



COMPTROLLER GENERAL

OF THE UNITED STATES

8559

The Civil Reserve Air Fleet--An Effective Program To Meet Defense Emergency Airlift Requirements

The Civil Reserve Air Fleet program provides the Department of Defense with commercial airplanes to augment military airlift during peacetime and wartime. Actions have been taken to make sure that civil aircraft will be readily available in national emergencies.

The Subcommittee on Priorities and Economic Policy of the Government Joint Economic Committee asked GAO to compile this report.



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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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The Honorable William Proxmire
Chairman
Subcommittee on Priorities and
Economy in Government
Joint Economic Committee
Congress of the United States

Dear Mr. Chairman:

During hearings before your Subcommittee on December 22, 1977, you requested that we make a comprehensive review of the U.S. Civil Reserve Aircraft Fleet program. In later meetings with your office, it was agreed that we would expand the scope of our work to include compiling a list of long-range aircraft owned by civil interests in other North Atlantic Treaty Organization countries and a brief summary of actions taken to modify passenger aircraft owned by U.S. air carriers to give the aircraft cargo carrying capability.

This report summarizes our findings on these matters. Other ongoing work within GAO should satisfy your expressed interest in the Department of Defense's airlift enhancement program.

As requested by your office, we did not obtain formal comments on this report, but we have discussed it with Air Force officials. As arranged with your office, this report will be released for distribution to interested parties in 30 days unless you publicly announce its contents earlier.

Sincerely yours

A handwritten signature in cursive script, appearing to read "James A. Beale".

Comptroller General
of the United States

REPORT TO THE
SUBCOMMITTEE ON PRIORITIES
AND ECONOMY IN GOVERNMENT
JOINT ECONOMIC COMMITTEE

THE CIVIL RESERVE AIR FLEET--
AN EFFECTIVE PROGRAM TO MEET
DEFENSE EMERGENCY AIRLIFT
REQUIREMENTS

D I G E S T

The U.S. Civil Reserve Air Fleet program provides the Department of Defense (DOD) with commercial airplanes for use in emergencies.

The Air Force and commercial airlines have taken prudent action to develop, test, and evaluate operating concepts, and to carry out procedures that assure the availability and usefulness of the aircraft. (See p. 6.)

Commercial airlines support the program. They recognize that disruptions in civilian air traffic would occur if the reserve air fleet were activated, but they believe the program is effective, economical, and essential. (See p. 9.)

The Military Airlift Command, the Joint Chiefs of Staff, and various commercial airlines have participated in exercises that test the program for responsiveness to emergencies. A recent comprehensive exercise revealed that current management procedures were adequate for wartime purposes. Improvements that are instituted as a result of the test should assure continued responsiveness to airlift emergencies. (See p. 10.)

As a part of operational planning, the Military Airlift Command has identified 220 airfields suitable, in varying degrees, for U.S. Civil Reserve Air Fleet operations. Airfields will be added based on operational needs. Some airfields are limited to peacetime operations, but could be used in emergencies. (See p. 13.)

Most military ground-support equipment can support commercial aircraft. One type of military loader can only reach 13 of the 16 to 18 feet required to service commercial wide-body aircraft but the Air Force and carriers have improvised adapters to make these loaders usable. The Air Force has bought 13 commercial loaders and has also taken preliminary steps to acquire additional loaders that are suitable for commercial wide-body operations.

(See p. 13.)

The Air Force has tried to gain congressional approval in modifying carriers' wide-body passenger aircraft for additional cargo airlift capability. In May 1978 the Senate Armed Services Committee denied modification funds and redirected Air Force efforts to incorporate cargo airlift capability in new aircraft production. (See p. 17.)

Other North Atlantic Treaty Organization alliance members are developing a program similar to the U.S. Civil Reserve Air Fleet to insure their commercial fleets for emergency use. Program decisions are expected about June 1979. (See p. 20.)

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ABBREVIATIONS

CRAF	Civil Reserve Air Fleet
DOD	Department of Defense
MAC	Military Airlift Command
NATO	North Atlantic Treaty Organization

CHAPTER 1

INTRODUCTION

The Civil Reserve Air Fleet (CRAF) program is designed to provide the Department of Defense (DOD) with commercial aircraft to augment military airlift during peacetime and wartime. Established in 1952, CRAF is composed of civil air carriers that contract not only their aircraft but also their operating and support personnel and facilities. The program is economically feasible because it provides DOD with emergency airlift capability without buying the aircraft, paying personnel costs, or flying and maintaining aircraft during peacetime. For planning purposes CRAF is organized into four segments--long-range international, short-range international, domestic, and Alaskan. CRAF's major role involves augmenting the long-range international military airlift that will be needed for overseas deployment and resupply missions.

The CRAF program is managed by the Air Force's Military Airlift Command (MAC) located at Scott Air Force Base, Illinois. MAC is DOD's single agency for airlift services and is responsible for providing airlift services that meet Joint Chiefs of Staff approved contingency plans. MAC will meet this responsibility through use of its own and CRAF aircraft.

As of May 1, 1978, CRAF included 21 civil air carriers and 302 committed aircraft. The long-range international segment of CRAF included 98 passenger and 122 cargo suitable aircraft. A breakdown of this long-range capability by carrier and aircraft type is included as appendix I.

CONCEPT OF OPERATION

MAC obtains the CRAF carriers' commitments of airlift resources under either an annual airlift service contract or a CRAF call contract. The annual airlift service contract is used in procuring normal peacetime airlift service for passengers and cargo. The call contract is used in obligating carriers that do not participate in MAC's peacetime operations. Also under the call contract, MAC incurs no cost unless a service is actually provided.

Carriers voluntarily committing airlift resources to the program share in MAC's peacetime procurement of airlift in proportion to their fleet's wartime commitment.

This commitment is based on a formula involving cargo tonnage, cubic feet, range, and block speed (average speed from point of takeoff to landing) of each type of CRAF aircraft. For fiscal year 1978, this procurement will cost about \$188.7 million.

CRAF activation

A MAC crisis action team is activated when necessitated by rapid and urgent developments, directed by the Commander in Chief, MAC, or started automatically upon receipt of an emergency action message from the Joint Chiefs of Staff indicating a change in alert condition. This team includes a group of designated staff representatives who provide around-the-clock response to war and emergency or contingency operations. The MAC crisis action team is responsible for directing and controlling CRAF carriers through actions, such as

- notifying the carriers of activation;
- activating continental United States and overseas senior lodger stations (locations where one carrier is the designated coordinator of all aircraft activity);
- processing airlift requirements, determining civil airlift needed, and assigning carriers specific missions;
- monitoring missions; and
- maintaining mission performance data and carrier capability status.

Contractual provisions allow CRAF activation to increase by stages, depending on the civil airlift needed. Airlift requirements for each stage are based on contingency plans of the Joint Chiefs of Staff. Although CRAF has never been activated, provisions exist for three stages of activation:

- Stage I, committed expansion. Additional airlift capability is needed because peacetime military airlift requirements are expanded and therefore prevent MAC from meeting both deployment and other traffic requirements simultaneously. The Commander in Chief, MAC, can activate this stage.

--Stage II, airlift emergency. Additional airlift capability is needed for an airlift emergency that does not warrant national mobilization. The Secretary of Defense can activate this stage.

--Stage III, national emergency. Activation of the total CRAF airlift capability is needed to meet a national emergency declared by the President or the Congress. The Secretary of Defense can activate this stage after such a declaration has been made.

Carriers voluntarily commit their airlift resources to either stage I or II. For stage III, the Department of Transportation allocates aircraft to the program by registration number.

Carriers are contractually committed to a 24-hour response time in stages I and II and a 48-hour period in stage III. Response time begins when the carrier receives a mission assignment from MAC. After completion of the mission, assuming there is no further assigned mission, the carrier can reschedule the aircraft into civil operations and has 24 or 48 hours to respond to another mission.

Senior lodger

With CRAF activation, the carriers may be required to provide air traffic support at their commercial facilities. At 35 civil airports a principal carrier is designated the senior lodger and may obtain assistance from other carriers located there. Generally, a senior lodger has the greatest support capability or the largest number of aircraft that travel to and from a given airport.

Senior lodger functions encompass:

--Administration. Performing manpower and personnel actions including hiring and firing, assuring security over documents and facilities, providing facilities and equipment, and accounting-finance, medical, procurement, and training services.

--Flight operations. Providing meteorological services, supplying operational information, providing search and rescue information, filing flight plans, and notifying crews of scheduled missions.

- Traffic services. Providing normal fleet services. (In some cases, the senior lodger may have to provide additional services such as lavatory servicing, cabin and cockpit cleaning, and food preparation for passengers and crew.)
- Communications. Providing and administering reliable and adequate air-ground, fixed, and local communications and the personnel to operate them.
- Supply. Providing and administering a supply support system, including the buildings, facilities and equipment.
- Maintenance. Performing inspections; conducting major and minor repairs; changing engines; and maintaining buildings, equipment, and related technical publications.
- Safety. Conducting ground and air safety programs and establishing a disaster preparedness plan.

Dispersal and regroup

Upon stage III activation the CRAF resources will be dispersed to predetermined bases and later directed to regroup bases. These bases are for the survival, recovery, reconstitution, and management of CRAF resources.

Upon receipt of a dispersal action from the MAC crisis action team, carriers proceed to a dispersal base with sufficient fuel to permit a takeoff for a regroup base. If possible, the carriers are to take sufficient personnel for 30-day support of the aircraft at a regroup base. MAC has written agreements with the dispersal base managers that cover the use of the facilities. The base managers have been advised of the number and types of aircraft to expect. For aircraft in flight over the continental United States the carrier directs their dispersal. Aircraft in flight offshore are subject to the security controls of the North American Air Defense Command. This Command directs air space evacuation to pre-established offshore bases where the CRAF crew obtains clearance for penetrating and operating in the Command's area.

CRAF missions are launched from a regroup base. These bases have the physical facilities to support CRAF during a mission. MAC has physical characteristics and capability data on each regroup base, including fuel

availability and capacity, medical and maintenance support, and group support equipment.

Communications

At CRAF activation MAC uses Aeronautical Radio, Inc. facilities as the primary communications link with the carriers. Aeronautical Radio, Inc., is a high speed message switching system that is connected by cross country and international circuits to various individual airline message switching computers and teletype systems. A message introduced at any airline point will be transmitted automatically to any other airline point. The system uses computers at Cedar Rapids, Iowa, and Elk Grove, Illinois. The latter location is designated for MAC usage upon CRAF activation. MAC's Assistant for Civil Air stated that stand-by equipment is operational at MAC and identical equipment being used for day-to-day operations that involve procurement of normal peacetime airlift.

Navigator augmentation

In October 1976 a carrier transferred 15 DC-8 cargo aircraft from international to domestic service then terminated the navigator support needed for international operations. To retain this long-range international cargo capability, MAC plans using military navigators to augment the carrier crews during CRAF activation. These navigators receive periodic orientations on the aircraft at the carrier's training facility.

CHAPTER 2

CRAF APPEARS ABLE TO RESPOND TO AIRLIFT EMERGENCIES

Since its inception in 1952, the Civil Reserve Air Fleet program has been tested numerous times in exercises designed to evaluate its responsiveness to airlift emergencies without actually activating the fleet. Participants have been combinations of Air Force (both headquarters and Military Airlift Command), Joint Chiefs of Staff, and CRAF personnel. The most recent comprehensive exercise--Scarlet Scarf--showed that the normal peacetime airlift management procedures for CRAF were also adequate for management in wartime. Improvements instituted as a result of the exercise should assure continued responsiveness to airlift emergencies.

MAC has also conducted test loadings with commercial wide- and narrow-body aircraft and is developing a computerized simulation model for analytical purposes that include CRAF aircraft.

SCARLET SCARF EXERCISE

The Scarlet Scarf exercise (April 6 through 8, 1976) was conducted to evaluate new concepts for managing and utilizing CRAF airlift resources under stage III activation. This involved

- evaluating the concept of utilizing expanded peacetime airlift management procedures for the wartime management of CRAF resources;
- exercising CRAF activation procedures at headquarters, MAC, and the carrier operations centers;
- exercising centralized mission management, including capability reporting, mission scheduling, flight monitoring, and logistics monitoring;
- evaluating voice and record communications used by the crisis action team to schedule airlift missions;
- indoctrinating newly assigned MAC personnel in CRAF operations; and
- monitoring and evaluating CRAF logistics workloads imposed on the crisis action team.

The participants in the exercise included the 15 carriers committed to the long-range international CRAF. (See app. I.) The exercise costs of approximately \$35,000 were primarily for the carrier representatives who were at MAC April 4-8, 1976, and for carrier operations center personnel.

Exercise scenario

The exercise depicted a deteriorating political situation in Europe and Asia. A sizable U.S. military force was deployed to Europe, and when the force was to be rotated and replaced, relations between free world and communist powers deteriorated further leading to the threat of general war.

At the beginning of the exercise MAC was saturated with airlift requirements forcing activation of CRAF. Also, a number of events were inserted to add realism to the exercise. Several of these events were

- the New York City corporate control center for one carrier was destroyed resulting in the transfer of aircraft control responsibilities to a secondary control center,
- a European airport was destroyed resulting in mission routing changes,
- an aircraft was inoperative due to four blown tires, and a hydraulic leak resulted in a 4-hour mission delay.

The exercise was restricted to headquarters, MAC, and CRAF carrier operations centers and involved simulated aircraft movement. The reports, records, and procedures, used in actual peacetime commercial airlift procurements were processed, but were not released outside MAC. Some of the assumptions governing the exercise were:

- Strategic airlift capability and the domestic, Alaskan, and short-range international CRAF were considered committed to responding to emergency situations.
- Civil missions in actual peacetime operation were considered not available for exercise play.

- Schedules were developed based on actual capability and elapsed times, and mission flow plans were designed to preclude airfield saturation.
- Carriers were given time to relocate, install, and/or remove seats and cargo kits in convertible aircraft and to position aircraft at onload bases.
- Aircraft planning factors, flying hour limitations, and crew rest requirements were in accordance with current regulations.
- Actual maintenance status and weather information was used.

Exercise results

MAC concluded that the use of normal peacetime procedures was adequate for the wartime management of CRAF. It was believed that CRAF should be exercised annually to prevent proficiency loss in program operations. The following are specific test results.

- MAC and carriers' communications procedures and equipment should be revised and updated. Message traffic is delayed due to limited capacity of existing equipment and the volume of teletype data during total airlift mobilization. The Aeronautical Radio, Inc., terminal, operating at 100 words per minute, could not handle all message traffic. Also, it does not have simultaneous message send-receive capability.
- Initial mission planning should accommodate positioning of stage crews, support personnel, and equipment when the carriers operate outside their normal route structure.
- Future flow plans containing the airlift requirements should be developed with the carriers' assistance for more realistic scheduling of ground times, airframe requirements, and route leg times. Also certain CRAF planning factors should be revalidated, such as aircraft onload and offload times, fueling, and arrival times.
- MAC's automated requirements flow plans and related reporting capabilities are inadequate to handle all

types of civilian aircraft in addition to the military aircraft. Also, MAC has not integrated all CRAF resources into its automated system because of limited capabilities. This automated system is used to match aircraft with mission requirements and does not differentiate and recognize the different capabilities among the various series of aircraft.

Corrective actions

Subsequent to the Scarlet Scarf exercise, MAC acquired an Aeronautical Radio, Inc., terminal with 120 character-per-second capacity and simultaneous message send-receive capability. A MAC official stated that this system handled communications without similar deficiencies in a joint MAC-CRAF exercise conducted in April 1978.

The representative stated that MAC is updating its automated mission planning and direction system. When completed in December 1978, the new system should correct positioning and scheduling problems, distinguish aircraft capabilities by series, and handle all airlift resources, both military and civil. In addition, MAC is evaluating certain CRAF planning factors, such as onload/offload, fueling, and arrival times, and the revisions will be published in Air Force Regulation 76-2, Airlift Planning Factors.

CARRIERS' VIEWS ON THE CRAF PROGRAM

CRAF carriers are optimistic about the program. These carriers have taken numerous steps to become more familiar with the program and proficient in the required tasks.

Operations

The carriers believe the CRAF program is an effective and economical way to meet DOD emergency airlift requirements. They recognize that if CRAF were activated, disruptions in civilian air traffic would occur. They believe that military missions will not significantly increase their flying activity, that wide-body aircraft can be supported with ground and materials handling equipment at military locations, and that airlift resources can be provided within 48 hours, as required, for stage III.

Carriers have familiarized their personnel with the CRAF program through procedural manuals and briefings. One carrier, to test the program efficiency, visited designated dispersal stations to determine if the stations could support its aircraft.

Exercises

Carriers believe that test exercises are important for measuring responsiveness to military emergencies. One carrier stated that this is the only way to keep the CRAF concept alive, short of activating the fleet. Another carrier stated that its personnel has participated in a senior lodger exercise directed by carrier management. The representative believes that exercises are necessary to maintain proficiency and familiarity with CRAF.

Several carriers stated that Scarlet Scarf revealed communication problems. They stated MAC has taken corrective actions, and the April 1978 exercise demonstrated improvements in communication capabilities.

AIRCRAFT TEST LOADINGS

CRAF aircraft have been test-loaded using a variety of loading equipment to ascertain the best loading methods for narrow- and/or wide-body aircraft. These test loadings were conducted to

- develop and evaluate loading procedures,
- identify special loading equipment items,
- identify specific Army equipment items which can be loaded and transported in the aircraft,
- familiarize MAC and user personnel with loading procedures, and
- validate cargo aircraft ground times.

Narrow-body aircraft

On September 25 and 26, 1977, and October 2, 1977, MAC conducted test loadings of a DC-8 and B707 aircraft at Pope Air Force Base, North Carolina. The aircraft were loaded with four 1/4-ton trucks and four 1/4-ton trailers, together with assorted Air Force equipment. Costs of \$72,635 were incurred and included \$48,024 for aircraft down-time and \$24,000 for shipping the cargo items to Pope Air Force Base.

The test showed that the trucks and trailers could be loaded on either aircraft as could most of the other assorted equipment. The exceptions were that a certain bomb trailer could not be loaded on either aircraft and only the B707 could accept a certain towing tractor and generator.

Wide-body aircraft

On April 21 and 23, 1978, MAC conducted test loadings of a DC-10-30CF and a B747-200F aircraft at McChord Air Force Base, Washington. The items loaded on the DC-10 included two 2-1/2-ton trucks, four 3/4-ton trucks, a 10,000-pound forklift, a general purpose trailer, a personnel carrier, and an OH-58 helicopter. The B747 was loaded with the same items and four 5-ton trucks, a combat loaded 2-1/2-ton truck, and a UH-1C helicopter. Commercial pallets, military pallets tied onto commercial pallets, and cargo/baggage containers were used with a commercial Cochran Airport System 316A loader as well as military 463L loader. The test cost approximately \$240,000. A test report was unavailable at the time our fieldwork was completed.

On November 29 and 30, 1977, MAC also test-loaded a B747 using a military 463L loader with adapter. The adapter is used to increase the height of the loaders so they will reach the higher cargo decks of commercial wide-body aircraft.

A MAC official stated that both wide-body tests were conducted to develop a loading manual for commercial wide-body aircraft. This manual should be available in late 1978.

SIMULATION MODEL DEVELOPMENT

MAC is developing a computerized simulation model to enhance its analysis capabilities. The model will be used to simulate emergency scenarios involving military and CRAF aircraft. The model is planned to

- handle military and CRAF aircraft, recognizing their size, speed, and load capabilities;
- accommodate scenario assumptions and means to satisfy resulting requirements; and
- contain characteristics (such as fuel, loading and unloading facilities, communications, runway lengths, and weight limitations) of approximately 400 civilian and military airfields in the continental United States and overseas.

A MAC representative stated the first use of the model will be to identify operational problems involving MAC's aircraft, and later the model will be used to simulate emergency type scenarios that require CRAF activation.

CONCLUSIONS

The Air Force and civil carriers have taken prudent steps to develop, test, and evaluate CRAF operating concepts, and implement operating procedures that should assure the usefulness of civil aircraft in an airlift emergency. Various exercises have tested the CRAF program, evaluating responsiveness to military emergencies. The most recent comprehensive exercise, Scarlet Scarf, shows that the normal peacetime airlift management procedures for CRAF were adequate for management in wartime. Improvements instituted as a result of the exercise should assure continued responsiveness of the program.

CHAPTER 3

SUFFICIENT AIRFIELDS AND

ADEQUATE SUPPORT EQUIPMENT AVAILABLE

MAC has an ongoing effort that identifies suitable airfields for CRAF operations based on users' operational needs. This effort reviews the physical characteristics of airfields and determines whether the characteristics support commercial wide-body and/or narrow-body aircraft.

In addition, MAC has identified that the military 463L loader limits usage primarily to commercial narrow-body and military aircraft. Steps have been taken to acquire additional loaders capable of servicing the commercial wide-body aircraft.

AIRFIELD SUITABILITY

Many variables affect the suitability of an airfield for CRAF operations. Some of these variables are weather, type of aircraft, aircraft load, and the airfield itself. An airfield's suitability depends on such factors as elevation, runway (type of surface, weight bearing capacity, length and width), obstacles in flight paths or near runways and taxiways, taxiway width, ramp space, and navigational aids.

MAC has identified 220 airfields in or near North America, Europe, and the Eastern Pacific that are suitable, to some extent, for CRAF operations, and it will continue to add airfields based on operational needs. Therefore, the 220 airfields are not considered all-inclusive. A MAC representative said that although some airfields have limitations, they could be used in an emergency. Generally, airfields are considered limited only to peacetime operations. A detailed breakdown of the European and Eastern Pacific airfields is in appendix II.

ADEQUACY OF GROUND-SUPPORT EQUIPMENT

MAC officials stated that most military ground-support equipment will service the commercial wide-body aircraft. Military 463L loaders are exceptions because they extend only 13 of the 16 to 18 feet required to reach cargo deck heights of the B747 and DC-10 aircraft. MAC has developed an adapter which increases the loader's reach capability to 19 feet and plans to use the adapter in the interim. As mentioned earlier, this loader with adapter has been tested by the Air Force.

In May 1976 MAC purchased 13 commercial loaders costing about \$1 million to service commercial wide-body aircraft. These loaders are located at strategic sites within the United States and overseas. MAC plans to supplement these loaders with the CRAF carriers' loaders, transporting them by military or civilian aircraft. Also, MAC has submitted a Required Operating Capability to the Air Staff for a military loader capable of servicing commercial wide-body aircraft. If this requirement is approved, MAC plans to acquire 39 of these loaders for about \$4 million and position them at strategic locations.

CARRIERS' VIEWS ON ADEQUACY OF SUPPORT EQUIPMENT

Carriers believe that adequate support equipment would be available in emergency situations to service their wide-body aircraft. One airline carrier stated that major airports in Europe had adequate loaders to service commercial wide-body aircraft. Even so, that airline was buying an air-transportable loader to service these aircraft, and the representative believed more loaders would be acquired in the future. Another carrier stated that commercial carriers had improvised an adapter-type modification on their loaders similar to the Air Force's adapter to gain additional ground support capability.

CONCLUSIONS

It appears that appropriate action is being taken to identify continental United States and overseas airfields that can support, to varying degrees, wide- and narrow-body aircraft. It also appears that considering military and civilian assets, equipment will be available and adequate to support CRAF operations.

CHAPTER 4

FUTURE OF CRAF MODIFICATION PROGRAM UNCERTAIN

The primary objective of the CRAF modification program is to create, within the U.S. civil industry, additional oversize (wide-body) cargo airlift capability to augment DOD airlift in emergencies. The program involves modifying passenger type aircraft, giving them cargo-carrying capability.

In 1974 MAC released a request for proposal soliciting commercial aircraft operators to offer wide-body aircraft for modification. Responding carriers offered 65 existing aircraft for full or minimum modification plus 22 new aircraft that were on order. In March 1978 MAC issued a request for proposal to American Airlines to modify up to eight of its B747 passenger aircraft. In April 1978 American responded to MAC's solicitation, but in June 1978 MAC canceled the request for proposal because the Senate Armed Services Committee denied the requested 1979 modification funds.

MAC has developed a plywood modification kit for 26 B747-passenger aircraft that will provide additional cargo capability.

1974 REQUEST FOR PROPOSAL

On December 16, 1974, MAC issued a request for proposal to commercial operators of wide-body aircraft soliciting aircraft modification. MAC proposed to

- pay for modifying civil passenger aircraft to a convertible configuration, 1/ pay all future costs associated with the modification, and compensate the carriers \$50,000 annually for each modified aircraft or
- share half the cost to modify an existing passenger aircraft for civil cargo service, or pay an equivalent sum should a carrier acquire a new wide-body cargo aircraft.

1/ MAC would pay for modifications to aircraft capable of being readily converted from passenger to cargo configuration or the reverse.

Modified aircraft would be placed in a special category of stage III of the CRAF program. Carriers would require an average of 37 to 45 hours to convert from passenger to cargo mode; therefore, these aircraft would not be available to MAC for stage I or II. MAC anticipates the modified aircraft withdrawn from stages I and II would be replaced with wide-body aircraft purchased in the future.

Eight carriers offered 87 aircraft in response to the 1974 request for proposal. Sixty-five of these were B747-passenger aircraft to be modified and returned to passenger service, and 22 were B747 and DC-10 aircraft to be modified or purchased under cost sharing provisions and used in cargo service. Overall, the 87 aircraft would provide main deck cargo capability of about 9.3 million tons per day and lower compartment cargo capability of about 1.7 million tons per day based on 10 hours' utilization. This added air-lift would assist in offsetting a shortage of oversize cargo capability.

DESCRIPTION OF MODIFICATIONS

In responding to the 1974 solicitation, the carriers selected 2 of 10 modification options. These modifications, either full or minimum modifications, were selected with the understanding that the work be conducted by the original aircraft manufacturer to preclude possible abrogation of airframe warranties.

The principal features of the full modification are

- a left hand side cargo door,
- main compartment floor revisions, modified convertible interiors,
- a B747-100F cargo-handling kit, and
- a cargo winch.

MAC does not plan to modify the lower cargo hold. The modification is expected to require about 60 days and will increase the aircraft's operating weight by 11,500 pounds. The capacity of the main deck would be increased to accommodate 32 military 463L pallets or 7 M-35 2-1/2-ton trucks on pallets.

- The principal features of the minimum modification are
- a nose cargo door and door provisions,
 - main deck floor revisions,
 - revised airplane systems for the nose cargo door, and
 - a treadway cargo handling kit

The modification would increase the aircraft's operating weight by 3,500 pounds. The capacity of the main deck would be 30 military 463L pallets or 6 M-35 2-1/2-ton trucks interspaced with 6 463L pallets.

The capacity of the lower cargo hold is the same in the full or minimum modification. The lower hold without galley can hold commercial pallets 88 inches by 125 inches, 96 inches by 125 inches, or commercial containers. Nine military 463L pallets 88 inches by 108 inches could be loaded in the lower hold by tying them onto the large commercial pallets.

STATUS OF MAC'S SOLICITATION TO AMERICAN AIRLINES FOR AIRCRAFT MODIFICATION

On March 3, 1978, MAC submitted a request for proposal to American Airlines, the only carrier to offer aircraft for the full modification. The proposal provided for full modification of one B747-100-passenger aircraft and options for full modification of up to seven additional B747-100 aircraft. American responded on April 3, 1978, with the understanding that modification be accomplished by the aircraft manufacturer, Boeing, to prevent jeopardizing aircraft warranties, to maintain the physical integrity of the aircraft, and to ensure that the aircraft structure is not degraded.

On May 10, 1978, the Senate Armed Services Committee denied funds for the CRAF modification program. The Committee stated that efforts should be redirected to incorporating convertibility features in new production wide-body aircraft and approved \$7.5 million in 1979 to be used for this purpose. The House Armed Services Committee had approved the Air Force's budget request on May 5, 1978. Responding to the Senate Committee's action, MAC canceled the solicitation to American on June 1, 1978. After receiving the DOD's appeal stating that \$28.5 million plus \$7.5 million approved

in fiscal year 1978 would fully fund a pilot program of four aircraft. the Committee of Conference agreed on \$28.5 million. These funds, however, are authorized only for modification of new production of wide-body passenger aircraft.

The Congress has repeatedly disapproved the Air Force's budget requests for the modification program.

<u>Year</u>	<u>Budget request</u>		<u>Congressional action</u>		
	<u>Amount</u>	<u>Aircraft</u>	<u>Type</u> <u>modification</u>	<u>Approved</u>	<u>Aircraft</u>
	(millions)			(millions)	
1976	\$12.0	2	Full	0	0
		2	Minimum		
1977	29.3	2	Full	0	0
		2	Minimum		
		2	Cost sharing		
1978	\$30.0	8	Cost sharing	\$ 7.5	1
1979	\$68.5	6	Full	a/\$28.5	Not specified

a/ Approved by the Committee of Conference.

PLYWOOD MODIFICATION KITS

In June 1977 MAC established a plywood modification kit program for 26 B747-passenger aircraft to provide additional bulk-cargo-airlift capability. Intended as an interim emergency measure, these kits provide 3.67 million ton-miles of additional capability, cost \$238,000, and require annual storage costs of \$1,000. The principal advantage of the plywood kits is additional bulk-cargo capability at low cost. A disadvantage is slow loading and unloading of the aircraft through the passenger doors, tying up ramp space at the airfield.

A plywood kit consists of standard Air Force cargo nets, straps and fittings, and half-inch plywood sheets. Passenger seats and certain passenger convenience items are removed from the aircraft before the precut plywood panels are placed on the main deck floor. MAC estimates, using 25 men, conversion time is 8 hours per aircraft.

Two carriers have offered 26 B747-100-passenger aircraft for the kit modification program. (These are the same aircraft that were offered for the CRAF modification program.) Kits for one carrier are stored at Travis Air Force Base, California, while kits for the other carrier are stored at John F. Kennedy International Airport, New York.

CONCLUSION

As a result of recent congressional action, major CRAF modification programs will be directed towards new production wide-body passenger type aircraft.

CHAPTER 5

ARRANGEMENTS BEING MADE TO INSURE AVAILABILITY OF CIVIL AIRCRAFT OF OTHER NATO COUNTRIES

Other North Atlantic Treaty Organization (NATO) alliance members are developing a program to utilize their mobility resources in emergencies. MAC's Assistant for Civil Air, who serves as a technical advisor to NATO's Civil Aviation Planning Committee, stated that the committee received two directives from NATO's Senior Civil Emergency Planning Committee:

- Study the availability of civil aircraft of NATO countries and national arrangements to insure availability of these aircraft in emergencies.
- Study peacetime modifications to civil aircraft enabling them to support military operations.

The technical advisor stated that, in his opinion, NATO would formalize arrangements on the first study directive by about June 1979. He believed the status of the second study directive was uncertain and would be influenced by the U.S. modification plans for the CRAF.

INVENTORY OF POTENTIAL CIVIL LONG-RANGE AIRCRAFT

MAC's Assistant for Civil Air maintains an inventory of long-range aircraft owned or on order by commercial carriers of the 14 other NATO countries. This inventory is an estimate based on aircraft manufacturers' data and trade publications, such as Aviation Daily and U.S Aviation Week and Space Technology.

As of May 1978, the MAC inventory of potential long-range aircraft showed 476 aircraft--350 passenger, 116 convertible, and 10 cargo aircraft. The inventory includes 84 French aircraft and 25 aircraft of a consortium of Danish, Norwegian, and Swedish airlines. (Sweden is not a NATO member.) This inventory of long-range aircraft is included as appendix III.

CONCLUSION

Action is being taken to ensure the availability of NATO civil aircraft in emergencies.

CHAPTER 6

SCOPE OF REVIEW

We reviewed the Military Airlift Command's regulations, procedures, and contracts governing the Civil Reserve Air Fleet program. We discussed program concepts with MAC officials and 6 of the 15 air carriers in the long-range international CRAF. We discussed testing these concepts and evaluating responsiveness with MAC and carrier officials, and we reviewed a DOD exercise that simulated an airlift emergency.

The CRAF modification program was reviewed discussing status and types of modifications to be performed. We obtained MAC's and the air carriers' views on the adequacy or compatibility with wide-body aircraft needs of military ground-support equipment and airfields. Air Force test loadings of wide- and narrow-body aircraft were discussed. Finally, we obtained an inventory of North Atlantic Treaty Organization members' civil aircraft, and discussed the NATO initiatives in establishing a program similar to the United States CRAF program with MAC.

Our review did not address legal questions concerning the use of civilian-flight crews in wartime or costs for maintaining the various mobilization stages.

SCHEDULE OF CARRIERS AND AIRCRAFT
COMMITTED/TO LONG-RANGE INTERNATIONAL
CRAF AS OF MAY 1, 1978

<u>Carrier</u>	<u>Aircraft model</u>	<u>Type (note a)</u>	<u>Number of aircraft at stage (note b)</u>		
			<u>I</u>	<u>II</u>	<u>III</u>
Airlift International	DC-8-50CF	CV	2	2	2
	DC-8-63CF	CV	2	3	3
	DC-8-33F	CG	-	-	<u>3</u>
			<u>4</u>	<u>5</u>	<u>8</u>
American	B707-300F	CG	-	-	4
	B747-100F	CG	-	-	<u>3</u>
					<u>7</u>
Braniff	B747-100-200	PX	-	-	1
	DC-8-62CF	CV	-	-	<u>1</u>
					<u>2</u>
Capitol	DC-8-63CF	CV	<u>1</u>	<u>2</u>	<u>2</u>
Continental	DC-10-10CF	CV	-	-	<u>8</u>
Flying Tiger	B747-100F	CG	5	5	5
	DC-8-61CF	CV	-	-	2
	DC-8-63F	CG	-	-	6
	DC-8-63CF	CV	<u>3</u>	<u>7</u>	<u>10</u>
			<u>8</u>	<u>12</u>	<u>23</u>
Northwest	B747-100-200	PX	4	7	17
	DC-10-40	PX	2	4	22
	B707-300C	CV	1	1	2
	B747-200F	CG	<u>2</u>	<u>3</u>	<u>4</u>
			<u>9</u>	<u>15</u>	<u>45</u>
Overseas National	DC-8-63CF	CV			2
	DC-10-30CF	CV	<u>2</u>	<u>2</u>	<u>2</u>
			<u>2</u>	<u>2</u>	<u>4</u>
Pan American	B707-300	PX	1	3	13
	B747-100-200	PX	7	14	28
	B747SP	PX			6
	B707-300F	CG	2	2	2
	B707-300C	CV	2	2	2
	B747-100F	CG	<u>2</u>	<u>3</u>	<u>4</u>
			<u>14</u>	<u>24</u>	<u>55</u>

APPENDIX I

APPENDIX I

<u>Carrier</u>	<u>Aircraft</u>	<u>Type (note a)</u>	<u>Number of aircraft at stage (note b)</u>		
			<u>I</u>	<u>II</u>	<u>III</u>
Seaboard World	B747-100F	CG	-	<u>1</u>	<u>2</u>
	DC-8-63F	CV	<u>4</u>	<u>4</u>	<u>4</u>
			<u>4</u>	<u>5</u>	<u>6</u>
Trans International	DC-8-61CF	CV	2	2	3
	DC-8-63CF	CV		3	6
	DC-10-30CF	CV	<u>3</u>	<u>3</u>	<u>-3</u>
			<u>5</u>	<u>8</u>	<u>12</u>
Trans World	B747-100-200	PX	-	-	11
	B707-300F	CG	-	-	10
	B707-300C	CV	-	-	<u>3</u>
			-	-	<u>24</u>
United	DC-8-50F	CG	-	-	<u>14</u>
Western	B707-300C	CV	-	-	<u>1</u>
World	B707-300C	CV	1	1	1
	B747-200C	CV	1	2	2
	DC-8-63CF	CV	2	2	5
	DC-10-30CF	CV	-	-	<u>1</u>
			<u>4</u>	<u>5</u>	<u>9</u>
Total--15 carriers			<u>51</u>	<u>79</u>	<u>220</u>

Type of aircraft available for stage III

<u>Aircraft</u>	<u>Cargo</u>	<u>Convertible</u>	<u>Passenger</u>	<u>Total</u>
DC-8	23	40	-	63
DC-10	-	14	22	36
B707	16	11	13	40
B747	<u>18</u>	-	<u>63</u>	<u>81</u>
Total	<u>57</u>	<u>65</u>	<u>98</u>	<u>220</u>

a/Symbols are for type aircraft: CV=convertible, CG=cargo, and PX=passenger.

b/See pages 2 and 3 of the report for an explanation of the various stages of the CRAF program.

AIRFIELDS SUITABLE FOR CRAF OPERATIONS
(not all-inclusive)
Located in or near Europe

Azores

Lajes Air Base
Santa Maria Airport

Belgium

Brussels National
Koksijde Airport

Denmark

Aalborg (Royal Danish Air Force)
Kastrup International

Germany

Bitburg Air Base*
Dusseldorf Airport
Erding (German Air Force)*
Frankfurt/Main
Hahn Air Base*
Ingolstadt
Jever*
Lahr Air Base*
Lansberg Air Base*
Nordholz Air Base*
Norvenich Air Base
Ramstein Air Base
Sembach Air Base*
Sollingen Airport
Spangdahlem Air Base
Stuttgart Air Base
Zweibrucken Air Base

Greece

Athinai Airport
Larisa Air Base*
NEA Anghialos Air Base
Souda Air Base

Iceland

Keflavik Airport

Ireland

Shannon

Italy

Aviano Air Base
Catania/Sigonella Airport
Pisa/San Giusto
Roma/Ciampino*

Luxembourg

Luxembourg Airport*

Netherlands

Gilze Rijen Airport*
Schipol Airfield
Soesterberg Air Base
Woensdrecht*
Ypenburg Air Base*

Norway

Flesland Airport
Gardermoen Airport
Sola Airport*

Portugal

Lisboa

Spain

Barajas International
Barcelona Airport
Murcia/San Javier*
Moron Air Base
Rota Naval Station
Torrejon Air Base
Zaragoza Air Base

Turkey

Balikesir Air Base*
 Batman Airfield
 Cigli Air Base
 Eskisheir Air Base*
 Incirlik Air Base
 Merzifon Airport*
 Sivrihisar Airport
 Yesilkoy

United Kingdom

Alconbury (Royal Air Force)
 Bentwaters (Royal Air Force)
 Boscomb Down Airfield

Coltishall Airport (Royal
 Air Force)*

Fairford (Royal Air Force)
 Finningley (Royal Air Force)
 Greenham Common Air Base
 Heathrow/London
 Lakenheath (Royal Air Force)
 Manchester International
 Middlekern
 Mildenhall (Royal Air Force)
 Prestwick Airfield
 Sculthorpe (Royal Air Force)
 St. Mawgan (Royal Air Force)
 Upper Heyford Air Base
 Waddington (Royal Air Force)
 Wethersfield (Royal Air Force)
 Wittering (Royal Air Force)
 Woodbridge (Royal Air Force)

Located in or near the Eastern PacificGuam

Agana Naval Air Station
 Andersen Air Force Base

Hawaii

Honolulu International
 Kaneohe Bay Marine Corps Air
 Station*

Japan

Itazuke
 Iwakumi Marine Corps Air Station*
 Misawa Naval Air Facility
 Tokyo International
 Yokota Air Base

Midway Island

Midway Naval Station*

Okinawa

Kadena Air Base
 Naha

Philippine Islands

Clark Air Base
 Cubi Point Naval Air Station*

South Korea

Kimhae International
 Kunsan Air Base
 Kwang-Ju
 Osan Air Base*
 Sachon
 Suwon
 Taegu
 Yechon

Taiwan

Ching Chuan Kang

Wake Island

Wake Island*

*Airfields suitable for limited CRAF operations. Other air-
 fields are suitable for unlimited CRAF operations.

OTHER NATO COUNTRIES POTENTIAL LONG-RANGE AIRCRAFT

Country	B747			DC-10			C-8			B707			Other	Total			
	PX	CV	CG	PX	CV	CG	PX	CV	CG	PX	CV	CG	PX	PX	PX	CV	CG
Belgium	2	-	-	-	3	-	-	-	-	5	6	-	-	7	9	-	
Canada	15	-	-	4	-	-	26	6	1	-	4	-	19	64	10	1	
Denmark and Norway (note a)	4	-	-	5	-	-	11	5	-	-	-	-	-	20	5	-	
France (note a)	22	-	6	6	-	-	5	5	-	25	11	-	4	62	16	6	
Germany	12	-	2	11	-	-	-	3	-	11	6	-	5	39	9	2	
Greece	2	-	-	-	-	-	-	-	-	2	4	-	-	4	4	-	
Iceland	-	-	-	-	-	-	-	4	-	-	-	-	-	-	4	-	
Italy	5	-	-	8	-	-	9	1	-	-	-	-	-	22	1	-	
Luxembourg	-	-	1	-	-	-	-	5	-	1	1	-	-	1	6	1	
The Nether- lands	12	-	-	7	4	-	11	6	-	-	1	-	-	30	11	-	
Portugal	2	-	-	-	-	-	-	-	-	7	5	-	-	9	5	-	
Turkey	-	-	-	2	-	-	-	-	-	-	-	-	-	2	-	-	
United King- dom	26	-	-	10	-	-	-	6	-	19	30	-	35	90	36	-	
Total	<u>102</u>	<u>0</u>	<u>9</u>	<u>53</u>	<u>7</u>	<u>0</u>	<u>62</u>	<u>41</u>	<u>1</u>	<u>70</u>	<u>68</u>	<u>0</u>	<u>63</u>	<u>350</u>	<u>116</u>	<u>10</u>	

Symbols are for type aircraft: PX=passenger, CV=convertible, CG=cargo.

a/MAC includes Denmark, Norway, and France resources in the inventory but with reservations. France's resources are questionable and Denmark and Norway's resources are a consortium that includes non-NATO member Sweden.

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