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Report to the Chairman, Subcommittee on Defense, Committee on Appropriations, House of Representatives

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TACTICAL AIRLIFT

Observations Concerning the Air Force's C-27 Proposal

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The Honorable Bill Chappell, Jr.
Chairman, Subcommittee on Defense
Committee on Appropriations
House of Representatives

Dear Mr. Chairman:

This report responds to your request of March 3, 1987, that we evaluate the Air Force's proposed acquisition of a light utility, short-takeoff-and-landing (STOL) aircraft to support various operations, including those involving low intensity conflict (LIC) situations. Our objectives included (1) determining whether the Air Force had adequately justified the need for the aircraft, (2) determining whether the specified performance capabilities of the aircraft would enhance mission performance, and (3) evaluating whether alternatives to acquiring a new aircraft were adequately considered.

Our review focused on the first two phases of the Air Force's three-phase plan: (1) to contract for the service of 5 STOL aircraft at a cost of about $10 million in fiscal years 1988 and 1989, (2) to procure, at a cost of about $145 million, 10 commercially available STOL aircraft, to be designated C-27s, to support the U.S. Southern Command (USSOUTHCOM) after the contract expired, and (3) to purchase, at a cost of about $114 million, an additional 8 such aircraft for the Military Airlift Command (MAC) for a worldwide mission. The estimated cost of the entire three-phase plan, through fiscal year 1992, was about $340 million (see app. I). The Air Force stated that the new aircraft were needed to provide more flexibility in carrying out LIC missions in Latin America and other parts of the world. Such missions are currently accomplished using C-130 aircraft and helicopters. Congressional authorization and funding were requested for USSOUTHCOM portions of the program for fiscal years 1988 and 1989.

Need for C-27 Is Uncertain

We found that the Air Force had not adequately justified the short- or long-term need for a new light utility STOL aircraft, leading to uncertainties concerning the proposed program. USSOUTHCOM had been able to perform its planned missions successfully using available resources. The joint Air Force and Army Center for Low Intensity Conflict was developing a joint LIC doctrine, but it will not be completed until about October 1988. The LIC doctrine, when developed, should enable the Air Force

to develop better information on the equipment and personnel movement requirements for this type of conflict. It should also help it determine the type and quantity, if any, of aircraft needed (see app. II).

Desired C-27 Capabilities Are Questionable

Even assuming the need for a STOL capability, the Air Force had not adequately evaluated whether the specified C-27 performance capabilities would require procurement of a new aircraft or significantly enhance its ability to perform its LIC mission (see apps. III and V). For example, we had questions concerning the following stated requirements:

- Requirement to land on and take off from 1,500-foot runways. This requirement may be unnecessarily restrictive and may unduly limit the range of aircraft that could qualify for the C-27 role. The C-130, currently being used for USSOUTHCOM missions and a C-27 candidate, meets 15 of the 16 specified C-27 requirements; no other commercially available aircraft can meet more than 13 of the specified requirements. The 1,500-foot STOL requirement is the only C-27 requirement not met by the C-130, according to its manufacturer. While the manufacturer shows the C-130 takeoff and landing capability with a 10,000-pound payload to be 2,300 feet, MAC can authorize its operation with that size payload from runways as short as 1,500 feet, and we were advised by reserve and active Air Force pilots that they sometimes conduct C-130 training operations on such runways. Within a few years of the planned C-27 acquisition, the CV-22, with vertical takeoff and landing capability, is also scheduled to become available to the services. While not meeting some of the stated requirements of the C-27, the CV-22 will offer greater takeoff and landing flexibility than a fixed-wing STOL aircraft because it will not always require runways for its operations.
- Capability to carry 35 troops, an artillery gun, or a truck. Since the mission requirements and tactics have not been defined, it is uncertain how many troops and what type of equipment a normal LIC mission will require. Further, it is questionable how often there will be roads over which the guns and trucks can be transported in LIC areas. In addition, this type of equipment also requires additional protection and logistical support (e.g., fuel and ammunition).

Alternatives Not Adequately Explored

It appears that the transfer of additional C-130s and helicopters to USSOUTHCOM, along with some reduction of MAC's peacetime restriction on the use of C-130s on unimproved runways of less than 3,000 feet when carrying partial loads (e.g., 10,000 pounds or less), could, if necessary, substitute for a new airlift system. Another relatively low-cost interim

option is the upgrade and transfer of selected C-7 aircraft to USSOUTHCOM. C-7s are already in the U.S. military inventory and have been used in the USSOUTHCOM area (see app. IV).

Conclusion

Because neither short-term nor long-term requirements had been adequately justified and existing substitute capabilities exist, we concluded in a draft of this report that the Air Force's proposed C-27 procurement and related interim STOL contract proposal were premature. On February 18, 1988, the Secretary of Defense announced that the C-27 program had been terminated because mission requirements could be satisfied through the use of existing resources. In commenting on our draft report, the Department of Defense (DOD) confirmed that the program had been cancelled. Accordingly, we are making no recommendations. We believe that a more informed judgment on the possible need for the C-27 will be possible after the Center for Low Intensity Conflict completes its development of a LIC doctrine.

We are sending copies of this report to the Secretaries of Defense and the Air Force; the Director, Office of Management and Budget; and other interested parties.

Sincerely yours,

Harry R. Finley
Senior Associate Director

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Abbreviations

DOD	Department of Defense
JCS	Joint Chiefs of Staff
LIC	low intensity conflict
MAC	Military Airlift Command
STOL	short-takeoff-and-landing
USSOUTHCOM	U.S. Southern Command
VTOL	vertical-takeoff-and-landing

C-27 Aircraft Proposal

In 1986 the Air Force proposed to procure a new tactical airlift aircraft for USSOUTHCOM.[1] The new aircraft—a light utility, STOL aircraft—was intended to provide the Command with more flexibility in carrying out its missions, including missions of a LIC[2] nature. The Air Force intended that the new capability would become part of a worldwide STOL airlift capability to serve LIC operations. Providing airlift for LIC operations worldwide is a concern among some U.S. defense experts.

The new STOL airlift system was planned to be implemented in three phases. The first phase would encompass a contract with a commercial aircraft vendor to provide the services of five aircraft, complete with aircrews and maintenance support, capable of meeting USSOUTHCOM needs, to be used until a permanent capability could be acquired. The second phase would involve the procurement of 10 light utility, commercially available aircraft to be designated as C-27 aircraft and to be configured as a squadron. The C-27 was to be capable of filling what USSOUTHCOM perceived as a "gap" between the lift capability of C-130 aircraft and helicopters currently available at the Command. The third phase would add a second squadron of eight C-27 aircraft to be based outside of the USSOUTHCOM area (e.g., in the United States), but deployable to USSOUTHCOM or elsewhere in the world as needed to participate in LIC-type missions. Table I.1 summarizes the estimated 5-year cost of the new STOL airlift program, based on unofficial preliminary estimates. DOD requested congressional authorization and funding for the first two phases (i.e., through fiscal year 1989).

Table I.1: Estimated Cost of the Proposed STOL Airlift System

(millions of then-year dollars)

	Fiscal year			
Phase/type of funding	**1988**	**1989**	**1990-92**	**Total**
Phase I				
Operations and maintenance (O&M):				
Contract for services of 5 light commercial aircraft	$8[a]	$2	$0	**$10**
Total phase I	**8**	**2**	**0**	**10**

(continued)

[1]USSOUTHCOM, a regional unified command under the Joint Chiefs of Staff, headquartered in Panama, is responsible for all U.S. military activities in Latin America, south of Mexico.

[2]LIC is defined by the Joint Chiefs of Staff as a "limited politico-military struggle to achieve political, social, economic or psychological objectives." LIC may include limited combat engagement, terrorism, insurgency, political pressure, or drug interdiction. DOD officials stated that USSOUTHCOM activities also routinely include resupply, civic action, humanitarian assistance, medical evacuation, tactical intelligence, and psychological operations assistance.

Phase/type of funding	Fiscal year 1988	1989	1990-92	Total
Phase II				
O&M:				
Civilian personnel, fuel, contractor logistics support, temporary duty travel, and mission support	2	4	0	**6**
Aircraft procurement: [b]				
5 aircraft	66			**66**
5 aircraft		65		**65**
Initial spares	5	4	5	**14**
Military construction:				
Upgrade Howard AFB, Panama	7	0	0	**7**
Military personnel:				
2 officers & 5 enlisted				[c]
25 officers & 82 enlisted	0	2	0	**2**
Total phase II	**80**	**75**	**5**	**160**
Phase III				
O&M:				
Civilian personnel, fuel, contractor logistics support, temporary duty travel, and mission support			30	**30**
Procurement (8 aircraft and initial spares)			114[b]	**114[b]**
Military construction:				
Upgrade of undetermined airbase to accommodate C-27 squadron			3	**3**
Military personnel:				
46 to 82 officers and 164 to 296 enlisted			24	**24**
Total phase III			**171**	**171**
Total	**$88**	**$77**	**$176**	**$341**

[a]Includes $6 million of planned fiscal year 1987 reprogramming to be expended in fiscal year 1988.

[b]The programmed aircraft procurement costs for phases II and III are based on an estimated cost associated with the C-8 (Buffalo) aircraft, which no longer is being produced. The manufacturer is apparently willing to re-open the production line with a minimum sale of 25 aircraft, about 40 percent more than planned for the C-27 program. Other aircraft competing for the C-27 role range in cost up to $27 million each.

[c]Less than $0.5 million.

U.S. military planners consider their primary LIC challenge to be in Central America. USSOUTHCOM officials said that they need the new STOL aircraft to conduct operations efficiently and effectively into and out of

unimproved airstrips as short as 1,500 feet in length. These officials stated that such a capability could give the Command access to several hundred additional airfields in Central America and several thousand additional airfields in South America.

The Congress did not authorize and fund the proposed C-27 acquisition in fiscal year 1988 and DOD deleted the proposal from its amended fiscal year 1989 budget request.

Airlift Requirements in Latin America

The United States has developed policy goals and objectives for Latin America that focus on democracy, economic development, defense, and drug suppression/interdiction. U.S. military strategy in that area seeks to promote stability by helping to create an environment in which the rule of law is protected to permit peaceful economic, social, and democratic development. More specifically, USSOUTHCOM seeks to (1) deter Marxist-Leninist expansion, (2) counter Soviet and Cuban supported terrorism, military influence, and destabilizing actions, (3) support El Salvador's counterinsurgency operations, (4) reduce narcotics trafficking, and (5) defend the Panama Canal. U.S. officials believe that the development and sustainment of democratic institutions can reduce the region's vulnerability to destabilization and can help Latin American governments become self-sufficient.

USSOUTHCOM is responsible for implementing the U.S. national security policy and strategy in Latin America. Accordingly, the USSOUTHCOM commander exercises command and control over U.S. forces through the three service components, a joint task force in Honduras, security assistance organizations located in 16 countries, and a command responsible for planning and coordinating special operations. The USSOUTHCOM military structure consists of

- about 9,000 U.S. troops in Panama to protect the Panama Canal by assuring regional stability, providing local defense, and helping Panama to develop a professional force capable of defending the Canal by the year 2000 in accordance with the Carter-Torrijos Treaty;
- a temporary force presence, through a program of military exercises and training deployments (e.g., in Honduras) of units and equipment from U.S.-based active and reserve forces, in order to deter Nicaraguan government action against its neighbors;
- 55 trainers located in El Salvador to train Salvadoran armed forces; and
- an assistance program to help Latin American nations (e.g., Columbia and Bolivia) combat the production and distribution of illegal narcotics.

Airlift is a key element in carrying out USSOUTHCOM's missions, especially in the underdeveloped countries in Latin America where the transportation infrastructure, including developed airfields, is limited. Troop and material movements, evacuation operations, disaster relief, search and rescue, drug interdiction, and other activities depend heavily on airlift, and some airfields in areas where such operations could be required are not able to accommodate large fixed-wing aircraft (e.g., C-130s). Consequently, helicopters are assuming an increased workload in Latin America. However, USSOUTHCOM contends that helicopters are designed primarily to carry small loads over short distances and are costly to operate, making them less desirable for accomplishing missions that could be performed by fixed-wing aircraft.

To address this airlift gap,[3] the Command developed a proposal for procuring a fixed-wing STOL aircraft (i.e., the C-27) in late 1985. The proposal was approved by the Joint Chiefs of Staff (JCS) in May 1986 and submitted to the Defense Resources Board for review and approval in July 1986. The Board approved the proposal and the Deputy Secretary of Defense directed the Air Force to develop plans for acquiring a new, light utility, fixed-wing aircraft for USSOUTHCOM. The Air Force proceeded with such a plan in the context of addressing a worldwide LIC requirement. The USSOUTHCOM portion of the plan was included in the President's fiscal year 1988 budget.

Objectives, Scope, and Methodology

On March 3, 1987, the Subcommittee on Defense, Committee on Appropriations, House of Representatives, asked us to evaluate the Air Force's justification for its proposed acquisition of 10 C-27 aircraft to operate in the USSOUTHCOM area. Our specific objectives were to determine (1) what led to the C-27 requirement, (2) whether the requirement was fully and adequately defined, (3) what alternatives were explored, (4) how the system will operate, how it will impact on other airlift systems, and how much additional capability it will provide and at what cost in both the short and long term, and (5) how the system relates to U.S. national objectives and interests in the geographic area to be served.

To accomplish our objectives, we (1) examined and analyzed DOD regulations, policies, and justification documents, (2) researched key legislation and other background on U.S. military roles in a LIC environment,

[3]This gap, of concern to USSOUTHCOM as early as 1983, has been described as the difference between C-130 and helicopter airlift service, in terms of range and payload.

and (3) conferred with responsible officials at DOD headquarters, supporting commands in the United States, and the USSOUTHCOM Headquarters in Panama. We conducted audit work at the following offices and organizations:

DOD Organizations in Washington, D.C. and Vicinity

- Office of the Secretary of Defense
- Defense Intelligence Agency
- U.S. Air Force Headquarters
- Air Force Systems Command
- U.S. Army Headquarters

Other DOD Organizations in the United States

- Aeronautical Systems Division of the Air Force Systems Command, Wright-Patterson Air Force Base, Ohio
- Headquarters, Air Force Logistics Command, Wright-Patterson Air Force Base, Ohio
- Headquarters, Military Airlift Command, Scott Air Force Base, Illinois
- Airlift Concepts and Requirements Agency, Scott Air Force Base, Illinois
- Center for Low Intensity Conflict, Langley Air Force Base, Virginia
- 907th Tactical Airlift Group Reserve Unit, Rickenbacker Air Force Base, Ohio

DOD Organizations in Latin America

- U.S. Southern Command, Quarry Heights, Panama
- Southern Air Division, Howard Air Force Base, Panama
- 61st Military Airlift Group, Howard Air Force Base, Panama
- Headquarters, U.S. Army Southern Command, Fort Clayton, Panama
- Small Wars Operations Research Directorate, Fort Clayton, Panama

The C-27 program was still in the planning and development phase at the time of our field work. We, therefore, focused primarily on the justification for the system, a comparison of the capabilities of the aircraft being considered, and how the LIC mission has been performed in the past. Our work was performed from March to October 1987, in accordance with generally accepted government auditing standards.

Proposal to Add C-27 Aircraft to the U.S. Intratheater Airlift Capability

DOD's proposal to procure a squadron of 10 light utility STOL aircraft (i.e., C-27s) in fiscal years 1988 and 1989 for USSOUTHCOM, to assist that command in carrying out its missions in Latin America had not been fully analyzed and supported. Some studies which could have made possible a better evaluation of the proposal's viability had not been completed. We also noted that the CV-22, a vertical-takeoff-and-landing (VTOL) aircraft, which in combination with C-130s and helicopters may be able to fulfill the C-27 mission, will enter the Air Force inventory in the mid-1990s, only a few years after the C-27 would become operational. The CV-22 mission will eventually parallel much of the mission of the C-27.

Need for a New STOL Aircraft Not Adequately Developed

The Air Force and USSOUTHCOM had developed little information to support the C-27 STOL aircraft justification. The C-27 proposal was justified primarily in conceptual terms. Little empirical data had been accumulated to demonstrate that missions have been adversely affected by the absence of a STOL aircraft. While there were indications that USSOUTHCOM could gain some flexibility by greater use of a light utility aircraft, this benefit did not appear to justify adding a new airlift program estimated to cost about $341 million during its first 5 years.

USSOUTHCOM and other unified commands around the world are constantly confronted with defending U.S. interests in situations involving war-like actions and in environments technically considered to be "peaceful," although the people most directly involved in such actions often perceive these situations as "wars." Such is the situation in parts of Latin America.

USSOUTHCOM officials believe that their current airlift tools are not well-suited to their mission and that an airlifter with more STOL capability than the C-130 and with greater range and payload capability than the helicopter would give the Command more flexibility in carrying out operations. However, the C-130 aircraft already in the Air Force inventory can satisfy more of the stated C-27 requirements than any other aircraft that could be procured.

We asked USSOUTHCOM officials to provide descriptions or examples of the ways in which their ability to perform their assigned mission had been impaired by the lack of the capability which would be provided by the C-27. In response, USSOUTHCOM pointed out three operations where it said the accomplishment of its mission and objectives had been impaired by the lack of STOL airlift capability. Despite the impairment, the Command considered all three operations to be successful. One operation

involved U.S. providing airlift requested by a Latin American country in support of a raid on a drug production facility. Because the landing strip nearest the target area was too short for a C-130 aircraft and too far away from the main operating base to be reached by helicopters, USSOUTHCOM contracted with a local company to provide the needed airlift. However, while arrangements were being made to obtain this service, the drug producers learned of the impending raid and left the target area before the raiding party arrived, according to Command officials.

Another operation involved the use of an unimproved landing strip that had been determined to be suitable for C-130 use. However, recent rains in the area had softened the landing strip and the aircraft broke through the strip and was damaged, a problem that might also have occurred with the C-27.

The third operation involved a loss of time because the U.S. military could not fly directly to and land at a target area using a STOL-type aircraft, but instead had to fly a circuitous route using a combination of C-130s and helicopters.

In addition to noting the three USSOUTHCOM-provided examples discussed above, we also reviewed operation and exercise after-action reports to determine whether significant mission impairment had resulted from the lack of STOL capability. Our review of after-action reports covering the last couple of years, revealed only two references to the lack of STOL capability. There may well have been other situations where a STOL capability would have been useful. However, this did not necessarily mean that a new STOL, fixed-wing airlift capability was essential to the achievement of USSOUTHCOM's missions. For the most part, USSOUTHCOM had been able to plan its operations and exercises without a light utility STOL aircraft and has considered them successful, including the three operations identified by USSOUTHCOM.

Little Basis for Number of STOL Aircraft to Be Acquired

Even if the general need for a new STOL aircraft was accepted, the number of aircraft that should be acquired had not been clearly demonstrated. Neither USSOUTHCOM nor MAC had determined the number of aircraft needed for Latin America or worldwide LIC missions. For example, according to a USSOUTHCOM official, the stated requirement for 10 light utility STOL type aircraft was derived from an assumption that a general contingency exists in Latin America, which could dictate as many as three deployments requiring one or more STOL aircraft each at any given

time. The Command concluded that a total of 10 STOL aircraft would be needed to support such a contingency. The 10 aircraft would permit a squadron of 8 primary, 1 back-up, and 1 trainer aircraft.

Command officials told us that no formal study or analysis had been performed to validate the number of aircraft needed; however, Command officials did a review of the 10-aircraft requirement about a year after it was originally determined. According to one official, the review examined the Command's 1986 operations to determine whether or not a STOL aircraft would have benefitted those operations. The review concluded that having STOL aircraft would have been beneficial and that 10 such aircraft would have been adequate.

MAC, like USSOUTHCOM, did not conduct a formal study or analysis to determine the number of STOL aircraft required either for USSOUTHCOM or worldwide. MAC relied on USSOUTHCOM to identify the number of aircraft that it needed and then added 8 aircraft to support worldwide LIC operations. MAC also stated that 1 of the 10 USSOUTHCOM aircraft would be based with MAC's worldwide C-27 squadron, thus providing both USSOUTHCOM and MAC with a squadron of 8 primary aircraft and 1 back-up aircraft. MAC would use its back-up aircraft to train pilots for both squadrons.

In July 1987, The RAND Corporation began a study for the Air Force of the worldwide need for the C-27 aircraft. A MAC official expected the study to help MAC justify not only acquiring the C-27, but also the need for an increased number of such aircraft. MAC expected the number of aircraft needed outside of USSOUTHCOM for worldwide use to increase from 8 to 20, or even 40 aircraft, which would cause a corresponding increase in the total program costs.

Research Concerning the Need for STOL Aircraft Continues

Research concerning the general need for a STOL aircraft, the specific capabilities to be required of the aircraft, and the number of aircraft needed for the worldwide mission and other LIC requirements was still being conducted at the conclusion of our fieldwork. In general, the C-27 requirement was based on the Air Force's projected need for rapid movement of equipment and troops to remote locations having short unimproved airfields in a LIC environment. However, the Army and the Air Force's LIC mission requirements and tactics had not been finalized. Past studies had not fully addressed the need for the C-27 mission requirements in a LIC environment. Ongoing studies should make possible a more thorough analysis of the need for the C-27 aircraft.

Center for Low Intensity Conflict

The joint Army and Air Force Center for Low Intensity Conflict, Langley Air Force Base, Virginia, is responsible for addressing issues concerning the military application of resources in a LIC environment. The Center began operations in September 1986 with a mission to advise the Army and the Air Force on how best to employ U.S. equipment and personnel in LIC areas. However, the Center had not completed developing a worldwide LIC scenario and doctrine. According to Center officials, the doctrine, that will combine the individual Army and Air Force LIC procedures into a joint service manual, would not be issued until about October 1988.

The JCS and services are ultimately responsible for defining joint doctrine. However, input to such doctrine may come from various sources. The Center's role in this regard extends back at least to March 1986 when its General Officer Executive Council identified a need for a joint military doctrine for low intensity conflict. At that time certain actions were to be taken. The office of primary responsibility for most of these actions was either the Center or JCS through the Center. Thus, the Center has been given a major role for developing, if not defining, worldwide LIC doctrine.

Airlift Concepts and Requirements Agency

The Airlift Concepts and Requirements Agency, a joint Army and Air Force study group located at Scott Air Force Base, Illinois, was directed in March 1985 to (1) evaluate the adequacy of existing intratheater airlift capabilities to support a LIC and (2) determine whether commands other than USSOUTHCOM require C-27 aircraft to carry out their LIC missions. To do so, an evaluation team visited USSOUTHCOM and examined the Command's rationale for the C-27 requirement and requested other unified commands to provide written responses on whether they too required such aircraft.

In November 1985, the Agency concluded that there were airlift voids in USSOUTHCOM's capability to support a LIC. The most critical void was the inability to carry small loads to many unimproved airfields from which USSOUTHCOM forces may operate. The responses from the other commands varied; however, none stated a requirement for the C-27 and only one stated that it needed an airlift capability other than C-130s or helicopters. Based on its examination, the Agency recommended a VTOL aircraft (i.e., the CV-22 which is currently being developed) for USSOUTHCOM and, until the CV-22 becomes available, it recommended

- upgrading strategically located airfields,
- assigning additional C-130s and helicopters, or
- assigning other existing light utility aircraft (e.g., C-7s or C-123s).

USSOUTHCOM agreed with the Agency's long-term recommendation of acquiring a new light utility aircraft, but not the CV-22; it wanted the proposed C-27 because, according to its officials, the CV-22 would not become available until the early to mid-1990s and would be more sophisticated than what they believed they need. USSOUTHCOM officials also generally disagreed with the proposed near-term solutions, stating that the need existed immediately for a suitable aircraft, not an old aircraft (e.g., C-7s or C-123s) that would require extensive reconditioning. Although the Command had upgraded some runways over the last few years, officials stated that further upgradings would be impractical and expensive.

Airlift Concepts and Requirements Agency officials told us that they did not perform an analytical assessment of USSOUTHCOM's C-27 justification. However, they said that MAC performed a follow-up study on the Agency's request for information concerning a possible worldwide need for the C-27.

MAC's Follow-Up Study of Worldwide Need

In February 1986, assuming that the commands' (other than USSOUTHCOM) lack of understanding of the C-27 requirement might have caused them to respond improperly to the Airlift Concepts and Requirements Agency, MAC sent a representative to the commands. After explaining the rationale behind USSOUTHCOM's C-27 requirement and obtaining comments from operations and planning personnel at each command, the MAC representative concluded that the requirement was unique to USSOUTHCOM, and noted that the general consensus was that the other commands needed more intratheater airlift capability. The other commands wanted more capability to "move lots of people, lots of equipment, a long way in a short time." In fact, the majority of the commands' planners requested additional C-130s with crews trained "to land in the dirt" (i.e., land on unpaved runways).

During our visit to MAC in April 1987, we questioned MAC's basis for developing a worldwide requirement when the unified commands had not expressed such a need. A MAC official agreed that a worldwide requirement for the C-27 had not been demonstrated.

The Rand Corporation

MAC officials informed us that, based on our questions and observations in April 1987 at USSOUTHCOM, the Air Force decided that it needed to have an independent study performed to address the worldwide C-27 requirement. In June 1987, the Air Force contracted with The RAND Corporation for such a study. A MAC official stated that the study—scheduled for completion in mid-1988—will address

- availability of airfields,
- typical aircraft loads,
- types of missions to be flown, and
- foreign military sales potential of any aircraft acquired for a LIC.

We believe that these are some of the concerns that need to be addressed before the Air Force acquires a STOL aircraft for a LIC. Other issues that should be addressed are (1) what the operating plan will include, (2) the tactics needed for a LIC, and (3) the extent to which LIC missions can be satisfied using existing resources.

Impact of the Vertical-Takeoff-and-Landing Aircraft on the C-27 Requirement

DOD requested authorization and funding for procurement of C-27 aircraft in its fiscal year 1988 budget. However, this request was denied. The House Armed Services Committee, in recommending denial of the request, stated

"The Committee does not recommend authorization of the C-27 aircraft to perform the designated mission because of the availability of existing helicopters and the anticipated near-term deployment of the [C]V-22 Osprey aircraft."

The Airlift Concepts and Requirements Agency recommended the CV-22 for USSOUTHCOM operations in lieu of the proposed C-27; however, USSOUTHCOM dismissed the Agency's recommendation in favor of the C-27. The CV-22 is being developed as an intratheater airlift aircraft to replace certain helicopters (i.e., the H-53 being used by the special forces) and to supplement the C-130 fleet.

The CV-22 development program is led by the Navy and the Air Force is a participating service. The CV-22, having VTOL capability, will not be restricted by the condition, length, or width of runways, and thus will offer even greater flexibility than the C-27 aircraft. In addition, the CV-22's payload and range capabilities will generally parallel the C-27 requirements, as shown by table II.1.

Table II.1: Comparison of C-27 Requirements With CV-22 Capabilities

Performance categories	CV-22	C-27
Maximum payload (pounds)	15,000	10,000
Ground troops	24	35
Litters	12	24
Takeoff distance (feet)	VTOL	1,500
Combat radius (nautical miles)	500	200
Ferry range (nautical miles)	1,130	1,500
Cruise speed	250	200

USSOUTHCOM has acknowledged that the CV-22, as well as the H-53 helicopter, if available, could generally fulfill the C-27's mission (i.e., fill the perceived gap between the C-130 and other helicopters). For example, the Director, Plans, Policy, and Political Military Affairs Directorate, USSOUTHCOM, observed the following in a February 1986 memorandum:

"We agree that the operational capabilities in [the C-27] ROC [Requirements Operational Capability] 2-85 ... are in general consonance with the CV-22 ... operational capabilities."

Command officials have also praised the H-53s as being very capable, but they are dedicated to special forces use and therefore not currently available for a C-27 role.

Conclusions

The long-term requirement for STOL aircraft, as perceived by USSOUTHCOM and MAC, was still evolving. The requirement, which started as a stated USSOUTHCOM need, endorsed by JCS and the Defense Resources Board, for 10 aircraft could grow to as many as 50 such aircraft to serve worldwide missions, according to MAC.

We believe that the nature and scope of such a program, with all of its implications for expanding costs, should have been supported by more analysis and evidence than was available to demonstrate that existing airlift cannot handle the missions.

C-27 Aircraft Required Capabilities

Key questions remained unanswered concerning the required capabilities of the C-27 aircraft because of the lack of sufficient mission analysis leading up to the proposal. There were other uncertainties as to how the aircraft would be used and, more specifically, what aircraft capabilities were essential for the USSOUTHCOM and other theater missions. As a result, it was not clear that procurement of a new aircraft would be appropriate.

What Takeoff and Landing Capability Would Be Needed?

USSOUTHCOM and the Air Force had little support for their requirement that the C-27 aircraft should have the capability to operate from 1,500-foot runways. Our analysis of this requirement suggested that it was unnecessarily restrictive. The validity of the requirement was crucial because it would (1) determine how many manufacturers could compete for the sale, (2) influence the price to be paid for the aircraft, and (3) affect how well the aircraft could serve the needs of the users.

The need to access more airfields was a major factor in deciding that the C-27 must be able to take off from and land on short runways (i.e., 1,500 feet in length). However, the need for this capability had not been clearly demonstrated and questions existed among Air Force and USSOUTHCOM officials as to whether such a capability was needed in Latin America.

Basis for 1,500-Foot STOL

The USSOUTHCOM 1,500-foot STOL requirement was based on (1) the Command's review of runways in Latin America and (2) the assumption that MAC-controlled C-130 aircraft would continue to operate in accordance with peacetime criteria, even in a LIC environment.

Using data showing the number, length, and location of airfields in Latin America, Command staff identified over 10,000 airfields (see table III.1) that they believed could be accessible if the Command had an aircraft that could land on a 1,500-foot runway.

Table III.1: Latin American Airfields of 1,500 Feet or Longer

Length (in feet)	Number of airfields in Latin America
1,500 to 3,000	6,042
Over 3,000	4,107
Total	**10,149**

The staff also observed that while over 4,000 of these runways were longer than 3,000 feet—C-130s normally operate from airfields that length—only about 550 were C-130 capable because of width and/or load-bearing limitations. Our limited analyses showed that about another 255 airfields could accommodate C-130s with 10,000-pound loads, if MAC would allow them to land on selected airfields under 3,000 feet in length. For example, our analysis of Defense Mapping Agency airfield data showed that at least 3,387 runways in the 1,500- to 3,000-foot category were long enough (i.e., at least 2,300 feet) and wide enough (i.e., at least 50 feet) to accommodate a C-130 aircraft; about 255 of these airfields also had the load-bearing capability required for "repeated use" by a C-130 with a 10,000-pound load. "Repeated use" is described by Federal Aviation Administration criteria as 1,200 aircraft passing a particular point on the airfield each year. While it was not practical for us to evaluate the load bearing capability of these airfields for occasional C-130 use, it appeared that many more of these airfields could serve this purpose on a limited basis since the C-130 meets the ground flotation (i.e., firmness or load bearing) requirement established for the C-27, as shown in appendix V.

The two types of C-130 missions are normal operational missions and contingent tactical assault (e.g., wartime) missions. When operating in a normal peacetime role, the C-130 uses a runway length of about 3,000 feet or longer. However, in the contingent tactical assault role, the C-130 aircraft with 10,000 pounds of cargo can be authorized to land on runways as short as 1,500 feet.

According to a MAC official, the contingency role requires specialized training. Pilots must receive recurring training consisting of at least 18 training missions over a 6-month period. To stay current, pilots must have at least three tactical assault training missions every quarter. This official estimated that about half of the reserve C-130 pilots met the tactical assault training requirement. He also said that both active and reserve C-130 pilots routinely practiced landing and taking off from runways as short as 1,500-feet, including runways in Latin America.

In addition, USSOUTHCOM, MAC, 12th Air Force, and Air Force Reserve officials agreed that C-130 aircraft could and had operated from dirt runways in the 1,500- to 2,500-foot range while carrying 10,000-pound loads.

An obstacle to C-130s being used in the contingency assault role was the MAC requirement that each such use of the aircraft on short runways in

an operational situation needed MAC approval. A MAC official explained that MAC's responsibility was to provide effective airlift (e.g., by C-130), which also included aircraft and crew safety. MAC regulations required that, during peacetime operations, safety margins must be allowed for clearing 50-foot obstacles at each end of the runway and for having distances between 300 and 500 feet between the landing or lift-off point and the end of the runway. The latter was to give the pilot the option of aborting the takeoff after losing one engine.

A team of MAC personnel, referred to as a combat control team, is required to certify that a runway meets MAC's safety requirements before it can be used for C-130 operations. In contingency situations, MAC can waive any of these requirements.

Army officials at USSOUTHCOM and MAC officials told us that MAC's stringent safety requirements were a major factor in USSOUTHCOM proposing the C-27 aircraft. USSOUTHCOM believed that it needed greater airlift flexibility in carrying out missions in its LIC environment than was currently available using MAC-controlled C-130s. Since the proposed C-27 mission was LIC-related, a MAC official suggested that perhaps the USSOUTHCOM commander should have greater latitude in determining the operational limitations of all airlift aircraft operating in his theater.

STOL Impact on Aircraft Selection

USSOUTHCOM officials viewed the aircraft's capability to operate from short runways as one of its most important features. This requirement, in combination with others, affected greatly the availability of aircraft for the C-27 role, since it would determine how many manufacturers could compete for the sale and also would impact on the price to be paid for the aircraft.

Aircraft industry responses to the Air Force's solicitation for information on the STOL features showed that none of the aircraft being produced could meet the 1,500-foot requirement and the other capabilities. It would be 2 to 3 years before an aircraft with all the required capabilities could be produced.

What Type and Amount of Payload Would Need to Be Moved?

The Air Force had not yet determined the quantities and mix of people, material, and equipment that would be moved by a STOL-type aircraft in a LIC environment. Payload requirements needed to be determined to enable the Center for Low Intensity Conflict to determine how best to employ such equipment and personnel in LIC areas.

Although USSOUTHCOM stated that it needed a STOL aircraft capable of carrying up to 10,000 pounds, including 35 equipped ground troops, 24 equipped paratroopers, a 105-millimeter towed artillery gun, or up to a 1-1/4 ton utility vehicle, it had not justified the need for these capabilities to MAC's satisfaction. MAC had asked USSOUTHCOM on several occasions to provide information on the typical load and combination of equipment that a USSOUTHCOM STOL aircraft would carry. MAC still was not satisfied with the basis for these requirements.

USSOUTHCOM, for example, had not provided the basis for the number of troops that the proposed STOL C-27 aircraft must be able to transport or the types of LIC missions that these units normally perform. While sources vary concerning the average weight of equipped combat troops, a draft Command planning document estimated the weight allowance for each ground troop with equipment at 260 pounds or 9,100 pounds for 35 equipped troops. All of the other identified payloads to be carried by the proposed aircraft were lighter. Command officials explained that 35 troops equal an Army platoon and that four C-27 sorties could deploy a company. However, they did not explain why a company would constitute a typical LIC mission or why a few more sorties with smaller loads could not meet the mission requirement as well.

In addition, USSOUTHCOM had not developed the basis for carrying vehicles and artillery guns on the proposed STOL aircraft. Command officials stated the aircraft must be able to carry the Army's 1-1/4 ton utility vehicle and a 105-millimeter artillery gun. However, it was not clear how frequently vehicles and artillery guns would be used in a LIC environment where C-130s would not be able to operate. A USSOUTHCOM official advised us that many of the places where the C-27 aircraft would be expected to operate would not have roads suitable for movement of such vehicles and guns. In addition, according to this official, LIC operations generally are conducted on foot. Taking vehicles and artillery guns along would complicate the logistics support requirements of such missions. Fuel, maintenance personnel, supplies, and ammunition would have to be taken and protected, thus increasing the airlift requirement. He concluded that vehicles and large equipment would be more applicable to large operations and would best be airlifted by the C-130.

USSOUTHCOM and MAC's Worldwide C-27 Requirements Differed

Numerous differences existed between the required C-27 characteristics identified by USSOUTHCOM, those sought by MAC, and those stated as being needed by the other unified commands. USSOUTHCOM and MAC were working together to develop proposed C-27 characteristics to serve as the basis for a "request for proposal" scheduled to go to industry soon. However, it was uncertain whether the selected aircraft would fully satisfy either USSOUTHCOM's or MAC's worldwide C-27 needs, since the LIC airlift needs stated by some unified commands were not reflected in the proposed C-27 requirements.

The C-27 characteristics described in USSOUTHCOM's requirements document, in some cases, were significantly different than those in MAC's requirement document. The 16 primary C-27 aircraft requirements consisted of 8 performance and 8 payload characteristics, and USSOUTHCOM and MAC's requirements varied for 9 of these 16 characteristics. Five of the variances related to the following performance characteristics: (1) overall mission capability in terms of takeoff and landing distance, rate of climb, and combat radius, (2) critical field length, (3) ferry range, (4) engine-out ceiling, and (5) ability to back up a 3 percent grade. The other four variances related to the following payload requirements: (1) number of paratroopers to be carried, (2) litter carriage, (3) carriage of standard size cargo pallets, and (4) need to perform "combat off-load" (i.e., rapidly unload cargo from an aircraft while it is still moving forward). These nine variances affected the ability of candidate aircraft to meet the requirements since, in most cases, the C-27 program office resolved the variances by adopting the more stringent of the two requirements.

For analysis purposes, we separated candidate aircraft into three categories. These categories were (1) existing aircraft, including those aircraft that had been completely developed and were ready for production or were currently being produced, and the manufacturer had expressed an interest in competing for the C-27 sale, (2) developmental aircraft, including those for which the design had not been completed to the point required to obtain the Federal Aviation Administration certification, and (3) alternative aircraft, including those aircraft which existed and, in most cases, were in inventory or storage and had been considered by the Air Force for the C-27 mission.

Our analysis showed that no aircraft could satisfy all the stated C-27 requirements. Three requirements appeared to be the most difficult for the six existing aircraft to satisfy. First, none of the existing aircraft (and four of the developmental aircraft and three alternative aircraft)

could or were estimated to be able to meet the 1,500-foot takeoff and landing requirement. According to USSOUTHCOM officials, the 1,500-foot capability was their most critical requirement. Second, only two existing aircraft (the C-130 and one other that had less STOL capability than the C-130) could satisfy the 3,000-foot critical field length requirement established to provide a safety margin in case of engine failure before takeoff. Finally, only one existing aircraft (the C-130) was known to be capable of backing up a 3 percent grade. USSOUTHCOM officials believed that this capability was needed because certain airstrips might be too narrow for the aircraft to turn around. (See app. V.)

As discussed previously, the LIC mission requirements were still being developed by the Center for Low Intensity Conflict. This raised questions concerning whether USSOUTHCOM and MAC could fully define either their LIC missions or their related C-27 requirements. For example, the cargo capabilities of the C-27 should have been directly related to the number and type of troops deployed in a LIC mission. This relationship would also have helped determine the type and amount of cargo the C-27 would carry.

When the other unified commands were polled by MAC on the characteristics needed in a LIC aircraft in February 1986, the primary response was that they wanted an aircraft having a longer range and able to carry more cargo and more troops than USSOUTHCOM and MAC were considering. These responses raised the question of whether the C-27 mission and worldwide requirements were compatible and whether USSOUTHCOM and MAC aircraft characteristic tradeoffs would result in the best aircraft for either mission.

Conclusions

The Air Force and USSOUTHCOM were not in a position to conclusively establish the capabilities required of the C-27 because uncertainties existed concerning (1) how the aircraft would be used and (2) whether the nature of unified commands' LIC operations justified one type of aircraft for worldwide use. These uncertainties raised questions as to what capabilities were needed and whether those adopted for the C-27 were valid.

Interim Plan for USSOUTHCOM to Acquire STOL Aircraft Service

USSOUTHCOM's plan to have MAC contract for light utility airlift to support a STOL-type mission until the C-27 aircraft became operational was questionable. These commands were proceeding with plans to contract for airlift for USSOUTHCOM, although the aircraft being considered did not meet the stated requirements for such a mission.

As discussed in appendixes II and III, the need for the STOL aircraft system for USSOUTHCOM and the basic aircraft requirements had not been adequately developed. Without greater certainty about the long-term mission and requirements, DOD could not adequately evaluate the various interim proposals being considered. However, USSOUTHCOM and MAC were proceeding with plans to contract with a commercial aircraft vendor to provide the services of five light aircraft, complete with aircrews and maintenance support.

Potential STOL Aircraft Interim Solutions

In 1985, USSOUTHCOM expressed an immediate need to have a light cargo STOL aircraft to provide increased flexibility in carrying out its LIC missions. In August 1986, based in part on this perceived urgent need, the Deputy Secretary of Defense released a Program Decision Memorandum directing the Air Force to establish a STOL System Program Office to manage the acquisition of the aircraft for delivery in fiscal years 1989-90 and to provide options to satisfy the interim STOL mission requirements beginning in fiscal year 1987. The Deputy Secretary directed that options studied should include leased aircraft, aircraft in use (excluding the C-7, an older aircraft in the National Guard, but no longer in the Air Force inventory), procurement of a new aircraft, or a mix of such options. In November 1986, the Deputy Secretary advised the Secretary of the Air Force that he had accepted the Air Force's recommendation to contract for a STOL capability for USSOUTHCOM for the near term.

The various options proposed to fill USSOUTHCOM's airlift needs on an interim basis have a range of costs, implementation times, and advantages or disadvantages. The solutions ranged from reassigning more existing airlift assets to the Command, which could have been accomplished fairly quickly, to the current plan of contracting for airlift that would not be operational until at least 1988.

Upgraded Airfields and More C-130s and Helicopters

In November 1985, the Airlift Concepts and Requirements Agency proposed that USSOUTHCOM's needs could be met on an interim basis by either upgrading strategically selected airfields for year-round C-130 use, or by assigning a mix of more C-130 aircraft and helicopters.

USSOUTHCOM, however, rejected both proposals, stating that upgrading strategically selected airfields would not be practical or politically feasible and presupposed a knowledge of and access to future conflict sites. The Command believed that, while additional C-130s and helicopters would increase its overall airlift capability, they would not fill the existing gap and give it access to many short, unimproved, and remote airfields.

C-7 Alternative

In August 1986, MAC proposed a plan to provide airlift to USSOUTHCOM that could have reached initial operational capability in the 2nd quarter of fiscal year 1987 (January to March 1987). This option, supported by some Office of the Secretary of Defense and Air Force Headquarters officials, involved relatively low costs and was considered to be logistically supportable. Under the proposed plan, MAC would own and operate six C-7 aircraft in Latin America under the direction of USSOUTHCOM. Although the C-7 is an old aircraft, National Guard C-7s had been rotated into Latin America with their units and used successfully. While the aircraft did not meet all of the stated performance requirements of the proposed C-27, it did have the stipulated STOL capability and came close to meeting a number of other performance criteria, including maximum payload, service ceiling, and troop carrying capabilities (see app. V).

MAC had inspected two C-7 aircraft which belonged to the U.S. Army Golden Knights that were being declared excess and four C-7 aircraft owned by the U.S. Army National Guard and still in its inventory, for structural integrity, maintenance histories, and configuration and equipment standardization. All six aircraft were determined to be in good shape, to require no major repairs or modifications, and to be capable of supporting the missions for which they were designed. While there would have been some costs associated with achieving MAC required equipment standardization, there were no physical obstacles to the aircraft's performance. The MAC assessment acknowledged that the C-7's reciprocating engines, which use aviation gasoline, would be maintenance-intensive. However, regular operation and experienced mechanics, which are currently available, would have reduced any down time. Also, aviation gasoline is readily available in Latin America.

A July 1986 Engineering and Logistics Supportability Assessment, by the Director, Materiel Management, Warner Robins Air Logistics Center, also found no major structural deficiencies in the six identified C-7s and determined that repairs to sustain Air Force operation of 60 hours per

month (per aircraft) for an indefinite period appeared minimal. To achieve a baseline configuration consistent with MAC's requirements for standardization, certain equipment would need to be installed and some modifications to existing systems would be necessary. The total estimated cost of equipping and modifying the six aircraft was $1.6 million as shown in table IV.1.

Table IV.1: Cost to Modify and Equip Six C-7 Aircraft

Cost element	Estimated cost
Installed equipment	$30,000
Engine overhaul (3 @ $39,000)	117,000
Propeller replacement (1)	10,500
Stripping and repainting (6 @ $50,000)	300,000
Modifications to systems	778,100
Updated manuals (flight, maintenance, etc.)	400,000
Total	**$1,635,600**

The study estimated the cost for contractor logistics support, spare parts, and repair manuals for the six C-7 aircraft would be $9.6 million and $6 million for fiscal years 1986 and 1987, respectively. In assessing the logistics supportability of the aircraft, the study estimated that the common (non-Air Force managed) items were supportable and that 90 percent of the aircraft parts were supportable from available Air Force service and repair activities. The study also recognized that the projected leadtime before 100 percent contractor logistics support could start depended on the type of contract issued; leadtime ranged from only 30 days for a sole-source contract to 15 months for a competitive contract.

A C-7 implementation schedule developed by MAC projected that, with a "go-ahead" decision in August 1986, the C-7 interim airlift would have reached initial operating capability by the end of March 1987 and full operating capability by the end of June 1987. USSOUTHCOM, however, rejected this option partly because it believed that MAC envisioned using the aircraft for an extensive period, thereby delaying the procurement of a new C-27 aircraft. Also, USSOUTHCOM believed that the older aircraft would have reliability and maintainability problems.

In September 1986, Air Force Headquarters asked USSOUTHCOM to reconsider using the C-7 as an interim solution because of the limited STOL aircraft available on the civilian market. The Command again rejected

this option, citing the lack of assurance that the aircraft would be reliable and maintainable and the guidance contained in the August 1986 Program Decision Memorandum to exclude the C-7 as an interim solution.

We believe that USSOUTHCOM's conclusion that the C-7, because of its age, would have reliability and maintainability problems may not be valid. DOD records show that over 880 STOL aircraft have been sold under the U.S. foreign military sales program, of which over 360 (primarily C-7s, C-123s, and C-47s, all old aircraft) are still operating. This indicates that these aircraft, even though old, continue to be maintainable.

Interim Contract for Airlift Services

The interim option favored by USSOUTHCOM was a contract for STOL airlift services. However, the contracting effort was delayed by discussions between MAC and USSOUTHCOM officials over provisions of the related statement of work and by their uncertainty over congressional support for the overall program.

The Air Force's initial $10 million funding proposal consisted of a contract for five STOL-capable aircraft covering a 15-month period ending September 30, 1988, the projected initial operating capability date of the proposed new C-27 aircraft. The contract capability would consist of civilian aircraft and crews under the operational control of USSOUTHCOM. In November 1986, the Deputy Secretary of Defense accepted the contract proposal and directed the Secretary of the Air Force and MAC to support USSOUTHCOM in completing a statement of work on which to base the contract by December 15, 1986. USSOUTHCOM provided a draft statement in December 1986 that included several uncertainties. A MAC official advised us that these uncertainties were later resolved, and the statement of work was incorporated into a solicitation of information from contractors, which was completed in February 1988. He stated that MAC intends to have the contract become operational by June 1988. The contract was expected to cover 4 months of fiscal year 1988 at a cost of about $4.7 million and the entire fiscal year 1989 at a cost of about $11.5 million.

The missions to be performed under the draft statement of work and the aircraft capabilities under the proposed contract differed significantly from those of the proposed C-27. For example, the statement eliminated the night missions, airdrop requirements, and the capability of the aircraft to carry vehicles and an artillery gun. In addition, as shown in

table IV.2, several performance requirements for the contract aircraft were much less demanding than those proposed for the C-27.

Table IV.2: Comparison of Key Interim and Long-Term Requirements

Categories	Interim requirements[a]	Long-term C-27 requirements
Maximum payload (lbs.)	3,000	10,000
Ground troops	11	35
Litters	capability required, but no number specified	24
Takeoff (ft. of runway)	2,000[b]	1,500
Ground flotation	CBR-7[c]	CBR–7[c]
Service ceiling (ft. above sea level)	18,000	25,000
Engine-out ceiling (ft. above sea level)	7,500	10,000
Ferry range (NM)	800	1,500

[a]Based on solicitation for information, February 1988.

[b]Runway must be semi-prepared (i.e., plowed, leveled, and/or sprayed with soil stabilizer).

[c]California Bearing Ratio (CBR) - a measure of an aircraft's ability to land on unimproved airstrips.

Conclusions

There were alternative LIC airlift options available to USSOUTHCOM to serve its STOL aircraft needs until the proposed C-27 was acquired or another long-term approach was adopted. These options included the transfer of more C-130s and helicopters to the Command, the upgrade and transfer of C-7s to the Command, or airlift service acquired from a private contractor, all of which were considered by USSOUTHCOM and the Air Force. The Air Force intended to adopt the contract option at a cost of about $16 million during fiscal years 1988 and 1989, although the aircraft being considered did not meet the stated requirements for the LIC mission. In addition, without greater certainty about the long-term mission and requirements, DOD could not adequately evaluate the various interim options.

Comparison of Potential C-27 Aircraft Against Requirements

Stated requirements	Existing aircraft					
	Dehavilland Buffalo C-8A[a]	Aeritalia G-222	Lockheed Hercules C-130	Grumman C-2A	Casa CN-235	British Aerospace BAE-146
Payloads						
Ground troops (35)	X	X	**X**	28	33	X
Paratroopers (24)	X	X	**X**	?	X	X
Litters (24)	X	X	**X**	12	X	X
Utility vehicles and artillery gun	X	X	**X**	?	?	X
463L pallets [2]	X	X	**X**	X	?	X
Airdrop containers	X	X	**X**	?	X	X
Combat offload	X	X	**X**	?	X	NO
Maximum payload [10000 lbs.]	X	X	**X**	X	7943	X
Performance						
Takeoff (T) or landing (L) at forward operating location in 1500' runway with a 50' obstacle [10000 lbs. payload, 200NM]	1525(T)	1890(L)	**2300(L)**	2800(T)	2395(T)	2560(T)
Critical field length [3000 ft.]	3100	3150	**X**	10000	4800	X
Cruise speed [200 KTAS]	X	X	**X**	X	X	X
Ferry range [1500 NM]	X	X	**X**	X	X	X
Service ceiling [25000 ft.]	X	X	**X**	X	X	X
Engine out ceiling [10000 ft.]	X	X	**X**	X	9500	X
Ground flotation [CBR7][b]	X	X	**X**	NO	X	X
Backup [3% grade]	?	2%	**X**	?	1%	NO
Aircraft requirements met/total stated requirements	13/16	13/16	**15/16**	6/16	8/16	13/16

[a]Only available if the Air Force negotiates with the manufacturer to re-open the line, which it apparently is willing to do with a minimum purchase of 25 aircraft, according to an Air Force official.

[b]California Bearing Ratio (CBR)

	Uncertified developmental aircraft				Other possible alternatives				
Bromon BR-2000	Skytrader Scout	Scandinavian C-180	Dupont DP-2	Burnelli GB-179	Casa C-212	CV-22 VTOL	Dehavilland Caribou C-7	Mancro Fairchild C-123T	Sikorsky H-53
X	24	X	X	?	24	24	32	X	X
X	X	?	?	?	23	22	X	X	X
X	12	?	?	?	12	12	22	X	X
X	NO	NO	X	?	NO	EXT.	V	X	EXT.
X	1/2	1/2	X	?	1/2	1/2	1/2	X	1/2
X	X	?	?	?	?	EXT.	X	?	EXT.
X	X	?	?	?	?	X	X	X	X
X	5700	7900	X	?	6218	X	8740	X	X
X	X	3000(T)	X	X	?	X	X	1900(T)	X
X	X	X	X	?	X	X	X	X	X
X	180	X	X	?	198	X	158	X	150
X	X	?	X	X	820	1130	1175	X	540
X	X	X	X	?	X	X	X	X	18400
X	X	?	X	?	X	8000	8800	X	?
X	X	?	X	?	?	X	X	?	X
?	X	?	?	?	?	X	?	?	X
15/16	10/16	4/16	11/16	2/16	3/16	10/16	7/16	12/16	11/16

X - meets or exceeds requirement
? - capability unknown
V - meets vehicle requirement only
NO - does not meet requirement
1/2 - can only carry one-half pallets
L - estimated landing distance
T - estimated takeoff distance
EXT.- meets requirement only through external carriage
KTAS - Knots True Air Speed

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