A RESEARCH STUDY OF THE ROTARY WING TEST AND EVALUATION SEGMENTS AT THE NAVAL AIR TEST CENTER, PATUXENT RIVER, MARYLAND

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NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

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by

Bruce Leon Valley

June 1975

Thesis Advisor: P. W. Benediktsson

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A Research Study of the Rotary Wing Test and Evaluation Segments at the Naval Air Test Center, Patuxent River, Maryland

by

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Lieutenant, United States Navy
B.S., United States Naval Academy, 1966

Submitted in partial fulfillment of the requirements for the degree of

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ACRONYMS

AST	Accelerated Service Trials
BIS	Board of Inspection and Survey
CNATC	Commander, Naval Air Test Center
CNO	Chief of Naval Operations
COMOPTEVFOR	Commander, Operational Test and Evaluation Force
CSD	Computer Services Division
DDT&E	Director, Defense Research and Engineering
DDT&E	Deputy Director for Test and Evaluation
DOD	Department of Defense
DSARC	Defense Systems Acquisition Review Council
EJFTC	Eastern Joint Flight Test Center
ETR	Eastern Test Range
FT	Flight Test Division
HUD	Heads-up Display
IHTF	Integrated Helicopter Test Facility
IOT&E	Initial Operational Test and Evaluation
ITEF	Integrated Test and Evaluation Facility
LATA	Lower Atlantic Test Area
MATACQ	Material Acquisition
NATC	Naval Air Test Center
NADC	Naval Air Development Center
NATF	Naval Air Test Facility
NAS	Naval Air Station

NAVMAT	Naval Material Command
NASA	National Aeronautics and Space Administration
NASC	Naval Air Systems Command; also NAVAIR, NAVAIRSYSCOM
NOL	Naval Ordnance Laboratory
NRL	Naval Research Laboratory
OPNAV	Office of the CNO
OPR	Office of Prime Responsibility
OT&E	Operational Test and Evaluation
PMA	Program Manager (Air)
RDT&E	Research, Development, Test and Evaluation
R&M	Reliability and Maintainability
SAR	Search and Rescue
SECDEF	Secretary of Defense
SECNAV	Secretary of the Navy
SSP	Senior SAR Pilot
ST	Service Test Division
STOL	Short Take-off and Landing
T&E	Test and Evaluation
TELO	Test and Evaluation Liaison Office
TECO	Test and Evaluation Coordinator
TEMP	Test and Evaluation Master Plan
TPS	Test Pilot School
TSD	Technical Services Division
VLA	Visual Landing Aid
VSTOL	Vertical/Short Take-off and Landing
WST	Weapons Systems Test Division

I. INTRODUCTION

A. GENERAL BACKGROUND

1. History

The Naval Air Test Center (NATC) was commissioned on 1 April 1943 at Patuxent River, Maryland as a complete test and evaluation command for Naval Aircraft and related systems. It was originally conceived as a consolidation of the various and previously scattered activities associated with the service acceptance of Naval aircraft. It has conducted evaluations on every air weapons system introduced into the fleet since that time.

2. Facilities

NATC covers an area of some 6800 acres, including flat ground with some interior bodies of water. It is bounded by water on three sides for eight nautical miles of waterfront covering sixty percent of the perimeter. Thus providing limited security and encroachment protection. The location is ideally situated in close proximity to Naval Headquarters in Washington, D. C. and numerous other organizations with direct work relationships with NATC. Naval Weapons Center (Dalgren, VA), Naval Ordnance Laboratory, NASA (Wallops Island), and the Naval Air Test Facility (Lakehurst, N.J.) provide several good examples.

A geographic sketch of NATC and its surroundings is presented as Figure 1, Appendix A. It is seen that despite the close proximity of those facilities mentioned above, NATC is located in a sparsely settled area which, with the adjacent Chesapeake Bay, is ideal for Naval aircraft test operations.

The Test Center possesses two primary air spaces, a close-in highly-instrumented range area to the east of the field and a large ocean-operating area in the Atlantic. Ordnance separation testing, structural testing, performance testing, and supersonic testing take place within these areas. The location of the NASA Wallops Island Facility just to the south of the Atlantic range area offers potential for mutual operations and range instrumentation.

The Naval Air Test Center is equipped with a wide variety of facilities which are uniquely required to conduct Naval aircraft weapons systems testing. These facilities are described in detail in References 1, 2, and 3 and are as follows:

Catapults
Arresting Gears
Automatic Carrier Landing Systems Development Site
Visual Landing Aids Development Site
Overwater Approaches
Instrumented Sonobuoy Range
Water-Edge Test Area
Environmental Test Facilities
HERO Facilities
ASN Tactical Support Center Development Site
Seaplane Operating Area (presently active)

Additionally, NATC is well equipped with the basic facilities required for aircraft weapons systems testing including:

Phototheodolite/Instrumentation Radar Tracking Range
Interference Test Lab Shielded Hanger
Antenna Model Range
Real Time Telemetry
Extensive Test Instrumentation
Standards and Calibration Labs
Ordnance Targets
Gun Firing Tunnel
Centrifuges
Jet Engine Test Facilities
Thrust Stand
Aircraft Scales
Low Pressure Chamber
Electro-Optical Range
Rocket Firing Facility
Scientific Computer Services

Current advance planning calls for the construction of an Integrated Test and Evaluation Facility (ITEF) at NATC within five years. The heart of this facility will be a large anechoic hanger which will allow the accomplishment of T&E simultaneously on one or more weapons systems in a synthesized environment with targets generated while the aircraft is on a desinated flight profile with a predetermined and controllable mission scenario. This state-of-the-art T&E facility is described in detail in References 4 and 5.

The Naval Air Test Center is fully equipped with all the conventional housekeeping necessities required to maintain a large operating air base. It has a total of seventeen large hangers, machine shops, public works, intermediate maintenance repair, three heavy-duty runways including an 11,800 foot all-weather runway, explosive handling and storage facilities,a large well-rounded supply department, extensive photo laboratory, ample base housing and modern hospital. Support facilities include:

All-weather Navigation and Control Station
Security/Marine Air Detachment
Laboratory Spaces
Upkeep and Repair Facilities

The Test Center shares the Patuxent River complex with a number of other tenants including several fleet squadrons (VC-4, VXN-8), a patrol reserve squadron (VP-68), a patrol training squadron (VP-30), and a number of ancillary organizations such as Fleet Air Training Unit Atlantic. Additionally, the U. S. Naval Test Pilot School and Operational Test and Evaluation Squadron One (VX-1) are based there. Despite the large number of tenants, NATC included, the Patuxent River complex is considered to be adequate in size and condition for current and predicted needs and has in the past been the subject of numerous proposals for further accomodation of additional RDT&E activities or fleet units at that location.

3. Organization

Reference 6 describes the Naval Air Test Center as a Class III activity under the command of the Chief of Naval Material with the chain of command extending through the Commander, Naval Air Systems Command. A flowchart presentation of the chain of command from the Secretary of Defense through the Commander, Naval Air Test Center (CNATC), and the position occupied by CNATC within the Naval Air Systems Command organization is presented as Figures 1 and 2, Appendix B.

The present NATC organization is of the traditional line-staff type. It is a military-civilian technical organization under military management. The NATC organization is presented as Figure 3, Appendix B. The Commander, Naval Air

Test Center, in addition to his staff which includes a group of program managers, controls six divisions; three test divisions, Flight Test Division, Service Test Division, and Weapons Systems Test Division; two support divisions, Technical Support Division and Computer Services Division; and the U. S. Naval Test Pilot School.

As can be seen above, NATC is structurally organized for functional testing. In essence, each branch of the NATC divisions represents a center of expertise in its area of testing and is organized to be able to accomplish relatively complete T&E in its area. A representative division organization is depicted in Figure 5, Appendix B.

NATC's division organization has formed primarily through an evolutionary process. As weapons systems increased in complexity, the need to have specialists and experts evaluate particular aircraft components or areas of interest increased. Thus were the three functionally-oriented divisions, Flight Test, Service Test and Weapons Systems Test formed. Each division evaluates that part of the total weapons system within its area of expertise: Flight Test evaluates flying qualities and overall performance; Service Test evaluates engine characteristics, human engineering, service suitability, and reliability and maintainability (R&M); Weapons Systems Test evaluates weapons/airframe compatibility, separation characteristics, and avionics performance.

Within each division, the organization is further broken down to branch levels with categories determined by

aircraft type and, more frequently, by mission description (i.e., carrier suitability, ordnance separation). Each branch contains a branch head (USN/USMC 04/05) and a chief engineer (GS-13/14), plus a pool of project test pilots/project officers, engineers, and technicians. To conduct a test project, a team of pilots, engineers, and technicians are selected from the pool and will generally remain together on the project until the testing is completed and the final Technical Report has been published. This Team is the fundamental working unit at NATC and has proven the catalyst for a successful marriage of civilian/military and operational/technical backgrounds.

In addition to the three functional divisions, two multi-faceted support divisions provide support services for T&E. Both support divisions are located on-station and remain under the control of CNATC. Technical Services Division (TSD) performs all laboratory calibrations, provides airborne and ground instrumentation and data acquisition for all NATC projects, and manages the Naval Air Systems Command's twenty-two million dollar instrumentation pool. Additionally, TSD provides conventional and telemetry real-time data handling systems as well as phototheodolite and instrumentation radar tracking coverage. Computer Services Division (CSD) provides all the computer and automatic data processing services for the Test Center, performs analysis and programming of all management information and scientific computer work, and operates the central computer system.

B. CURRENT TRENDS

Since 1969, several major studies, such as the President's Blue Ribbon Defense Panel and the Congressional Committee on Government Procurement, have been made of the organization and management of the Department of Defense. Among the many conclusions of these studies, the ones most affecting NATC are the identification of a requirement for more operationally-oriented test and evaluation and the recognition that the most effective operational test and evaluation (OT&E) would be achieved when the test organization reported directly to the Chief of the Service, representing both the developer and the user, but organizationally independent of both.

In the Department of Defense (DOD), the office of Deputy Director Test and Evaluation (DDT&E) under Director Defense Research and Engineering (DDR&E) was established with across-the-board responsibility for the Secretary of Defense (SECDEF) in T&E matters. This office possesses great authority in T&E, derived from the role as principle DOD spokesman for T&E before Congress, direct access to SECDEF, and participation in the Defense Systems Acquisition Review Council (DSARC). DSARC is a relatively new management layer and decision-making apparatus in the procurement process and is discussed in Reference 3. Significantly, DDT&E while advocating the principle of independent OT&E, seeks to avoid overly long program stretch-outs by permitting OT&E to be accomplished by the developmental test activity, such as NATC. Within the Navy, the Commander, Operational Test and Evaluation Force

(COMOPTEVFOR) was already organized for such objective T&E management and thus was assigned OT&E responsibility with direct access to the Chief of Naval Operations (CNO).

Many of these recent changes are in direct response to procurement problems exposed by the two major studies already referenced. At this time, there appears to be little significant change in the manner procurement and T&E policy is implemented at the Naval Air Systems Command (NAVAIR) level. There is no formal organization for T&E within NAVAIR nor is there a formal NAVAIR directive on T&E policy and procedures. All NAVAIR staff work related to T&E matters is managed by the Test and Evaluation Coordinator's (TECO) office, which interfaces principally with AIR-510, the Aircraft and Weapons Systems Division within NAVAIR. The requirement to perform test and evaluation is contained in the functional statements of the NAVAIR offices as stated in the NAVAIR Organizational Manual, NAVAIR INST 5400.1. Briefly, this means that each office in NAVAIR directs work within its specialty to activities such as NATC, effectively issuing T&E policy to these activities. As examples, assignment of projects is coordinated by Plans and Programs, AIR-01, exploratory and development work is assigned to the Assistant Commander for Research and Technology, AIR-03, engineering development is assigned to the Assistant Commander for Material Acquisition AIR-05, while the technical aspects and general overview of particular projects in the procurement process are managed by "class desk" officers, air project coordinators, and Air Program Managers (PMA).

New policies established by DOD embodying concepts such as the DSARC, with major program milestone decisions, place an increased emphasis on rapid yet extensive evaluations. NATC has reflected these considerations in its Planned Improvement Program. NATC seeks a combination of aging and obsolete facilities replacement and the acquisition of new facilities to meet new requirements. The thrust of the improvement program is to maintain a quality capability to evaluate the more sophisticated weapons systems of the near future and to seek more efficient and automated techniques for quantitative test data acquisition.

A brief summary of those major improvements planned by NATC are as follows.

1. An instrumentation systems, a shift from VHF to UHF telemetry frequencies and the installation of an extensive real time data processing system.

2. Expanded tracking and positioning capabilities of the NATC airborne tracking range. One proposal calls for the construction of an Aircombat Manuevering Range, currently an option study.

3. Construction of a NAVAIR-proposed electromagnetic shielded anechoic chamber which will provide 100 to 120 decibels of shielding up to 40 GHZ. Anechoic material will be installed to suppress internal transmission reflections, creating a free-space environment.

4. Aircraft Data Analyis Facility to house the Automatic Data Processing Facilities, the Telemetry Laboratory, and the Real Time Processing System.

5. Construction of a new academic and administrative building for the Test Pilot School. This building will also house flight simulation equipments as they are purchased by NATC for test pilot training and actual equipment evaluations.

6. Construction of a Surface Effects Ships (SES) test facility at the Patuxent Seaplane Basin located at NATC.

Prior to FY69, NATC operated under the Non-Industrial Accounting System, an appropriation-type system which does not allow for distributing overhead costs to work/services. From the end of FY69 to the end of FY74, NATC utilized a Modified Industrial Accounting System which has allowed for indirect expenses to be distributed to projects. At the beginning of FY75, NATC implemented a modified form of institutional funding for test and evalution work. In effect, NATC will bill direct costs to projects and overhead costs to an institutionally-funded reimbursable order provided by NAVAIRSYSCOMHQ.

II. RELATED STUDIES

A. GENERAL

Two lengthy studies, The President's Blue Ribbon Defense Panel in 1968 and the Congressional Commission on Government Procurement in 1972, carried great influence in all areas of the acquisition process. Although the studies dealt with all areas of the governmental buying process, particular attention was paid to the agency which uses over half the annual budget, the Department of Defense (DOD).

Always aware of the political influences affecting the purchase of major weapons systems, DOD responded to the studies by aligning its policies in the direction the studies pointed--more cost effective procurement and a better control mechanism to assure that such procurement problems as were experienced with the C5A Transport Aircraft and the Main Battle Tank did not occur again. A part of this process dealt with the T&E function and, over time, several reports and studies were completed to make recommendations in the T&E areas.

Only those reports which are salient to NATC are mentioned here and the brief report descriptions (chronologically arranged) will concentrate on those areas most pertinent to the NATC study.

B. THE REPORTS

1. The Perry Report, March 1965 (Reference 7).

In late 1964, in response to a memorandum from the Director of Defense Research and Engineering (DDR&E), a survey team was formed for the purpose of determining whether it was feasible and advantageous to relocate sufficient activities to NATC and Naval Air Station (NAS), Patuxent River for the purpose of fully utilizing that installation, or whether it was more feasible and advantageous to close it and relocate its aircraft test mission and activities elsewhere. The main conclusion of this study was: "at the present time, and for the foreseeable future, there is a clear requirement for the Navy to retain Patuxent as its primary center for test and evaluation of Naval Aircraft." Although ten years have elapsed since the issuance of the Perry Report, the conclusions and recommendations still appear valid. Most of the reasoning, although presented for the testing of all types of aircraft, also applies in the specific areas of in-flight structural, flying qualities, and performance testing of helicopters and VSTOL aircraft.

2. Ostrom Study, July 1970 (Reference 8).

In 1970, again at the request of DDR&E, the Services, with the Army as lead service, were asked to form an ad hoc study group to address consolidation of all military test facilities. The study group was directed by Brigadier General Charles D. Y. Ostrom, USA. The study group was told to concentrate on those facilities with adjacent water ranges and

those in danger of community encroachment. NATC was included in both categories. The Ostrom Study results were unobtainable, but research indicates it was inconclusive in nature. This study is mentioned only to maintain continuity and to establish the continued pressures for consolidation.

3. The Department of Defense Test and Evaluation (T&E) Facility Base Review, published 23 June 1971 (revised August 1971), Reference 9.

This study examined the total DOD T&E Facility Base and recommended further studies of those facilities located in the lower Atlantic area. The report specifically recommended moving NATC to the Eastern Test Range (ETR), Cape Kennedy, Florida, as the nucleus of an Eastern Joint Flight Test Center, (EJFTC) under the executive management of the Navy. The report also recommended the consolidation of other Navy activities into the ETR complex.

In October 1971, the Lower Atlantic Test Area (LATA) Study Group published their report (Reference 10). LATA had been commissioned by the Deputy Secretary of Defense to "accomplish a detailed study of the proposed transfer and consolidations" recommended in the (previous) ETR plan. The results of the study, briefly stated, were that the relocation of NATC was not compelled by any foreseeable encroachment and the costs of such a relocation could not be amortized through annual savings at a new location.

As a result of these conflicting reports, no T&E facilities were relocated or consolidated. Soon after these reports were published, several studies considered particular

areas of testing, such as aircraft structural testing, or particular aircraft in the testing process, with a view toward consolidation.

4. A Consolidation Study of Inter-Service HELO/VSTOL Aircraft Test Functions and Facilities, dated 23 Nov 1973 (Reference 11).

This report was issued by a subpanel of the Joint Logistics Command Panel for Consolidation of Functions and Facilities (COFF). The report explored a total of fifteen separate and specific test areas necessary for the development of helicopters and VSTOL aircraft. Again the objective was the consolidation of functions or facilities.

Of the Navy, Army, and Air Force activities considered, it was found that nearly all recommendations were to consolidate at the Navy facilities. This situation is not surprising in that, of the three services, the Navy is most active in helicopter/VSTOL development and that several of the specific test areas are basically for Navy-only activities which have no counterpart in the other services (e.g., helo-borne sonar).

NATC was specifically named for consolidation of the following functions: Office of Prime Responsibility (OPR) for Personnel Rescue/Transfer, shipboard/helicopter dynamic interface, in-flight refueling, ship-to-air refueling, airborne mine sweeping, anti-submarine warfare, and amphibious assault.

A significant weakness in this report was its lack of financial basis. In most cases, sufficient cost information was unknown or unavailable and the subpanel did not attempt to derive a common cost basis from which to make comparisons.

Nevertheless, the document gave some accounting of the Navy's favorable position, when compared to the facilities of other Services in this functional area.

5. NAVAIR-05 Utilization of Field Activities Study, 23 January 1974, Reference 12.

This report, commonly called the "Rhees Report," for Captain T. R. Rhees, USN, a member of the study group and also Director, Aircraft and Weapons Systems Division, NAVAIR (AIR-05), was required by the Assistant Commander for Material Acquisition (MATACQ). Its overall objective was to improve the efficiency and economy of the NAVAIR field activities. The scope included development of a master plan for the field activities with consideration of related functions and work of other Navy and DOD field activities. The functions associated with field activity capabilities, which the study considered in descending order of priority are:

1. Evaluation
2. Testing
3. Fleet Support
4. Acquisition Management Support
5. Production Support
6. Research and Development

The report stated that a significant amount of the T&E workload was misdirected to and between field activities. The result was seen as uncertainty by these activities as to what was expected of them with resultant poor planning and the risk of sub-standard performance and general inefficiency. The root cause of this problem, according to the report, was the "overlapping and duplicative functional assignments" which "permit dispersion and decentralization of tasking

authority." The report further states that "there is no single authoritative voice below the NAVAIR Assistant Commander that addresses overall capabilities, requirements and workload, and adjudicates resource allocation," further suggesting a central field Commander of NAVAIR T&E Activities as a centralized command and control mechanism. It is most significant that this is the first time that these studies examined the central organization administering the field activities as a possible source of problems.

Specifically, the report stated that NATC should perform the following functions in addition to the overall responsibility for coordinating the testing of Naval Aircraft: ship installation test associated with aircraft launch and retrieval, visual landing aids (VLA), and lighting for fixed-wing and V/STOL aircraft; testing in Aero-Medical/Human Factors/Crew Systems areas; testing of electrical components; testing of conventional ordnance; testing of ground/support equipment; and tests of maintainability and reliability. It was also reported that much of the NATC expertise in these areas, developed in accordance with the NATC charter, was being duplicated elsewhere.

6. Consolidation Proposals Regarding Naval Air Test Facility (NATF), NATC, and the Naval Air Development Center (NADC), submitted to COMNAVAIR from CO, NATF, Lakehurst, N.J., 17 July 1974, Reference 13.

This report analyzes the consolidation of all or part of the facilities mentioned in its title at one of these locations. It is a parochial document which builds a case

for (1) the continuance of NATF at its Lakehurst location and (2) the absorption into NATF of a variety of functions from NADC and NATC. While a number of the study's points have merit, the basic analysis is conducted using criterion of cost and space available. No cost breakdowns are presented and space utilization overlaps are difficult to analyze. It should be noted that the "extensive new facilities" constructed at NATF, Lakehurst, were built for the testing of shipboard equipment. Whether these facilities are acceptable for the testing of helicopter/shipboard interface remains an unanswered question.

7. The Donaldson Commission Report, 22 July 1974, Reference 14.

The Donaldson Report is a far-reaching in-depth analysis of RDT&E within the Navy, written by a team of consultants for the Commander, NAVAIRSYSCOM, Vice Admiral Lee. Because of its unusual brevity and exceptional candor, it is perhaps the single most important reference for change in the Navy's RDT&E of the future.

The Report determined that the Navy overreacted to the President's Blue Ribbon Defense Panel with a multitude of letters, policies, and studies but few major management actions. As a result, staff requirements for T&E have not been reviewed, T&E command chains have not been delineated, directives are confusing and sometimes contradictory, and the control of the T&E resources is fragmented.

The Report predicted a future of more advanced S/VTOL concepts and of more aircraft operating from small surface

ships, as well as a continuing rise in the interface and compatability problems between aircraft and ships for this same reason.

The Donaldson Report, in its study of base structure and management organizations, found no effective central direction for T&E within NAVAIR or the U. S. Navy. The future T&E requirements appeared well known but not the implementing functions of planning, programming, and budgeting. The principle recommendations of the reports are as follows:

1. Effect a rational consolidation of T&E functions. Current facilities located in the geographic West would test aircraft weapons and related sub-systems, while current facilities located in the geographic East would test aircraft platforms.
2. Create a U. S. Navy T&E "Czar." This does not necessarily require only one position but rather a series of key positions within OPNAV and NAVMAT.
3. Create a specific chain-of-command within OPNAV and NAVMAT for T&E.
4. Create a Test and Evaluation Master Plan (TEMP) at the OPNAV/NAVMAT and NAVAIR levels.

Two other reports contribute to this synopsis and should be mentioned, as they are both preliminary cornerstones of this thesis. Both reports were written by this author for other courses while conducting preliminary research into the central thesis topic.

8. Integration of Naval Air Test Center Rotary Wing Organizations: Pre-Thesis Analysis and Feasibility Study, 7 June 1974, Reference 3.

This paper reported on the conduct of basic research into the organizational problems of the rotary wing elements at NATC. It discussed the establishment of direct liaison at NATC for thesis research purposes. Its primary purpose, however, was to conduct an initial static analysis of the NATC organization utilizing the documents and publications already presented herein as References 1, 2, 4 and 6. The results of this static analysis revealed organizational problems deemed suitable for a research thesis effort. It should be noted that due to its somewhat sensitive discussions, this paper received small distribution, particularly at NATC.

9. Test and Evaluation Organizations: A Systems Analysis, 12 December 1974, Reference 16.

This paper was written by the thesis writer for a course in Systems Analysis Methodology at the Naval Postgraduate School. Although the information concerning modeling, costing, and quantitative methods is unimportant to this discussion, the paper does make a contribution to the scope of this thesis. It describes the pattern of abstractions which led from the relatively local problem of helicopter maintenance at NATC, to the NATC organization itself, thence to several of the studies already discussed here, and finally to the T&E organizations and policies of NAVAIR. The net result has been a moderate change in the scope of this paper, which will be discussed in more detail later. Basically, however, the NATC organization and its rotary wing elements will be viewed

as an open system, with aspects of external organizations and policies integrated as necessary into the discussion and analysis of the NATC organization itself.

III. THESIS INTENT

A. PURPOSE

The purpose of this study is to conduct a management and organizational study of the rotary wing components in the various activities at NATC, to evaluate the feasibility of a Rotary Wing Division or Integrated Helicopter Test Facility (HTF), to consider various alternatives and include as potential integrating subjects the rotary wing components of Flight Test, Service Test, Weapons Test, Test Pilot School, VX-1 and such other units or components deemed of potential value to such an integration, subject to the concurrence of NATC. This focal problem of rotary wing organization will not, however, be considered in an isolated manner. Rather the analysis will attempt to include comment as necessary on the NATC organization itself and the plans and policies of external organizations such as NAVAIRSYSCOM.

B. SCOPE

The scope of this study was to treat the focal problem of Rotary Wing Organizations at NATC as an open system from which abstraction was accomplished as necessary to include all pertinent and relevant factors. It was difficult to develop conclusions with strong quantitative support, however desirable this end. Further thesis research or studies internal to NATC to produce such data will be required.

This approach hopefully provided a complete and explicit examination of a Navy T&E field activity organization against the relevant backdrop of T&E history, studies, precedents, competitive and chain-of command organizations. This approach should have value in the development of a problem-solving matrix for the solution of today's, and tomorrow's, T&E-related problems.

C. PROBLEM STATEMENT

The Naval Air Test Center organization for internal administration and command and control of its T&E mission has remained relatively static while the general environment of RDT&E within DOD and the Navy has undergone considerable flux. Despite a considerable reputation for success in the T&E area, NATC's organization does not appear to make a fair-share contribution to the NATC success. Without a forward-looking approach, the NATC "informal system" preempts the organization itself and appears primarily responsible for its success.

The anachronism created by this situation promises to be magnified considerably as the effects of austere funding and a decreased manpower level are felt. The rotary wing elements among the various subdivisions of NATC singularly lack any organizational centralization by aircraft type or mission and will be affected most adversely. These fragmented rotary wing elements, despite a considerable and increasing level of T&E funding and specific program visibility, have little voice in the largely fixed-wing environment of NATC.

The strong interest in V/STOL technology and development and the desire to develop and maintain state-of-the-art T&E capability in this area, as stated by NATC in its position publications, is not currently supported by its internal policies, current or projected.

IV. METHODOLOGY

A. GENERAL

An important objective of this study was to include all factors pertinent to the problems of NATC and, specifically, its rotary wing elements. To do this successfully, it was necessary to develop dynamic inputs for an essentially static model. The dynamic aspects were provided through management questionnaires distributed at NATC, and through two research trips to NATC with agendas that included geographic site surveys, large numbers of personal interviews, and study of proprietary documents not available for distribution outside of NATC. These steps, covered later in more detail, were conducted in accordance with the following milestones published first in Reference 3 in June 1974. They are as follows:

Milestones

From Date	To Date	Activity
4 Apr 1974	7 Jun 1974	Pre-thesis research (organization & management) term paper
5 Jul 1974	23 Sep 1974	Obtain data base Refine Assumptions Construct static model Define Scope
1 Oct 1974	21 Dec 1974	Research trip to NATC Interviews Site (facilities) survey Construct dynamic model

From Date	To Date	Activity
3 Jan 1974	24 Mar 1975	Resolve static/dynamic models Thesis development
1 May 1975		Thesis review/comment Thesis delivery to advisor/ first reader Thesis publication
1 May 1975	15 Jun 1975	Trip to NATC to debrief published thesis (if desired by NATC)

B. STATIC ANALYSIS

Initially a static analysis of the problem was conducted. A list of reference documents were provided by the Deputy Commander, NATC and the NATC staff Rotary Wing Program Manager. These included such primary references as the NATC Organizational Manual, the NATC Master Plan, the Facilities Master Plan, and the Product Improvement Plan. These documents were supplemented by a file received from the Rotary Wing Program Manager which contained all NATC internal correspondence from 1964 on the subject of NATC re-organization and the flight safety and maintenance availability problems of the NATC rotary wing elements.

This static analysis provided the initial research into the NATC organizations and was designed to answer the following questions:

1. What were the determining factors in the current problems of NATC rotary wing elements? Were these problems within the rotary wing elements themselves, at the NATC level, or external to the NATC field activity?

2. Was there sufficient interest at NATC to make such an effort worthwhile? Of particular interest were the areas of receptivity of new ideas, cooperation in providing information, and funding to make the research dynamic.

The product of this static analysis, Reference 3, determined that a thesis effort was justified and that NATC was interested and would provide assistance. It also provided an initial study of those factors believed to contribute to NATC's problems.

C. DYNAMIC ANALYSIS

The dynamic analysis began in October 1974 with a research trip to NATC. Upon arrival, a briefing was given to the Deputy Commander, NATC, outlining objectives and obtaining permission to conduct personal interviews and distribute a questionnaire to all management levels except the Commander, NATC. This permission was given without condition. During this visit a high degree of cooperation was received and all objectives were met. The three research elements were conducted as follows:

1. Site Surveys

A tour of the NATC facilities was undertaken to familiarize the writer with the various potential locations for a consolidation of NATC's rotary wing elements, as required, and to note those facilities not fully utilized or over-utilized. An appreciation of the space requirements for the aircraft maintenance, test project, and administrative

segments of the rotary wing organizations was of particular importance. The survey was primarily conducted outside of normal working hours, with the exception of office spaces.

2. Personal Interviews

With rare exception, all interviews were conducted on a non-appointment walk-in basis. It was felt that the most honest and accurate views would be obtained if little or no time was allowed for the interviewee to solicit or cross-reference his responses. All key management personnel were interviewed, with a sampling of similar billets taken where desirable, and interviews were conducted largely during working hours and in assigned spaces. Significant personnel samples were taken. Among those interviewed were the following:

Staff	Deputy Commander, NATC (Acting) Technical Director Staff Assistants NATC Technical Director Program Managers T&E Coordinator Staff Assistants Comptroller
Divisions	Division Directors Division Deputy Directors Chief Project Officers Project Test Pilots Project Engineers
Support	Maintenance Officers Maintenance Supervisors Maintenance Personnel (Enlisted) Contractor Representatives Operations Personnel Search and Rescue Personnel

Without exception, interviewees were unusually cooperative and most candid in discussing or amplifying topics from the thesis questionnaire. This capability of providing a

broad unbiased range of expert opinion on these issues of interest is a keystone to this thesis.

3. Questionnaire

A questionnaire was distributed to forty-five persons attached to NATC. Of this number, forty were properly completed and mailed to the thesis writer at the Naval Postgraduate School. A blank sample of the questionnaire is presented as Figure 1 in Appendix C. It should be noted that the questionnaire format is actually that of an Opinion Range Form, developed for ease in data examination and reduction. Within this study it will be referred to as the Questionnaire.

Although anonymity was guaranteed, an attempt was made to solicit sufficient background data to enable the sample to be broken into representative groupings. The purpose for this was to note any lack of correlation of opinion between groups. The groups were divided as follows:

Group 1 - Senior Military (05 - 06)

Group 2 - Junior Military (03 - 04)

Group 3 - Senior Civilian (GS13 - GS17)

Group 4 - Junior Civilian (GS9 - GS12)

Further details of the questionnaire and a discussion of questionnaire results will be found in the Analysis section of this thesis.

V. ANALYSIS/DISCUSSION

A. SUMMARY OF THESIS ASSUMPTIONS

1. National Level

1. The national defense budget relative to the GNP will decrease in real dollars, but will remain approximately level in terms of FY 74 dollars.

2. The O&M dollar expenditure will increase at such a rate as to reduce availability of RDT&E dollars.

3. The executive branch will act to substantially reduce the number of military and civilian (federal) employees in defense.

2. DOD Level

1. There will be a strong DOD effort to consolidate RDT&E activities and coordinate joint use of facilities.

2. Production decisions will be based on more hardware and simulation T&E to complement paper evaluations.

3. DOD will continue to emphasize more timely, meaningful, and realistic operational testing.

4. RDT&E management will become more centralized and detailed at OSD level.

5. Constraints on the number of uniformed personnel, average grade, and the number of civil servants will continue.

3. Department of the Navy Level

1. Naval surface forces will continue to exploit the logistics and warfare capabilities of helicopters.

2. The Navy will ultimately reorganize the RDT&E commands and management structures.

3. There will be an increased Navy-wide need for specially-trained T&E personnel.

4. There currently exists no dedicated formal organization for T&E within NAVAIRSYSCOM.

4. NATC Level

1. The immediate future will be characterized by a continuing increase in the demand for T&E services, to be met with decreased manpower and funding.

2. NATC will be located at NAS Patuxent River until at least FY 80.

3. Within the Navy, there will be consolidation of T&E functions and control which will impact NATC.

4. NATC will continue to conduct technical T&E of prototype and production equipments.

5. NATC will provide facilities and personnel for operational testing.

6. The role of Test Pilot School will expand. FAA, Army, and Air Force test pilot training functions, fixed and rotary wing, may consolidate at NATC in the immediate future.

7. Early emphasis on IOT&E will increase the time, cost, and assets required of NATC. The emphasis on BIS and DT&E will remain relatively stable.

8. Joint testing with OPTEVFOR and other activities will increase.

9. NATC will increase the use of large flying test beds, including STOL/VTOL aircraft, in general, particularly in IOT&E participation programs.

10. NATC functional areas are all subject to modification, consolidation, elimination, or expansion.

B. GENERAL

Any discussion of the rotary wing elements at NATC, their related problems and solutions, must answer three basic questions. First, why should this segment of the NATC organization reorganize, what benefits accrue? Second, what sort of organization would best serve the stated objectives of this rotary wing segment while causing minimal change to portions of NATC external to this segment? Third and last, where at NATC should such an organization be located, and at what cost/benefit to other NATC segments? These three questions will be discussed each in turn.

Historically, there has been strong argument at NATC for a rotary wing consolidation in both project test and maintenance directly traceable within NATC internal correspondence back to July 1963, a period of nearly twelve years. In each case, studies of rotary wing consolidation have been directed, reports filed, and little or nothing implemented. The attitude found among civilians with tenure in the rotary wing segment, determined through interview, is that these periodic events promote brief rotary wing visibility but waste time and effort for little gain. There is high expectation of intransigence.

C. WHY SHOULD THE ROTARY WING ELEMENTS BE REORGANIZED?

1. Project Interfacing

Large test programs at NATC invariably cross the functional lines of existing test divisions. With vertical authority, reporting, and reviewing, there is no mechanism for the interfacing of project teams from various functional areas. The informal system then becomes the substitute, often resulting in poor project integration and coordination. The result is a test program lacking in the highly-desirable synergistic quality of which NATC is capable, an aggregate technical effort clearly better than the sum of its parts.

2. Aircraft Maintenance

Over time the rotary wing maintenance organizations have suffered with a wide variety of critical problems, among them (1) regular loss of enlisted maintenance personnel allowance, replaced in part by a civilian contract maintenance force, (2) frequent suboptimal consolidations, and (3) maintenance management with insufficient authority. The apparent result has been a reduced average aircraft availability for project testing. This vital function is well recognized as causal in NATC technical output problems, but over time has defied solution.

Another aspect of the maintenance problem is the wide variety of helicopter models and types included in the maintenance requirement, each aircraft essentially one-of-a-kind due to project test equipments or other special installations.

The substance of this problem is the lack of user control over maintenance and the limited authority possessed by maintenance management. Consolidation of all rotary wing maintenance resources under user control should tend to effect significant improvement. Given today's budget climate, more Navy maintenance personnel and the dollars to hire more contractor maintenance personnel will, in all probability, not be available. Thus, complete consolidation offers the method for optimal allocation and use of scarce resources.

3. Chain of Command/Technical Review

With some exceptions, the current chain-of-command and technical report review chain for rotary wing elements appear to have marginal expertise in the rotary wing area. Although capable of separating fact from opinion and general data analysis, a low experience level in this area may lose for the technical report that depth of judgement and experience capable of refining a satisfactory technical effort into an optimal one.

A rotary wing divisional organization with senior rotary wing management would correct this deficiency in specific experience, allowing a more refined technical product of higher quality.

4. Empire Effect

Creation of a consolidated rotary wing organization would remove the various rotary wing segments from their current status as elements within the divisions, a prime detractor in previous attempts at consolidation. It should also have a positive effect in making this group more competitive for

programs relating to their specialized training. In recent years, few rotary wing aviators at NATC have participated in the various VTOL/STOL programs (ex. AV8A Harrier, CL84) conducted at NATC.

A rotary wing organization at NATC will allow this segment the chance to improve its capability and its position in parity. With management, technical review, and aircraft maintenance under the internal control of rotary wing-experienced personnel, this synergism should produce a high level of technical performance and achieve economies of scale.

5. The Future

The NATC Long Range Plan indicates that the T&E workload into the 1980's has a heavy committment to rotary wing programs. Lamps Mark III, CH53E, HSX, and significant testing programs to support foreign sales, all show evidence of increased visibility for rotary wing programs.

At NATC, the critical variables of finance, manpower, and facilities all tend, in the broader national political and economic perspective, to be fixed or slightly decreasing. Thus, management and information systems and optimal organizational structure offer the principle solutions to the workload requirements of the future.

6. An Experiment/An Example

A rotary wing divisional organization allows an objective evaluation to be conducted on an alternative organizational structure at NATC. After some time, the success/failure and costs/benefits of the rotary wing division could

act as a key determinant for the reorganization of other segments at NATC. A trial balloon of this type might offer a less costly exercise in modeling than reorganization of the entire NATC complex with no historic data base to be used as a predictor of success.

D. WHAT SHOULD A ROTARY WING DIVISION LOOK LIKE?

Although a rotary wing division at NATC essentially designs itself due to the functional resources already located within the current divisional structure, there are several key requirements and trade-offs that must be considered. On the proper selection and the balancing of these key issues depends the success of the rotary wing divisions.

1. Senior Management

There are few organizations that are not personnel-quality critical. This division is no exception. It is of paramount importance that only high-quality rotary wing-experienced personnel be assigned to the management positions, both civilian and military. The movement of dead wood into positions in this new organization must be avoided. Of particular importance is the selection of a division director who is still progressing in his career, not leveled off or awaiting a retirement date. The director should be of competitive seniority to other division directors, and he should possess broad rotary wing and RDT&E background. The choice of a top military and civilian assitant should be based on similar guidelines.

2. Simplicity

The organizational structure should be kept as simple as possible. An expectation of fewer personnel in the future legislates a lean, mean look but also calls for broad decentralization of responsibility and authority, in equal amounts. Chain of command must be well defined. Although not discussed in detail within this thesis, the concepts of Management By Objectives (MBO) as officially espoused by the Navy at the policy level, should be instituted from the start. Fundamentally, this requires the communication and exchange of organizational and individual goals on a regular basis at all levels within the structure.

3. Maintenance

Rotary wing maintenance should incorporate all elements aboard NATC, to include: all current test support resources, TPS, VX-1, and SAR. Although the inclusion of the operational aspects of VX-1 is not desired due to the required separability of operational and developmental testing (OT&E/DT&E), their rotary wing maintenance should benefit from such a move. Similarly, the Test Pilot School is not operationally included due to their peculiar mission, training and scheduling requirements, however their rotary wing maintenance should likewise move under the divisional maintenance umbrella. Pilots from these organizations will remain separated in all ways from the rotary wing division and the aircraft should remain under the operational control of VX-1 and TPS respectively.

4. Test Pilot Training/Specialized Experience

A rotary wing division offers an obvious advantage in its capability to train and standardize its pilots, as economies of scale prevail. It does, however, force a critical trade-off in test pilot resource utilization. For the first time, a choice is available between a specialist or generalist test pilot. The pilots may be pooled together, allowing better operational and administrative control but requiring everyone to be able to fly all varieties of tests across functional areas. An alternative would be to keep the test pilot a specialist in a functional area. It is recommended that this latter approach be used, as the former approach shows a potential degradation of test procedure, safety, and technical product. It may be desirable, for instance, on a three year tour that a test pilot switch branches each year thus broadening his experience but in each case--as a specialist. This suggestion assumes an up-to-date, in depth test procedure manual exist in each branch to effect a timely and safe transition but this should exist as a matter of course. Such a procedure would also act to keep a strong and counter-productive competitiveness from developing within the branches.

5. Reliability and Maintainability (R&M)

At a time when an increased emphasis in weapons systems acquisition is on the life cycle cost of a system, it is desirable that some capability in the reliability and maintainability area be maintained in a rotary wing division. Currently, R&M resources are located only in the Service Test

Division and are probably of insufficient number to allow detachment or division without a significant reduction in overall R&M quality. Although somewhat innovative, the creation of an R&M expertise with particular knowledge in rotary wing systems may be desirable in this case. This might be justified by the increase in rotary wing T&E workload expected, as well as the unusual R&M requirements which exist in rotary wing T&E due to the unique environmental factors of temperature and vibration.

6. Test Aircrew

Until approximately FY 73, sufficient experienced and well-qualified enlisted aircrew were assigned to NATC to assist in the evaluation of aircrew-operated systems. Currently, there are few qualified aircrew on board to assist in evaluation of rotary wing aircrew systems. To depend solely on civilian engineers and technicians, or on temporary assistance from the fleet to fulfill this requirement would be an error. Although fleet experience is a strong prerequisite, it is the coupling of this quality with T&E training that produces the best technical input.

It is recommended that dedicated enlisted aircrewmen well-qualified in fleet systems, be assigned to a rotary wing division in the interest of maintaining a complete systems T&E capability. These aircrew might be available for administrative duty but should be primarily utilized in the avionics-related branch.

7. An Orientation Toward Advanced T&E Technology

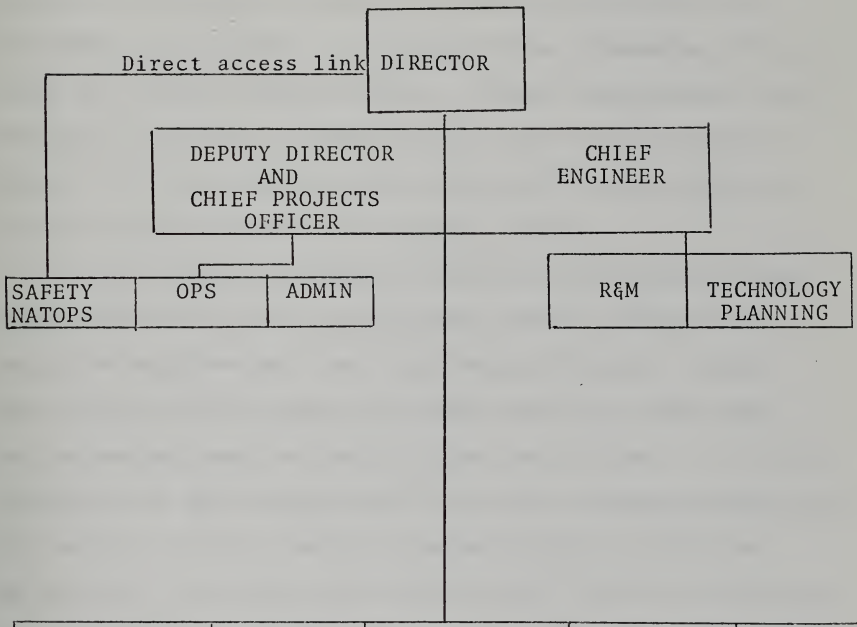
It is desirable to maintain some mechanism to preserve a forward-looking perspective in the area of T&E technology. As a planning function, this should allow a successful integration of T&E programs with future abilities for evaluation. Current studies appear to predict that much of future T&E will be accomplished with electronic simulation. The Integrated Test and Evaluation Facility (ITEF), currently under consideration for future construction at NATC, provides a good example. It is important that T&E organizations keep themselves abreast of these developments so that, as capital investment allows construction of such facilities, they are prepared to utilize them to produce better, more complete, and lower cost evaluations. It is well to consider that T&E technology may be the key to conducting effective evaluations in an environment of constrained finance, manpower, and material resources.

E. THE NATC ROTARY WING DIVISION

An organization that meets the self-designing requirements of functional T&E capabilities already in place at NATC, and integrates the issues and requirements of those areas just discussed, is presented as Figure 1. This organization should be considered for implementation by NATC.

There are two additional areas that need mention in order to further refine the above organization, Search and Rescue, and the function of the staff Rotary Wing Program Manager. Each will be considered individually.

NATC ROTARY WING DIVISION



AIR SYSTEMS BRANCH	WEAPONS BRANCH	MAINTENANCE BRANCH	SEA CONTROL BRANCH	SAR BRANCH
Flying Qualities Performance Dynamic Interface Service Suitability AST Human Factors Equipment Interface	Attack Assault Gunsights Ordnance Inc. Separation HUD	Standard Duty Maintenance Organization with Contractor and/or Civilian Contract Support Integrated as Necessary	ASW ASMD Mine Sweep Avionics Aircrew Evaluations	Search and Rescue Support Services

Figure 1

1. Search and Rescue

The Search and Rescue (SAR) unit at NATC has long been part of a unique problem. Because of its critical mission it always carries the highest aircraft maintenance priority at NATC. Although maintenance is conducted by NATC, the personnel and aircraft are attached to the Commanding Officer, Naval Air Station, Patuxent River. These circumstances cause continued ineffective communications and misunderstandings. Recently SAR pilot shortage has caused NATC test pilots to alternate and stand the SAR co-pilot watches.

Most of these problems should be alleviated by transferring these aircraft and personnel assets to NATC and incorporating them into the rotary wing division. Branch head status could be given the Senior SAR Pilot (SSP) and the entire unit made a branch within the division. If further reductions in SAR personnel were to occur, although undesirable, the function could be better absorbed within the division. The division could then determine the best resource allocation procedure to support this additional important function internally. This should be better than several organizations (NAS, MAINT, Divisions, Staff) effecting a compromise not necessarily efficient.

2. Staff Program Manager Function

Any organization is only as good as its liaison and workload coordination functions. At NATC, these functions are handled external to the divisions by program managers attached to the NATC staff. During the personal interview phase of

thesis research, strong objection was frequently heard to the current status of the program manager, sometimes from the program managers themselves. Opinion describes the Program Manager as lacking sufficient authority or visibility, thus finding difficulty in arbitrating differences or squabbles between divisions, and in actively conveying NATC policy and objectives to the divisions within the PM's areas of assignment.

It is recommended that the program manager function be continued but that steps be taken to improve the authority of program managers, sufficient to allow them to act more effectively in problem-solving and arbitration. Increased seniority would be one alternative, one thought being that staff program managers rank at 06 while division directors rank as junior 06 or 05. This is another case where ignoring this ancillary problem might significantly reduce the effectiveness of any new organization that might be implemented.

F. WHERE SHOULD A ROTARY WING DIVISION BE LOCATED?

The singularly important criteria for location is flight, ramp, and hanger safety. Site surveys conducted while on the research trip also considered as secondary criterion, without particular priority, the following: minimum cost, inconvenience to move to both rotary wing elements and other units, hanger space, tower view, line space, office space, and SAR response capability.

The survey revealed three sites with basic characteristics for contention; Hanger 110/111 area, TPS/WST area, and Hanger 101. Results of the survey are presented in Figure 2 below. The judgement of acceptability was qualitatively determined.

EVALUATION CHARACTERISTICS FOR ROTARY WING DIVISION LOCATION

LOCATION CRITERION	HANGERS 110/111	WST/TPS	HANGER 101
General Safety	X	X	O
Min Cost of Move	O	X	X
Inconvenience of Move	O	X	X
Hanger Space	O	O	O
Line Space	X	O	O
Office Space	O	O	O
Tower View	X	X	O
SAR Response	X	X	O
Maintenance Space	O	O	O

LEGEND ACCEPTABLE = O UNACCEPTABLE = X

Figure 2

Results of the survey definitely favored Hanger 101, particularly with regard to the principle criterion, safety. It was the only location with a definite 360° approach capability, lacking water or vertical hazards. It was the only facility in sight of the tower, with a generous ramp/line space, and directly adjacent to the helicopter grass operating area.

The second choice, Hanger 110/111, has a much-criticized landing pad with vertical interference and lacking true run-on capability to handle single-engine approaches of large helicopters, as well as being in a position to interfere with or distract fixed wing aircraft on approach to Runway 13. A congested line area, with taxi operations difficult around parked aircraft and other obstacles, and a parking/taxi/take-off area so close to office spaces to warrant excessive distraction, are further drawbacks.

Hanger 101 is recommended as the best location for the NATC rotary wing division. Its drawbacks, inconvenience and cost to move, should be potential short term sacrifice to long term gain. The current prime tenant, reserve patrol squadron VP-68, might be re-located to the hanger and spaces recently vacated by the Patrol Training Squadron, VP-30, move to NAS Jacksonville. Other tenants of this hanger are either overflow components from large NATC sub-organizations or small elements or detachments from extra-NATC organizations. If space is the only requirement for these tenants and no specialized requirement pertaining to location or facilities

exist, then sufficient existing facilities should be available for their relocation aboard NAS Patuxent River without major inconvenience.

G. THE THESIS QUESTIONNAIRE

The thesis questionnaire was presented and described in Methodology. It was distributed, collected, and examined in order to determine the response of various groups at NATC to issues scheduled for addressal in this thesis. The results, overall, are considered valid and significant in that (1) there is a high degree of opinion correlation on most issues in all groups, (2) the majority of the aggregate responses agree with the analysis put forth in this thesis, and (3) 32% of the questionnaire sample of thirty-seven were not directly involved in a rotary wing billet or organization at NATC, which should have significantly reduced the possibility of parochial influence. As will be seen, many issues were of a more universal nature and were related to other segments or organizations at NATC as well as rotary wing.

Originally, the questionnaire was to be used as a data base for the Statistical Program for the Social Sciences (SPSS) in the IBM 360 Computer available at the Naval Postgraduate School. In this way, a wealth of statistical information would have been available through forms of multi-variate regression analysis. This idea was discarded, primarily due to the relatively small sample size which would tend to invalidate the programming technique, and because the data results, when reduced and put into format, were clearly usable in raw but aggregate form.

Perhaps the greatest value this questionnaire possesses is to make available to NATC management the candid opinions of distinguishable groups within the NATC organization on a variety of important issues and current RDT&E-related topics. These opinions, in the aggregate, reflect the influence of NATC management in policy and objectives description, training and education, consistancy of approach, etc. If, for example, all senior personnel responded to a statement with a definite opinion while junior personnel all responded "no opinion," an education problem at lower levels would be indicated. Fortunately, nothing this drastic was found. In the future, information such as this questionnaire delivers can be used to predict receptivity to change, strongly parochial enclaves, education requirements, etc..

The questionnaire will be presented in original question order with comment or analysis, as appropriate.

Question 1. A consolidated rotary wing maintenance force at NATC would improve efficiency and effectiveness.

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
6	5	1	4	1	Jr Off
2	5	0	0	0	Sr Off
2	3	1	0	0	Jr Civ
4	3	0	0	0	Sr Civ
14	16	2	4	1	= Net

Comment: General agreement, good opinion correlation. 81% agree, 38% strongly. 95% had opinion. Disagreement primarily from JR OFF. Comments generally supportive.

Question 2. A consolidated rotary wing division at NATC would improve efficiency and effectiveness.

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
8	4	1	2	2	Jr Off
2	2	0	3	0	Sr Off
2	4	0	0	0	Jr Civ
1	5	0	0	1	Sr Civ
13	15	1	5	3	= Net

Comment: General agreement, good opinion correlation. 76% agree, 35% strongly. 97% had opinion. Disagreement nearly all military.

Question 3. Overall, rotary wing maintenance at NATC provides the timely maintenance required by project workload.

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
0	3	3	8	3	Jr Off
0	2	0	3	2	Sr Off
0	1	0	4	1	Jr Civ
0	1	1	4	1	Sr Civ
0	7	4	19	7	= Net

Comment: General disagreement, reasonable correlation. 70% disagree, 19% strongly. 19% agree. 11% no opinion. Most comment based on aggravated user experience. Wide range of suggestions, moderate feeling of having given up on unsolvable problems.

Question 4. Organizational structure is responsive to technical and organizational change.

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
1	5	6	3	2	Jr Off
0	2	3	1	1	Sr Off
0	0	2	4	0	Jr Civ
0	3	1	2	1	Sr Civ
1	10	12	10	4	= Net

Comment: Slight disagreement. 30% agree, 32% no opinion, 38% disagree, 11% strongly. Question probably better if broken into technical and organizational fragments. Disagreement comments very opinionated, the term "anachronistic organization" used in referring to NATC four times.

Question 5. Rotary wing T&E workload will increase in foreseeable future.

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
3	8	4	2	0	Jr Off
2	5	0	0	0	Sr Off
1	5	0	0	0	Jr Civ
2	5	0	1	0	Sr Civ
8	23	4	3	0	= Net

Comment: Strong agreement, excellent opinion correlation. 82% agree, 21% strongly, 11% no opinion, 8% disagree. Basically a motherhood statement but clearly

indicating the workload expectation in the response. Many comments noted the relative gains in predicted rotary wing workload of future as compared to fixed wing.

Question 6. Personnel from the rotary wing areas of NATC (maintenance, divisions, staff) have equal levels of responsibility and authority.

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
0	7	4	5	1	Jr Off
1	3	1	1	1	Sr Off
0	1	3	2	0	Jr Civ
0	2	1	4	1	Sr Civ
1	13	9	12	3	= Net

Comment: Very slight disagreement, essentially a no opinion aggregate reply. A normal distribution with 37% agree, 24% no comment, 39% disagree. A question of this nature, which seems conspiratorial in that it asks a subordinate to judge seniors, will often indicate a net indecision. Such is the case here.

Question 7. There is unnecessary duplication of responsibility among segments of the NATC organization.

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
3	7	3	4	0	Jr Off
2	2	1	2	0	Sr Off

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
1	1	3	1	0	Jr Civ
0	4	1	3	0	Sr Civ
6	14	8	10	0	= Net

Comment: General agreement. 53% agree, 10% strongly, 21% no opinion, 26% disagree. Disagreement evenly distributed. Most responses viewed this question as referring to "dead wood" placed in middle/upper management. Many comments, in disagreement, saw no redundancy but cited cases where there was no one responsible.

Question 8. Geographic distances between rotary wing elements at NATC adversely affect project coordination.

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
4	5	2	3	3	Jr Off
0	5	0	1	1	Sr Off
0	4	0	2	0	Jr Civ
2	2	0	4	0	Sr Civ
6	16	2	10	4	= Net

Comment: General agreement. 58% agree, 16% strongly, 5% no opinion, 37% disagree. Senior officer agreement consensus. Distribution indicates moderate disparity of opinion. Possibly different organizations have no problem/big problem here. WST rotary wing must drive 5.5 miles to review chain location. ST review chain has coincident location with rotary wing.

Question 9. If an NATC rotary wing divisional organization were formed, VX-1 rotary wing should be included.

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
2	2	1	7	5	Jr Off
0	0	0	3	4	Sr Off
0	2	0	3	1	Jr Civ
0	2	0	3	3	Sr Civ
2	6	1	16	13	= Net

Comment: Predictable response to a well-publicized requirement for OT&E/DT&E separability. 77% disagree, 34% strongly, 5% no opinion, 21% agree.

Question 10. If an NATC Rotary Wing divisional organization were formed, TPS rotary wing should be included.

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
3	4	1	3	6	Jr Off
2	0	0	2	3	Sr Off
0	2	2	1	1	Jr Civ
0	1	0	4	3	Sr Civ
5	7	3	10	13	= Net

Comment: General disagreement. 61% disagree, 34% strongly, 8% no opinion, 31% agree. A surprising five responses (13%), all military, agree strongly. Comments indicate such a move is thought to offer a panacea to TPS rotary wing maintenance problems. Disagreement generally based on unique nature of TPS operations and scheduling.

Question 11. The new FY75 NATC financial accounting systems, modified institutional funding, will provide an improved funding picture at NATC.

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
0	4	10	1	2	Jr Off
0	0	4	0	3	Sr Off
1	3	2	0	0	Jr Civ
1	3	0	2	1	Sr Civ
2	10	16	3	5	= Net

Comment: Strongly no opinion. 43% no opinion, 32% agree, 25% disagree. Senior military either don't know or disagree strongly (4 to 3). Most junior military don't know (10 of 17). An apparent educational problem. Also it should be recalled that these questionnaires were filled out in Oct/Nov 1974, three months after the new system was instituted.

Question 12. The planned ITEF (Integrated T&E Facility) will increase inter-service and contractor testing at NATC. If agree, by what percent (ex. 20,30)?

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
0	3	14	0	0	Jr Off
1	4	1	0	1	Sr Off
0	2	4	0	0	Jr Civ
1	5	2	0	0	Sr Civ
2	14	21	0	1	= Net

Comment: Statistically, an agreement (42%), but with 55% no opinion, it is apparent that ITEF as a plan or concept has not been explained to most NATC personnel. The fill-in (Percent increase in testing responses) varied greatly and was disregarded.

Question 13. NATC will remain at Patuxent River for the foreseeable future, and will not decrease in force levels, T&E capability or T&E funding levels.

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
1	6	4	6	0	Jr Off
2	4	1	0	0	Sr Off
0	5	1	0	0	Jr Civ
2	6	0	0	0	Sr Civ
5	21	6	6	0	= Net

Comment: Strong agreement. 69% agree, 13% strongly, 16% no opinion, 15% disagree, all of the latter junior military. Response comments indicated either based on NATC briefings or wishful thinking. (Note: no civilian or senior military disagreement.)

Question 14. NATC divisions organized by aircraft type, such as high performance, prop/turbo prop. STOL/VSTOL would be more amenable to the T&E of the future.

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
1	6	4	6	0	Jr Off
2	4	1	0	0	Sr Off
0	5	1	0	0	Jr Civ
2	6	0	0	0	Sr Civ
5	21	6	6	0	= Net

Comment: General agreement. 70% agreement, 16% no opinion, 16% disagreement, none strongly. Some resistance to change and ignorance of advantages of differing organizations and future T&E requirements noted in comments.

Question 15. Organizational change of rotary wing elements at NATC would bring about safety of flight/ramp ops improvement.

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
4	7	3	3	0	Jr Off
0	1	2	4	0	Sr Off
0	5	1	0	0	Jr Civ
0	4	3	1	0	Sr Civ
4	17	9	8	0	= Net

Comment: General agreement. 55% agree, 11% strongly, 24% no opinion, 21% disagree. Comments revealed inadequacy of question/statement. "Organizational change to what?" frequently asked. Agreement responses noted that change away from current ramp/landing pad area was desirable.

Question 16. There is room for a full-fledged rotary wing division at NATC (in the physical sense). If agree, where would you locate it?

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
5	9	1	1	1	Jr Off
0	5	0	1	1	Sr Off
1	3	2	0	0	Jr Civ
0	6	0	1	1	Sr Civ
6	23	3	3	3	= Net

Comment: Strong agreement. 77% agree, 16% strongly, 8% no opinion, 15% disagree. General comment is that sufficient facilities exist currently to implement any organizational arrangement of current NATC assets. Location preference responses numbered forty and were arranged as follows: Hanger 101-13, VP30 Hanger-6, Hanger 115-3, new construction -3. Receiving less than three votes each were the following: Hangers 109, 111, 110, Webster Field, and TPS. It is interesting to note that 13 votes (33%) supported the finding of the thesis site survey.

Question 17. Within the divisions, chain-of-command above branch level has adequate rotary wing expertise and is optimally qualified to pass judgement on technical reports passed upward from these branches.

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
0	1	8	6	2	Jr Off
1	1	0	4	1	Sr Off
0	4	1	1	0	Jr Civ
0	4	1	3	0	Sr Civ
1	10	10	14	3	= Net

Comment: Slight disagreement. 45% disagree, 8% strongly, 26% no opinion, 29% agree. Comments regarding fixed wing review of rotary wing technical reports numerous. Some justifiable confusion caused by word "optimally" in question/statement.

Question 18. The immediate future at NATC will be characterized by a continual increase in the demand for T&E services to be met with decreased manpower.

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
2	10	3	2	0	Jr Off
0	6	1	0	0	Sr Off
1	3	1	1	0	Jr Civ
1	4	0	0	0	Sr Civ
4	23	5	3	0	= Net

Comment: Strong agreement to well-entrenched opinion. 71% agreement, 13% no opinion, 16% disagreement. Most comments based on personal observations of trends in recent time period.

Question 19. The movement within DOD and the Navy for consolidation of T&E functions will impact NATC with a requirement for improved T&E output/dollar efficiency and effectiveness.

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
3	9	5	0	0	Jr Off
3	3	1	0	0	Sr Off
2	4	0	0	0	Jr Civ
2	4	0	2	0	Sr Civ
10	20	6	2	0	= Net

Comment: Very strong agreement. 79% agree, 26% strongly, 16% no opinion, 5% disagree. Comments indicate awareness of a more efficient NATC as required by circumstances.

Question 20. A suitable NATC LONG RANGE PLAN which carefully describes feasible implementation alternatives and incorporates machinery for continued change should be formulated by NATC.

RESPONSE:

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Group
6	5	5	1	0	Jr Off
3	4	0	0	0	Sr Off
2	4	0	0	0	Jr Civ
2	5	0	1	0	Sr Civ
13	18	5	2	0	= Net

Comment: Very strong agreement. 82% agree, 34% strongly, 13% no opinion, 5% disagree. Comments dovetail into comments of question 19.in that NATC LRP is expected to move the NATC organization effectively into this more difficult environment. Strong comment indicated an "or else" attitude. Some criticism of 1974 LRP that, at questionnaire writing, remained unimplemented.

Question 21. Name five (5) problems at NATC that you would like to see changed.

RESPONSE: (Aggregate)

PROBLEM	VOTES	COMMENTS
Maintenance	23	(inadequate, unresponsive)
Personnel	11	(inadequate)
Rotary Wing Div.	10	(required to solve problems)
Top Management	8	(inadequate, parochial, "empire")
Program Managers	7	(too junior, insufficient authority)
Divisions	6	(squabbling, poor interfacing)
Supply	4	(unresponsive)
NAVAIR	4	(lack of guidance, confusion)
NATC Organization	3	(anachronistic, resists change)
NATC Financial Management	3	(improper, reduces NATC competitiveness)
Project Workload	2	(overburdens assets)
Project Dollars	1	(insufficient for workload requirements)

PROBLEM	VOTES	COMMENTS
NATC Technical	1	(inadequate)
NATC Image	1	(poor throughout RDT&E community)
Total Responses	87	

Comment: The priorities indicated by the aggregate response follows fairly closely the analysis within the thesis, with perhaps some bias created by the fact that some problems achieve greater visibility within an organization. Certain externalities such as the supply system, NATC image, etc., cannot be effectively integrated into the analysis.

Question 22. (Optional) Draw a skeleton organizational outline of the NATC you would like to work for.

Comment: Only six replies of forty answered this question, probably due to the time factor required for the entire questionnaire. Of the six NATC organizations submitted, four were essentially the current NATC organization with slight changes. Two responses included the design of a rotary wing division but neither had sufficient detail to warrant further comment. Question 22 made no information contribution to this discussion.

Overview on Questionnaire

Overall, the questionnaire responses demonstrated a strong consistency of opinion most of which fell reasonably close to the content of the thesis analysis. This was particularly

impressive in that many responders may have felt uneasy over the question of their anonymity being preserved or the judgemental nature of some of the questions regarding their seniors, thus forcing them to a more conservative or "no opinion" viewpoint.

The results of the questionnaire seem to support three broad statements:

1. The current problems of NATC rotary wing elements can only be solved through a reorganization process.
2. NATC must consider external forces and make itself more internally efficient in order to contend with the current and future exigencies of the RDT&E environment.
3. There is a strong requirement for an advanced planning document to aid NATC in making current changes and preparing for the future.

VI. NEW DEVELOPMENTS

A. GENERAL

Almost coincident with the completion of the thesis analysis, thesis liaison at NATC provided unexpected information; CNATC had directed NATC to reorganize, effective 1 April 1975. A Reorganization Committee was appointed to implement the guidelines as set forth by CNATC. Principle criteria for the reorganization were improved flight safety and technical product.

It is not the purpose of this segment to offer discussion on the similarities or differences between the NATC organization developed by the Reorganization Committee and the organization suggested in the foregoing thesis analysis. Rather a brief report will be made describing the new NATC organization. This will be followed by a brief analysis of potential problems that may occur as a result of these organizational changes with recommendations, as appropriate, for problem solution or minimization. The thesis data base will be the basis for this analysis.

1. Old Problems

The principle problems affecting performance of the current NATC organization are presented as Figure 2, in Appendix A. The fundamental differences in problem description result from the NATC-wide perspective necessarily adopted by

the Reorganization Committee as compared to the rotary wing focus used by the thesis.

2. The New Organization

The proposed NATC organization is presented as Figure 3, Appendix A. As may be seen, the divisions, now called directorates, are structured along mission lines. This form is similar in some ways to the mission directorate system proposed, but never implemented, by the NATC Long Range Plan of February 1974 (Reference 2). The Rotary Wing Aircraft Test Directorate organization is presented in Figure 4, Appendix C., both as a directorate example and for comparison with the organization previously developed in thesis analysis. The strengths of the new NATC organization and the problems to be overcome which may result from the new organization, as published by the Reorganization Committee, are presented as Figures 5 and 6 respectively of Appendix A.

B. ANALYSIS

There is little doubt that the proposed NATC organization will be a major positive step toward the solution of problems which have long bothered the Test Center. It should be noted that the apparent catalyst for this progressive change was Rear Admiral Taylor Brown, USN, the current Commander of NATC and the first CNATC to possess prior NATC experience and background as a test pilot. The Reorganization Committee has demonstrated considerable foresight in seeking advance appraisals of problems which will result from the new organization. These problems were presented in the preceding

paragraph. This analysis of the potential problems of the new organization will begin with one of those:

Centers of Engineering Expertise Diluted--The change of division/directorate structure from test function to mission orientation left many well-developed centers of test expertise with no apparent "home" or in a circumstance where their capabilities would now straddle two or more of the test directorates. Those expertise centers that did not readily adapt to inclusion in the Technical Support or Computer Services Directorates were relegated to a catch-all organization called the Systems Engineering Directorate. While realizing that there was little other organizational choice, it should also be apparent that the diverse, even unrelated, composition of this directorate will make it difficult to manage. Some of the segments, such as ordnance, have such strong ties with mission functions and have developed such specialized and autonomous procedures, that it is difficult to visualize the ordnance segment fitting into this new directorate except in the administrative sense. This problem and the associated problem of establishing management controls over diverse segments, each of which will soon develop strong supporting requirements and funding ties with old counterparts now in new organizations, and the strong informal organization that will develop, will be a continual and compelling challenge.

Project Test Pilot/Engineer "Team Concept"--Throughout its existence, NATC has relied heavily on the placement of singular responsibility and authority on a project team consisting of,

at a minimum, one test pilot and one engineer. Over time, this concept has proved itself the optimal way to conduct a project, particularly in the area of problem-solving, combining the requisite talents of technical know-how and leadership in appropriate measure.

The new organization calls for a Test Operations Group headed by a Chief Test Pilot. This group will be essentially a pilot pool while the civilian engineers and technicians will continue to man their branches as before. This organizational choice appears natural, given the strong tendency away from a matrix arrangement and toward a vertically-structured organization. There are, however, potential draw-backs. With safety and technical product improvement as the principle criterion for reorganization, it would appear that the Test Operations Group could concentrate successfully on proper pilot check-outs, NATOPS, and other aspects of standardization. This would eliminate a frequent complaint that NATC pilots are not properly certified in the variety of aircraft they fly. A strong concern, however, will be that the new pilot pool generalist test pilot will have insufficient knowledge and specific experience in the diversified flight test procedures he will be called upon to perform. Given that it took a new test pilot four to eight months to adequately learn his testing specialty in the old test divisions, it appears that safety may be compromised by lack of familiarity with test procedures rather than, as before, inadequate knowledge of the aircraft. With this generalist approach is seen the associated possibility that less specialized test experience

will adversely affect the technical product. Both of these problems, if materialized, would be directly counterproductive to the objectives of the NATC reorganization.

The Discontinuance of Program Managers--Under the new organization, billets for staff program managers will be deleted. Most of the current program managers will be absorbed into the directorates, in such billets as Chief Test Pilot. The Director of each directorate will assume responsibilites for program management within his mission area. Arbitration of work load assignments straddling mission lines (such as dipping sonar between the ASW and Rotary Wing Test Directorates) will be determined by the NATC Technical Director and the Deputy Commander NATC.

If any area should receive strong and lasting attention, it should be the minimization of interdivision/directorate strife, a continuing and increasing problem in recent years. Few problems have a more pervasive influence on personnel motivation and output than these internal differences. The Deputy Director, NATC, has heavy chain-of-command responsibilities. The Technical Director has broad responsibilities to "establish technical policy guidance, ensure NATC is properly organized for its mission, assign priority of all NATC projects, and determine the committment of all resources to conduct projects." It may be advisable to install a Project Coordinator on the NATC staff, senior to all directorate heads, to manage and arbitrate the work load assignments arriving at NATC. This function could also serve as a central

clearing point and point-of-contact for external organizations seeking NATC support as well as a focal source for advance planning information and support requirements.

C. EXOGENOUS FACTORS

While NATC plans its reorganization, similar pressures have prompted change in areas external to, but with strong influence over, the Test Center. It is axiomatic that NATC's changes must allow for the influence of these external changes on itself. Two areas currently in flux, a new NAVAIR T&E focus (NAVAIR 06) and the Management Information System (MIS) required between such a focus and the field activities are discussed below.

TECO/TELO/NAVAIR 06--The original charter given the NAVAIR Test and Evaluation Coordinator, a second "hat" worn by CNATC, carried significant authority and was designed to ensure that field activities were properly coordinated and their workloads representative of NAVAIR policy. The current TECO staff appears to manage aircraft assets, arrange bailments, and have little real authority or enforcement capability for NAVAIR policy. It is significant that work load assignments arriving at NATC from locations other than NAVAIR (examples: NRL, NOL) do not fall within the TECO's purview.

Recently, NAVAIR has taken steps to create NAVAIR 06, which when implemented will control all NAVAIR field activities, determining their resources, tasking, and missions. AIR 06 is designed to eliminate the current bypassing of TECO and the myriad informal work load assignment channels which have

grown up between NAVAIR's shops and other syscoms and services, and the NAVAIR field activities. An accurate pictorial representation of current work load assignments and that hoped for after creation of AIR 06 is presented as Figures 7 and 8 of Appendix A.

Potential problems concerning AIR 06 are found in the current power structures of AIR 03, AIR 04, and AIR 05. Each will lose a measure of control to AIR 06 and each appears to have an endorsing or criticizing function in the formation of AIR 06. In order to obstruct this diffusion of power, we may speculate that the AIR 06 organization, when created, may lack the control and authority to make it the T&E "deus ex machina" for which it has been heralded. In any case, any effort to consolidate T&E workload at a single point in NAVAIR, then disperse it to the appropriate field activity will be a positive improvement. Additionally, a focal point for the distribution of T&E workload at NAVAIR will provide the appropriate location for the dispersion of an aggregate NAVAIR T&E policy and long range goals and objectives, a strong and necessary supplement for the advance planning of the various field activities.

Under the old NATC organization, a Test and Evaluation Liaison Office (TELO), operating under TECO, was located at NAVAIR. TELO appeared to have only a reporting and advising function. Within the new NATC organization, an NASC (NAVAIR) Liaison office, reporting to CNATC and located at NAVAIR, is planned. The function of this liaison office will be similar to other offices currently maintained at NAVAIR by other

field activities such as China Lake and Point Mugu, to solicit workload assignments, advise of technical capability, and generally "sell" NATC. This is viewed as an appropriate method for insuring that NATC receives its share of the workload and dollars, particularly in test areas unique to its charter. It is an unfortunate suboptimization of a more general malaise in that field activities, in general, need to have liaison offices competing for work unit assignments and needing to explain their capabilities to their superiors in the T&E chain-of-command. Perhaps the creation of AIR 06 will see a redefinition of field activity charters, work assignments within their bounds, elimination of redundant test resources, and no further need for these liaison efforts in salesmanship.

MIS--The two areas just discussed, that of the Project Coordinator function at NATC and the coordination of policy and work assignments at the NAVAIR level are related as parts of a management information system (MIS). It is important to realize that these functions are not only singularly important but are most important in the aggregate. Reorganizing NATC or a similar field activity without insuring that an appropriate instrument exists for the carriage of T&E policy, goals and objectives, long range planning, and work unit assignments from NAVAIR to the field activity, would be analogous to building a ship and putting it to sea without a steering mechanism. Without such an information system, the field activity is unable to determine that its operations and plans

are consistent with NAVAIR requirements. A strong emphasis should be placed on the MIS function.

D. CURRENT NATC FINANCIAL SYSTEM

As discussed early in the thesis, NATC implemented a modified form of institutional funding for test and evaluation at the beginning of FY 75. Effectively, NATC bills direct costs to projects and overhead costs to an institutionally-funded reimbursable order provided by NAVAIR. Although this subject does not relate uniquely to the new NATC organization, it will be an integral fact of life with the new NATC. The new system, in short, is not working. The criterion for billing direct costs is aircraft flight hours. The cost basis was derived from a flight hour forecast for annual requirements. The forecast appears to have been high by a factor perhaps as large as 50%. Resultantly, amortization of direct costs over significantly fewer flight hours raised the cost per flight hour. The net result is a highly-priced project flight hour requirement which although it may remain competitive with other NAVAIR field activities, is probably much higher than required.

In the case where machine (aircraft) hours do not represent an acceptable standard for the reasonable allocation of direct costs or cannot, over time, be forecast with acceptable accuracy, then a substitute criterion such as man-hours might be used for direct cost allocation. No consideration of adopting a different financial system is considered as it is

surmised that this new system is to be a standard throughout the NAVAIR field activities. This situation is particularly important in that the singular problems of a relatively new financial system and a new organization, simultaneously imposed, may mitigate against a successful organizational change in that it may be impossible to differentiate problem source.

VII. CONCLUSIONS/RECOMMENDATIONS

1. The rotary wing division organization presented in this study should solve the majority of the current problems afflicting the rotary wing segments of the NATC organizations and should be considered for implementation. The following potential benefits would accrue:

   a. Improved project interfaces between rotary wing segments.

   b. Improved rotary wing maintenance.

   c. Improved rotary wing technical report review.

   d. Reduction of the NATC "Empire" effect.

   e. Possible synergistic effects where the entire rotary wing organization may perform better than the sum performances of its segments.

   f. Better planning capability for requirements of future rotary wing T&E.

   g. A success predictor providing data necessary for planning further organizational change at NATC.

2. A rotary wing division should have the following attributes:

   a. Highly-motivated rotary wing and RDT&E experienced top management, military and civilian.

   b. A simple formal organization with well-defined authority/responsibility chains and including the Management By Objectives (MBO) concept.

c. A maintenance branch with all rotary wing assets on base to maintain. Include NATC, TPS, VX-1, and SAR.

d. Test pilots with specialized experience and increased aircraft standardization/familiarization procedures.

e. A reliability and maintainability (R&M) capability.

f. A group of fleet-experienced enlisted aircrew as evaluators of crew-related equipments.

g. An orientation and planning capacity toward advanced T&E technology.

h. All Search and Rescue (SAR) assets, personnel and aircraft.

i. A staff rotary wing program manager with sufficient authority, seniority, and visibility to act decisively.

3. An NATC rotary wing division should be located at Hanger 101 for the following reasons:

a. Safest overall location; only 360° approach to area without obstructions in consideration.

b. Adequate hanger, line, office and ramp space.

c. Only considered location within total view of tower.

d. Best SAR response location.

e. The single disadvantage, requirement to move current tenants, is judged worthwhile for long term benefits.

4. The thesis questionnaire distributed at NATC lends aggregate agreement to the conclusions given above. In general, the questionnaire results express three broad statements:

a. The current problems of NATC rotary wing elements can best be solved through a reorganization process.

b. NATC must consider external forces and make itself leaner and meaner in order to contend with the current and future exigencies of the RDT&E environment.

c. There is a strong requirement for an advance planning document to aid NATC in making current changes and in preparing for the future.

5. The recent decision to establish a mission-oriented division (directorate) organization effective 1 April 1975 should consider the following potential problems:

a. Management difficulties of specialized expertise groups within the Systems Engineering Directorate, a catch-all organization devised to assemble these diverse and fragmented groups.

b. Possibility that a generalist test pilot in a pilot pool will degrade safety and NATC technical product.

c. Lack of an arbitration and project coordination function between staff and directorates with discontinuance of the program manager structure on NATC staff.

d. That NAVAIR 06 will not perform the anticipated degree of project workload coordination with field activities.

e. Creation of an NATC liaison office at NAVAIR, though yielding an improvement on NATC's

competitive posture with other field activities, will act to confuse still further the issue of restricting field activities to work within their respective charters, a coordination requirement of NAVAIR itself.

f. The failure to create a satisfactory management information system (MIS) to support the exchange of policy and technical products, from the directorates through NATC, TECO or its replacement, to NAVAIR.

6. Consideration of an alternative financial direct cost assignment criterion should be given. Possibly man-hours vice machine (aircraft) operating hours would be easier to forecast and thus help to maintain a more competitive cost estimating posture for projects offered to various field activities.

7. Further thesis research study is recommended in the following specific areas:

a. Optimal maintenance force mix (Navy enlisted, general contract, specific contractor representation) for the new Rotary Wing Test Directorate at NATC.

b. Application of advanced simulation techniques to NATC aircraft T&E.

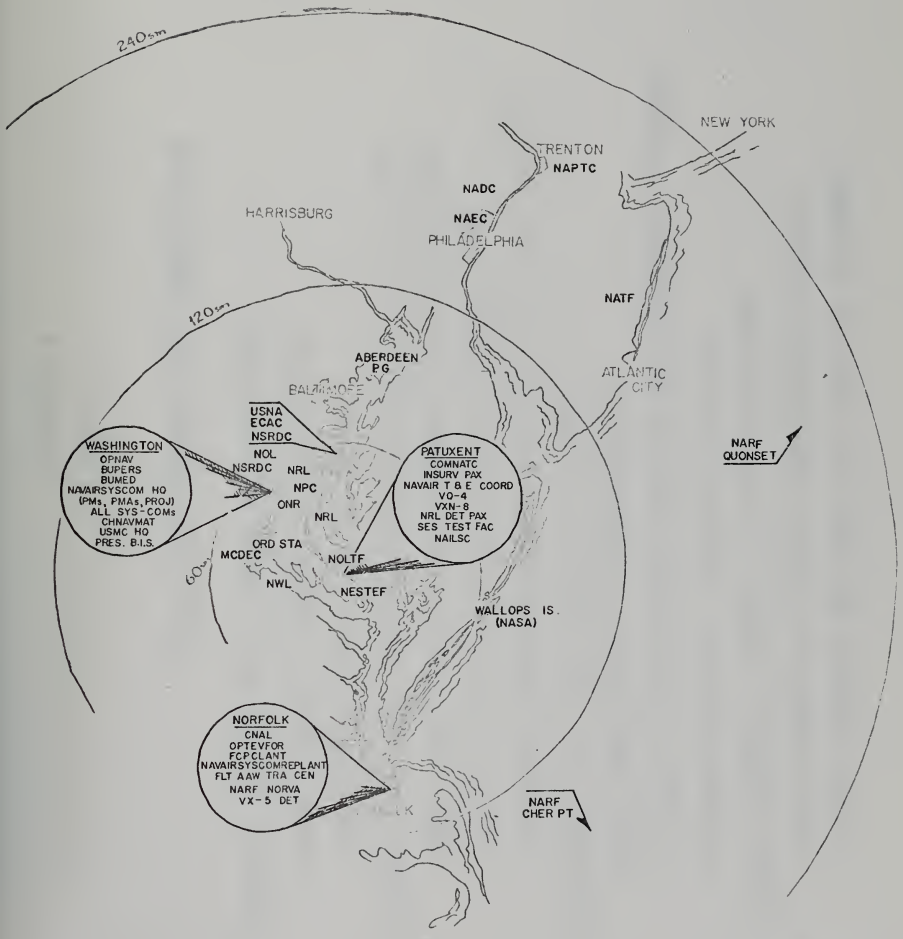
c. Creation of a NAVAIR-field activity management information system (MIS).

APPENDIX A

Figures

APPENDIX A

Figure 1



GEOGRAPHIC RELATIONSHIP/INTERFACE
- NATC -

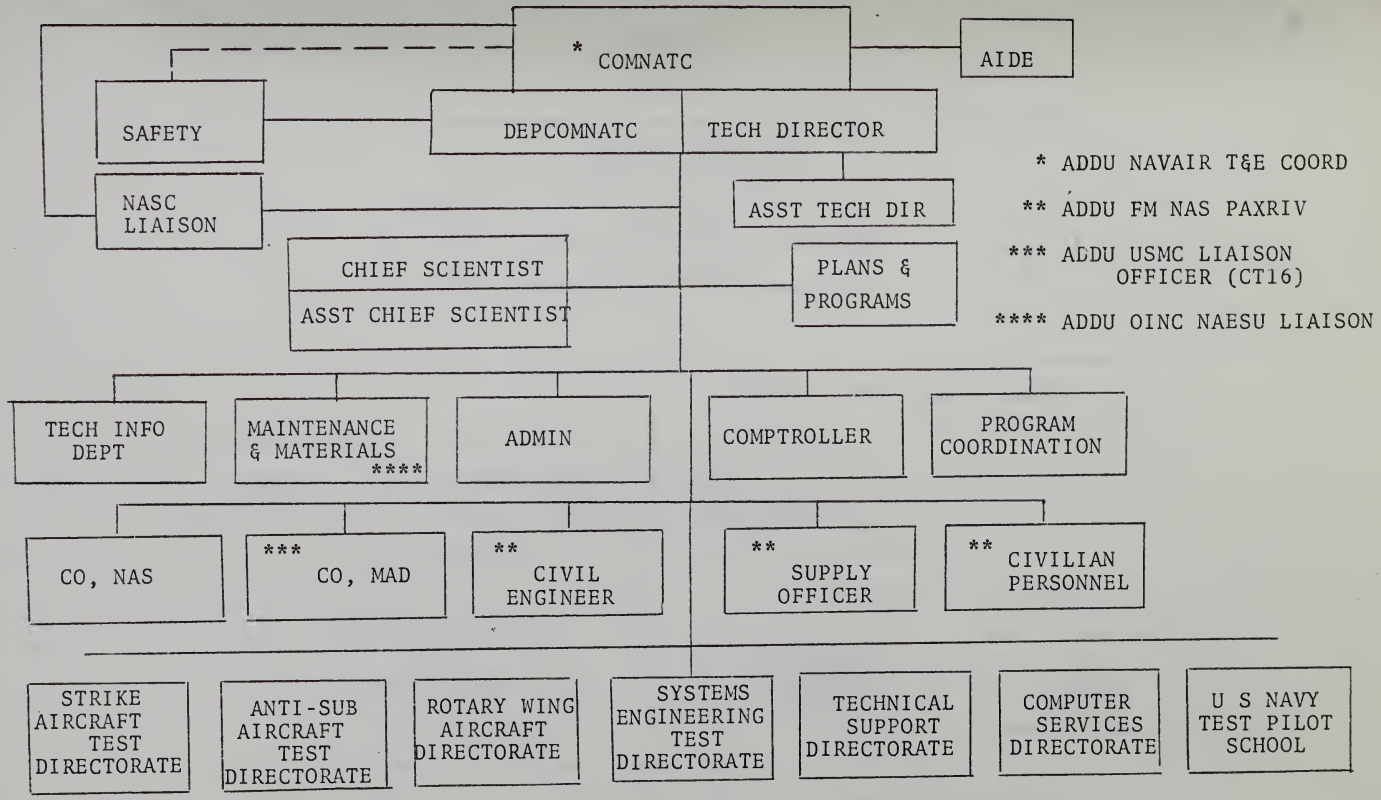
APPENDIX A

Figure 2

PROBLEMS WITH PRESENT NATC ORGANIZATION

* AIRCRAFT OF SAME TYPE IN THREE/FOUR DIVISIONS
    * COORDINATION OF AIRCRAFT USAGE DIFFICULT
    * SOME DUPLICATION OF TESTING EFFORT
* AVIATORS WITH SAME QUALIFICATION REQUIRED IN EACH DIVISION
    * DUPLICATIVE TRAINING AND STANDARDIZATION REQUIREMENTS
    * REDUCED FLIGHT TIME PER AVIATOR IN AIRCRAFT TYPE
    * INADEQUATE DIALOGUE BETWEEN AVIATORS FLYING LIKE AIRCRAFT
* MAINTENANCE NOT UNDER CONTROL OF OPERATOR
    * COMPLICATED PRIORITY SYSTEM REQUIRED
    * REDUCED DIALOGUE BETWEEN AVIATORS AND MAINTENANCE PERSONNEL
    * AIRCRAFT OFTEN NOT COLOCATED WITH USER
* PROGRAM MANAGERS EXTERNAL TO DIVISIONS REQUIRED
    * FINITE CONTROL OF PROJECTS AND RESOURCES UNLIKELY
    * AIRTASK SPONSORS MUST DEAL WITH MANY NATC PERSONNEL

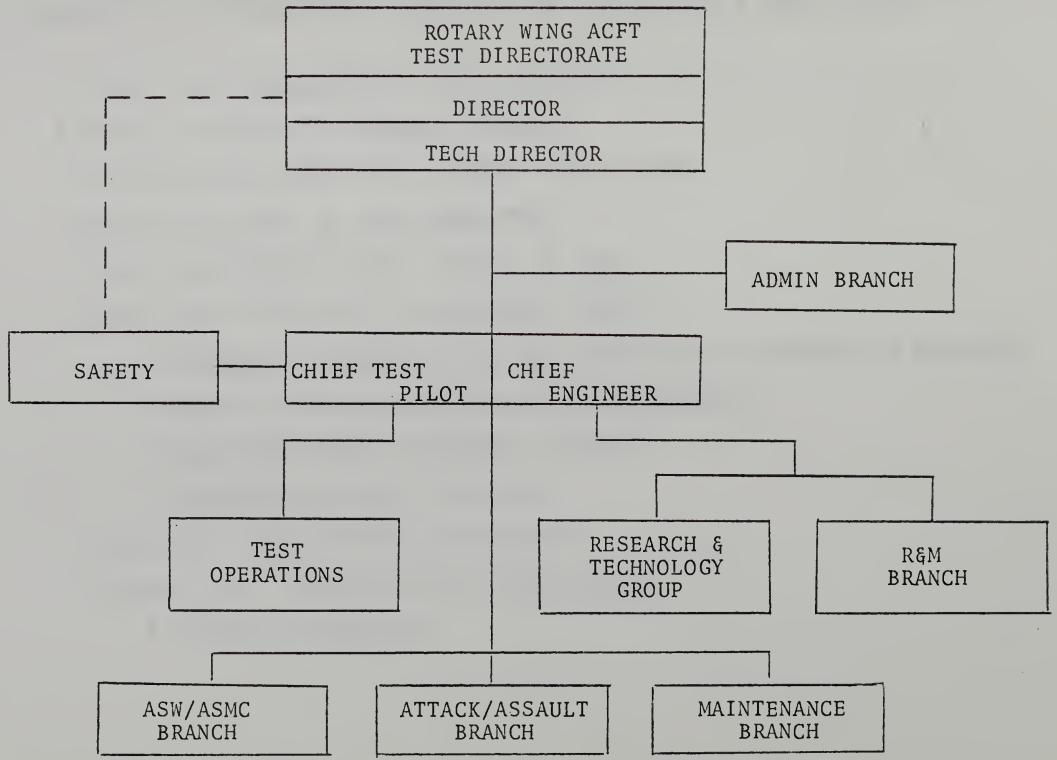
APPENDIX A: Figure 3



PROPOSED NATC ORGANIZATION (Effective 1 Apr 1975)

APPENDIX A

Figure 4



PROPOSED ROTARY WING TEST DIRECTORATE (Effective 1 Apr 1975)

APPENDIX A

Figure 5

STRENGTHS OF PROPOSED NATC ORGANIZATION (EFFECTIVE 1 APRIL 1975)

* DIRECT LINE MANAGEMENT OF MOST PROJECTS
* EASIER LIAISON WITH PROGRAM SPONSORS
* REDUCES REQUIREMENTS FOR AIRCRAFT AND AVIATORS
* PLACES CIVILIANS IN LINE MANAGEMENT
* PLACES MAINTENANCE UNDER CONTROL OF USER
* SIGNIFICANT POTENTIAL FOR INCREASED SAFETY
    * TRAINING, STANDARDIZATION AND CROSSFEED OF INFORMATION ENHANCED
    * FLIGHT TIME/AVIATOR/AIRCRAFT TYPE INCREASED
    * DEDICATED SAFETY PERSONNEL PROVIDED
    * COLOCATES AIRCRAFT WITH USER
* SIMPLIFIES ADMINISTRATIVE PROCEDURES
* RESEARCH AND TECHNOLOGY BASE STRENGTHENED
    * SOFTWARE EMPHASIZED

APPENDIX A

Figure 6

PROBLEMS TO BE OVERCOME IN PROPOSED NATC ORGANIZATION
(EFFECTIVE 1 APRIL 1975)

* SOME CENTERS OF ENGINEERING EXPERTISE DILUTED
* SOME EXPENSE INCURRED IN MOVING EQUIPMENT
* SOME HIGHER LEVEL CIVILIANS LACK LINE MANAGEMENT EXPERIENCE
* MAINTENANCE CONTROL PERSONNEL SPREAD THINNER
* DIALOGUE ACROSS MISSION LINES REDUCED

APPENDIX A

Figure 7

A MAJOR PROBLEM

WORK LOAD ASSIGNMENTS

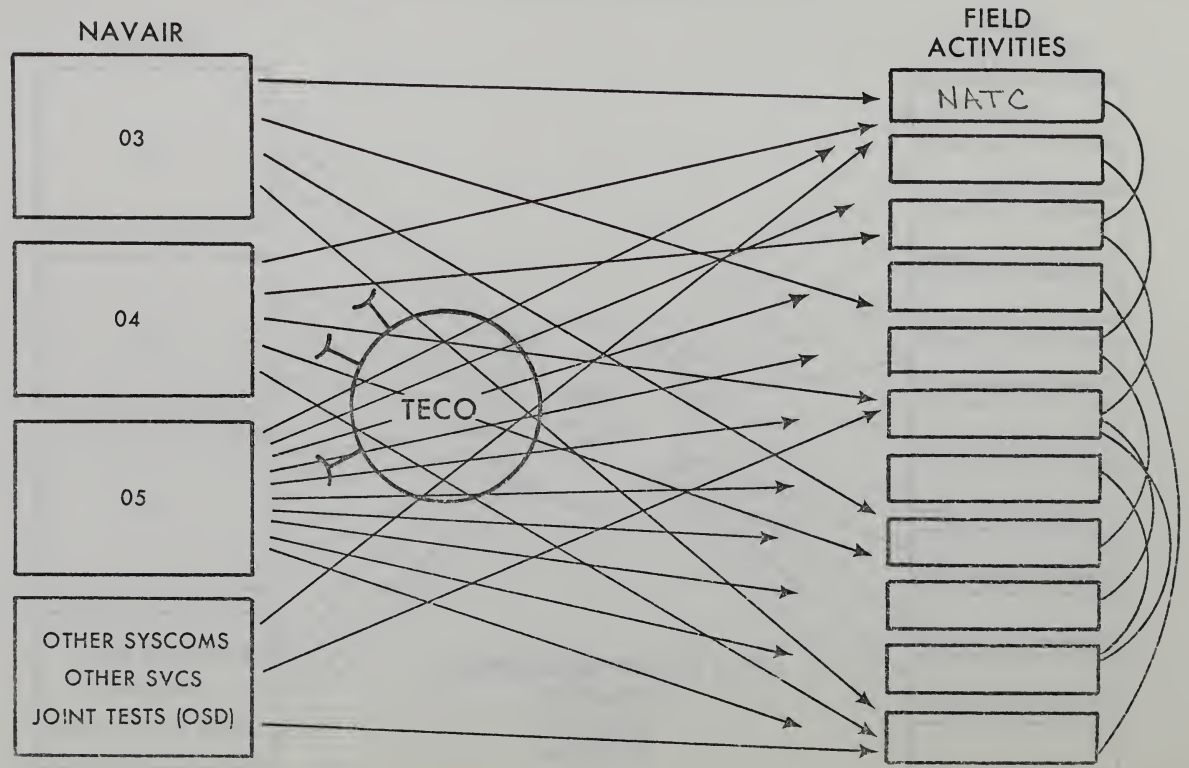
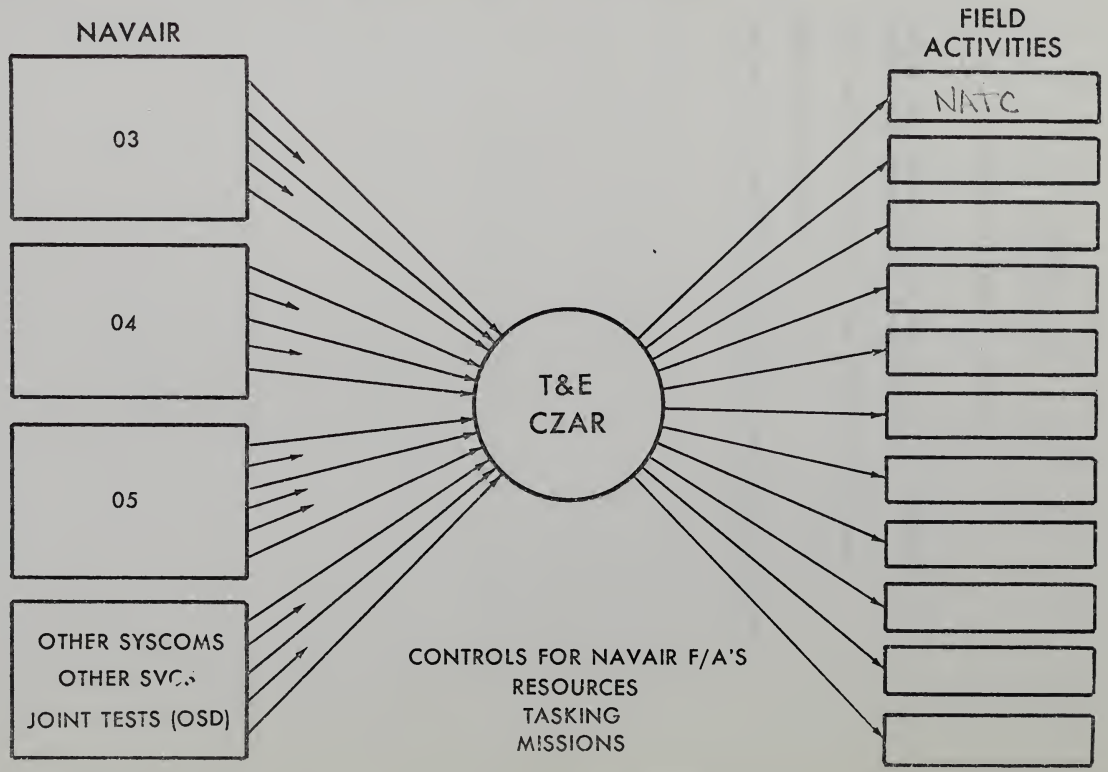


Figure 8

THE SOLUTION

WORK LOAD ASSIGNMENTS

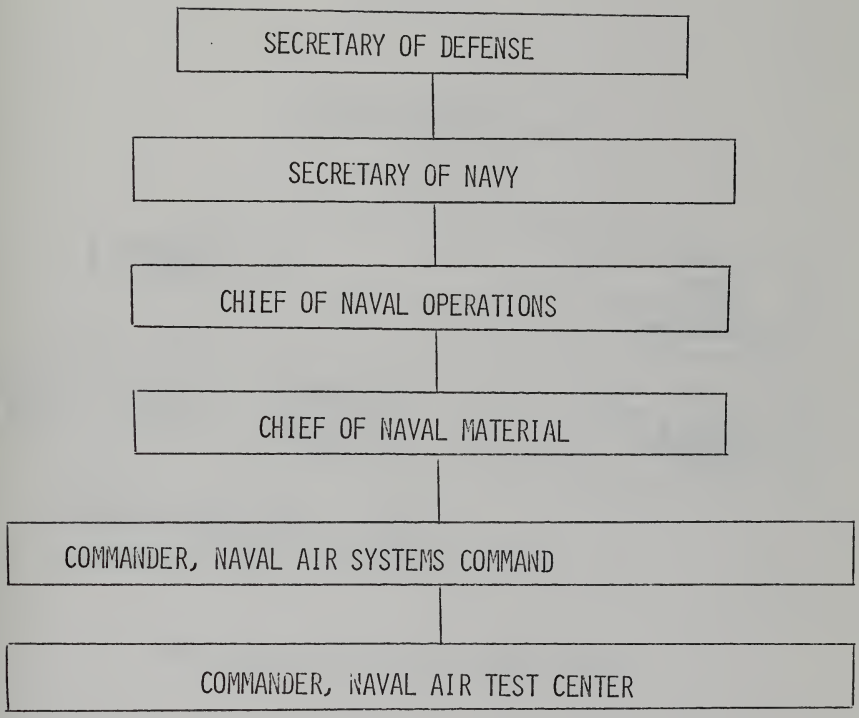


APPENDIX B

Organizational Charts

APPENDIX B

Figure 1

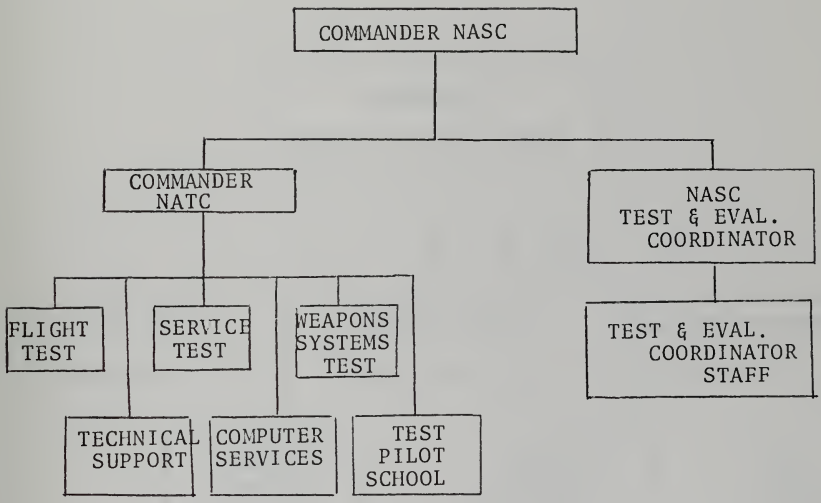


CHAIN OF COMMAND

CNATC TO SECNAV

APPENDIX B

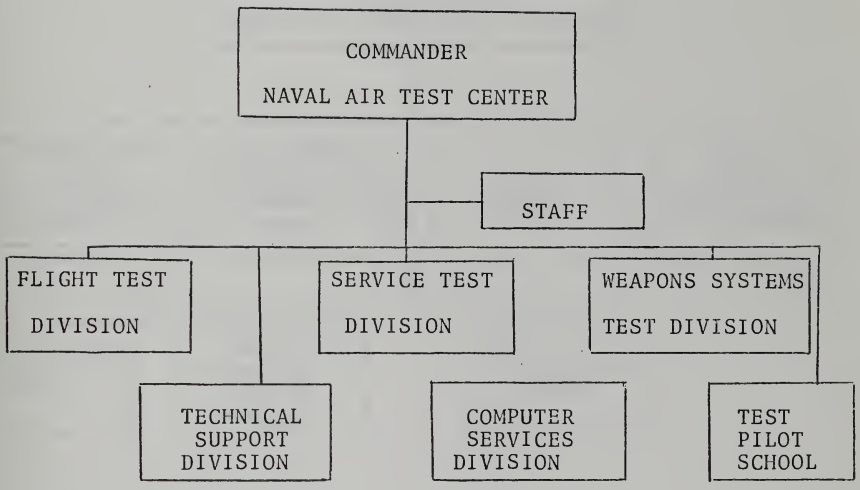
Figure 2



THE NATC ORGANIZATION WITHIN NAVAIR

APPENDIX B

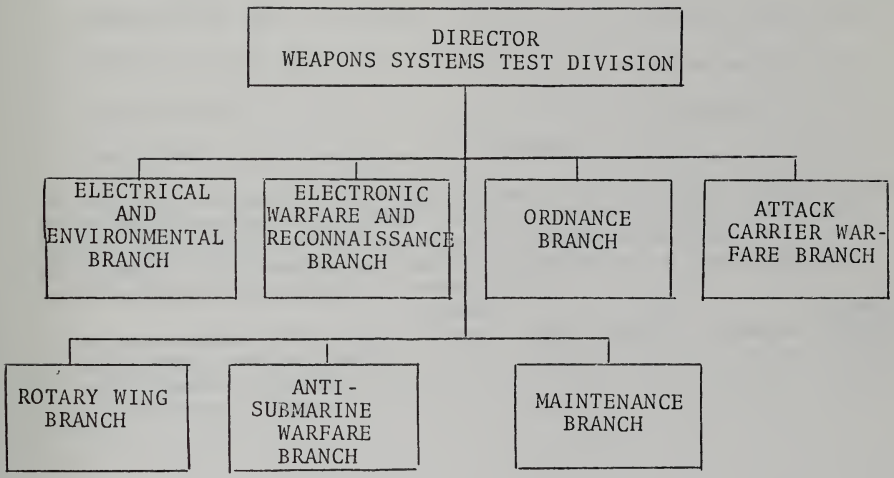
Figure 3



CURRENT NAVAL AIR TEST CENTER ORGANIZATION

APPENDIX B

Figure 4



EXAMPLE OF NATC DIVISION

(WEAPONS SYSTEMS TEST DIVISION ILLUSTRATED)

APPENDIX C

THESIS QUESTIONNAIRE

NATC ROTARY WING ORGANIZATION

General Info:

1. NATC SUB-UNIT (EX, WST, STAFF) _____

2. RANK (EX, E-5, O-5) _____

3. AVN BACKGROUND (VF, HC) _____

4. YRS AT NATC _____ 5. IN RDT&E _____

The following questions are designed to assist in the design of an improved rotary wing organization at NATC. They will become part of a thesis data base and your responses will be treated in confidence and will in no way be traceable. Your assistance, and the prompt return of the questionnaire in the accompanying envelope is appreciated.

	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
1. A consolidated rotary wing maintenance force at NATC would improve efficiency and effectiveness. Comment.	◯	◯	◯	◯	◯
2. A consolidated rotary wing division at NATC would improve efficiency and effectiveness. Comment.	◯	◯	◯	◯	◯
3. Overall, rotary wing maintenance at NATC provides the timely maintenance required by project workload. Brief comment.	◯	◯	◯	◯	◯

	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
4. Organizational structure at NATC is responsive to technological and organizational change. Comment.	○	○	○	○	○
5. Rotary wing T&E workload will increase in the foreseeable future. Comment.	○	○	○	○	○
6. Personnel from the rotary wing areas of NATC (maintenance divisions, staff) have equal levels of responsibility and authority. Comment.	○	○	○	○	○
7. There is unnecessary duplication of responsibility among segments of the NATC organization. Comment.	○	○	○	○	○
8. Geographic distances between rotary wing elements at NATC adversely affect project coordination. Comment.	○	○	○	○	○
9. If an NATC rotary wing divisional organization were formed, VX-1 rotary wing should be included. Comment.	○	○	○	○	○

	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
10. If an NATC rotary wing divisional organization were formed, TPS rotary wing should be included. Comment.	◯	◯	◯	◯	◯
11. The new FY75 NATC financial accounting system, modified institutional funding, will provide an improved funding picture at NATC. Comment.	◯	◯	◯	◯	◯
12. The planned ITEF (Integrated Test and Evaluation Facility) will increase inter-service and contractor testing at NATC. If agree, by what percent (20,30). _____ Comment.	◯	◯	◯	◯	◯
13. NATC will remain at Patuxent River for the foreseeable future and will not decrease in force levels, T&E capability, or T&E funding levels. Comment.	◯	◯	◯	◯	◯
14. NATC divisions organized by aircraft type, such as high performance, prop/turboprop, STOL/VSTOL would be more amenable to the T&E of the future. Comment.	◯	◯	◯	◯	◯

	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
15. Organizational change of rotary wing elements at NATC would bring about safety of flight/ramp ops safety improvement. Comment.	○	○	○	○	○
16. There is room for a full-fledged rotary wing division at NATC (in the physical sense). (If agree) where would you locate it?	○	○	○	○	○
17. Within the divisions, chain-of-command above branch level generally has adequate rotary wing expertise and is optimally qualified to pass judgement on technical reports passed upward from these branches. Comment.	○	○	○	○	○
18. The immediate future at NATC will be characterized by a continual increase in the demand for T&E services, to be met with decreased manpower. Comment.	○	○	○	○	○
19. The movement within DOD and the Navy for consolidation of T&E functions will impact NATC with a requirement for improved T&E output/dollar efficiency and effectiveness. Comment.	○	○	○	○	○

a. _____

b. _____

c. _____

	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
20. A suitable NATC LONG RANGE PLAN which carefully describes feasible implementation alternatives and incorporates machinery for continued change should be formulated by NATC. Comment.	◯	◯	◯	◯	◯

21. Name five(5) problems at NATC that you would like to see changed.

A.

B.

C.

D.

E.

22. (Optional) Draw a skeleton organizational outline of the NATC you would like to work for.

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