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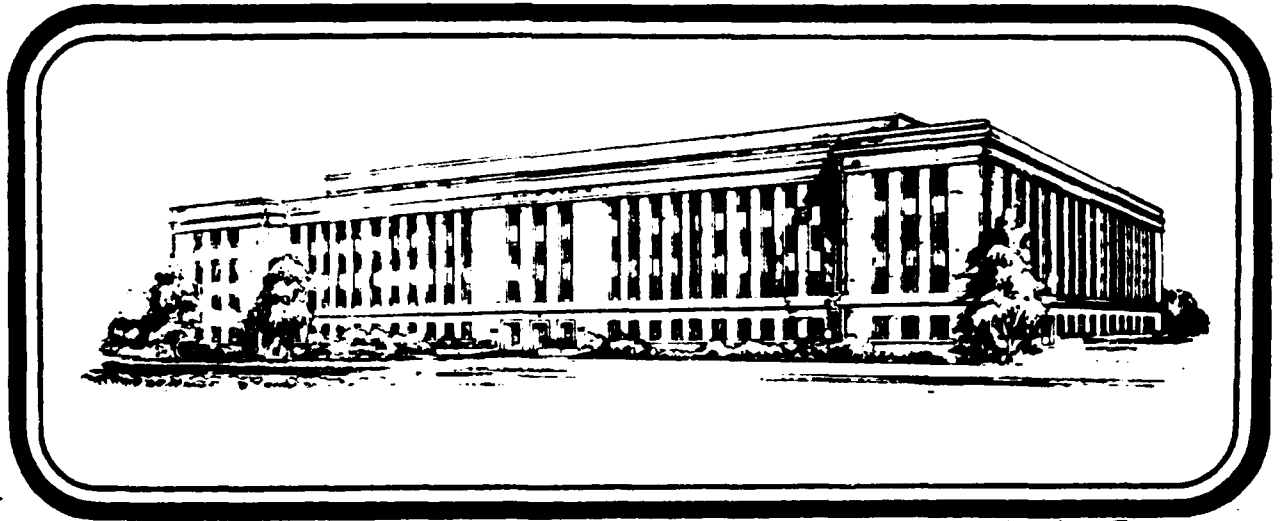
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**MOBILIZATION AND DEFENSE MANAGEMENT
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CIVIL RESERVE HELICOPTER FLEET PROGRAM



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THE INDUSTRIAL COLLEGE OF THE ARMED FORCES
NATIONAL DEFENSE UNIVERSITY

MOBILIZATION STUDIES PROGRAM REPORT
CIVIL RESERVE HELICOPTER FLEET PROGRAM

by

JAMES L. HIGGINBOTHAM, LTC, USA

A RESEARCH REPORT SUBMITTED TO THE FACULTY
IN
FULFILLMENT OF THE RESEARCH
REQUIREMENT

RESEARCH SUPERVISOR: COL RICHARD S. NEMETH
THE INDUSTRIAL COLLEGE OF THE ARMED FORCES

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ABSTRACT OF STUDENT RESEARCH REPORT INDUSTRIAL COLLEGE OF THE ARMED FORCES

NAME OF RESEARCHER (S) James L. Higginbotham, LTC, USA	TITLE OF REPORT Civil Reserve Helicopter Fleet Program
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ABSTRACT

The United States Army will face a helicopter shortfall in any future mid or high intensity conflict. This study addresses the factors which contribute to this problem and identifies possible short and long terms solutions. It concludes that the commercial helicopter fleet provides a viable source for alleviating the problem in the near term and suggests that a joint military and civilian development effort for future generations of helicopters provides the best opportunities for long term resolution.

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EXECUTIVE SUMMARY

TITLE: Civil Reserve Helicopter Fleet: A Concept Paper for Consideration by the Department of Defense.

AUTHOR: Lieutenant Colonel James L. Higginbotham, U.S. Army

The complexity of the helicopter, coupled with funding constraints, limited production facilities and inadequate tooling, precludes defense contractors from producing helicopters in sufficient quantities to sustain a large scale conventional war effort. The problem will be especially critical during the initial stages of conflict as both helicopter and crew losses incurred in operations along and across the forward edge of the battle area (FEBA) are expected to be extremely heavy. Accordingly, these factors dictate that an alternate source for helicopters be identified to satisfy this expected demand. This study conceptually examines an alternate source for satisfying this requirement and recommends a concept for a program similar to the Civil Reserve Air Fleet (CRAF) Program currently in use by the Air Force. Specifically, the author discusses the feasibility of securing selected numbers and types of helicopters from commercial operators for Army use during mobilization and reviews the issues associated with using these assets. The study concludes that this concept is feasible for implementation in the training environment and recommends that the Department of the Army further study this subject to determine the desirability of initiating a Memorandum of Agreement between the Department of Defense and the Department of Transportation to formalize this policy option. Finally, the study suggests that a possible long range solution is a joint military/civilian effort to develop and produce future generations of helicopters.

CHAPTER I
INTRODUCTION

The United States Army will face a critical helicopter shortage in the next major conventional war unless actions are initiated to identify and secure a contingency source to complement the mobilized industrial base production output. The equipment shortage will result from a combination of factors which include, among other things, heavy combat losses; inadequate fill levels and equipment mismatches (e.g., authorized OH-58; assigned OH-6); equipping newly activated units; and the inability of the industrial mobilization base to provide adequate and timely replacements. These areas are briefly discussed below.

Combat Losses

The majority of the scenarios envisioned for United States forces involvement in combat operations indicate that substantial losses will be incurred, especially during the initial stages of the conflict. The intensity of the battle, coupled with the Soviet Union's technological advances in weaponry and the relative vulnerability of much of the Army's helicopter fleet (i.e., the second generation helicopters used in Vietnam), will result in extremely heavy losses, especially in operations along and across the forward edge of the battle area (FEBA). The projected losses for each type of helicopter will not be depicted as such data would be classified and is not

essential for the purpose of this report. However, an unclassified study conducted by Bell Helicopter in 1978 indicated that 354 AH-1S (gunships) would be lost through M+6 months and 987 through M+17 months.¹ Even though this was contractor data providing rationale for keeping a "warm" production base at his facility, the results may reflect realistic loss rates for short and long war scenarios, respectively. If attack helicopters with all of their armament and survivability features experience attrition levels of this magnitude, it is realistic to assume that losses of the 1960 vintage utility and observation aircraft will be substantially higher.

Equipment Fill Levels and Mismatches

The shortage and mismatch problem exists primarily in the Reserve Components. Evidence of the problem's magnitude is readily discernible when comparing the authorized and "on hand" aircraft in both the United States Army Reserve (USAR) and National Guard units. For example, the USAR is currently authorized 603 helicopters yet only has 482 assigned.² While this 20 percent shortfall in total numbers is unacceptable from a readiness standpoint, the most significant aspect of this problem could well be the necessity for substituting inferior models for those required for mission accomplishment. In this regard, the USAR has a recognized requirement for 48 CH-47D's (Chinook); an authorization for 48 CH-47C's; and has 46 CH-47A's assigned. While it is unrealistic to think that USAR units would have the D model since the 101st Air Assault Division, a major unit in the Rapid Deployment Joint Task Force (RDJTF) did not get its first D model until the

end of February 1983, it nevertheless reemphasizes the author's contention concerning the shortage of required assets.³ Another critical area in the USAR is the shortage of electronic warfare helicopters which are absolutely essential for operational and intelligence missions on the modern battlefield. The USAR has an authorization for 55 EH-1H helicopters but does not have any assigned.⁴

A similar, yet perhaps even more serious, situation exists in the National Guard units. While there are equipment shortages or mismatches in virtually every type of authorized helicopter, the greatest problem areas are gunship and scout (observation) aircraft. For example, the National Guard is authorized 409 AH-1 Cobra gunships, but currently has only 40 assigned. The National Guard has been assigned 278 UH-1M models for use as interim gunships pending receipt of the remainder of the Cobras, but even with this augmentation, these units are still short 91 gunships, representing 22 percent of their authorization for this type of helicopter.⁵

A similar situation exists with observation aircraft. The National Guard is authorized a total of 907 scout helicopters and currently has 369 OH-6's and 508 OH-58A's in the inventory to satisfy this requirement.⁶ Based on numbers alone, the National Guard is in relatively good shape; however, as with the gunships, these aircraft are technologically inadequate for the modern battlefield. This is especially true with the OH-6. While this helicopter was highly popular with the aviators who flew it in Vietnam, it, nevertheless, is a 1960 vintage aircraft which must operate in a much more sophisticated and lethal future battlefield. Therefore, it will probably experience a high attrition rate.

A third area which could be of major importance is the mismatch between authorized and assigned medium lift helicopters. The National Guard is authorized 62 CH-47C helicopters and currently has 51 CH-47A models assigned. The severity of the impact resulting from the shortage of the CH-47 helicopter will be minimized by the augmentation of 72 CH-54 (Skycrane) helicopters. While this aircraft will "take up the slack" in the near term, it too, is an early 1960 vintage aircraft and will be extremely vulnerable in the next war.⁷

Force Structure Expansion

Force structure expansion under full mobilization will most likely result in a need for additional aircraft to equip newly activated units and to support increases in both flight and soldier related training. The significant increases in student inputs that are projected for most rotary wing courses taught at the Army Aviation School are especially noteworthy. Current mobilization plans call for a 40 percent increase in both the Initial Entry Rotary Wing Course and the Warrant Officer Military Development Course; 389 percent increase in the Rotary Wing Aviator Refresher Course; 159 percent increase in the CH-47 Qualification Course; and a 107 percent increase in the Europe/Nato Rotary Wing Aviation Training Program.⁸

With the deployment of CONUS based units to the combat zone and the subsequent force structure expansion, it is anticipated that new helicopter units will be activated to support soldier training at the major training centers as well as base operations at other installations. Additional helicopters will be needed to equip these units to insure that the essential functions are supported.

Personnel Shortages

The mobilization process will also result in a reduction of instructor personnel at numerous locations. The most significant impact will be the loss of instructor pilots at the Aviation Center. An already existing shortage, which ranged upward to 20 percent in FY82, will be exacerbated. Based on mobilization data, approximately 27 percent of the civilian instructor pilots at Fort Rucker are members of the National Guard, Army Reserve, or military retiree community (with "hip pocket" orders to active duty under mobilization) and would be subject to recall to active duty. The loss of approximately 212 instructor pilots, including both contractor personnel and Department of the Army civilians, will result in increasing the student to instructor ratio from its current 3.1 (and 2.1 in some cases) to 4.1.¹⁰ Continuation of this high ratio for an extended period of time could have a detrimental impact on the quality of training and may ultimately result in the extension of some courses. Any course extension would be counterproductive to the goals of mobilization training programs which are generally designed to expedite completion by elimination of most holidays and expanding training time to a minimum of six days a week.

Industrial Base Mobilization

Another factor which will contribute to a shortage of helicopters in the next war will be the inability of the production base to meet the industrial mobilization requirements. While the leadtime required to achieve maximum production levels differs among contractors, suffice it to say that even the

most optimistic production schedule would not provide a sufficient number of helicopters to influence the outcome of the battle, except in a protracted conflict. A brief discussion of the mobilization status of several helicopters is discussed in the remaining paragraphs of this chapter to provide some indication as to the seriousness of the problem.

The OH-58 (Kiowa) is a two place, single engine light observation aircraft produced by Bell Helicopter. This helicopter, which is being used in an interim scout role, is no longer in production. Current estimates indicate that it will take a minimum of 18 months after production resumes before the mobilization level of 50 per month could be attained. Extensive leadtime would also be required to reopen the production line due to the lack of materiel and manpower. Therefore, it could conceivably take three years (depending on the amount of warning) to attain the maximum output levels."

A similar situation exists with the UH-1 (Iroquois) which has been the major Army helicopter asset since its initial procurement in 1959. This helicopter was the backbone of all airmobile operations in Vietnam and still comprises over 90 percent of the Army's utility fleet. The Army took delivery of the last UH-1H in December 1976. Even though the production line is still warm due to Bell's commitment to produce five UH-1H's per month for foreign military sales, it would still take a minimum of 24 months to get this line back into full scale production. It could conceivably take as long as four years to reach maximum output levels of 200 per month under mobilization should the Department of Defense (DOD) decide to procure this helicopter.¹²

Increasing output levels for the UH-60 (Black Hawk) would be a problem even though this helicopter is still in production. This is the newest (production) aircraft in the Army inventory and comprises the remainder of the utility fleet. Sikorsky Helicopter, the contractor for the Black Hawk, can produce 12 helicopters per month based on current tooling and facility constraints. Under mobilization, the capacity can be increased to 38 per month by working three shifts eight hours per day, seven days per week. It would, however, take a minimum of 24 months after contract award to attain the maximum production levels. This leadtime would be required to procure materiel, develop facilities, setup tooling, and expand the workforce.¹³

The CH-47 (Chinook) is the Army's medium transport helicopter produced by Boeing Vertol. The Army received its' first Chinook in 1962 and since that time 699 have been delivered. Current plans call for 361 of the earlier models to be modified into a "D" model version to provide greater lift capability and survivability. These aircraft will be modified concomitantly with the new production models to meet the Army's medium lift helicopter requirements. Current production level of five per month could be increased to 11 per month, but Boeing would need at least 21 months leadtime to attain this mobilization level.¹⁴

The AH-1 came into the inventory in 1967 to replace the earlier UH-1B/C models which were being used as interim gunships. There is a modernization program that is on-going to convert earlier models to the modernized AH-1S version. Additionally, the production line is still "warm" as Bell Helicopter is producing two AH-1S models each month. Even with this "warm" production

base, it could still take up to 24 months leadtime to attain the mobilization output levels of 58 per month. Bell Helicopter states that with a warm production base of 7 per month, it would be able to reach maximum output levels within 14 months. They further stated that with a cold base, it would require 17 months leadtime to start up and an additional 11 months to reach maximum production levels.¹⁵

The AH-64 (Apache) is the Army's advanced attack helicopter. The first production model of this helicopter will be delivered by Hughes Helicopter in February 1984. The initial production will be two per month with full production ultimately reaching 12 per month. The time needed to attain maximum production levels of 28 per month under mobilization would vary depending upon the production rate at that time. If the production is at the full rate of 12 per month, the amount of leadtime would be 34 months.¹⁶

The production leadtime for each of these helicopters could be substantially reduced by procuring and storing "surge kits" for those pacing items which constrain production output levels. If these kits were readily available at the outbreak of hostilities, the leadtime required to attain mobilization output levels for some helicopters could be reduced by as much as 50%. There is a trade-off involved in implementing this option as the procurement costs for these kits may be prohibitive. Notwithstanding the trade-offs involved, this option warrants a critical examination by decisionmakers, especially in view of the current inadequacy of the industrial mobilization base to rapidly support a large scale war effort.

FOOTNOTES

CHAPTER I (Pages 1 - 8)

¹Letter from Mr. J. F. Atkins, President Bell Helicopter Textron, to The Honorable Percy A. Pierre, Assistant Secretary of the Army, Research Development and Acquisition, 4 August 1978. Hereafter cited as J. F. Atkins Letter.

²Letter from Colonel William J. Lumpkins, Jr., Office, Chief of Army Reserves to LTC James L. Higginbotham, 27 December 1982. Hereafter cited as W. J. Lumpkins Letter.

³"101st Airborne Gets Its First "D" Model Chinook," The Army Times, 14 February 1983, p. 27.

⁴W. J. Lumpkins Letter.

⁵Telephone conversation with Mr. Richard Taylor, Aviation Logistics Division, National Guard Bureau, Edgewood Arsenal, Maryland, 3 February 1983.

⁶Ibid.

⁷Ibid.

⁸Interview with Major (P) Marvin Baker, Chief, Training Division, Directorate of Training and Doctrine, USAAVNC, Fort Rucker, Alabama, 19 October 1982.

⁹Ibid.

¹⁰Ibid.

¹¹Letter from Mr. Scott J. Silies, United States Army Aviation Research and Development Command (AVRADCOM), St. Louis, Missouri to LTC James L. Higginbotham, undated. Hereafter cited as the Scott F. Silies Letter.

¹²Interview with Ms. Norma Sill, UH-1 Program Office, TSARCOM, St. Louis, Missouri: 4 January 1983.

¹³Interview with Mr. Mark E. Barkley, Chief Program Management Division, Program Manager's Office--Black Hawk--TSARCOM, St. Louis, Missouri: 14 January 1983.

¹⁴"CH-47," Army Aviation, 15 December 1982, p. 69, and interview with Capt Gary Dethiers, CH-47 Program Managers Office, TSARCOM, St. Louis, Missouri: 14 January 1983.

15 J. F. Atkins Letter.

16 Scott F. Silies Letter.

CHAPTER II

THE CIVIL RESERVE AIR FLEET (CRAF)

This study examines the private sector to determine if commercial assets can be utilized during the next war to alleviate the expected helicopter shortfall. There is precedence for this approach. During WWII, President Franklin D. Roosevelt authorized the Secretary of War to requisition commercial airplanes to assist the military in moving critical supplies to the war zone. The commercial firms' support in this effort must be categorized as superb as evidenced by their performance in 1942 when they transported 85% of all war related air cargo consumed during that year.¹ This commercial augmentation at a time when our military airlift was totally inadequate contributed directly to the nation's war effort.

While utilization of the commercial fleet early in WWII was the beginning of our strategic mobility concept, greater gains in this area resulted during the latter phases of that war and from both the Berlin Airlift and Korean War. For example, during the Berlin airlift, civil air carriers flew more than 2,500 missions into Berlin proper comprising 10 percent of the total flights carrying supplies to that war-torn city.²

These success stories were valuable "lessons learned" during the post World War II years as it became apparent that civil aviation would play a critical part in war mobilization plans. Recognizing this need, President Truman appointed a commission to study this subject and develop a concept for

implementation. The commission completed its study in 1948 and published a report entitled "Survival in the Air Age" in which it recognized a requirement for close coordination between the armed services and the commercial air carriers. It further concluded that the military air transport fleet capability was far short of what might be necessary and recommended civil-military contracts be concluded to provide for augmentation in the event of future emergencies.³

In 1950, The National Resources Board, using the aforementioned commission's report as a basis and spurred on by the urgency of the Korean War, concluded that there was a pressing need for maximum utilization of the commercial airline industry's assets for wartime airlift needs and recommended establishment of both primary and secondary civil air reserve components. Based on these recommendations, President Truman established the Civil Reserve Air Fleet (CRAF) Program in February 1951 by Executive Order 10219. This Executive Order directed the Secretary of Commerce to formulate plans and programs for assignment of civil air carrier assets to DOD to augment organic capability during times of national emergency. In March 1952, DOD published its' plan to support the requirements outlined in this executive order. This plan, which became known as the "Gray Book," is considered the "official" beginning of the CRAF Program that exists today.⁴

The program that evolved from this directive is a voluntary civil/military partnership in which the commercial airlines commit selected airlift resources to DOD in accordance with agreed upon arrangements. This partnership provides an effective means of supplementing our organic strategic airlift capability.

FOOTNOTES

CHAPTER II (Pages 11 - 12)

1 Air War College, Research Report--Civil Reserve Air Fleet (CRAF): A Primer for Defense and Industry (Maxwell Air Force Base, Alabama: 1979), p. 4.

2 Ibid., p. 5.

3 Ibid., p. 6.

4 Ibid., p. 6.

CHAPTER III

CIVIL RESERVE HELICOPTER FLEET PROGRAM

The magnitude of the helicopter shortage will vary with the intensity of the war, but suffice it to say that the problem will be significant even in a mid intensity environment. While quantum improvements in capability and survivability have been achieved with new generation helicopters, these systems will not be available in sufficient numbers to provide the required combat sustainability. Accordingly, this chapter addresses both near and long term solutions for alleviating the impact of the helicopter shortage.

Commercial Helicopter Fleet

The near term shortage problem is perhaps the most critical. It certainly warrants early attention by DOD if the Army is to have the required capability to fight and win a long war. One source for satisfying this short term requirement is the large number of commercial operators. To underscore the potential inherent in this option, it should be noted that as of the end of 1981, there were approximately 850 commercial operators with a combined fleet of 9,000 helicopters.¹ While the size of the commercial fleet is certainly impressive, it is important to understand that there exists a wide variation within the fleet as to models, types, configurations, capacities, equipment, capabilities, and manufacturers. The commercial fleet, for example, is comprised of various models produced by Bell, Hughes, Boeing, Sikorsky,

Aerospatiale, Agusta, Robinson, and Hiller.² Most of these helicopters are compatible with those in the military fleet; however, some (e.g., Hiller, Aerospatiale, Agusta, etc.) would be of limited value in a short warning scenario due to the extensive training requirements, lack of compatible maintenance systems and the increased number of line items in the repair parts inventory that would be needed to integrate these helicopters into the active fleet. Therefore, these helicopters will not be considered in this study.

Compatibility with the Military Fleet

Even eliminating the "off-brand" helicopters discussed above, the types and models in the commercial fleet that are compatible with those in the Army inventory number in the thousands.³ It is important to note, however, that even some in this category could not be readily integrated into the military fleet without some modification. The modification required and the ease and expense with which it could be accomplished varies with the manufacturer, equipment on board the aircraft, and the helicopter type. For example, commercial aircraft are certified to FAA regulations, which are more stringent than military standards in some areas. On the other hand, some survivability features in the military aircraft require space and weight considerations which are often not built into the commercial version.⁴ To modify these commercial aircraft for use in a combat environment would be an extensive (and expensive) proposition and could dramatically impact on the commercial use. Additionally, extensive modifications to commercial helicopters to enhance their military utility would be an extremely low priority action as such

modifications would have to be completed at the expense of decrementing higher priority weapon systems which are urgently needed in the field.

Some commercial models, however, could be used in a training or administrative environment without any modifications whatsoever. For example, many firms have aircraft that are completely compatible with the current Army inventory. Among these are the Hughes 500 (OH-6), Bell 206 (OH-58), and the Bell 205 (UH-1). Other firms have aircraft which would require only minor modifications prior to integration into the military training environment.⁵ An example is the Bell 206 which in some firms is equipped for single pilot operation. Consequently, even for a training environment, co-pilot/instructor pilot flight controls and an intercom system would have to be installed. These aircraft may also have to be equipped with an avionics package compatible with the military tactical and/or logistical nets, if required for the training environment. Other minor changes may also include installation of standard landing gear and adding military seat belts and shoulder harnesses.⁶

Commercial Crew Qualifications

Not only do the commercial firms offer a valuable source for helicopters, they also have a reservoir of highly qualified aviators and maintenance personnel which could be tapped for mobilization. A majority of aviators in most firms are former military pilots. All firms have a minimum requirement of 1,500 hours for employment; however, some aviators have over 20,000 hours of flight time.⁷ Based on the experience level and the number of flight instructors in the commercial firms, there would be minimal, if any, training

time required for their use at CONUS installations. Additionally, in view of the extensive flight experience available, minimum training would be required to develop additional instructor pilots. These personnel could be used to replace the civilian instructors that will be lost to the training base under mobilization due to military commitments in the Reserve components.

Commercial Maintenance

The maintenance capability varies among the firms that were contacted during this study, but it was not uncommon to find the capability to conduct both direct and general support maintenance in their maintenance shops. Some firms, especially the larger ones, are authorized FAA Repair Stations and, as such, do complete rebuild and overhaul of airframes, components, and engines. In such firms, the availability rates far exceed U.S. Army standards. For example, the emergency medical service mission conducted by Rocky Mountain Helicopters requires that the firm be operational 24 hours a day seven days a week. In any 30-day period, the firm is allowed only of 24 hours "down time" (including scheduled maintenance) or they pay a heavy penalty. Similar requirements exist in the other firms that were contacted and job completion averaged over 98 percent. This completion rate is especially impressive when considering the fact that each of their aircraft averages in excess of 100 hours per month.⁸ As a matter of comparison, the military helicopter fleet averages 15-18 hours per month and has a slightly higher maintenance hour/flight hour ratio than the commercial fleet.⁹

The decision as to whether or not the crews (aviators and/or maintenance) personnel should accompany the aircraft will depend on military manpower availability. Discussions with personnel at the Reserve Components Personnel Administration Center (RCPAC) in St. Louis, Missouri, revealed that there are currently 659 aviators (officers and warrant officers) in the retiree pool with "hip-pocket" mobilization orders. Similar strength figures exists for helicopter crew chiefs. There are also aviation personnel in the Individual Ready Reserve, but the combined levels of these two resource pools may be inadequate, at least in the near term, to man the force levels under mobilization.¹⁰

The combination of commercial helicopters, aviators and maintenance personnel can provide a valuable adjunct to the Army force structure and should be closely evaluated as a means of alleviating the near term shortfall in helicopter capability.

The CRAF Program

A method for dealing with the near term problem has been discussed. A long range solution may be more difficult to develop. Worthy of further study, however, is the CRAF program the Air Force has proposed to the commercial airline industry. Under this program, the Air Force provides funds to either modify existing commercial airliners or to fund changes during the production process of future procurements to provide passenger aircraft a capability to be converted to cargo carriers. The Air Force also agrees to pay the airlines on a per mile basis for the additional costs incurred from

operating the aircraft with the extra weight that results from the aforementioned modification.¹¹

The reader should not be misled into believing that all parties are equally enthusiastic about totally supporting the program as evidenced by the fact that even though Congress appropriated \$140 million for the conversion between 1978 and 1982, to date only one new aircraft has been modified into a convertible configuration.¹² Even so, this program is the least expensive means of adding cargo capability; therefore, DOD is currently formulating a revised request to industry to solicit their participation in the program.¹²

Even though the Air Forces implementation of the CRAF Enhancement Program has been accomplished on a relatively small scale, this factor should not negate an Army effort to consider a similar program as a means of reducing the anticipated shortfall of helicopters. While some programs, especially those requiring extensive modifications to existing aircraft, would require large amounts of "up front" money, others, if needed, could be accomplished with minimal initial expense. Accordingly, it would be premature to reject this idea as being unworkable or unaffordable without further study.

Helicopter Research Development

A joint military/civilian venture for helicopters as envisioned in this paper is certainly not without Army precedent. During the Korean conflict, for example, the Bell 47 was converted to military use and became an effective weapon system known as the OH-13.¹³ This system was so effective that it

remained in the active Army inventory well beyond the Vietnam war years. As a matter of fact, the OH-13 "S" model was used quite effectively as a scout helicopter until the arrival of the OH-6 and OH-58 during the latter years of that war. During the decade of the 1960's, the Army conducted the research and development of some helicopters-UH-1A (Bell 204), OH-58 (Bell 206), OH-6 (Hughes 500 series)-which were easily modified for use in the commercial markets due to the lack of specificity in terms of military requirements. As a result of commonality, high civil consumption rates and economies of scale, the military realized greatly reduced spare parts costs. The commercial sector on the other hand benefited from the research and development costs expended by the military.¹⁴

Other turbine powered, second generation helicopters. AH-1 (Cobra gunship), CH-54 (Skycrane), CH-53 (Sea Stallion) and CH-46 (Sea Knight)-have not been so readily adapted to commercial operations. These type aircraft have specific military requirements placed on them which militate against economical use by the civil sector.¹⁵ For example, commercial operators obviously do not have a need for the performance inherent in a gunship, nor could those operators who primarily support the petroleum industry effectively use larger helicopters due to the limited size of offshore oil rigs in the Gulf of Mexico.

As we enter production of third generation helicopters, the gap between joint military/civilian R&D, and application has widened to the extent that neither sector benefits from the actions of the other. An examination of the Military UH-60 and Civilian S-76 and Bell 222 programs is indicative of the

divergence in cross utilization. In the UH-60 program, the helicopter is so technically sophisticated and mission specific that it virtually precludes any possible use in the commercial sector. The military obviously had to bear the total R&D costs as well as shoulder the burden for procurement and operational support costs for this aircraft. In the S-76 and Bell 222 programs, the helicopter manufacturers funded the R&D efforts out of profits. The manufacturers did not have the luxury of thousands of hours of military operational testing and use prior to type classification, a factor which contributed to the initial fielding difficulty. To make matters worse, each program was dependent upon the fickle whims of a difficult, if not impossible to determine, civil market that has been adversely affected by the current state of the economy.¹⁶

Future Helicopter Development Efforts

In view of the trend toward total specialization in the third generation of helicopters, it is logical to question the likelihood of any future successful, joint civil/military development effort. Before adopting this conclusion two programs which hold some promise as joint development candidates warrant examination. The first is the Joint Services Advanced Vertical Lift Aircraft (JVX) Program. The proposed aircraft will have extensive military utility (service ceiling 30,000 feet; speed 270 knots, and vertical lift), but could possibly also have affordable commercial utility if military specifications don't price it out of the market.¹⁷ While there is currently no large commercial market for the JVX in this country, there is

reason to believe that a need for such an aircraft will surface in the outyears. For example, as oil exploration moves further offshore in the Gulf of Mexico, the oil rigs will likely become bigger. This factor, coupled with the increased distances which make the speed of the helicopter attractive, could establish a civilian market for the JVX. A market may currently exist for this aircraft in the North Sea as their rigs can support--both in terms of numbers of personnel to be moved and size of landing area-- a JVX type of operation.¹⁸

While the R&D and production costs for this aircraft will be considerable, it should be noted that historically these costs comprise only 20-25 percent of the total life cycle cost for the system.¹⁹ It is not envisioned that the commercial operators would substantially contribute to the expenditures for this development effort, but even so, the helicopter manufacturer should certainly be agreeable to developing a civilian version of the military model and in the process could reduce the military outlays for the project. Notwithstanding this possibility, the greatest potential savings to both the military and civilian sectors will come from the operations and support cost which traditionally comprise at least 75 percent of the life cycle costs of a major weapon system. These saving would result from increased purchases which would tend to lower unit costs. Substantial savings would especially be realized if the total buy for the military could be reduced by virtue of the fact that the commercial segment purchased numbers in sufficient quantities to service the military's needs during mobilization.

A second program with possibility for a joint venture is the Heavy Lift Helicopter (HLH) Program. This program was initiated by the Army in the 1960 time frame but was cancelled because of costs before the prototype development was completed. As a matter of fact, one of the prototypes is still in a hangar at Boeing, but at last report neither industry nor the Army was willing to expend additional funds to resume development.

The primary problem with the HLH Program is the costs associated with development and procurement of a relatively small number of aircraft which precludes the Defense establishment from taking advantage of the economies of scale normally associated with large buys. The need still exists in the military community and, if anything, has become more critical since the decade of the 1960's. There may also be substantial need for this type of helicopter in the commercial sector. This contention is based on an examination of the operating data for two commercial firms which operate the CH-54 Skycrane helicopter. The average cumulative flight time on these helicopters is in excess of 12,000 hours per aircraft and obviously both firms are making an adequate return on their investment to justify its continued use in civil operations.²⁰ This operation data greatly exceeds that of the Army National Guard which operates a fleet of 72 CH-54's with an average cumulative flight time of 1,200 hours per aircraft.²¹ Based on the potential need, it would be worth examining the possibility of a joint development/procurement effort to see if the combined buy would make it a cost effective option for both sectors.

Advantages of Joint Development Programs

A joint development program offers the possibility for lower costs for both sectors and could materially enhance the manufacturer's ability to maintain the technological state-of-the-art as his profit margin is generally too small to warrant large expenditures on high risk technology. By the same token, the commercial operators are not in a position to fund extensive research and development activities. Conversely, the federal government, in accordance with its foremost responsibility of providing for the defense of the nation, must, of necessity, expend substantial funds to maintain state-of-the-art military aircraft. If the need for military specifications does not outweigh the cost savings that could accrue from a joint development program, the Army should seriously consider this as a potential option for reducing the ever escalating operating and support cost for major weapon systems such as the helicopter. Such an action would also increase the number of military compatible helicopters in the commercial market for possible use during mobilization. The author is not advocating a joint development program for all helicopters, but rather only for those which have strong potential for commercial application. A future generation trainer (e.g., the follow on for the TH-55 or other training aircraft) which would not require specific capabilities unique to the military could be a candidate for a joint development program and thereby offer some overall cost savings to both sectors.

A joint program for future generations of helicopters can and should be undertaken; however, the degree to which such a program can be effectively

implemented certainly deserves close scrutiny and further study. Generally speaking, the more parties involved in the effort, the less specialized the end product. Consequently, it is a tough order to build a helicopter that meets both industry and military specifications. Questions also arise as to the reliability of civilian market projections. In essence the question that begs to be answered is how does the government hold the industry's feet to the fire in view of the volatile situation that exists in the business world? The smaller and medium sized operators are almost totally at the mercy of the "ups and downs" in the business cycle and, therefore, may be unreliable as business partners. Evidence of this, but certainly on a much larger scale, is the fact that many major airlines cancelled orders for new aircraft during the present recession even though this action necessitates payments of millions of dollars in penalties.

There are some who would argue that a substantial fleet of commercial helicopters which are compatible with military needs would greatly reduce the numbers required by the active military forces. In essence the proponents of this philosophy believe that this reservoir of helicopters operated by commercial firms, which would be available in the event of a national emergency, would negate the requirement for a large military fleet of a like type.

Others would argue that our current force structure requirements are already based on optimistic expectations and any further reduction could have serious consequences when the "balloon goes up." Those who espouse this latter philosophy would argue that any attempt to reduce a buy based on

expected availability of filler aircraft from commercial operators was unacceptable. They would further argue that continual reductions in quantities of equipment to compensate for technological improvements have already reduced organizational size to dangerously low levels. In essence, this group believes that we are rapidly economizing ourselves to a point of mission degradation and would cite the fact that we accepted a 15 for 23 exchange ratio for the UH-60 in units where it is replacing the UH-1 and 18 for 21 exchange ratio for the AH-64 in units where it is replacing the AH-1. According to this line of thinking, the numbers are slowly diminishing and numbers, as much as capability, will be a critical factor on the next battlefield. This fact, coupled with the current shortage in the force structure, would militate against further reductions based on anticipated availability of commercial assets.

A long range joint development program would accrue benefits to both sectors; however, the suggestion that a joint venture could lead to a reduced number of helicopters required to equip the force is rejected by this author. I agree with the school of thought which believes that there is a tremendous danger in further reducing the active structure, even if assets are available on a "string." Notwithstanding the foregoing comment, the option should also be considered in any future studies on this subject.

FOOTNOTES

CHAPTER III (Pages 14 - 26)

¹United States Department of Transportation, Federal Aviation Administration, Census of U.S. Civil Aircraft (Washington, D.C., 1981).

²Helicopter Association International, Membership Directory, 1981 (Washington, D.C.: June 1981), p. 18-19.

³ibid., p. 75-256.

⁴Letter from Mr. Samuel J. Sutter, Bell Helicopter Textron to LTC James L. Higginbotham, 16 December 1982.

⁵Letter from Mr. Jeffrey D. Morris, Director of Safety, Houston Helicopters, Inc. to LTC James L. Higginbotham, 15 December 1982. Hereafter cited as the Morris Letter.

⁶ibid.

⁷Interview with Mr. Carl Brown, Chief Pilot, Air Logistics, Lafayette, Louisiana.

⁸Letter from Mr. Donald G. Andrews, Vice President for Operations, Rocky Mountain Helicopters, Inc., Provo, Utah to LTC James L. Higginbotham, 8 December 1982. Hereafter cited as the Andrews Letter.

⁹Scott F. Silies Letter.

¹⁰Telephone conversation with Mr. E. T. Colwell, United States Army Reserve Component Personnel Administration Center, St. Louis, Missouri: 11 January 1983.

¹¹John F. Zugschwert, "It's Too Logical--It'll Never Work (Commercial Application of the JVK)," VERTIFLITE, September/October 1982, p. 26.

¹²"Capitol Hill," Air Force Magazine, March 1982, p. 37.

¹³Zugschwert, "It's Too Logical--It'll Never Work," p. 22.

¹⁴ibid.

¹⁵ibid.

¹⁶ibid.

17 Ibid.

18 Morris Letter.

19 Abraham Singer, "Defense Systems Acquisition." Lecture, Industrial College of the Armed Forces, Fort Lesley J. McNair, Washington, D.C.: 3 March 1983.

20 Zugschwert, "It's Too Logical--It'll Never Work," p. 27.

21 Ibid.

CHAPTER IV

MAJOR ISSUES AND ANSWERS

Impact on the Petroleum Industry and Local Communities

One major issue affecting the implementation of a Civil Reserve Helicopter Fleet Program for the Army is the potential adverse impact on other aspects of the national defense effort and the local civilian communities resulting from integration of the commercial helicopters into the force structure.

Commercial firms have wide and diverse missions which include: passenger operations; providing helicopters for emergency medical service to numerous hospitals; supporting construction, logging, petroleum, news gathering activities, aerial photography, external lift, and training operations. While the loss of any of these services would have some effect on the communities involved, the severest impact could be on the defense effort itself. In essence, this action could be counter productive to the overall defense mission accomplishment in that a large percentage of the commercial fleet is involved in supporting some phase of the domestic petroleum industry. In firms such as Petroleum Helicopters Incorporated (PHI), Air Logistics, and Houston Helicopters, Inc., approximately 90 percent of their aircraft are used for ferrying crews and spare parts to off-shore oil rigs. The consequence of removing these helicopters is best shown by examining the time differential involved between surface and air transportation. For example, in one firm the average flight time for ferrying crews to the off-shore oil platforms in the Gulf of Mexico is approximately 50 minutes, whereas the time required to cover the same distance with the fastest crew boats is 7-9 hours.¹

The foregoing statement should not be construed as implying that the degree of reliability on helicopters to support the petroleum industry completely negates the civil reserve helicopter fleet concept as an option for reducing helicopter shortages. Quite the contrary, even some of these assets could be made available. For example, while it is ideal to rotate the oil rig crews for seven days on and seven days off, wartime requirements may require changes in that policy. With longer work schedules, surface transportation could possibly be utilized to augment the helicopter fleet, thereby reducing dependency on helicopters. Finally, the helicopters normally used for exploration would probably be available as this type of activity would most likely cease in a wartime situation. This contention is reinforced by a United Kingdom study which indicated that approximately 75 percent of their civil helicopters (including those supporting the North Sea Oil effort) would be available for other tasks and to meet the overall shortage of military helicopters that also exists in their Army.²

It should also be noted that there are some firms which are not involved whatsoever in the support of the petroleum industry, and as such, could be utilized by the defense establishment without any degradation to the defense effort. For example, some firms are almost totally involved in passenger hauling operations, both in regularly scheduled flights and charter services.³ While the withdrawal of these assets may cause some disruptions and inconvenience to the communities involved, the impact would be minor for a nation at war. As a matter of fact, the need for some of these services--especially scheduled helicopter commuter flights--would diminish substantially

as the Civil Reserve Air Fleet is activated and commercial aircraft are used to supplement military transport in moving supplies and personnel to the war zone. The priorities for air travel that would be established upon implementation of the CRAF Program would significantly reduce the need for helicopter commuter service to connect with the commercial airlines since the latter's domestic flights will be greatly reduced both in frequency and number of cities served.

It is the opinion of the author that while this issue is certainly worthy of further examination, it should not, in itself, preclude the establishment of a Civil Reserve Helicopter Fleet for the Army. It is my belief that there is probably a sufficient number of helicopters in the commercial fleet to establish a program without any severe disruptions to domestic petroleum output or to the local communities.

Availability of Commercial Crews

A second issue concerns the availability of commercial helicopter crews under a Civil Reserve Helicopter Fleet Program. Many commercial pilots are former service members who still have a military obligation to the Individual Ready Reserve, retiree replacement pool, Selected Reserves or National Guard units. Discussions with several of the largest commercial firms revealed that as many as 98 percent of their pilots are former members of the military services and 30-35 percent of them still have some residual military obligation in one of the categories listed above. These personnel would already be subject to recall to active duty. Therefore, care must be taken

not to double count and overstate the mobilization assets. For example, commercial firms could designate crews for specific civil reserve helicopter fleet aircraft who are also members of one of the aforementioned military categories. This problem can be easily overcome by including specific limitations in the implementing directives and contractual arrangements to require the commercial operators to provide sufficient personnel, excluding those with military commitments, and aircraft for X number of flying hours per day. A similar stipulation currently exists in the CRAF Program and indications are that this is a workable arrangement.

Incentives and Remunerations

A third issue is the type and degree of incentives and remunerations that will be provided to commercial operators to encourage participation in this program. All firms who responded to the author's queries on this research effort addressed the remuneration issue. On this subject, Mr. Donald G. Andrews, Vice President for Operations for Rocky Mountain Helicopters stated:

"As to the corporate view of the CRAF concept, you will find our company is supportive of a strong defense, loyal to our country, and willing to cooperate in any preliminary studies. We are, however, committed to the free enterprise system and would need to be compensated for participation."

Mr. Robert Chaves, Director of Operations for Island Helicopters provided another typical response in which he stated:

"Since Island Helicopters is a commercial helicopter company which relies on the aircraft flying to serve various customers for our sole source of income, we would expect remunerations and incentives concurrent with the established hourly rates charged to customers."

All respondents also expected to be compensated for any costs incurred in modifying the aircraft, to include revenue lost while the modifications were being done and a monthly fee to offset the loss in load carrying ability resulting from the modifications.

FOOTNOTES

CHAPTER IV (Pages 29 - 33)

¹Telephone conversation with Mr. Carl Dougherty's assistant (Vice President for Domestic Operations), Petroleum Helicopter, Inc., Lafayette, LA., 6 January 1983.

²"An Unconventional Approach to Defense Resources," Survival, November/December 1982, p. 257.

³Telephone conversation with Mr. Robert Chaves, Director of Operations, Island Helicopter Company, Garden City, New York, 7 January 1983.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

This research revealed that there is a parallel between the strategic airlift shortfall which has plagued this nation since World War II and the current gap that exists between anticipated requirements and the available supply of helicopters to support combat operations in a major conflict. Based on this finding, the author conceptually examined the feasibility of developing a Civil Reserve Helicopter Fleet Program, similar to the CRAF Program which has been successfully institutionalized by the Air Force, as a means of minimizing the effect of this shortfall. The author also examined the desirability of implementing joint military/civilian development programs for future generations of helicopters.

A review of historical files and discussions with various Department of Defense agencies to include the Defense Technical Information Center, Defense Studies Information Exchange, Department of the Army Staff Offices (DCSLOG, DCSRDA, DCSOPS), The Command and General Staff College, The United States Army Transportation School and the United States Army Aviation Center failed to identify any investigations or preliminary studies that have been conducted on this subject. Accordingly, the substantive information in this paper is based in part on responses solicited from 15 commercial helicopter operators whose fleet size ranges from eight to 382 helicopters; four helicopter manufacturing firms (Bell, Boeing-Vertol, Hughes and Sikorsky); The American Helicopter

Society; The Helicopter Association International; and various command and staff agencies of the Army to include USAAVNC, AVRADCOM, TEARCOM, USAR, and the National Guard Bureau.

The purpose of this research was to examine a concept for a Civil Reserve Helicopter Fleet; therefore no attempt was made to develop a detailed program. The study concentrated on determining if such a concept had any potential value for solving the problem of helicopter shortfalls in the next war. Based on this premise, the conclusions and recommendations derived from my study effort are discussed next.

Conclusions

- o The Army will experience a helicopter shortage in the next war due primarily to heavy combat losses and the inability of the industrial base to provide sufficient helicopters until at least M+24 months.

- o The long leadtime to attain mobilization output levels results from the lengthy production time required for manufacturing pacing items.

- o A contingency source from some of these helicopter requirements in the near term is the commercial operators in the private sector. A large quantity of helicopters in the commercial fleet are compatible with those in the military fleet. These include the Bell 205 (UH-1), Bell 206 (OH-58), Hughes 500 (OH-6), and Sikorsky S-64 Skycrane (CH-54).

- o Commercial helicopter could not be introduced into a combat environment without extensive modifications--e.g., crashworthy fuel cells, infrared suppressors, radar warning devices, gun mounts, armament, armor seats, etc.

However, they appear to meet minimum requirements for use in a training environment or to support base operations and soldier training at CONUS installations. The introduction of commercial helicopters into these environments would free the existing military assets to be utilized for equipping understrengthened units, or replacing combat losses.

- o Commercial helicopter pilots are highly qualified (experience level ranges from a minimum of 1,500 hours to more than 20,000 hours) and could be used as an immediate source of aviators in a mobilization. Since the vast majority of the commercial pilots are former military aviators, the training time required for integrating them into military operations in a CONUS environment would be minimal.

- o The maintenance personnel in the commercial fleet are highly qualified and could provide a source for helicopter crew chiefs/repairers if needed under mobilization.

- o A program which offers some long range potential for alleviating the impact of this shortage is a joint civilian/military development program for future generations of helicopters which do not require mission specific capabilities. Such a program offers the possibility for lower costs for both sectors and could materially enhance the manufacturer's ability to maintain the technological state-of-the-art.

Recommendations

The Department of the Army should further examine this subject to determine if a Civil Reserve Helicopter Fleet could provide a viable option for supplementing the military helicopter fleet during mobilization.

If subsequent studies reinforce this contention, A memorandum of agreement should be initiated with the Department of Transportation to formalize the agreement. A contingency plan should also be developed which identifies the required helicopters by type, tail number, and location. The latter is a critical element, as some firms may be headquartered on the east coast and have helicopters operating on the west coast or in Alaska. The helicopters requiring no modification for use by the military should be designated as priority assets and would, therefore, become the first to be activated in the event of mobilization. If sufficient numbers are not available from the aforementioned assets, other assets which are compatible with the military fleet but may require minor modifications (e.g., co-pilot controls, avionics, etc.) should be targeted for subsequent activation.

In developing the contingency plan, a determination should be made as to whether or not the aviators and maintenance crews will accompany the helicopters when the Civil Reserve Helicopter Fleet is activated.

Finally, the Department of Army should, in conjunction with the helicopter manufacturers and commercial operators, explore the possibility for joint development programs for future generations of helicopters.

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GLOSSARY OF TERMS

AH	Attack Helicopter
AHS	American Helicopter Society
AVRADCOM	Aviation Research and Development Command
CH	Cargo Helicopter
CHINOOK	CH-47
COBRA	AH-1
CRAF	Civil Reserve Air Fleet
DCSLOG	Deputy Chief of Staff, Logistics
DCSOPS	Deputy Chief of Staff, Operations
DCSRDA	Deputy Chief of Staff, Research Development Acquisition
EH	Electronic Helicopter
FEBA	Forward Edge of the Battle Area
HAI	Helicopter Association International
HLH	Heavy Lift Helicopter
JVX	Joint Services Advanced Vertical Lift Aircraft Program
OH	Observation Helicopter
R&D	Research and Development
RDJTF	Rapid Deployment Joint Task Force
TSARCOM	Troop Support and Aviation Material Readiness Command
UH	Utility Helicopter
USAVNC	United States Army Aviation Center
USAR	United States Army Reserve

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