REPORT TO THE CONGRESS

Adverse Effects Of Producing Drone Anti-Submarine Helicopters Before Completion Of Development And Tests

B-160877

Department of the Navy

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

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

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To the President of the Senate and the
Speaker of the House of Representatives

This is our report on the adverse effects of producing Drone Anti-Submarine Helicopters before completion of development and tests by the Department of the Navy.

Our review was made pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

Copies of this report are being sent to the Director, Office of Management and Budget; the Secretary of Defense; and the Secretary of the Navy.

Comptroller General
of the United States

*COMPTROLLER GENERAL'S REPORT TO THE **CONGRESS***

ADVERSE EFFECTS OF PRODUCING DRONE ANTI-SUBMARINE HELICOPTERS BEFORE COMPLETION OF DEVELOPMENT AND TESTS
Department of the Navy B-160877

D I G E S T

WHY THE REVIEW WAS MADE

In accordance with a request from Congressman Sidney R. Yates, the General Accounting Office (GAO) reviewed the Navy's development of selected antisubmarine warfare systems. The report, summarizing the results of GAO work on one of these--the Drone Anti-Submarine Helicopter--was made public by Congressman Yates.

In that form the report did not contain comments from the Navy or from the manufacturer of the helicopter. In its present form, the report includes their comments and related GAO views. The report's basic findings, however, remain unchanged.

FINDINGS AND CONCLUSIONS

Through June 30, 1969, the Navy spent over a quarter of a billion dollars for the development and acquisition of the Drone Anti-submarine Helicopter Weapon System. This system, designed for the delivery of torpedoes by drone helicopters, operates from surface ships for the purpose of attacking and destroying enemy submarines. (See p. 4.)

Although this weapon system provided the Navy with a capability it did not previously have, the system suffered from a high rate of loss of the drone helicopters. Of the 750 drones purchased by the Navy, 362 have been lost. (See pp. 8 and 16.)

GAO believes that the difficulties experienced with the system resulted, in large part, from the Navy's ordering the drone helicopters into production before they were fully developed and tested. (See p. 8.)

At the time these helicopters were under development in the early 1960's, the Navy had under way a ship modification program. This program included, in part, installing on destroyers equipment needed to permit drone helicopters to operate from them. Modifications were completed on the first ship nearly 3 years before the first drone helicopter was delivered to the fleet. This "ship to drone gap," together with the capability that the drone helicopter was expected to afford the fleet, created strong pressure on the Navy and on the contractor to expedite development and delivery of the helicopters.

It appears that this pressure was a major factor leading to production of the helicopters before they had been fully developed and tested. (See p. 9.)

There have been no purchases of the drone helicopter since June 1966. There are no plans for future purchases. (See p. 18.)

The practice of concurrently developing and producing weapon systems was a matter of concern to the Blue Ribbon Defense Panel. In its report of July 1, 1970, the Panel recommended that a new development policy for weapon systems and other hardware should be formulated and promulgated to cause the reduction of technical risks through demonstrated hardware before full-scale development, and to provide the needed flexibility in acquisition strategies. The Panel's report also stated that the new policy should provide a general rule against concurrent development and production, with the production decision deferred until successful demonstration of developmental prototypes. (See p. 25.)

RECOMMENDATIONS OR SUGGESTIONS

The concurrent development and production of major weapons systems by the Navy and GAO recommendations on this practice were discussed in GAO report to the Congress entitled, "Adverse Effects of Large-Scale Production of Major Weapons Before Completion of Development and Testing, Department of the Navy" (B-163058, November 19, 1970).

In that report GAO recommended that the Navy revise its instruction relating to concurrent development and production to provide for the submission of meaningful data to the Assistant Secretaries who make concurrency decisions. In addition, GAO recommended that the Naval Audit Service give consideration to making regularly scheduled audits into the practice of concurrent development and production. The Navy generally agreed with these recommendations. (See p. 25.) GAO is therefore not making further recommendations at this time.

AGENCY ACTIONS AND UNRESOLVED ISSUES

The Navy and the manufacturer of the drone helicopter provided GAO with comments on the matters discussed in this report. (See pp. 31 and 43.) Principal among their comments was the statement that the rate of loss of the helicopter was less than had been anticipated during the early stages of this weapon system program. (See pp. 32 and 45.)

GAO found that the loss rate of the drone helicopter exceeded the expected rate of loss shown in data developed by the Navy after the program got under way. (See p. 21.)

MATTERS FOR CONSIDERATION BY THE CONGRESS

Several committees and many members of the Congress have expressed a strong interest in major weapon systems and how their development and

procurement can be improved. In a prior report to the Congress--"Need for Management Improvement in Expediting Development of Major Weapon Systems Satisfactory for Combat Use" (B-163058, November 17, 1969)--GAO suggested that, to enable the Congress to exercise appropriate legislative controls over the funding of major defense systems, the Congress may wish to require that:

--Determination be made by the Secretary of Defense, prior to authorizing production of a new system or major modification of an existing system, that all of its significant components have satisfactorily met all prescribed developmental tests.

--Notification be furnished by the Secretary of Defense to the appropriate congressional committees in any case where the Secretary considers that authorization of production is essential even though not all developmental tests have been satisfactorily completed; such notification should include the reasons for authorizing concurrent development and production and the status of development of each significant component.

GAO believes that the Navy's experience with the Drone Anti-Submarine Helicopter further illustrates the need for the Congress to be provided with information showing when the practice of concurrent development and production is employed by the Department of Defense to acquire major defense systems. (See pp. 25 and 26.)

Contents

ABBREVIATION

DASH Drone Anti-Submarine Helicopter

COMPTROLLER GENERAL'S REPORT TO THE CONGRESS

ADVERSE EFFECTS OF PRODUCING DRONE ANTI-SUBMARINE HELICOPTERS BEFORE COMPLETION OF DEVELOPMENT AND TESTS
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CHAPTER 1

INTRODUCTION

We have reviewed the Navy's development and acquisition of the Drone Anti-Submarine Helicopter (DASH).[1] DASH is a small, lightweight drone helicopter designed for unmanned, remote-controlled delivery of antisubmarine warfare torpedoes. DASH operates from surface ships for the purpose of attacking and destroying enemy submarines at distances commensurate with the detection capability of modern active sonars. Pictures provided to us by the Navy of the two models of the drone helicopters--QH-50C and QH-50D--are included on pages 6 and 7 respectively. The DASH weapon system has a history spanning more than a dozen years and, through June 30, 1969, has cost the Government more than a quarter of a billion dollars.

ORIGIN OF DASH

The Navy believed that advances made in the development of submarines following World War II demanded new techniques in antisubmarine warfare. One of the desired techniques was a means by which destroyers, a key element in the Navy's antisubmarine warfare operations, could attack submarines at ranges exceeding the submarines' attack range.

The idea of using a drone helicopter to overcome this range problem was conceived in 1957. It was considered that use of a drone helicopter, which would eliminate the need for a pilot, would give the ship commander greater freedom of operation, day or night, under hazardous weather conditions. Such helicopters would have an advantage over missiles in being recallable at the last minute if necessary. Further, drone helicopters could strike enemy submarines at maximum sonar range.

On August 21, 1957, the Chief of Naval Operations issued Development Characteristic Number *AS-04504-2*, a document which established the features, characteristics, and

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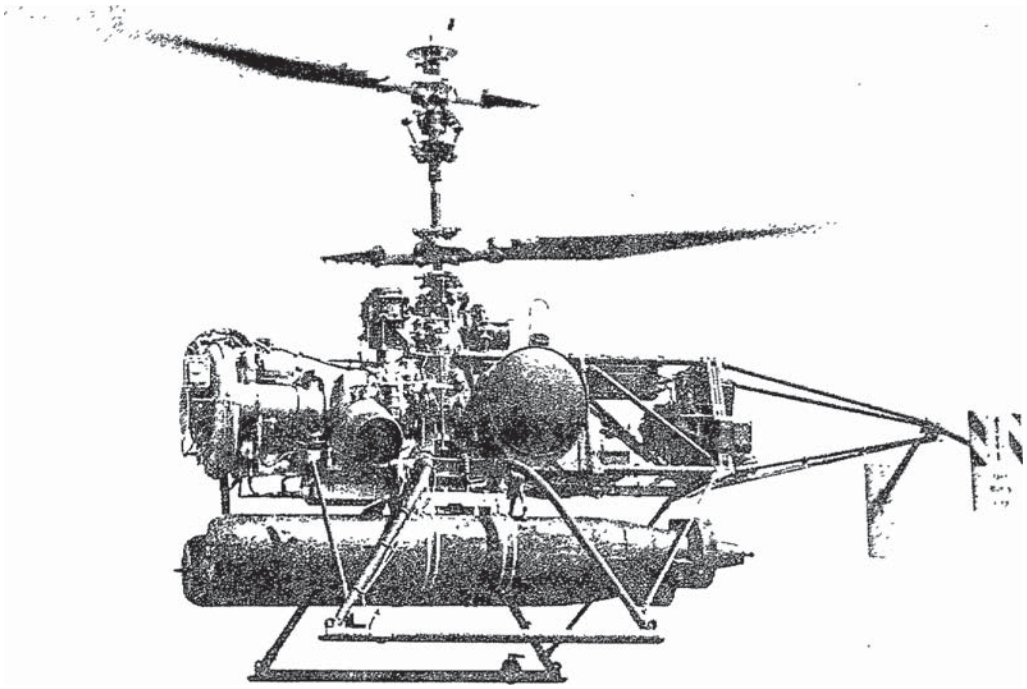
[1] The scope of our review is discussed on page 27.

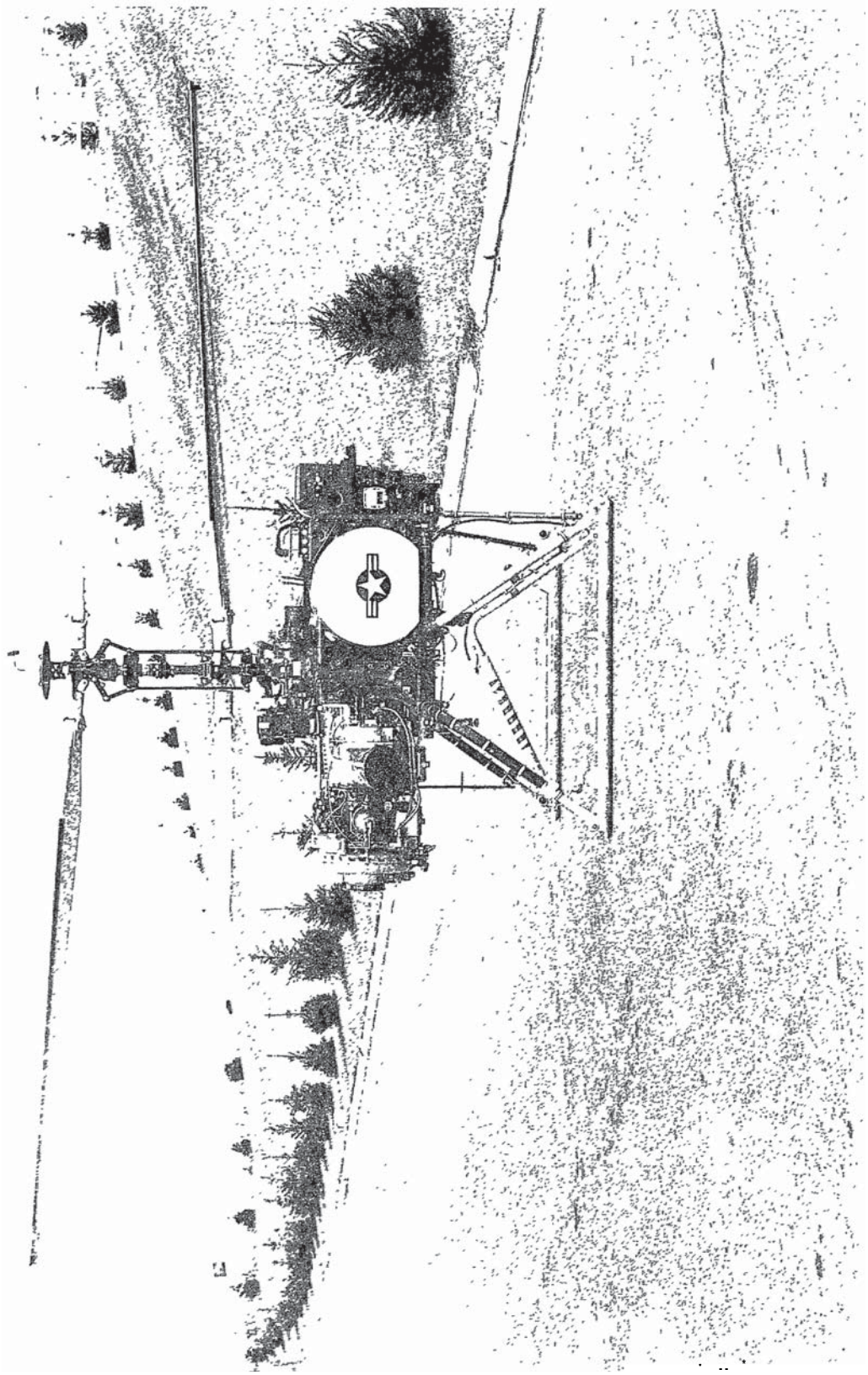
capabilities for the development of an unmanned, remotely-controlled, drone helicopter for delivery of antisubmarine warfare weapons from small ships and other suitable ships. From this development characteristic DASH evolved.

The principal officials responsible for administration of the activities discussed in this report are identified in appendix III.

QH-50C **DRONE**



QH-50D DRONE



CHAPTER 2

CONCURRENT DEVELOPMENT AND PROCUREMENT OF DASH

The Navy spent over a quarter of a billion dollars to develop and purchase the DASH weapon system. Although this system has provided the Navy with an antisubmarine warfare capability it did not previously have, the system has suffered from a high rate of loss of the drone helicopters. In our opinion, the difficulties experienced with the system resulted, in large part, from the Navy's ordering the drones into production before they were fully developed and tested.

INITIATION OF THE DASH PROGRAM

In June 1958 the Chief of Naval Operations determined that operational drone helicopters would be required in the fleet beginning in fiscal year 1962. To meet this requirement, it was planned that the DASH program should proceed on a three-phase basis. The first phase would be to buy an initial quantity of DSN-1 helicopters for test and evaluation purposes. The second phase would be to buy a limited number of DSN-2 helicopters. It was planned that these drones would be used in the fleet beginning in July 1961 until a later, more advanced drone, the DSN-3 (hereinafter referred to as QH-50C), could be delivered to the fleet. The third phase of the program would be a design competition which would lead to the production of operational quantities of the QH-50C drone. Under this plan, fleet deliveries of the QH-50C were to begin after July 1963.

The Navy initiated this plan on December 31, 1958, with the award of cost-plus-a-fixed-fee contract NOas 59-0219c to Gyrodyne Company of America, Inc. for the production of nine research and development DSN-1 models and three research and development DSN-2 models. These helicopters, powered by gasoline-burning engines, were to be used for system evaluation purposes and were to be delivered during the period December 1959 through December 1960.

During the summer of 1959, the Navy's Ships Characteristics Board decided that aviation gasoline, a fire hazard aboard destroyers, should be removed from destroyers that were to carry DASH drones. Since the DSN-2 drones were to be gasoline-powered, the Chief of Naval Operations directed that the planned DSN-2 production procurement for fiscal year 1960 not be made and that the QH-50C turbine-powered drone, using less dangerous fuel, be placed into development.

During the same period, the Navy had under way a ship modification program. The program included, in part, installing hangars and platform facilities needed to handle the drone helicopters aboard the destroyers that were to be equipped with **BASH.** The modification program began even though the helicopters were not scheduled to be available for installation aboard the ships when the ship modifications were to be completed. Consequently, in January 1960, when modifications were completed on the first ship involved in the program, the gap between readiness of the destroyers and availability of the drones materialized. This "ship to drone gap," together with the expected additional antisubmarine warfare capability that the DASH weapon system was to afford the destroyer force, created strong pressure on the Navy and on the contractor to expedite development and delivery of DASH helicopters. It appears that this pressure was a major factor leading the Navy to order these helicopters into production before they had been fully developed and tested.

PROCUREMENT OF DASH DRONES

In response to the direction of the Chief of Naval Operations to place the QH-50C into development, during February 1960 the Navy awarded cost-plus-a-fixed-fee contract NOw 60-0099c to Gyrodyne for the procurement of two research and development models of the QH-50C drone. During April 1960, the contract was amended to provide for the procurement of two additional research and development models of the QH-50C drone. Gyrodyne was selected for the award of this contract since the QH-50C drone was a modified version of **the** DSN-2 which was being developed by Gyrodyne under the contract awarded in 1958. On April 1, 1960, the Navy awarded cost-plus-a-fixed-fee contract NOw 60-0154c to

Gyrodyne for 15 QH-50C drones that were to be used for tests and evaluations.

When these two contracts were awarded, the Navy had not made a free, unmanned (drone) flight of the research and development model helicopters, DSN-1 or DSN-2, ordered under the 1958 contract. The first drone flight of a DASH-type vehicle (DSN-1) was not made until August 12, 1960. This was followed by a shipboard drone flight by a DSN-1 drone from the destroyer U.S.S. HAZELWOOD in the Chesapeake Bay on December 7, 1960.

By December 1960, the Navy had not received the research and development models of the QH-50C drone ordered earlier that year, and, consequently, the test program on these drones had not begun. Nevertheless, during this month, the Navy amended contract NOw 60-0154c and ordered from Gyrodyne 42 production models of the QH-50C drone for fleet use. Moreover, during the following 35 months--when (1) the test program for the QH-50C was conducted and revealed a large number of deficiencies in the drone, (2) 27 QH-50C drones crashed and were struck from the Navy's inventory, and (3) QH-50C drones were grounded for about 4-1/2 months in 1963 because of equipment problems--the Navy ordered an additional 127 QH-50C drones from Gyrodyne. The Navy's final purchase of 185 QH-50C drone helicopters was made under a contract awarded to Gyrodyne in February 1964.

As stated above, after the QH-50C drones began undergoing tests and use by the fleet, it was found that they did not meet all required operational characteristics. For example, the QH-50C did not have the required all-weather capability and guidance accuracy. To overcome these problems and to add additional capabilities to the drone, the Navy directed Gyrodyne in April 1964 to reconfigure four QH-50C drones which were then under production. The reconfigured drone was designated the QH-50D; and, through June 1966, the Navy awarded contracts for the purchase of 377 drones of this model from Gyrodyne. All 377 of the drones were ordered by the Navy before its test program for the QH-50D was completed. The final drone of this model was accepted by the Navy in October 1969.

The Navy has spent more than a quarter of a billion dollars on the DASH program. This amount includes not only the costs of the drone helicopters but also certain other costs associated with the program, such as the cost of several items of major shipboard support equipment. Of the total program costs, about $151.5 million is applicable to the eight contracts awarded to Gyrodyne.

CHAPTER 3

TEST AND EVALUATION PROGRAM

The test and evaluation program established for the DASH weapon system was divided into three major phases. These phases and their objectives were:

1. Technical Evaluation--To certify that the performance of the DASH weapon system as an equipment was ready for Operational Evaluation.

2. Board of Inspection and Survey--To conduct trials and inspections prior to acceptance for Naval service to determine whether the contract with its authorized changes had been satisfactorily fulfilled and to determine whether the DASH weapon system and its support equipment were capable of fulfilling their mission and were suitable for fleet use.

3. Operational Evaluation--To determine the operational suitability of the DASH weapon system including reliability, maintainability, and supportability and the adequacy of personnel requirements and training programs.

The Technical Evaluation phase, which consisted of contractor demonstrations of the drone helicopters, was completed for the QH-50C drone in June 1962 and for the QH-50D drone in June 1965. The other two phases of the test and evaluation program, as they applied to the QH-50C and QH-50D drones, are summarized below.

QH-50C DRONES

The Board of Inspection and Survey trials of the QH-50C drones were conducted in two phases at the Naval Air Test Center, Patuxent River, Maryland, and were completed on July 18, 1963. During both trial phases, numerous deficiencies were detected in the drone, the most significant of which were the drone's lack of all-weather capability and the poor reliability and serviceability of certain components. The final report on these trials recommended that

the QH-50C drone be finally accepted for service use "*** provided satisfactory corrective action is taken on [13] *** deficiencies classified as mandatory ***." The report further recommended the correction of an additional 27 deficiencies.

The Operational Evaluation of the QH-50C drone was also performed in two phases. Phase I was conducted by the Operational Test and Evaluation Force, Norfolk, Virginia. The purpose of phase I was to evaluate the QH-50C flight capability in a shipboard operational environment during day and night operations in various conditions of weather and sea state. The first operating period of the evaluation, from November 26, 1962, to January 11, 1963, was terminated by a series of drone accidents. After efforts were made to overcome these difficulties, phase I was resumed on June 18, 1963, and was completed on July 11, 1963.

Principal among the conclusions drawn from phase I of the Operational Evaluation was that the QH-50C could be operated from a destroyer, but that system reliability, particularly in the area of avionics and air frames, could be maintained at an acceptable level only with extensive maintenance procedures by highly qualified personnel. Recommendations were made directed at overcoming these and other problems disclosed during the phase I evaluation.

Phase II of the Operational Evaluation was conducted by the Test and Evaluation Detachment, Key West, Florida, during the periods September 3 to October 4, 1963, and November 2 to November 30, 1963. The purposes of phase II were to determine the system's hit capability against submarine targets within a range of 10,000 yards, to determine the system's suitability for service use, and to recommend basic tactics. During phase II testing, problems were experienced because of design deficiencies, malfunction of equipment, and unsatisfactory material support.

The report summarizing the results of phase II of the Operational Evaluation recommended that the QH-50C be accepted for service use contingent upon (1) the redesign of QH-50C avionics to prevent uncommanded functions and (2) the installation of a radar augmentation device on the drone.

Other recommendations, not affecting the contingent approval, were made regarding the operational and tactical use of the QH-50C.

QH-50D DRONES

The Board of Inspection and Survey trials of the QH-50D drones began on December 13, 1965, and were completed on May 27, 1966. During these trials, 29 deficiencies were detected on the QH-50D and of these, the Board reported that "*** 12 deficiencies *** preclude satisfactory mission accomplishment." Further, while the QH-50D was supposed to be an improved version of the QH-50C, many of the deficiencies found in the QH-50D were of the same type found in the QH-50C during its Board of Inspection and Survey trials.

Major conclusions reached by the Board of Inspection and Survey from its trials were that (1) DASH should satisfactorily perform its mission upon correction of the 12 deficiencies that precluded satisfactory mission accomplishment and (2) DASH was not satisfactory for operation under icing conditions and had a limited capability for operation in rain. It was recommended that the QH-50D be finally accepted for service use when these 12 deficiencies were corrected and that the remaining 17 deficiencies be corrected to improve mission effectiveness.

The Operational Evaluation was conducted on QH-50D drones by the Test and Evaluation Detachment, Key West, Florida, during the periods October 17 to December 5, 1966, and April 6 to May 15, 1967. During the evaluation, numerous problems and delays were encountered because of equipment malfunction and unsatisfactory materiel reliability. The report on this evaluation recommended that the QH-50D be accepted for service use only after the mean time between failures was at least 125 hours. The report also included recommendations regarding improvements to equipment and component parts.

STATUS OF DEFICIENCIES

Many of the deficiencies identified during the Board of Inspection and Survey trials were corrected (1) by retrofitting drones that were already in the fleet and (2) during production of those drones still on order.

There were, however, several deficiencies that were not corrected.

With respect to deficiencies disclosed during the Operational Evaluations of the QH-50C and QH-50D drones, we asked cognizant Navy officials to furnish us with data showing their disposition. These data were never provided to us.

CHAPTER 4

FLEET EXPERIENCE WITH DASH

Fleet deliveries of QH-50C drones began in November 1962. Less than 2 months later, in January 1963, all QH-50C drones were grounded because of equipment problems. These problems were overcome by modifications, and the flying restriction on the drones was removed on June 6, 1963.

DASH drones delivered to the fleet do not have all the capabilities prescribed for them. For example, fleet drones do not have certain capabilities even though, as far back as August 21, 1957, in the basic development characteristic for the drones, there were requirements calling for those capabilities.

Throughout its history, the DASH weapon system has been plagued by a high loss rate. During congressional testimony in 1967, the Secretary of Defense stated that the drone had encountered "*** higher-than-expected peacetime attrition and lower-than-expected performance ***." Of the 750 QH-50C and QH-50D drones purchased by the Navy, a total of 362 had been lost through April 1969, as follows:[1]

Calendar year	QH-50C	QH-50D	Total
1963 and prior	27	-	27
1964	31		31
1965	60	-	60
1966	45	16	61
1967	57	51	108
1968	11	53	64
1969 (4 months)	-	11	11
Total	231	131	362

Although Navy records do not show the cause of all the problems the Navy experienced with the drones, it is our opinion that, in large part, these problems resulted

[1] At the conclusion of our fieldwork, the latest data that the Navy's DASH Project Officer had on drone losses were as of April 30, 1969.

from ordering the drones into production before they had been fully developed and tested. We believe that the record supports this conclusion. In discussing problems experienced with equipment that contributed to the 1963 grounding, Navy personnel stated in official correspondence:

> "Under the subject DASH program the Contractor was required to develop and produce aircraft for fleet introduction in a period of three years on an R&D program that normally would take seven years.
>
> "In a normal R&D program the difficulty experienced with the servo actuator would have been discovered and corrected as a routine change in the development program."

Further, in congressional hearings during 1963, a ranking Navy official, in discussing the grounding of the drones, stated:

> "The problems that we have with the DASH, however, are that perhaps we did not put enough flight hours on it before we tried to introduce it into the fleet."

WITHDRAWAL OF DASH FROM SHIPS ARMED WITH THE ANTI-SUBMARINE ROCKET

The utilization of the DASH weapon system is dependent upon the detection and classification of targets by sonar. In other words, if a ship's sonar has an effective detection radius of 5,000 yards, the maximum weapon delivery requirement of the ship's DASH drones would generally be 5,000 yards.

A DASH operational radius of 30 nautical miles was established as a requirement for the drone in order to equal the intended design range of a sonar, which was then under development. This sonar was scheduled for operational evaluation in 1962 to determine its acceptability for service use and was programmed for installation as a long-range detection system aboard antisubmarine warfare destroyers. Availability of the sonar failed to materialize as planned

due to major technical problems, and this sonar was not approved for service use until November 1968.

During 1966, destroyers were operating with sonars that did not regularly obtain ranges of more than 10,000 yards. Hence, while an operational radius of 30 nautical miles (about 60,000 yards) had been established as a requirement for and had actually been achieved during tests by DASH drones, the maximum weapon delivery requirement of the drones was only the effective sonar range. This factor led to eliminating the need for further DASH procurement and removing the drones from certain ships in the fleet. In this respect, FRAM I destroyers[1] were equipped with both the Anti-Submarine Rocket and DASH drones. Navy records state that the Anti-Submarine Rocket had proven to be a reliable weapon system and was not adversely affected by sea states and weather conditions. Since both DASH and the Anti-Submarine Rocket could similarly deliver antisubmarine warfare weapons, the Department of Defense considered the two systems to be redundant on FRAM I destroyers.

Therefore, in December 1966, the Secretary of Defense decided against further procurement of the drone helicopters and concluded that existing QH-50D drones should be used only on FRAM II destroyers and destroyer escorts of the 1006 and 1021 classes--these ships were not equipped with the Anti-Submarine Rocket. It was believed that, by using the existing inventory of these DASH drones on only the FRAM II destroyers and the aforementioned destroyer escorts, there would be a sufficient inventory of QH-50D drones on hand to meet the Navy's needs for the foreseeable future and that there would be no need for further procurement of DASH drones.

Subsequently, in December 1967 the Chief of Naval Operations directed removal of DASH drones from FRAM I destroyers, The Navy is presently utilizing QH-50D drones aboard

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[1]There were two types of modifications made to destroyers during the ship modification program discussed on page 9. One extended the useful life of the ship by about 8 years; these destroyers became known as FRAM I ships. The other type of modification extended the useful life about 5 years; these destroyers became known as FRAM II ships.

FRAM II destroyers and certain destroyer escorts. At the conclusion of our fieldwork, all of the Navy's QH-50D drones were assigned to the fleet except 18 drones which were being used principally for research projects. All but 3 of the remaining QH-50C drones were in storage. A Navy official informed us that the QH-50C drones are being retained as a contingency reserve for use in the event of a national emergency.

CHAPTER 5

CONTRACTOR COMMENTS AND RELATED GAO VIEWS

We sent a draft of this report to Gyrodyne for its review and comments. Gyrodyne's reply (see app. I) stated that the facts presented in our report draft were essentially correct but that there was other information not appearing in the report draft which, in Gyrodyne's opinion, would modify our conclusions. The contractor included this information in its reply.

Gyrodyne's principal comments related to conclusions in the report draft that the DASH Weapon System suffered a high rate of *loss* of the drone helicopters and lower-than-expected performance. The contractor noted in its comments that the basis of these conclusions was a statement made by the Secretary of Defense in congressional testimony during 1967 (see p. 16), and the contractor has taken issue with the Secretary's statement.

CONTRACTOR COMMENTS

Gyrodyne stated that there was no contractually-specified requirement with which to relate experienced peacetime attrition (rate of loss). The contractor noted that there was, however, a 1961 study by the Navy that presented estimated reliability and attrition goals. These goals were based on expected usage and experience with fixed wing drone fighters operating from land bases utilizing equipment of that era and outfitted with telemetry.[1] Gyrodyne presented data showing that the loss rate experienced by the drone helicopters was lower than that anticipated by the goals derived from the 1961 study,

The contractor stated that the lower-than-expected performance quoted by the Secretary of Defense has been assumed in our draft report to relate to recommendations

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[1] Telemetry is an electrical system that can be used to monitor performance of drone aircraft under operating conditions.

resulting from the Board of Inspection and Survey and Operational Evaluation Tests and to DASH requirements suggested by internal Navy documents, neither of which were contractually imposed, Gyrodyne concluded that noncontractual recommendations and requirements should not be construed as lower-than-expected performance,[1]

GAO VIEWS

The records we reviewed do not identify the data that the Secretary of Defense used to conclude that DASH experienced "*** higher-than-expected peacetime attrition and lower-than-expected performance ***." It appears, however, that his conclusion was based upon data developed by the Navy after its 1961 study. During 1966, in commenting on the April 1, 1965, Technical Development Plan for the DASH Weapon System, the Chief of Naval Operations indicated that the required reliability for the system called for each drone to provide, on the average, 125 hours of operation before being lost as a result of material failure. As indicated on page *14*, this operating requirement was restated in the report on the Operational Evaluation of the QH-50D. In the report, it was recommended that the QH-50D be accepted for service use only after the mean time between failures was at least 125 hours.

DASH drones did not meet the 125 operating hour objective discussed above, From July 1, 1966, through April 30, 1969, QH-50C drones flew over *4,600* hours and QH-50D drones flew over 11,600 hours, During this period, 76 QH-50C's and 109 QH-50D's were lost as a result of material failures, Using the Navy's method of computing the average operating time between losses resulting from material failure, these figures represent an average operating time between such losses of only about 61 hours for QH-50Cs and about 106 hours for QH-50Ds.

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[1]This contractor comment is related to the fact that, while some deficiencies found during tests of equipment result from contractors' failure to meet contractual requirements, other deficiencies relate to areas outside the scope of the contracts and are the responsibility of the Navy.

CHAPTER 6

NAVY COMMENTS AND RELATED GAO VIEWS

We sent a draft of this report to the Secretary of Defense for review and comments. The Assistant Secretary of the Navy (Research and Development), by letter dated April 29, 1970, provided us with the agency's reply (see app. 11). The Navy's principal comments together with our views are summarized below,

> The Navy stated that, at the initiation of the program in 1957, the Weapon System Planning Factor provided for an average of 25 hours of operation from each drone before it was lost. In its comments the Navy presented data showing that the average operating time experienced by drones before being lost exceeded 25 hours; the Navy therefore concluded that the loss rate was not as great as had been expected.

As discussed in the preceding chapter, DASH drones did not meet either (1) the required reliability of 125 hours discussed in the Chief of Naval Operations' 1966 letter relating to the Technical Development Plan or (2) the 125 hour mean time between failure recommended in the report on the Operational Evaluation of the QH-50D.

> The Navy stated that to fully evaluate the DASH Weapon System, the development and acquisition of the Drone Control System must be included as well as the small, lightweight drone helicopter. The control system, both airborne and ground, has contributed to a major portion of the drone losses.

According to statistics provided to us by Gyrodyne (see p. 36), only 32 of the 362 drone losses were attributable to failure of shipboard equipment, Of these, 10 losses were attributed to radar failure rather than failure of the shipboard (ground) control system. Based on these statistics, it appears that the shipboard control system was not a major factor contributing to drone losses.

The airborne control system has been responsible for a number of drone losses. This system is only one of many components of the drone helicopter. We believe that any effort to review the development and acquisition of individual components making up the helicopter would be unnecessarily costly and time consuming. Moreover, in our opinion, such a review would not alter the conclusion drawn from the facts discussed in this report, i.e., the difficulties experienced by the Navy with the DASH Weapon System resulted, in large part, from ordering the drones into production before they were fully developed and tested.

> The Navy stated that the deficiencies revealed during the Board of Inspection and Survey trials on the QH-50C were corrected. The Navy also indicated that corrective action was taken on deficiencies noted during the Board trials on the QH-500. Corrective action to enable flight under icing and rain conditions was taken by installing fiberglass blades, which included heating mats for anti-icing on the QH-50D. These blades were capable of being installed on the QH-50C.

Our review showed that not all deficiencies noted during the Board trials on the QH-50C were corrected. With respect to deficiencies noted during the Board trials on the QH-50D, some are still not corrected on the drones in the fleet, Specific examples are not discussed in this report because they are classified.

> The Navy stated that the record shows that deficiencies revealed during the Operational Evaluation on the QH-50C have been corrected where required; however, it was determined that correction of the other deficiencies would not be accomplished because of the impact on system effectiveness and program cost.

As discussed on page 15, during our review we asked Navy officials for, but were not provided with, data showing the disposition of deficiencies disclosed during the Operational Evaluation. After receiving the agency's comments on the report draft, we met with Navy officials and asked that they provide us with the record mentioned in the Navy

comments that shows the disposition of the deficiencies. At this writing, this record has not been provided to us.

> The Navy stated that drones delivered to the fleet do not have all the capabilities prescribed for them in the 1957 planning period due to changes in Specific Operational Requirements. The Specific Operational Requirements contain the prescribed capabilities for the drones delivered to the fleet; the requirement for the classified capability was eliminated by the Office of the Chief of Naval Operations.

Contrary to the views expressed by the Navy, there are certain capabilities, including some prescribed in 1957, which fleet drones do not have, and the requirement for these capabilities was not affected by changes to the Specific Operational Requirements. Examples of such capabilities are not discussed in this report because they are classified.

Navy records show that, in some cases, capabilities were not met or were canceled for reasons of economy; in other cases, difficulty was experienced in attempting to develop the capabilities,

CHAPTER 7

GAO VIEWS ON CONCURRENT DEVELOPMENT AND PRODUCTION

As stated in this report, we believe that the difficulties experienced with the DASH Weapon System resulted, in large part, from the Navy's ordering the drone helicopters into production before they were fully developed and tested. The practice of concurrently developing and producing weapon systems was a matter of concern to the Blue Ribbon Defense Panel. In its report of July 1, 1970, the Panel recommended that a new development policy for weapon systems and other hardware should be formulated and promulgated to cause the reduction of technical risks through demonstrated hardware before full-scale development, and to provide the needed flexibility in acquisition strategies. The Panel's report also stated that the new policy should provide a general rule against concurrent development and production, with the production decision deferred until successful demonstration of developmental prototypes.

In our report to the Congress--"Adverse Effects of Large-Scale Production of Major Weapons Before Completion of Development and Testing, Department of the Navy" (B-163058, November 19, 1970),--dealing with the Navy's practice of concurrently developing and producing weapon systems, we recommended that the Navy revise its instruction on concurrent development and production to provide for the submission of meaningful data to the Assistant Secretaries who make concurrency decisions. In addition, we recommended that the Navy Audit Service give consideration to making regularly scheduled audits into the practice of concurrent development and production. These recommendations were generally agreed to by the Navy, and we are therefore not making further recommendations at this time.

MATTERS FOR CONSIDERATION BY THE CONGRESS

In a prior report to the Congress--"Need for Management Improvement in Expediting Development of Major Weapon Systems Satisfactory for Combat Use" (B-163058, November 17, 1969)--we suggested that, to enable the Congress to exercise appropriate legislative controls over the funding of

major defense systems, the Congress may wish to require that:

--Determination be made by the Secretary of Defense, prior to authorizing production of a new system or major modification of an existing system, that all of its significant components have satisfactorily met all prescribed developmental tests.

--Notification be furnished by the Secretary of Defense to the appropriate congressional committees in any case where the Secretary considers that authorization of production is essential even though not all developmental tests have been satisfactorily completed; such notification should include the reasons for authorizing concurrent development and production and the status of development of each significant component.

We believe that the Navy's experience with the Drone Anti-Submarine Helicopter further illustrates the need for the Congress to be provided with information showing when the practice of concurrent development and production is employed by the Department of Defense to acquire major defense systems.

CHAPTER 8

SCOPE OF REVIEW

Our fieldwork in this review was performed during fiscal year 1970 and included examination of official records of the Department of the Navy at the Office of the Chief of Naval Operations, the Naval Air Systems Command Headquarters, and the Naval Ship Systems Command Headquarters, all of which are located in Washington, D.C. Also, we interviewed Navy officials in an attempt to obtain data relating to the DASH Weapon System which are not reflected in the official records made available to us.

In addition to our work in Washington, D.C., we visited the Navy Air Development Center, Johnsville, Pennsylvania; the Naval Plant Representative Office, Bethpage, New York; and the Operational Test and Evaluation Force, Norfolk, Virginia. At these activities, we reviewed selected records and discussed with Navy officials various matters relating to the DASH Weapon System.

APPENDIXES

GYRODYNE COMPANY OF AMERICA, INC.
ST. JAMES, LONG ISLAND, NEW YORK
11780
JUNIPER 1-5400

4 May 1970
A-4147

Mr. C. M. Bailey
Director, Defense Division
United States General Accounting Office
Washington, D. C. 20548

Dear Mr. Bailey:

We are pleased to have been afforded the opportunity to review your draft report to the Congress of the United States entitled "Adverse Effects of Producing Drone Anti-Submarine Helicopters Before Completion of Development and Tests -- Department of the Navy B-160877." The facts presented in your draft are essentially correct; however, information not appearing in your report will provide additional facts which would thereby modify your conclusions.

Information available to the Gyrodyne Company is summarized herein to indicate that the DASH Program has been successful, that loss rates have been substantially lower than anticipated, and that performance has been satisfactory. The "Adverse Effects of Producing Drone Anti-Submarine Helicopters Before Completion of Development and Tests," were minimal in nature, and therefore, it might be more appropriate to retitle your report to "Review of Effects of Producing Drone Anti-Submarine Helicopters Before Completion of Development and Tests."

The two major points of the GAO report leading to the conclusions presented were that the DASH System suffered a "high rate of loss" of the drone helicopters and "lower-than-expected performance."

The basis for the above conclusions was the statement made by the Secretary of Defense to the Armed Services Committee during the January-February 1967 hearings (reference Military Procurement Authorizations for Fiscal Year 1968 - Hearings - 1st Session on S. 666, page 106) in support

of the decision to reduce the planned deployment of the DASH System by about one-third and cancel the planned FY 67 Procurement.

Facts known to Gyrodyne, which are similar to those contained in the GAO report, pages 16 and 17, under the section heading "Withdrawal of DASH from Ships Armed with the Anti-Submarine Rocket," give the reasons for the decision to remove DASH from the FRAM I destroyers. These reasons are in sharp contrast to the statement made by the Secretary of Defense that it was a "high rate of loss" of the drone helicopters and "lower-than-expected performance" which led to the reduced utilization of the DASH System.

Based on facts that are presented herein, Gyrodyne does not understand the basis for the Secretary of Defense's adverse comments relating to attrition and performance.

In order to determine whether a "higher than expected peacetime attrition" had been experienced with DASH, it is first necessary to have established a requirement upon which to base the comparison. Although no reliability or operational usage contractual requirements had been specified for the DASH Weapon System, a 1961 study by the Naval Air Development Center presented reliability and attrition estimated goals based on expected usage and experience with fixed wing drone fighters operating from land bases utilizing equipment of that era and outfitted with telemetry.

Enclosure (1)presents a summary of the DASH reliability achievements for the seven (7) years covered by the GAO report (February, 1962 to April 1969) compared to the projected goal established by NADC. The Mean Time to Loss hours experienced with the QH-50C/D vehicles was in excess of twice the goal projected by NADC for Fleet operations and over nine times that projected for Navy training operations. Therefore, loss rate, in spite of additional usage, was lower than anticipated. A breakdown of the causes of losses is given in the same enclosure.

Enclosure (2) presents a summary of the QH-50D reliability achievements for the period 1 July 1966 to 31 July 1969. The Mean Time to Loss hours experienced were in excess of twice the goal projected by NADC for Fleet operations and over nineteen times that projected for Navy training operations.

The success ratio of 29.2 to 1 achieved by the Japanese Navy without the use of telemetry is indicative of the reliability of the system.

Enclosure (3) provides some samples of outstanding performance as achieved by the DASH Training Unit, Flight Site BRAVO at Dam Neck, Virginia, and the destroyers USS MOALE, USS SPERRY. USS STEINAKER and USS CHEVALIER.

The "lower than expected performance" quoted by the Secretary of Defense has been assumed in the GAO report to relate to the BIS and OPEVAL Navy Test Programs, and to requirements suggested for implementation upon the DASH System by internal Navy documents which have not been contractually imposed. The Contractor does not receive OPEVAL reports. From BIS tests, deficiencies are included in the test report which are recommendations by the test personnel for an improved system even though no requirements exist in the specifications. Therefore, deficiencies noted in the GAO report include specification deficiencies as well as non-contractual deficiencies. The Contractor is notified that non-contractual deficiencies are to be corrected only after review for desirability and proper contractual authorization.

For example, the BIS report on the QH-50C listed thirteen (13) deficiencies for which correction was considered mandatory - eight (8) of which were the Navy's responsibility and five (5) of which were recommendations for product improvement through contract changes. The BIS report for the QH-50D recommended acceptance for service use provided satisfactory corrective action was taken on twelve (12) deficiencies, four (4) of which were recommended to be completed prior to Fleet deployment and eight (8) of which were recommended to be corrected but not to interfere with Fleet deployment. These twelve deficiencies included five (5) which were the Government's responsibility, three (3) which were isolated malfunctions and four (4) which were considered the Contractor's responsibility. Of the four (4) that were considered the Contractor's responsibility, two (2) were procedural changes, and one (1) was a specification change.

Enclosure (4) lists the major co-development programs initiated by the Navy to provide additional capabilities if deemed necessary for wartime or expended use of the weapon system. Several of these co-developments were called out in the Specific Operational Requirement (SOR) W22-04. Incorporation of these eo-developments on the production vehicles was not authorized.

BIS and OPEVAL non-contractual recommendations and SOR non-contractual requirements should not be construed as "lower than expected performance."

An article contained in "Anti-Submarine Warfare Quarterly," Winter-1968, provided the information that during fiscal year 1968 the DASH effectiveness was greater by 9% than that experienced by Mark 44 Tube or ASROC delivery systems. This article summarized the achievements of DASH by the following statement:

> "THIS SYSTEM HAS COME FROM AN ABBREVIATED BAST, ESTABLISHED A COMMENDABLE PRESENT AND OPENED THE WAY TO AN EVER-EXPANDING FUTURE IN DRONE HELICOPTER AVIATION. "

The article presented certain information utilized in obtaining various systems effectiveness. Enclosure (5) has been prepared to present the comparative cost of ASROC and DASH for equal number of torpedo firings.

The GAO report indicates that through June 30, 1969, the Navy spent $275,000,000 for development and acquisition of the DASH Weapon System and that the Navy lost, through April 1969, 362 out of the 750 vehicles purchased.

The vehicle loss period covered by the GAO report appears to be from February 1962 through April 1969, or approximately seven (7) years. This period includes approximately one (1) year of development and evaluation phase testing and six (6) years of operational usage. Enclosure (1) indicates that eight (8) vehicles were lost during development and production tests and fifty-eight (58) during Fleet training and a total of 13,800 flight hours was accumulated in these two phases. It is also shown in enclosure (1) that during the approximate six years of operational usage, the Fleet accumulated 1'7,072 hours of flight and lost 296 vehicles. The development and the major portion of the training programs had the benefit of telemetry. The Fleet operations did not utilize telemetry except for a limited use by five (5) ships under the SNOOPY Project. The accumulated flight hours of 30,872 represent at least over 30,000 flights and missions, and it is remarkable to note that DURING THE ENTIRE PERIOD, NO HUMAN LIFE WAS LOST.

It has been estimated that the average cost of the QH-50C/D, including engine, is approximately $125,000. Based on this figure, the cost of the 362 lost vehicles amounts to $45,250,000. This is the loss for development, training and a six-year period of operational use involving more than 100 destroyers. Based on the $275,000,000 investment by the Navy for this ASW capability, with the weapon system entering its seventh year of operational use, the total attrition represents only 16.4% of the total investment.

Although utilization of the DASH destroyers is being reduced, the assets of DASH are being used toward the development of several other Weapon Systems, thus making the remaining inventory of DASH still a valuable asset to the U.S. Government.

The capability of the QH-50C/D to perform many other functions besides the original torpedo-carrying ASW function has been recognized bv the Savy, the Advanced Research Projects Agency of the DOD, and to some extent by the other Services.

Enclosure (6) lists derivatives of the basic DASH System that have been and are being tested for other purposes. These functions make use of the inherent capabilities of the Coaxial Helicopter Rotor concept incorporated in the QH-50C/D vehicles. The defense potential and cost effectiveness of the DASH derivative -- Nite Panther/Nite Gazelle -- is presented in the classified document, Sensor Aided Combat Systenis (U), NSIA Symposiuni Proceedings, Serial No. 678-70, page 10-1, titled "Stand-Off Sensing and System Implications."

The DASH Weapon System is the only remotely controlled system which has been deployed without telemetry. The advantage of telemetry for increased Mean-Time-Between-Loss has been demonstrated by the comparative performance between the Training Sites and the Fleet, as shown in enclosure (1).

Based on the inforniation supplied herein, Gyrodyne believes that the DASH Weapon System is a successful and economical Weapon System. A major stand-off ASW capability has been provided for the defense of the United States. The derivatives of DASH presently being tested will provide additional economical and effective defense systems.

Very truly yours,

GYRODYNE COMPANY OF AMERICA. INC.

Peter J. Papadakos
Peter J. Papadakos
President

QH-50C D MEAN TIME TO LOSS COMPARISON DATA FOR PERIOD FEBRUARY 1962 THROUGH APRIL 1369

Site	Flight Hours	Losses	MTBL (hr)	Ratio to NADC* Projected Goal
LANT FLEET Training Dam Neck	5,738	23	250	10:1
PAC FLEET Training San Clem. Is.	6,187	35	176	9:1
LANT & PAC FLEET	17,072	296	58	2.3:1
GYRODYNE DEVELOP-MENT & PRODUCTION TEST	1,875	8	235	9.4:1
Total	30,872	362	85	3.4:1

* NADC confidential report "A Decision of Weapon System Planning Factors for the DSN-3 Drone Anti-Submarine Helicopter (DASH)" TM-64-61, dated December 1961

CAUSES OF QH-50C, D LOSSES

From incident reports and telemetry records where available. the causes of QH-50C, D losses have been allocated as shown in the following chart:

	Quantity Lost	Percent, Cause
Vehicle	187	52
Human Factors	88	24
Shipboard Equipment	32 (10 lost by radar)	9
Unknown	55	15
Total	362	100%

QH-50D RELIABILITY FOR PERIOD 1 JULY 1966 - 31 JULY 1969

Site	Telemetry Used	Flight Hours	Losses	MTBL (hr)	Ratio to NADC* Projected Goal
LANT FLEET Training Dam Neck	Yes	1973	4	493	19.7:1
PAC FLEET Training San Clem. Is.	Yes	2848	13	219	8.8:1
LANT FLEET Ships	No	4160	52	80	3.2:1
PAC FLEET ships	No**	3727	66	56	2.2:1
JAPANESE***	No	733	1	733	29.2:1
GYRODYNE PRODUCTION TEST	Yes	700	0	- -	- - -

* NADC confidential report "A Decision of Weapon System Planning Factors for the DSN-3 Drone Anti-Submarine Helicopter (DASH) "TM-64-61, dated December 1961

** Starting 1 July 1968 T/M installation was started on five (5) ships. Operational data is unknown.

*** The span of calendar time for the flight hours is 7 January 1967 to 1 December 1969.

SAMPLES OF OUTSTANDING DASH RELIABILITY

(a) With Telemetry

U. S. Atlantic Fleet DASH Training Unit Flight Site BRAVO at Dam Neck, Virginia	As reported in Navy Times dated 23 February 1968, flight site BRAVO celebrated a Second Anniversary of accident-free flying. During this period over 1700 operating hours were logged with 1400 of these hours representing actual time in the air. 150 Junior Officers were qualified as DASH Controllers during this period.
USS MOALE	During the September - October 1969 operations under Project F0251 "DESJEZ", over 75 hours were logged without loss in a 3-week period. A 50-mile vehicle control range from the ship at 4700 feet altitude on a 3.8-hour flight was achieved.

(b) Without Telemetry

USS SPERRY	During December 1967, operated for 105 flight hours (20 at night) over a 19-day period with no loss.
USS STEINAKER	From October 1966 to November 1968, 311 flight hours were recorded with one loss.
USS CHEVALIER	During January 1968, 56 flight hours were recorded during a 3-day operation without loss (approximately 1/2 of the operating time was at night).

SAMPLES OF OUTSTANDING DASH RELIABILITY (Cont.)

1. The USS STEINAKER (DD-863) conducted the following accident-free DASH operations over a 16-month period (1 July 1967 through October 1968):

   280 Flight Hours

   During: 272 day flights
   81 night flights
   334 landings

   (In May 1968 flew 95.8 hours while in Seventh Fleet.)

   (In April 1968 during transit from Panama Canal to San Diego flew DASH 38 hours during 25 flights with a 20-minute average on-deck time between flights.)

2. The Commanding Officer stated:

   "---The success of the system hinges on its continual utilization; and, for this reason, STEINAKER flew extensively day and night. The system proved to be a rugged and dependable one, in some cases under severe wind and sea conditions. The confidence and proficiency of the DASH personnel were proportional to the number of hours of operation."

3. The Commander Destroyer Squadron Two said:

   "--- STEINAKER is commended for the aggressive and professionally competent manner in which the command has pursued and maintained effective DASH operations during the period cited. It is interesting to conjecture what the future of the DASH concept would be if fleet-wide experience matched STEINAKER'S consistently reliable performance. ··

4. The Commander Cruiser-Destroyer Flotilla Four stated:

   "The remarks - (above) - are fully supported. Again, it is ably shown that people are so often the key to our successes."

DASH CO-DEVELOPMENTS

During the development and production of DASH, the following items were also developed but were not incorporated in the production vehicles:

1. Features to enable flights through icing conditions and heavy rain. The capability of the vehicle to fly through icing conditions was demonstrated in the Cold-Chamber Facility at Eglin AFB. The production fiberglass blades incorporate a heating element for deicing, but installation of the remainder of the equipment has been held in abeyance. The leading edge of the blade is suitable for flights through heavy rain conditions.

2. Engineering and tests to provide the QH-50C/D with the capability to carry a special weapon were successfully completed.

3. Precision navigational capability was developed by the utilization of the Surface Speed Sensing System. Engineering work and tests were satisfactorily completed.

4. A Special Support Telemetry System to monitor the performance of the vehicles was developed. Its use was restricted to the training sites and ship's qualification trials of each destroyer.

5. Twelve (12) sets of operational telemetry capable of monitoring the vehicle performance and providing capabilities for Sonobuoys, vehicle tracking and other functions were developed and procured.

COMPARATIVE COST OF ASROC TORPEDO LAUNCHINGS FOR THREE (3) FISCAL YEARS WITH EQUIVALENT DASH LAUNCHINGS DURING SAME PERIOD

		ASROC			DASH			
Fiscal Year	Number of Firings	Rocket	Torpedoes Lost (Malf.)	Total	Vehicles Lost	Torpedoes Lost (Malf.)	Torpedoes Lost/Veh. Loss	Total
1966	166	9,130,000	$1,152,000	$10,282,000	$178,750 (1.43 Loss)	$1,008,000	68,640	$1,255,390
1967	185	10,175,000	1,056,000	11,231,000	201,250 (1.61 Loss)	840,000	77,280	1,118,530
1968	125	6,875,000	7'32,000	7,667,000	135,000 (1.08 Loss)	576,000	51,840	762,840
				$29,280,000				$3,136,760

The costs above have been computed as follows:

ASROC - $55,000. Expended in each torpedo launching.

MK-44 Exercise Torpedo - $24,000. Torpedo losses were obtained from the information set forth in the article "Facts and Figures" referenced below.

DASH Vehicle - $125,000 each. The loss costs based on Mean Time to Loss of 58 hrs and each vehicle dropping two torpedoes per mission.

The above comparative analysis is based on data excerpted from an article entitled "Facts and Figures" authored by Lt. J. M. Shull, Jr., USN and Lt.(jg) R. C. Adams, USNR, U.S. Atlantic Fleet DASH Training Unit, Dam Neck, Virginia, and printed in "ANTISUBMARINE WARFARE QUARTERLY, WINTER - 1968" (COMASWFORLANT - NORVA). This article also shows that DASH System effectiveness has consistently topped ASROC. DASH performance ran a close second to tube shots until FY 1968 when DASH effectiveness proved the greater by 9%.

DERIVATIVES OF DASH

The following is a list of projects that have been derived from DASH:

Project Name	Sponsor	
1. DESJEZ	NAVY	Sonobuoy Dispensing for ASW Detection
2. SNOOPY	NAVY	Surveillance with TV; Gunspotting
3. MIDGET	NAVY	Evacuation or Rescue (Personnel)
4. DAMPS	NAVY-Dam Neck	Electronic Countermeasures
5. SEEK LAUNCHER	ARPA/AIR FORCE	Surveillance-Base Perimeter Defense
6. BLOW LOW	DIA/ARPA/NAVY	Surveillance (Day or Night) Several Sensors
7. ARMY ARMED DRONE	ARPA/ARMY	Ordnance Delivery/TV Surveillance (Grenades, Bomblets)
8. NITE PANTHER	ARPA	Surveillance and Artillery Spotting by the use of Radar, day and night TV, and other sensors with tracking capability for moving targets
9. NITE GAZELLE	ARPA	Nite Panther with Ordnance delivery capability on stationary and moving targets: Ordnance: Precision Bombing SAWS Ammo Rockets Missiles
10. GRANDVIEW	ARPA	Nite Gazelle operating through a Relay Data Link to extended ranges
11. CARGO	GYRODYNE	Pick up and delivery of cargo to high risk areas
12. SMOKE LAYING	GYRODYNE	Laying of Smoke to provide protective screening

DEPARTMENT OF THE NAVY
OFFICE OF THE SECRETARY
WASHINGTON, D.C 20350

29 APR 1970

Mr. Charles M. Bailey
Director, Defense Division
U. S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Bailey:

The Secretary of Defense has asked me to reply to your letter of 25 February 1970 which forwarded the GAO draft report cn the drone anti-submarine helicopter.

I am enclosing the Navy reply to the report.[1]

Sincerely yours,

Encl:
(1) Navy Reply to GAO Draft Report of 25 Feb 1970 on the Drone Anti-Submarine Helicopter (OSD Case #3084)

[1] GAO note: The Navy's reply cites the page numbers on which material discussed in this report appeared in the draft report provided to the Secretary of Defense. These page numbers may not coincide with the location of the material in this report.

Navy Reply

to

GAO Draft Report of 25 February 1970

on

Drone Anti-Submarine Helicopter

(OSD Case #3084)

I. GAO Findings and Conclusions

GAO found that the Navy spent over a quarter of a billion dollars for the development and acquisition of the DASH (Drone Anti-Submarine Helicopter) weapon system. The DASH is a small, lightweight drone helicopter which operates from surface ships for the purpose of attacking and destroying enemy submarines and is designed for unmanned, remote-controlled delivery of ASW (anti-submarine warfare) torpedoes. GAO states that the system suffered from a high rate of loss of the drone helicopters and lower-than-expected performance; the Navy lost 362 of the 750 drones purchased. GAO believes that the difficulties experienced with the system resulted largely from the Navy's ordering the helicopters into production before they were fully developed and tested.

GAO found that at the time these helicopters were under development in the early 1960's, the Navy was modifying its destroyers by installing on them the equipment needed to permit drone helicopters to operate from the ships, even though the helicopters were not scheduled to be available aboard the ships when the ship modifications were to be completed.

GAO concludes that since modifications of the first ship were completed nearly 3 years before delivery of the first drone helicopter to the fleet, strong pressure was created on the Navy and the contractor to expedite development and delivery of the helicopters.

GAO found that no purchases of the drone helicopter have been made since June 1966 and there are no plans for future purchases.

[See GAO note.]

GAO note: Omitted material relates to matters not pertinent to this report.

Enclosure (1)

II. Navy Position

While there are no recommendations, the findings and conclusions address specific main areas. Comments are offered in these areas.

a. General

With regard to GAO's statement on Page 14 of the report that "the DASH weapon system was plagued by a high loss rate", the loss of only 362 drones of the 750 drones purchased, was far less than anticipated based on the planning factors established in 1957. At the initiation of the program in 1957, the Weapon System Planning Fector for the Drone Anti-Submarine Weapons System established a MTBL (Mean Time Between Loss) of 25 hours. During the period 1964 through 1966 a total of 12, 152.4 hours were flown with 152 losses (on an MTBL of 79.9 hours). During the period from January 1967 through April 1969 26,500.4 hours were flown with 183 losses (MTBL of 144.8 hours)[1].

To fully evaluate the DASH Weapon System, the development and acquisition of the Drone Control System (SRW-4) must be included as well as the small, lightweight drone helicopter, The control system, both airborne and ground, has contributed to a major portion of the drone losses.

As to the cost of the program to date, the quarter of a billion dollars includes ship modification, drone control systems, drones, special support equipment, spares and publications.

b. Concurrent Deyelopment and Procurement of DASH

(1) GAO states on pages 1,5,6 and 7 of the report that:

(a) the Navy ordered the drones into production before they were fully developed and tested.

(b) in January 1960, when modifications were completed on the first ship involved in the program, a "ship to drone gap" appeared; this gap, together with the capability the drone helicopter was expected to afford the fleet, was a major factor leading to production before full development and testing.

Comment. Before production was initiated for the drone vehicles, experimental flights were conducted to prove the system concept. In 1958, modifications were made to a manned rotocycle and flight tests were conducted. In addition, the first drone flight with a safety pilot was made in October 1959.

The modification of the first ship was completed in January 1960. The Navy was embarked on a large scale modernization which included an effort to upgrade the destroyers. This effort was called Fleet Rehabilitation and Modernization (FRAM) program. In destroyers the FRAM overhaul required about one year to complete. The hanger

[1] GAO note: After receipt of the Navy comments, a Navy official informed GAO that the statistics in this paragraph were incorrect. Information obtained during GAO's review shows that the MTBL of 79.9 hours shown above should be 73.2 hours and the MTBL of 144.8 hours should be 78 hours.

and flight deck for DASH were combined as a part of this effort. Separating the DASH modifications and the rest of FRAM in order to accommodate Fleet introduction was not feasible.

To provide remote drone controls for installation, a contract was executed for delivery commencing in December 1961. By September 1562, 39 control systems had been delivered. The Navy acceptance of drone test vehicles, less support, commenced in September 1961 (15-DSN-3). The acceptance and introduction into the Fleet of DASH production vehicles (42-DSN-3) commenced in November 1462. Successful flight testing of a coaxial manned helo and a drone helicopter with a safety pilot provided the assurances and justification, upon which the initiation of production of drone helicopters WRS based.

(2) GAO states on page 7 of the report that in the 35 month period from December 1960 to December 1963 the Navy ordered 127 QH-50C drones although: (a) the test program was conducted and revealed a large number of deficiencies, (b) 27 drones crashed, and (c) QH-50C drones were grounded far about 4½ months in 1963 because of equipment problems.

Comment. During this period: (a) the test program including BLS (Board of Inspection and Survey) was conducted and the deficiencies revealed were corrected; (b) the 27 drones were lost from causes including human errors, control guidance equipment and vehicle malfunction; and (c) the problems causing the 4½ months grounding in 1363 did not become apparent during the earlier test program.

(3) On page 8, GAU states that the QH-50C did not have the required all-weather capability and guidance accuracy.

Comment. The Qii-50C DASH vehicle's performance was not satisfactory in rain and in icing conditions. Other aspects of the all weather requirement were satisfied. However, this is not construed to mean that DASH was meant to fly in every conceivable weather condition. As to the guidance accuracy of the QH-50C Weapon System, this was considered acceptable as a result of OPEVAL (Operational Evaluation) Test Report, Phase 11, dated 24 April 1964.[1] In addition, modifications to improve range and performance were made on the QH-50C; some of these improvements were a direct result of fleet tests. These improved performance characteristics become a part of the specification for the QH-50D.

c. Test nnd Evaluation Program

Beginning on page 9, GAO discusses the three phases of this program: (1) technical evaluation, (2) BIS, and (3) operational evaluation.

(1) Test and Evaluation. GAO states on page 9 that at the time of the review, they were unable to determine the nature or the

[1] GAO note: The test report stated that the guidance accuracy did not meet the operational requirement but was considered acceptable.

results of the technical evaluation phase, because Navy officials did not know which tests were. made; this lack of knowledge apparently resulted because tlic current key DASH officials are relatively new to the program.

Comment. Technical Evaluation (the Contractor Demonstration) was made on the QH-50C/QH-50D to certify the performance of the DASH Weapon System as equipment ready for BIS. Contractor Demonstration reports have been located and are available for review?

(2) BIS reports. Page 10 of the report states that the final report on the BIS trials recommended that the QH-50C be finally accepted for service use provided satisfactory corrective action was taken on 13 deficiencies classified as mandatory and recommended corrections on 27 additional deficiencies. With regard to the QH-50D, GAO states on page 12 that major conclusions reached from the BIS trials were that: (a) DASH should satisfactorily perform its ASW mission upon correction of the 12 deficiencies, and (b) DASH was not satisfactory for operation under icingconditions and had limited capability for operation in rain.

Comment. corrective action to enable flight under icing and rain conditions was taken by installing fiberglass blades on the QH-50D; these blades, capable of being installed on the QH-50C, included heating mats for anti-icing and leading edge erosion strips preventing rain erosion. Corrective action was implemented on the other deficiencies noted.

(3) Operational Evaluation. GAO states on page 11 that OPTEWOR (Operational Test and Evaluation Force) recommended that the QH-50C be accepted for service use contingent upon (a) the redesign of QH-50C avionics to prevent uncommanded functions and (b) the installation of a radar augmentation device on the drone. OPTEVFOR made other recommendations, not affecting the contingent approval, regarding the operational and tactical use of the QH-50C.

Comment. The record shows that deficiencies have been corrected where required; however, it was determined that correction of the other deficiencies would not be accomplished because of the impact on system effectiveness and program cost.

d. Fleet Experience with DASH

On page 14, GAO states that DASH drones delivered to the fleet do not have all the capabilities that haye been prescribed for them. For example, fleet drones do not have certain CLASSIFIED capabilities even though, as far back as August 21, 1957, in the basic development characteristic €or the drones, there were requirements calling for those capabilities.

[1]GAO note: Revisions have been made in this report as a result of the information provided to us by the Navy on this matter.

Comment. Drones delivered to the fleet do not have all capabilities prescribed for them in the 1957 planning period due to changes in SOR (Specific Operational Requirements). The SOR contains the prescribed capabilities for the drones delivered to the fleet; the requirement for the classified capability was eliminated by the Office of the Chief of Naval Operations.

PRINCIPAL OFFICIALS OF THE DEPARTMENT OF DEFENSE AND THE DEPARTMENT OF THE NAVY RESPONSIBLE FOR ADMINISTRATION OF ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
DEPARTMENT OF DEFENSE		
SECRETARY OF DEFENSE:		
Melvin R. Laird	Jan. 1969	Present
Clark M. Clifford	Mar. 1968	Jan. 1969
Robert S. McNamara	Jan. 1961	Feb. 1968
Thomas S. Gates, Jr.	Dec. 1959	Jan. 1961
Neil H. McElroy	Oct. 1957	Dec. 1959
Charles E. Wilson	Jan. 1953	Oct. 1957
DEPARTMENT OF THE NAVY		
SECRETARY OF THE NAVY:		
John H. Chafee	Jan. 1969	Present
Paul R. Ignatius	Aug. 1967	Jan. 1969
Paul H. Nitze	Nov. 1963	June 1967
Fred Korth	Jan. 1962	Nov. 1963
John B. Connally	Jan. 1961	Dec. 1961
William B. Franke	June 1959	Jan. 1961
Thomas S. Gates, Jr.	Apr. 1957	June 1959
Charles S. Thomas	May 1954	Mar. 1957
CHIEF OF NAVAL OPERATIONS:		
Admiral Elmo R. Zumwalt, Jr.	July 1970	Present
Admiral Thomas H. Moorer	July 1967	June 1970
Admiral David L. McDonald	Aug. 1963	July 1967
Admiral George W. Anderson	Aug. 1961	July 1963
Admiral Arleigh A. Burke	Aug. 1955	Aug. 1961

PRINCIPAL OFFICIALS OF

THE DEPARTMENT OF DEFENSE AND

THE DEPARTMENT OF THE NAVY

RESPONSIBLE FOR ADMINISTRATION OF ACTIVITIES

DISCUSSED IN THIS REPORT (continued)

	Tenure of office			
	From		To	
DEPARTMENT OF NAVY (continued)				
COMMANDER, NAVAL AIR SYSTEMS COMMAND: (formerly Chief, Bureau of Naval Weapons)				
Rear Admiral T. J. Walker	Feb.	1969	Present	
Rear Admiral R. L. Townsend	May	1966	Feb.	1969
CHIEF, BUREAU OF NAVAL WEAPONS:				
Rear Admiral Allen M. Shinn	May	1964	Apr.	1966
Rear Admiral W. T. Hines (acting)	Mar.	1964	May	1964
Rear Admiral K. S. Masterson	Nov.	1962	Mar.	1964
Rear Admiral Paul D. Stroop	Sept.	1959	Oct.	1962
CHIEF, BUREAU OF AERONAUTICS:				
Rear Admiral Robert E. Dixon	July	1957	Dec.	1959

U.S. GAO Wash., D.C.