights would have to be subsidized to become commercially viable. It is not comfortable with this outcome. Moreover, the Air Force cannot justify the additional flying hours on already aging aircraft. Flying commercial routes would not substitute for training missions; therefore these transports probably would log additional hours.

Reducing the Impact of a CRAF Activation

Greater Use of Civilian Airfields

Another incentive for continued or expanded CRAF participation is the reduction of impact of activation on airlines. Air carriers were enthusiastic about contributing to the national defense as long as they did not incur unnecessary costs. One means of addressing this concern is to optimize use of available CRAF resources once activated.

To enable smoother operations, the airlines suggested maximizing the use of airline hubs for potential cargo and troop onload sites. For perfectly valid reasons during ODS, most onload locations for CRAF aircraft were military installations; aircraft were sent to the locations of the troops and cargo. Crews flew from these locations on to Europe and the theater. The airlines feel that the use of their own hubs for loading troops and cargo would be less disruptive. Some of these hubs were reasonably close to the more congested APOEs, such as Dover AFB.

The airlines argue that this practice addresses two issues: cost and flexibility. Under conditions of short leadtimes, which could recur in a future activation, airlines can position aircraft and crews more easily and quickly from home base locations. Moreover, they can use their own ground resources and thus minimize (or at least better manage) loading delays.

Certain benefits accrue from this practice. If the airline can cut costs and inefficiencies, then the company has an incentive to fly for the military. AMC could consider this benefit as an entitlement granted to airlines committing more of their valuable aircraft to the CRAF. Figure 10 shows that most of the CRAF missions involved only a handful of airlines (see Appendix, Table 5, for three-letter codes to airline name translation). Indeed, the airlines involved in flying 25, 50, and 75 percent of the CRAF missions number three, six, and twelve, respectively.[6] If just a fraction of the missions, say 50 percent or less, flew from an airline hub, the number of airlines involved would have been six or fewer.

Although the airlines see much merit in this concept, and in fact MAC allowed Federal Express to shuttle cargo out of an overcrowded APOD up to its New York hub during the operation, the military sees difficulties in the concept's formal implementation. AMC prefers to maintain control over its cargo so that it can redirect it or change its priority up to the last minute. Apart from the additional ground transportation required to move cargo and passengers to other onload points, security is a major consideration. While it is relatively routine to board troops with their personal weapons at a military airfield, it is not so at a civilian airport (many would prohibit this practice).

Two-Tiered Air Service Rate

Several airlines advocated the adoption of a two-tiered airlift payment: one for peacetime and another to operate during an activation. Advocates of a two-tiered rate schedule say the costs used to compute a peacetime rate represent normal operating conditions and costs, and that it would not be fair to use these figures under very different wartime conditions. Flying missions for the military, often on short notice, drove carrier operating costs up sharply; this increase is not reflected in peacetime rates or peacetime cost data. The airlines argue they need to be compensated for additional costs that go above and beyond what it takes to fly peacetime military missions; otherwise, they face a disincentive in committing assets in the CRAF.

[6]The appendix contains a list of airlines participating in ODS and the number of missions actually flown.

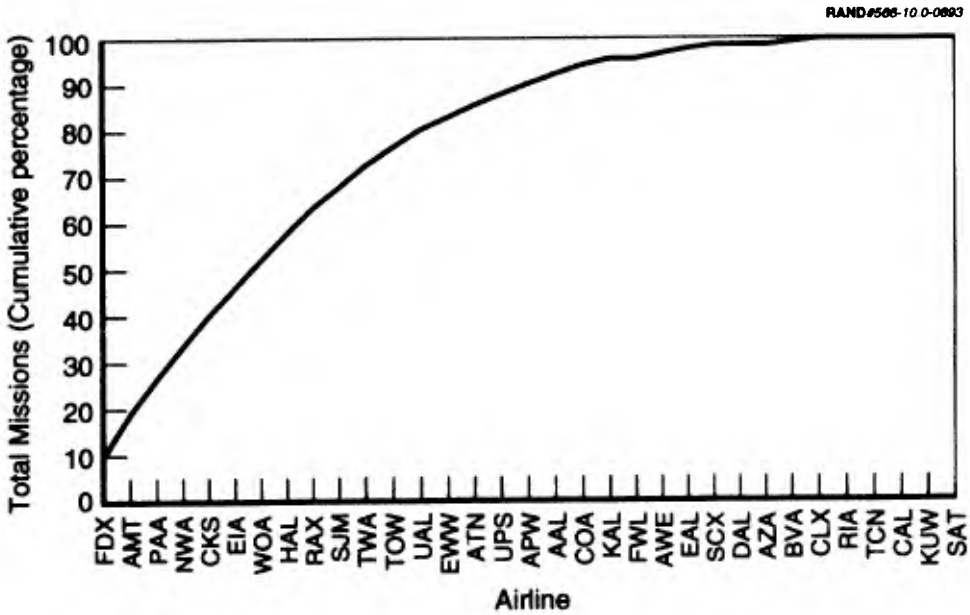


Figure 10—Cumulative Number of Missions by Airline (Fraction of Missions Flown from August 1990 to May 1991)

Short mission leadtimes resulted from the short leadtimes CENTCOM gave MAC. If the onload sites were not located on the airlines normal route structure, companies had to get the aircraft positioned along with a crew, as well as other crews at technical stops in the U.S., if necessary, and Europe. If this routine could not be done efficiently, extra crewing time and additional crew rests were needed. As efficiencies decreased, costs grew. One airline observed that it seemed as if aircraft were moved around without regard to history or the move's effect on an airline's operation.

It is doubtful that the scheduling burden was so overwhelming for companies who routinely do these types of activities. The real complaint was the consistently inefficient use of crews and aircraft; both were too expensive to be idled or be moved about without regard to prior missions. Although the CRAF contract called for a minimum usage of 10 hours daily per aircraft, these rates were not always met, at least not with passenger aircraft. The airlines were paid on a mission completed basis. If delays occurred, even if caused by the military, the airlines did not receive compensation until the mission was completed. Airline representatives assert that aircraft pulled from service but not used effectively levied additional costs to the airlines.

Standby coverage, included in the new CRAF contract, addresses the above problem. This coverage would apply either to crews and planes waiting on the ramp for cargo or to passenger pickup standing by elsewhere. The new contract

guarantees payment of eight hours per day, for each activated aircraft for up to 30 days whether the plane is in flight or on the ground.[7] With this policy more of the risk is placed on AMC to ensure that these aircraft are used at least up to eight hours per day.

Some questioned the carrier's perspective and, indeed, believed that the airlines reaped excessive profits during Desert Shield and Desert Storm. The carriers deny this charge (although without data, this claim is difficult to assess). The perception gap is important, however. The airlines believe that MAC did not fully appreciate the effects on the industry as a result of some of its policies. Some thought this problem was serious and sensed an alienation that grew with time. Likewise, the airlines may not have fully appreciated MAC's problems. For instance, automated systems that were supposed to help schedule flows did not work properly, which forced more manual scheduling and resulted in a lower efficient use of resources. As new changes to these systems occur, some of these types of problems should disappear. Now that the airlines understand how a CRAF activation affects their own companies, it is imperative for the military to mitigate disincentives to CRAF participation as much as possible.

---

[7]Communications with HQ AMC, November 1993.

9. Conclusions

The CRAF's proven military worth during both Desert Shield and Desert Storm and its cost-effectiveness during peacetime make its successful continuation essential to the future of our strategic mobilization force. As the U.S. worldwide military presence continues to transition to a more CONUS-based force, the need to deploy troops over longer distances to critical hot spots places a high premium on strategic airlift capability. Paradoxically, just as this need for extensive deployment capability increases, the traditional incentive for participation in the CRAF—peacetime military business—is decreasing.

The Biggest Challenge: CRAF Incentives

One of AMC's biggest challenges concerning the CRAF is how to develop alternative incentives to encourage reluctant airlines to make a real commitment of assets to the program. As a result of the first-time activation of the CRAF in 1990, participation in the program is no longer risk-free. In the future, corporate decisionmakers certainly will weigh their willingness to commit their assets to military use during an activation against the potential benefits of participating in the program at all other times. Given additional budget constraints in the near future and the projected decline of peacetime military business, some of these incentives may be derived from nontraditional sources (see Chapter 8). If so, then AMC will need the cooperation of a wider community including non-DoD government agencies. The recognition by our military and political leaders of CRAF's value to our country's national security is critical in winning this support.

No less important to the CRAF is addressing the complications that surfaced during the operation or that could surface in future scenarios. To AMC's credit, many airline representatives shared the view that the CRAF worked better than anticipated for a program never before activated. Having voiced this opinion, these same individuals expressed many concerns. Some of the most significant dealt with liability, command and control updates near and in the theater, and from the airline's perspective, contributing factors leading to the inefficient use of activated commercial resources.

Some Policy Modifications Needed

Liability

Although the intent of the government in using commercial aircraft for military missions is to shield the air carrier from unreasonable risk while performing a mission, the reality during Desert Shield and Desert Storm sometimes fell short of this goal. Also some DoT and DoD programs have not been kept current in many respects, such as dollar amounts, links to an actual CRAF activation, and the actual use of these aircraft (for instance, not covering segments of missions that occurred entirely within CONUS, despite their military nature). During and since the operation, the airlines have analyzed both their commercial policies and those of the government. As a result, the airlines have overcome much of their former uncertainty about these issues. Armed with this new understanding, they are much less likely to volunteer valuable assets without appropriate liability protection. Clearly the DoT and DoD understand this concern and are continuing to work on getting modified and new legislation that will remedy gaps in coverage.

Improved Command and Control Communications

The difficulty some commercial crews experienced in receiving in-flight information pertaining to the threat and to their mission, in particular, led some crews to abort missions early in the war. Fortunately during Desert Storm these so-called information "blackouts" did not lead to serious problems, primarily because coalition forces gained air superiority very early. Scud missile attacks—which continued until the close of the war—however, always carried an element of uncertainty over whether the latest missile was equipped with chemical or biological warheads.

The issue of communicating with theater command and control continues to apply to future scenarios under uncertain conditions and during a transition from a safe to a hostile environment. Clearly the military would not knowingly expose airliners to danger. During the period leading to a known threat, however, potential risks can exist. In-flight information addresses the concerns that airlines have about potentially hazardous situations by providing more up-to-date reports.

AMC officials indicate they will monitor the investments the airlines make in utilizing satellite communications during commercial flights in addition to considering other options. Taking advantage of this growing capability makes more sense to AMC from a military effectiveness and fiscal perspective. CRAF

officials within AMC say that if they decide to invest in this option, equipment would be acquired that is compatible with the commercial technology. Then communications with aircrews would be facilitated. It may be only a matter of time until in-flight satellite communications come on-line. Whatever approach AMC decides to pursue, the remaining issue is when and how much to invest in acquiring this needed capability.

Minimizing the Inefficient Use of Activated Assets

Since airlines operate in an intensely competitive environment, concern grew over MAC's usage of commercial aircraft and crews. Many factors combined to frustrate airline schedulers. To list only a few, operational efficiency suffered from short mission leadtimes of three to five days; information gaps in the GDSS on commercial missions led to unannounced and unanticipated flight arrivals at loading sites; and congested airfield conditions were commonplace at key loading sites.

AMC is continuing to respond to these complaints. Regarding short leadtimes, the command received deployment priorities from USTRANSCOM, which received them directly from CENTCOM. In the future, AMC may not have any more control over leadtimes than MAC had; however, it can ensure some compensation for higher costs that the airlines incur through no fault of their own.

In fairness to AMC, establishing reliable operating cost estimates for contract airlift missions has not been easy. According to the airlines, in the past they have encountered difficulties in providing cost data to the military because the task of recovering these costs is incredibly complicated. Carriers submitted reimbursement requests to recoup some of their higher operating costs. Some airlines protest the need to submit myriad requests in the first place. In response, the command indicated its willingness to look into a new policy, but it required an analysis of the respective cost data.

Airlines prefer to avoid protracted ground times partially because of opportunity costs. Put simply, commercial aircraft earn more profits by flying. Although the new contract offers a minimum payment rate equivalent to eight hours of operation per day, the airlines still have an incentive to argue for policies to reduce ground time at loading and unloading sites.

During the operation, MAC gave high priority to processing CRAF flights at military airfields, to the point of making organic, military aircraft wait in the case of competing needs. Delays did occur, however, during the congested conditions

at peak periods. The carriers submitted a proposal to load more aircraft committed to the CRAF at commercial airfields. This proposal certainly is intriguing. The CRAF office has indicated a willingness to study this idea. We hope the military seriously weighs this proposal.

Despite the problems and complications that occurred during Operation Desert Shield and Desert Storm with the CRAF, reasons for optimism exist. Officials at AMC have shown great sensitivity and willingness to work with carriers before, during, and since the activation. Many airlines evidence a continuing desire to participate in the CRAF, particularly with a realignment of incentives and disincentives. The program is based on sound principles of contributing a vital resource to our national security at great cost-effectiveness. ODS illustrated that a voluntary program can work and can contribute vital resources to our national defense. But even in CRAF's success, the nation and Air Force decisionmakers must address its shortcomings with needed resources and support to ensure CRAF's robustness for the future.

Appendix

CRAF Mission Information

This appendix includes data referred to in earlier text. Mission totals for CRAF flights actually flown are shown in Table A.1. Flights were counted in terms of the date that they landed at or departed from the airfield of greatest significance. For instance, flights departing from CONUS destined for the theater were considered in terms of when they arrived in the theater. Flights departing from the theater to return to CONUS were considered in terms of when they departed, etc. Table A.2 is a translation table for airline codes. It shows the three-letter airline code, the name of the airline, its participation in a joint venture with another CRAF airline, and if the airline is foreign, its country of origin.

Table A.1

CRAF Missions by Airline (August 1990 to May 1991)

Airline	Joint Venture	Aug–Dec	Jan–Feb	Mar–May	Subtotal	Fraction of Total
FDX	JV-1	162	149	249	560	0.1103
AMT	JV-3	198	75	166	439	0.0865
PAA	JV-1	86	87	198	371	0.0731
NWA	JV-1	154	90	113	357	0.0703
CKS	JV-3	129	121	107	357	0.0703
EIA	JV-2	119	93	106	318	0.0626
WOA	JV-2	96	85	129	310	0.0610
HAL		87	61	103	251	0.0494
RAX		78	93	73	244	0.0481
SJM		97	101	40	238	0.0469
TWA		54	50	128	232	0.0457
TOW	JV-1	64	36	99	199	0.0392
UAL		47	22	107	176	0.0347
EWW	JV-2	0	81	64	145	0.0286
ATN		59	49	28	136	0.0268
UPS	JV-1	37	81	3	121	0.0238
APW		2	67	46	115	0.0226
AAL	JV-2	35	19	44	98	0.0193
COA		17	14	52	83	0.0163
KAL		24	18	27	69	0.0136
FWL		22	31	0	53	0.0104
AWE		5	8	23	36	0.0071
EAL		21	11	0	32	0.0063
SCX		12	4	13	29	0.0057
DAL		5	3	18	26	0.0051
AZA		0	12	12	24	0.0047
BVA		11	10	1	22	0.0043
CLX		0	0	17	17	0.0033
RIA		0	0	14	14	0.0028
TCN		3	0	0	3	0.0006
CAL		0	0	1	1	0.0002
KUW		1	0	0	1	0.0002
SAT		1	0	0	1	0.0002

Table A.2

Airlines Participating in Desert Shield/Desert Storm

Code	Airline	Joint Venture	Foreign Ownership
AAL	American Airlines, Inc.	JV-2	
AMT	American Trans Air, Inc.	JV-3	
APW	Arrow Airways, Inc.	JV-2	
ATN	Air Transport International		
AWE	America West Airlines		
AZA	Alitalia-Linee Aeree Italiane, S.P.A.		Italy
BVA	Buffalo Airways		
CKS	Connie Kalitta Services, Inc.	JV-3	
CLX	Cargolux Airlines International		Luxembourg
COA	Continental Airlines, Inc.		
DAL	Delta Air Lines, Inc.		
EAL	Eastern Airlines, Inc. (no longer in service)		
EIA	Evergreen International Airlines	JV-2	
EWW	Emery Worldwide Airlines, Inc.	JV-2	
FDX	Federal Express Corporation	JV-1	
FWL	Florida West Airlines		
HAL	Hawaiian Airlines, Inc.		
KAL	Korean Air Lines, Co., Ltd.		South Korea
KUW	Kuwaiti Airlines		Kuwait
NWA	Northwest Airlines, Inc.	JV-1	
PAA	Pan American Airlines, Inc. (no longer in service)	JV-1	
RAX	Rosenbalm Aviation, Inc. (no longer in service)		
RIA	Rich International Airways, Inc.		
SCX	Sun Country Airlines, Inc.		
SJM	Southern Air Transport, Inc.		
TCN	Trans Continental Airlines		
TOW	Tower Air, Inc.		
TWA	Trans World Airlines, Inc.		
UAL	United Air Lines, Inc.		
UPS	United Parcel Service Company	JV-1	
WOA	World Airways, Inc.	JV-2	

Bibliography

Brown, Major Kirk L., *History of the Civil Reserve Air Fleet (1952–1986)*, Report No. 87-0360, Air Command and Staff College, Air University, Maxwell AFB, AL, April 1987.

Chenoweth, Mary, *The Civil Reserve Air Fleet: An Example of the Use of Commercial Assets to Expand Military Capabilities During Contingencies*, N-2838-AF, RAND, June 1990.

"A Chronology of Events," *Desert Storm Almanac Supplement, Military Technology Magazine*, June 1991.

"Civil Reserve Air Fleet (CRAF) Passenger and Cargo Mission Data," HQ MAC, August 1990 to June 1991.

"Civil Reserve Air Fleet (CRAF) Capability Summary," HQ MAC/XOV, Form 312, July 1990.

"Commander in Transition," *AIR FORCE Magazine*, May 1992, p. 53.

CRAF Mission Types, p. 6.

Desert Shield and Desert Storm: A Chronology and Troop List of the 1990/1991 Persian Gulf Crisis, Strategic Studies Institute, U.S. Army War College, 25 March 1991.

Ewing, Lt Col William, *Six Months of Desert Shield/Storm*, HQ MAC Briefing, MAC/XPY (Command Analysis Group), January 1991.

HQ MAC/XOKAI, "Request for Purchase of International Long- and Short-Range Passenger and Cargo and Aeromedical Evacuation Airlift Services and Civil Reserve Air Fleet (CRAF) for 1 Jan 93 through 30 Sep 1993," 9 April 1992.

"Korean Airlift: Flying Pipeline," *Interavia*, 5(11), 1950, pp. 551-554.

Lund, John, and Ruth Berg," *Project AIR FORCE Analysis of the Air War in the Gulf: Strategic Air Lift in Operation Desert Shield*," R-4269/4-AF, RAND, 1992.

"Memorandum of Decision for Indemnification of Air Carriers (PL 85-804) Performing Missions in Support of Desert Shield under MAC Air Transportation Contracts when the Civil Reserve Air Fleet (CRAF) is Activated," Secretary of the Air Force, Donald B. Rice, August 17, 1990 (Public Law 85-804 and Executive Order 10789).

Minutes of the FY98 International Airlift Preproposal Conference on Solicitation F11626-92-R0002 (International Airlift Services Preproposal Conference, January 13, 1992), Department of the Air Force, HQ MAC, January 27, 1992.

Title XIII Aviation Insurance Program: Questions and Answers, U.S. Department of Transportation, Federal Aviation Administration, Office of Aviation Policy and Plans, FAA-APO-89-10, August 1989.

Transportation Reference Data, Field Manual 55-15, HQ Department of the Army, Washington D.C., 9 June 1986, pp. 2-27, 2-28.

Weiner, Eric, "U.S. Insurance Offered For Mideast Transport," *The New York Times*, September 5, 1990, Section D, p. 6.