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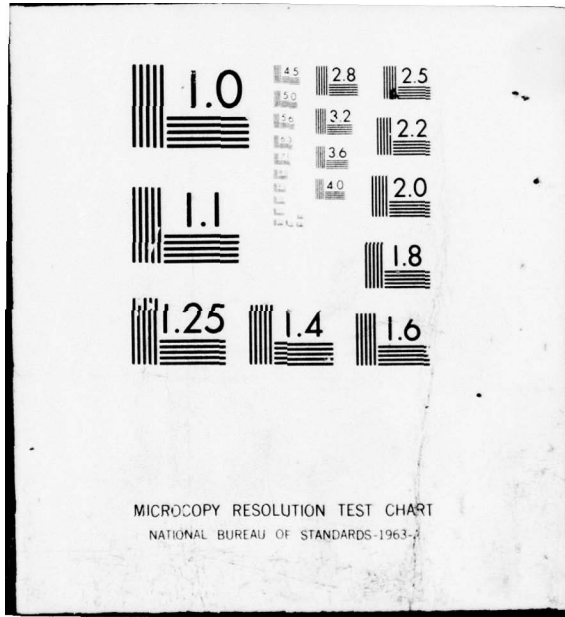
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**REVISION OF  
NAVAL FLIGHT OFFICER  
BASIC TRAINING**

April 1976

Prepared for:  
Chief of Naval Education and Training  
Naval Air Station  
Pensacola, Florida

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## REVISION OF NAVAL FLIGHT OFFICER BASIC TRAINING

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## FOREWORD

This report summarizes a project during which the U.S. Navy's Naval Flight Officer Basic Training Course was revised in accordance with instructional system development (ISD) procedures. The principal features of the revision were to increase the emphasis upon the operational relevance of that training, to reorganize the course content, and to apply techniques of training different from those conventionally employed in Naval Flight Officer training. The project included a limited implementation of the revised course and its further revision based upon experiences obtained.

The project was sponsored by the Chief of Naval Education and Training (CNET) and was conducted jointly by personnel from the U.S. Navy and the HumRRO Central Division, Pensacola Office. Principal support for the project was provided by Training Wing Six and Training Squadron Ten, U.S. Naval Air Station, Pensacola. The project was initiated in July 1974, and concluded in May 1976. The CNET Technical Monitors were CDR John Gash and CDR Anthony Marcantonio.

This report includes two appendices which are bound separately. Appendix A, "Naval Flight Officer Basic Training Objectives," documents the training objectives met through the training developed during the project. Appendix A is a revision of an interim report, "Revision of Naval Flight Officer Training Objectives," which was submitted for Navy review in March 1975. Appendix A was revised to reflect comments obtained during that Navy review. Appendix B, "Naval Flight Officer Basic Training Material," contains the information necessary for the administration of the training course developed during this project.

This report was prepared by HumRRO and Navy project staff personnel. The HumRRO project staff consisted of Mr. Maurice Siskel, Jr., Project Director through the first 15 months of the project, and Dr. Paul W. Caro, Project

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Director for the remaining effort; Mr. Winon E. Corley, Mr. Larry B. Jividen, Mr. John G. Bradley, and Dr. Wallace W. Prophet. The Navy project staff consisted of CDR Ross Terry, Project Officer, LCOL William Johnson, USMC, LCDR Richard Coven, LT John Christman and CAPT Stephen Mugg, USMC.

This project was performed under U.S. Naval Training Equipment Center contract No. N61339-74-C-0166.

## SUMMARY AND CONCLUSIONS

### PURPOSE

The Naval Flight Officer (NFO) is a critical component of modern naval flight operations. The use of complex aircraft electronic systems in weapons delivery, air combat maneuvering, and electronic warfare, as well as the operation of navigation systems, are among the many responsibilities of the NFO.

The Navy has carried out several major efforts aimed at making NFO training even more effective and responsive to fleet requirements than in the past. This series of efforts has culminated in the development of a revised NFO Basic Training course based on the principles and techniques of Instructional Systems Development (ISD). The present report describes that effort and the results of a test implementation of the revised course.

### APPROACH

The approach taken in developing the revised NFO Basic Training course generally followed the five phases embodied in the ISD model: (1) analysis of the operational job; (2) specification of training objectives; (3) specification of learning events and activities; (4) course implementation; and (5) evaluation of the new course.

Because of previous Navy efforts concerned with specifying NFO fleet job requirements, relatively little additional effort was required for the first phase. In the second phase, a detailed examination and review of training objectives was carried out resulting in specification of a new set of training objectives for the revised course. These objectives, which involved the deletion of some formerly existing objectives and the addition of some new ones, were submitted to the Navy for review and approval before proceeding with the development of the revised course in the third ISD phase.

The revised course involved making maximum use of existing course materials and facilities. In particular, extensive use was made of the radar/navigation trainer, Device 1D23. Flight training was given in the T-39 and T-2 aircraft. Among the important features of the revised course were the institution of specialized "pipeline" training aimed at the four different advanced NFO training pipelines to which the students go after completing the NFO Basic Training course, emphasis of individualized instruction, use of the training manager concept, use of peer instructors, small group instruction, and functional context training.

In the fourth ISD phase, the revised course was implemented by the Navy on a limited basis. In this implementation two NFO instructors received orientation training to allow them to function as Training Managers (TM). Each TM carried ten students (total N=20) through the revised training course, calling on other Navy instructors and instructional support as required by the revised course.

The final ISD phase was that of evaluation of the new course through the results from the trial implementation. The evaluation had two major emphases, the general feasibility or workability of the revised course in an operational training setting, and whether or not the revised course did, in fact, allow accomplishment of the training objectives.

#### RESULTS

Results of the limited implementation of the revised NFO Basic Training course indicated that the training objectives were successfully achieved under the revised program. Five of the 20 students attrited during the Basic course. Two of the five attritees resigned early in the course for reasons unrelated to their performance, while two more resigned after completing the Core portion of the Basic course with above average achievement. The fifth attritee

was grounded for medical reasons. Three of the remaining 15 students were rated as weak students by Navy evaluation personnel.

The evaluation suggested areas for further revision of the course, generally of a minor nature. The general program concept was found to be feasible for operational implementation and to offer certain advantages to the Navy. The specific instructional techniques used were also judged feasible. As a result of the evaluation, a final suggested revised course was prepared jointly by Navy and HumRRO personnel and is presented as an appendix to this report.

#### CONCLUSIONS

On the basis of the results of this effort, the following conclusions are warranted:

1. The revised NFO Basic Training course is feasible for operational implementation and will offer significant advantages to NFO training.
2. Resource requirements related to operational course implementation, as described in this report, should be examined by the Navy for future planning purposes.
3. Consideration should be given to developing revisions of the advanced pipeline portions of NFO training to further increase the efficiency of overall NFO training.
4. In accord with ISD methodology, steps should be taken by the Navy to develop a continuing fleet feedback-course revision system for NFO training.

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## CHAPTER I: INTRODUCTION

### BACKGROUND

The Naval Flight Officer (NFO) is an indispensable crewmember in many aspects of naval flight operations. In addition to some of his more routine activities, such as navigation and communication, he must be able to use a large variety of quite complex equipment and exercise considerable decision-making skills in air combat maneuvering and weapons delivery in both electronic and visual modes. Further, he must be capable of coping with enemy ECM and using ECM against hostile air and ground elements. Although these activities barely sample the range of responsibilities which fall to the NFO, they serve to illustrate the complexity of the job.

NFO training has been effective, and NFOs have performed, typically, in an exemplary manner in the fleet. Even so, from time to time there have been complaints that NFOs were inadequately trained when they reach fleet assignments; that they did not have an overall perspective, or so-called big picture, of how they fit into flight missions; and that they had received some training which was not really pertinent to their responsibilities. In addition to such complaints emanating from fleet elements, problems existed during NFO training itself. Some of these problems were indicated by the fact that NFO attrition rates during training were high and that morale among NFO students tended to be poor. When considered together, these complaints and problems suggested need for a revision of NFO training to allow the NFO better to measure up to fleet requirements and to bring about increased cost effectiveness in an expensive training program.

In the early 1970's, both the Naval Air Training Command and fleet elements recognized that the training programs for NFOs were in need of updating. As a consequence of this recognition, an intensive, comprehensive study of the NFO

training program was undertaken, at CNO direction, by a Study Group under the direction of Rear Admiral J. M. Thomas, Chief of Naval Air Training. The report of RADM Thomas' Study Group, which recommended major changes in the NFO training program, was published in May 1972.<sup>a</sup> The recommended changes involved revision of the training courses comprising NFO training, redefinition of its scope, and redefinition of the various NFO training pipelines. Efforts began almost immediately to revise the NFO training program in accord with those recommendations.

An early activity toward that goal of revision NFO training consisted of an extensive analysis of NFO training requirements. That analysis was conducted by another Navy Study Group, Naval Aerospace Medical Research Laboratory (NAMRL). It concentrated upon identifying the skills and knowledges required of NFOs assigned to each NFO community with its unique mission and aircraft. The principal result of the NAMRL study, published in 1973, was an objective identification of operational task requirements common to all NFO missions. These common training requirements were delineated in a report authored by Commander Doll.<sup>b</sup>

Another step toward the revision of NFO training was initiated during 1975 when the Navy initiated the development of revised NFO training programs at the RAG level. Initial efforts involved utilizing the systems approach to training (SAT) methodology in the analysis of RAG training requirements for the E-2C, EA-6B, and A-6E communities. It is likely that these initial efforts will be extended to other NFO communities until the responsiveness to fleet requirements of training provided in each NFO RAG is assured.

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<sup>a</sup>"Report on the Study of Naval Flight Officer (NFO) Training in the Naval Air Training Command, "Hqs., Chief of Naval Air Training, Naval Air Station, Pensacola, FL, 15 May 1972.

<sup>b</sup>Doll, Richard E., "Naval Flight Officer Function Analysis. Final Report. Commonality of Operational Functions." Naval Aerospace Medical Research Laboratory NAMRL-1194, Pensacola, FL, 2 November 1973.

Development also has been initiated of a Navy Electronic Warfare Training System (NEWTS). When available for use, this system will modernize a major portion of the training received by NFOs at one of the NFO specialty schools, the Airborne Electronic Warfare School. The NEWTS will make computer-assisted instruction and other facets of modern training technology available to a major segment of NFO specialty training and will make that pre-RAG training program more efficient as well as more fully responsive to fleet requirements.

As a part of this concerted effort to enhance NFO training, an additional project was initiated in 1974 which concentrated specifically upon the initial or basic portion of NFO training. The project was undertaken jointly by the Human Resources Research Organization (HumRRO) and the Navy squadron responsible for the conduct of NFO Basic Training, Training Squadron 10 (VT-10), and was conducted under the auspices of the Chief of Naval Education and Training through the Naval Air Training Command and Training Wing Six. The purpose of this jointly conducted effort was to implement recommendations of the Thomas Study which relate specifically to NFO Basic Training. The present report summarizes the joint efforts which led to a revision of NFO Basic Training and describes the revised training course which resulted from those efforts.

#### ORGANIZATION OF THE REPORT

The present report describes the NFO Basic Training course revision project and the products of that project. Subsequent major sections of the report consist of (a) a discussion of the approach undertaken in the accomplishment of the project's objectives; (b) a summary description of the revised NFO Basic Training program developed during the project; (c) a discussion of the effectiveness of the revised course with respect to the objectives of NFO Basic Training; and (d) considerations related to its possible adoption by the Navy for future NFO Basic Training. Recommendations concerning further efforts to enhance the

program's effectiveness and administrative efficiency also are included in the final section of the report.

There are two appendices to this report, each of which is bound separately to facilitate use by interested individuals and agencies. Appendix A consists of a listing of the objectives of the revised NFO Basic Training Program. A draft of this document, submitted as an Interim Report, was reviewed by cognizant Navy representatives early in the project. Based upon comments contained during that review, the objectives were revised. Appendix A contains the revised objectives.

Appendix B consists of the essential documentation of the revised NFO Basic Training course developed during the present project. The appendix contains listings of all resources required for administration of the revised course and descriptions of the manner in which those resources are to be employed during training.

#### DESCRIPTION OF NFO TRAINING

Naval Flight Officer Basic Training is conducted at Naval Air Station, Pensacola, Florida, by Training Squadron Ten (VT-10). Students for the program volunteer from several commissioning sources. These sources include the Naval Flight Officer Candidate program, Naval Reserve Officer Training program, Naval Academy, Navy Enlisted Scientific Educational Program, Marine Platoon Leaders Classes, Officers Candidate Schools of the Navy, Coast Guard, and Marine Corps, and commissioned officers from Fleet assignments.

Prospective NFOs and Naval Aviators (NAs) begin their training together at the Naval Aviation Schools Command, NAS Pensacola. Approximately 50% of the future NFOs and NAs attend Aviation Officers Candidate School (AOCS) for 11 weeks, where they receive academic training in such areas as Naval orientation, Naval history, leadership, seamanship, aviation physiology, basic aeronautics, engineering, swimming and physical fitness. Concurrent with the AOCS program,

previously commissioned officers receive preparatory training in aviation and environmental subjects to prepare them for subsequent training. At the completion of these Naval Aviation Schools Command programs, the SNFOs and SNAs begin separate courses, with the SNFOs proceeding to VT-10 for NFO Basic Training.

NFO Basic Training activities are conducted in classrooms, in simulators, and in aircraft. Classroom training covers both Airways and Dead Reckoning Navigation, Voice Communications, Computer Systems, Advanced Systems, Radar Systems, and Meteorology. Skills learned in the classroom are applied to simulated operational tasks in the simulator and in the training aircraft. During inflight training, the SNFO is exposed to visual and instrument navigation at high speeds, and he becomes familiar with aircraft systems and aircraft performance characteristics.

Upon completion of NFO Basic Training at VT-10, the SNFO goes on to further training in one of four advanced training pipelines. These pipelines are Advanced Jet Navigation (AJN), Radar Intercept Officer (RIO), Advanced Navigation, and Airborne Tactical Data Systems. Each pipeline concentrates upon training for specific tasks which the NFO will perform in his future fleet assignment.

At Training Squadron 86, which is also located at NAS Pensacola, Florida, SNFOs receive training in either the RIO or the AJN pipelines. The AJN training is oriented to low level visual and radar navigation tasks necessary in fleet attack type aircraft. The RIO training concerns tasks related to detecting airborne targets, conducting intercepts, and tactics.

Advanced Navigation training is presently conducted at Training Squadron 29 in Corpus Christi, Texas, but will soon shift to Mather AFB, California. The training conducted in this pipeline concentrates on long range, over water navigational skills required by patrol and force support aircraft. The Airborne Tactical Data System pipeline, which principally involves academic or classroom

training, is designed to prepare the SNFO for duties in airborne aircraft detection and control.

Upon completion of the training provided in these advanced pipelines, the student is designated a Naval Flight Officer and is assigned to a specific Replacement Air Group (RAG) where he receives further training in a fleet aircraft. The NFO is then assigned to a tactical fleet squadron as a qualified crew member.

## CHAPTER II: APPROACH

The efforts undertaken to revise NFO Basic Training were modeled, in general, after the Instructional Systems Development (ISD) model adopted by the Interservice Committee on Instructional System Development<sup>a</sup>. The ISD model consists of five phases: (1) analysis of the operational job; (2) specification of training objectives; (3) specification of learning events and activities; (4) course implementation; and (5) evaluation of the newly developed instructional course. Because portions of the information that otherwise would have been developed in the execution of the ISD model were already available, the approach necessarily varied from that described by the Interservice Committee. The approach followed in the present project is described below.

### ANALYSIS OF THE OPERATIONAL JOB

The initial ISD model phase concentrates upon analyses of training requirements, or the requirements underlying criterion performance of the operational job. Activities include identifying tasks and functions involved in job performance, analyzing existing training provided job incumbents, and selecting the training site and the principal resources to be employed during future training activities.

The present project relied upon information that was largely available prior to project initiation with respect to analyzing the operational job in order to determine NFO Basic training requirements. The task analyses conducted by NAMRL during its study of NFO fleet performance requirements were relied upon, and the NAMRL report<sup>b</sup> which identified the tasks common to all NFO

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<sup>a</sup>Interservice Procedures for Instructional System Development. CNET 106A, Chief of Naval Education and Training, Pensacola, FL, 1 April 1976.

<sup>b</sup>Doll, Richard E., "Naval Flight Officer Function Analysis, Final Report. Commonality of Operational Functions," Naval Aerospace Medical Research Laboratory NAMRL-1194, Pensacola, FL, 2 November 1973.

communities became the basis for selecting tasks and functions to be trained in the NFO Basic Training course under study. Although the HumRRO and Navy project personnel were familiar, to varying degrees, with NFO fleet tasks, no investigations were conducted by these personnel to verify the NAMRL findings or to conduct additional analyses of any portion of NFO Basic Training other than at NAS Pensacola, using the existing resources of VT-10, or other resources judged to be readily available to the Squadron for the conduct of NFO training.

Since much of the job analytic information was readily available, it was possible to initiate the second ISD phase, specification of training objectives, much earlier in the project than otherwise would have been feasible. While project efforts related to specifications of training objectives are described separately below, it should be noted that those efforts were underway almost from the beginning of the project. Thus, during analyses of the existing NFO Basic Training course, training objectives were available for use in determining the relevance to the operational job to training presently being conducted.

Extensive effort was devoted to analysis of the content of NFO Basic Training as it was being conducted at the time this project was initiated.<sup>a</sup> This effort consisted of a systematic comparison of the course's content with the operational job requirements as reflected in the Thomas and NAMRL studies and with other information related to NFO fleet performance requirements available within VT-10. The objective of the comparison was to identify course

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<sup>a</sup>NFO Basic Training, like other military training programs, is subject to frequent minor revision with respect to methods of instruction, instructional personnel, content, etc. During the course of the present project, numerous such minor revisions were made. While some of the changes related to course content and instructional procedures were based upon project analytic and program development activities, most were intended merely to update information presently in the training program and resulted from routine efforts to assure the thoroughness and relevance of the training being conducted. As these changes occurred in the existing course, they were adopted, as appropriate, by the Project Staff for inclusion in the revised course then under development.

content, if any, which did not appear to support fleet requirements. This analytic effort produced three products. The first product was the identification of course content which appeared, in the judgment of the project staff, to contribute to the attainment of particular course objectives. The second product was the identification of course content which did not appear to make such a contribution. The final product was the identification of gaps in course content, i.e., areas where new or additional content was required to prepare SNFOs for subsequent training or assignments.

As part of the analysis of the present course, the resources available for the conduct of training also were studied. The principal such resources are the T-39 and T-2 aircraft and Device 1D23, a navigation trainer developed specifically for NFO training. The purpose of these efforts was to determine how they might best be used in the conduct of NFO Basic Training. During these efforts a Task Commonality Analysis<sup>a</sup> was conducted in which the training features of Device 1D23 were compared with the features of the T-39 and T-2 aircraft. The TCA consisted of four principal activities: (1) tasks associated with criterion performance in the T-39 and T-2 aircraft were identified; (2) tasks associated with such performance in Device 1D23 were identified; (3) systematic comparisons were made of task elements found in the aircraft and device; and (4) estimates were made concerning the potential transfer of training from the device to the aircraft. Comparisons were then made between the current manner in which the device was being used and its use in a manner designed to optimize its training value. This resulted in development of revised usage procedures for implementation into the revised NFO Basic Training course being developed.

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<sup>a</sup>Caro, Paul W., "Equipment-Device Task Commonality Analysis and Transfer of Training," HumRRO Technical Report 70-7, Human Resources Research Organization, Pensacola, Florida, June 1970.

## SPECIFICATION OF TRAINING OBJECTIVES

The second ISD phase involved specification of the objectives that would be met by the revised NFO Basic Training course. Emphasis during conduct of the efforts underlying this phase was two-fold: first, upon identifying the objectives to be met during future NFO Basic Training; and second, upon assuring that the objectives of that training were stated in terms which made them amenable to a determination of whether they had been attained. This phase was conducted concurrently with the conduct of the initial ISD phase, and in fact, was one of the first project activities completed.

Specification of training objectives for a revised NFO Basic Training course began with the previously specified, i.e., existing, objectives of the present course. The existing objectives, both terminal and enabling, were reviewed in detail, and analyses were conducted to determine their relation to job requirements. The purpose of this review was to verify that the existing objectives were consistent with information external to the present course concerning NFO performance requirements. The major source for such information was the previously identified NAMRL study reports<sup>a</sup> and reviews of the training received by SNFOs prior to entering the NFO training program.

The job performance requirements identified in the NAMRL study included those for which training is conducted during NFO pipeline and RAG training, i.e., after completion of Basic Training, as well as those for which training is conducted during NFO Basic Training itself. The NAMRL report which identified the training requirements which are common to all fleet NFO assignments was particularly helpful in delineating the job requirements and hence the training objectives appropriate specifically to NFO Basic Training. Other

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<sup>a</sup>Doll, Richard E., "Naval Flight Officer Function Analysis, Final Report. Commonality of Operational Functions," Naval Aerospace Medical Research Laboratory NAMRL-1194, Pensacola, FL, 2 November 1973.

useful information was obtained through reviews of the objectives of Aviation Officer Candidate training and through interviews with incoming SNFOs concerning skills they already possessed and which, therefore, did not need to be included in the revised NFO Basic Training course. In addition, the judgments of the project staff were relied upon in the selection of the objectives to be met in the revised Basic Training course. The general rule followed in making these judgments was that the existing objectives of NFO Basic Training would be modified only in those cases in which clear evidence external to the present course could provide a basis for such modification. The consequence of application of this rule was to revise the existing NFO Basic Training course while preserving its role in the overall NFO Training program and its relationship to other elements of that program.

The training objectives which were determined to be appropriate to NFO Basic Training were reviewed to assure that they were stated in terms which were amenable to measurement, i.e., that they were performance requirements clearly specified in objective, measurable terms. Where objectives were judged to be unclear or were expressed in terms which did not lend themselves to measurement, they were rewritten in objective form to the extent possible. Where performance standards were lacking, they were added to the objectives in question.

When the relevant training objectives had been identified, attention was directed to performance measurement. The performance measurement tools and techniques employed in the present NFO Basic Training course were reviewed and were found, generally, to be relevant to the measurement of performance related to the revised training objectives. With respect to academic instruction, the existing written tests were adapted for use in the revised course. The adaptation consisted of deletion of test items which related to content

material no longer required by the revised training objectives, and, in a few cases, the addition of items related to training objectives not adequately covered by test items remaining after such deletion. Since minimal changes had been made in the training objectives related to performance in the aircraft and in the training device, it was determined that certain of the performance tests being used during aircraft and device training in the existing course were appropriate for use in the revised course as well. However, those tests tended to be somewhat subjective and to relate to higher order behaviors such as "headwork" and "responsiveness to instruction" rather than to specific behaviors required during the course of a specific in-flight activity. Therefore, the existing performance measurement tools were supplemented by performance recording forms, or checklists, designed for the recording of specific behavioral events. These checklists, which are described elsewhere in this report, enabled the in-flight and device instructional and examining personnel to obtain more objective performance information to support their assessment of whether specific training objectives had been met.

The rewritten statements of objectives of NFO Basic Training were compiled into an interim project report and were submitted to the Navy for review. The review was conducted by representatives of CNET, CNATRA, TRAWING SIX, and each of the NFO fleet communities. Based upon that review, revisions were made where indicated by Navy comment, and further project activities were oriented toward development of a revised NFO Basic Training program which would meet the restated training objectives. These training objectives are contained in Appendix A, which is bound separately.

#### SPECIFICATION OF LEARNING EVENTS AND ACTIVITIES

The third ISD phase consisted of development of a revised NFO Basic Training course which would meet the training objectives specified during the

second phase. In accomplishing this, extensive use was made of the analysis conducted during the first phase of the present course and the comparisons which had been made between existing course content and the revised training objectives. In fact, a specific goal during the development of the revised training program was to make use wherever appropriate of existing training material and resources rather than to develop entirely new material. An additional goal was to eliminate any redundant or superfluous course material which might be found.

The effort involved in the conduct of activities associated with this third ISD phase consisted of two principal thrusts. The first involved the reorganization, and, to the extent required, the revision of the content of the existing NFO Basic Training course to assure that the training objectives would be fully met with respect to course content. To a large extent, this effort consisted of rearrangement of blocks of instruction which already existed. The effort also included the generation of new material where existing material was judged to be inadequate, but the amount of such new material was small.

The second thrust of the effort resulted in the specification of learning events and activities for the revised course. This involved, in part, adaptation of the methods of instruction presently employed in NFO Basic Training to take advantage of recent advances in training technology. Training techniques were selected which were judged to be appropriate to the training objectives and the content of training and which would contribute to the efficiency as well as the effectiveness of the revised NFO Basic Training course. Emphasis with respect to *training techniques* was upon the selection of optimum ways of conducting the required training without respect to techniques then in use in the course under study. In contrast, the emphasis during specification of

*course content* was upon making use of existing course material wherever feasible. Consideration of techniques of training to be employed in the revised course was constrained only to the extent imposed by limitations in personnel and other resources available to administer the training.

The revised NFO Basic Training course specified during this activity was implemented on a limited basis in order to obtain data concerning the practicability of a number of the training techniques involved in the NFO training context. Based upon that limited implementation, needs were found for various modifications in the manner in which the training was being conducted, and these changes were made. The limited course implementation and the evaluation activities which accompanied it are described below. The revised NFO Basic Training course incorporating the various modifications found desirable during the limited implementation is documented in Appendix B, which is bound separately from the present report. The revised course is described in a subsequent section of this report.

#### COURSE IMPLEMENTATION

The fourth ISD phase consisted of an implementation of the NFO Basic Training course as it had been revised during the preceding phase, and the fifth consisted of an evaluation to determine both the effectiveness and the administrative efficiency of that revised course. These two activities were conducted concurrently. That is, the revised course was implemented, and its effectiveness as well as its administrative efficiency were determined on the basis of events which transpired during that initial implementation.

The implementation was necessarily limited in scope. Resources were not immediately available which would have permitted the training of all SNFOs under the revised course. Further, the Navy did not desire to adopt the revised course in its entirety until concepts involved in its administration

had been subjected to evaluation. Therefore, the initial implementation involved a "test" class of 20 SNFOs. These 20 SNFOs were selected at random from a group of approximately twice that number who had been scheduled to enter NFO Basic Training in mid-October 1975. Inspection of the records of these SNFOs following their selection indicated that they were representative of the larger population of SNFOs undergoing NFO Basic Training during fiscal year 1976.

Program implementation began with selection and training of the key instructional personnel, the Training Managers(TM). The TMs, whose duties with respect to the revised course are described elsewhere in this report and in Appendix B, were selected on the basis of their prior experience as instructors in the existing NFO Basic Training course and their expressed interest in becoming involved in what they viewed as an innovative training program. Thus, the TMs already had extensive knowledge of the content of the course under revision and of the resources available for the conduct of NFO Basic Training. The only additional training they required consisted of familiarization with the manner in which the revised course was organized and with a few course content changes which distinguished the revised course from the existing one, and instruction concerning proposed methods of instruction and techniques of employment of training resources such as Device 1D23 and the two training aircraft.

Because of the limited nature of the implementation, no attempt was made to instruct all Squadron personnel with respect to the revised course. In addition to the TMs, however, a number of other personnel became involved, in various instructional capacities, with the limited course implementation. These personnel included the pilots of the T-39 and T-2 aircraft, as well as several NFOs who served as instructors during T-39 training flights. These personnel received training appropriate to their participation in the revised course from the project staff.

The limited implementation was conducted by the TMs, following a schedule of course activities prepared for that purpose. While other members of the project staff assisted the TMs from time to time, principally with respect to administrative and logistic matters, these project personnel did not become involved directly in the conduct of training. The reason for the limited participation of these personnel was to facilitate the evaluation of the extent to which administration of the course by Training Managers was feasible.

#### EVALUATION OF THE NEW COURSE

The fifth ISD phase, evaluation, was conducted concurrently with the initial implementation of the revised course. The procedures involved in the evaluation differed somewhat from those appropriate to the ISD model to the extent that external criteria were not always available. For example, it was sometimes necessary, as was the case during examination flights in the two-place T-2 aircraft, for the instructor to serve also as the performance evaluator. Further, while it would have been possible to follow graduates of the limited implementation throughout subsequent NFO training activities and fleet assignments, and thus to obtain data concerning the thoroughness of their training with respect to subsequent performance requirements, such an approach was not possible within the time available for completion of the project. Consequently, only performance and other data obtained during conduct of the revised course were used in the evaluation. This approach, of course, does not preclude other evaluations of the performance of the test SNFOs.

Evaluation of the revised NFO Basic Training course consisted of two separate emphases. The first dealt with the manner in which the course was administered, while the second dealt with the proficiency of students at given points during training and the effort invested in their training. With respect

to the manner in which the course was administered, the evaluation was largely subjective in nature. The data consisted of judgments concerning the feasibility of use of the various instructional techniques involved if these techniques were used on a Squadron-wide basis. That is, the evaluation standard against which judgments were made was whether the technique would be feasible if all NFO Basic Training students were trained by that technique, rather than only the 20 students involved in the initial limited implementation.

These judgments were made by the Project Staff responsible for the preparation of the present report. The judgments were heavily weighted by solicited comments obtained from Squadron administrative personnel and other Navy personnel who, by virtue of their contact with project activities, were in a position to make informed judgments themselves about various program elements and activities. Nevertheless, it must be noted that judgments concerning the administrative feasibility of the course and its various instructional techniques were based upon experience during its administration to a limited number of students. While it is believed that the course as described elsewhere in this report is implementable for all NFO Basic Training, the present project did not test that belief per se. Consequently, it may reasonably be assumed that some adjustments not anticipated at this time would be required in the instructional techniques involved during full implementation of the revised NFO Basic Training course.

With respect to the second emphasis involved in the evaluation, the proficiency of the students and the effort involved in their training, less reliance had to be placed upon purely judgmental factors. Student proficiency was determined through written and multiple choice tests administered in a classroom setting and by performance tests administered in Device 1D23 and in the two training aircraft. The test instruments employed were those identified

earlier during conduct of the second activity of the ISD model. In all cases, performance of the test SNFOs was compared with the standards of performance required of students going through the existing NFO Basic Training course where the content of the two courses was comparable. While a control group of students in the existing course was not identified per se for comparison purposes, test SNFO performance was evaluated against the standard of acceptable performance for SNFOs in the existing course.

The administrative efficiency of the revised course was evaluated in terms of the resources needed for its conduct. That is, measures underlying the evaluation were course length, amount of time required to achieve various training objectives, and the extent to which principal instructional resources, i.e., the device and the training aircraft, were utilized. In the case of administrative efficiency, similar measures of the efficiency of the existing course were available for comparison.

The various data related to the effectiveness and the administrative efficiency of the revised NFO Basic Training course are presented in a subsequent section of this report.

The ISD model specifies that program evaluation is a continuous process. That is, data from an initial evaluation such as that described herein provides feedback to course developers that permits them to revise again the course under study for subsequent evaluation. The present evaluation served that purpose, as well as the purposes of providing information concerning the effectiveness and administrative efficiency of the course during its initial implementation. Based upon evaluative information obtained during the limited implementation described above, further modifications have been made in the revised NFO Basic Training course. These consist of minor modifications to course content and a variety of changes in the way the course is to be administered. It is the judgment of

the project staff that these changes will increase the value of the revised course to the Navy and have increased its administrative feasibility. The description of the revised course presented elsewhere in this report and in Appendix B incorporates all such modifications and revisions. It is assumed that the process described in the ISD model of revision, evaluation, revision, etc., will continue to be a part of efforts accompanying future implementation of the revised NFO Basic Training course described in this report.

CHAPTER III:  
DESCRIPTION OF THE REVISED  
NFO BASIC TRAINING COURSE

INTRODUCTION

This chapter contains a description of the revised NFO Basic Training Course. The description includes all revisions found to be desirable during the limited implementation and evaluation of the course conducted during the project. As is required by the ISD model, information developed during those course implementation and evaluation activities has been used as a basis for revision of the course. Thus, the course described in this Chapter differs from the course evaluated during the project in that it incorporates changes found desirable as a consequence of that evaluation.

The course description contained in this Chapter is intentionally general. It provides an overview of the revised NFO Basic Training Course, but it does not contain all of the information concerning course content, schedule, or training procedures which would be necessary for its administration. Personnel desiring more detailed information concerning the revised course and its administrative requirements are referred to Appendix B. The objectives of the revised course, as has been noted earlier, are contained in Appendix A. Both appendices are bound separately.

COURSE ORGANIZATION

The revised NFO Basic Training Course consists principally of classroom instruction, training in Device 1D23, and training in the two training aircraft, the T-39 and the T-2. For convenience of description, the course can be viewed as being organized into two major segments, a Core segment and a Pipeline segment. All SNFOs undergo Core training, which is intended to meet the objectives contained in Appendix A. Upon completion of Core, SNFOs are selected for

specific types of fleet assignments, e.g., Navigator or Radar Intercept Officer, and receive further training specific to that selection. This specialized phase of Revised NFO Basic Training is intended to increase the proficiency of SNFOs with respect to specific objectives relevant to their future assignments beyond that required for SNFOs whose future assignments will not require such additional proficiency.

#### CORE TRAINING

The Core portion of the revised NFO Basic Training Course consists of four phases and requires approximately 90 training days, plus holidays, or 19 training weeks, to administer. The training received in each of the four phases builds upon skills and knowledges developed during preceding phases. Thus, as the SNFO progresses through Core training, he moves from the relatively simple to the more complex tasks, and from enabling to terminal objectives. The training conducted during each phase of Core training is summarized below.

##### Phase I: Introduction to Airways Navigation

The first phase which requires approximately 22 training days to administer, consists principally of training in the classroom and in Device 1D23. The overall goal of this training is to introduce the SNFO to the task of navigating jet aircraft within controlled airspaces. Although the training also includes information of a more general nature related to the role of the NFO in the Navy at large, the emphasis is upon acquiring knowledge about instrument flight equipment, rules, and procedures; learning to communicate via radio under the stresses associated with instrument flight; and practicing the tasks required of a navigator before and during instrument flights.

Airways navigation training conducted in the classroom during this phase includes study of aircraft performance data, navigation instruments and their

interpretation, airways navigation techniques and procedures, instrument flight rules, DoD flight publications, flight planning, and basic meteorology. During this training, extensive use is made of self-study programmed textbooks, but films, discussions and formal lectures are also employed. In addition the SNFOs practice radio communication tasks using recordings of communications made during typical navigation training missions, and they visit the Base control tower and are briefed on the functions of a Federal Aviation Administration Air Traffic Control Center.

During six scheduled training sessions in Device 1D23, the SNFOs are introduced to a simulated instrument flight environment where they practice the tasks of an in-flight navigator. These tasks include tuning radios and navigation instruments, inserting aircraft performance data, managing fuel, and communicating with ground controlling agencies, as well as performing navigation tasks per se. Practice sessions in the device include all elements of an instrument flight, i.e., take-off, climb, enroute flight, and execution of approaches and missed approaches at a terminal navigation facility. Within the limitations imposed by the fidelity of flight simulation provided by the device, these training sessions reproduce subsequent training flights to be conducted in the T-39 aircraft during Phase II.

Other training activities during the initial phase of Core training include exposure to a simulated high altitude environment in an altitude chamber, ejection seat training, and participation in routine Navy training activities such as physical training, sea survival training, and personal inspections. These latter kinds of activities continue as required throughout subsequent phases as well.

#### Phase II: T-39 Training

The second phase consists of a continuation of the instrument navigation training initiated during Phase I. Phase II training revolves around the T-39

training aircraft. It begins with a classroom introduction to the aircraft and to its various systems which relate to the NFO's tasks as a member of its flight crew. This classroom training is of approximately 4 training day's duration.

The major portion of Phase II training takes place in the aircraft, where the NFO performs crew tasks associated with navigation within controlled airspaces. In-flight training consists of three-leg instrument cross-country flights during which each SNFO navigates one complete leg, from takeoff to landing, and observes fellow students navigate the other two. Tasks performed by the SNFOs during these flights include, in addition to pre-flight mission planning, monitoring ground operations, performing taxi and take-off functions required of copilot in the T-39, conduct of communications with flight controlling agencies, selecting navigation aids, managing fuel, and advising the pilot with respect to heading/altitude changes and time estimates. His training continues until he is able to demonstrate to the pilot and to an on-board NFO instructor that he has attained the course objectives relevant to airways navigation. Approximately four flights are required for the typical SNFO to meet these objectives. Three weeks are allowed for this flight training.

During Phase II training in the aircraft, the SNFO learns to perform duties associated with his role as a T-39 crew member in addition to learning to navigate. These tasks include assisting the pilot in aircraft pre-flight inspection, ground operations (e.g., taxiing), and use of the various aircraft checklists associated with each phase of flight. The SNFO also is trained to respond in accord with published procedures to all aircraft emergencies which might occur during flight in the T-39 aircraft.

Concurrent with training in the T-39, the SNFO undergoes sea survival training and continues to receive instruction in selected academic subject matter required by the training objectives. This training, which is conducted on a basis

not to interfere with scheduled flight activities, consists of an introduction to computer systems and electronics theory. He also reviews previously studied material relevant to his flight activities and is examined on his knowledge of flight rules and regulations. The duration of Phase II training is approximately 21 days.

#### Phase III: Advanced Navigation

During the third phase, which is of approximately 27 training days' duration, the training again centers around the classroom and the training device. Classroom instruction includes subject matter related to electronic warfare, meteorology and navigation by means of dead reckoning (DR), radar and inertial navigation systems. During these classroom activities, the SNFOs receive training in the concepts of visual navigation and perform a number of practical exercises involving hypothetical visual navigation missions.

Training in Device 1D23 consists of practicing navigation outside of controlled airspace, i.e., by employing DR techniques and separately, by interpreting radar returns on a simulated radar scope, the SNFO also is introduced to the operation of an inertial navigation computer and to requirements to update computer position fixes using radio navigation data. Device and classroom training are interlaced in such fashion that concepts introduced in the classroom are reinforced through practice in the device. A total of eight DR and radar navigation training periods are scheduled in Device 1D23 during Phase III.

#### Phase IV: T-2 Training

The final phase of Core training centers upon the T-2 training aircraft. The phase begins with a classroom introduction to the aircraft and to its various systems and an introduction to low level flight planning. These activities require approximately 6 training days to complete. Phase IV classroom

training is followed by five scheduled training flights in the T-2. Approximately three weeks are allowed for this training to take place. Thus, the total time required for the conduct of Phase IV is approximately 20 training days.

The primary objectives of T-2 phase training are those which relate to visual navigation, although the student is required to practice many of his previously acquired instrument navigation skills in the T-2 aircraft under the somewhat more stressful environment associated with use of oxygen masks and G-suits. Visual navigation flights are conducted at low flight levels. In addition, the SNFO is introduced to aerobatics, air combat maneuvering, and formation flight procedures. As was the case with respect to T-39 training, the SNFO learns to perform those T-2 crew functions required of the NFO in the two-place T-2 aircraft, e.g., responding to emergency conditions which may arise during flight, assisting the pilot in the use of checklists, navigation and communicating with flight controlling agencies.

Core training is completed at the conclusion of the T-2 training phase, and students are selected for subsequent assignment to a type of operational aircraft/mission. Subsequent training in the revised NFO Basic Training course takes place during the Pipeline training segment described below and is oriented specifically to the selected future assignment of each SNFO.

#### PIPELINE TRAINING

The Pipeline portion of revised NFO Basic Training consists of four options or pipelines, each of which corresponds to a particular operational aviation community. These NFO communities are identified in the description of NFO Training section in Chapter 1. Each of the four options constituting Pipeline training is described below.

### VF Pipeline

The VF, or Fighter, Pipeline consists of an introduction to the duties and responsibilities of the NFO aboard fighter-type aircraft in fleet assignments. Classroom training in this pipeline, which requires approximately eight hours to administer, concentrates upon information related to aircraft performance, angle of attack, energy availability, rules of engagement, safety and related considerations. In-flight training during eleven scheduled flights provides a continuation of airways navigation training; practice of routine NFO cockpit duties, such as use of checklists, fuel management, and radio communication; as well as instruction related to section low level and coastal reconnaissance missions, day and night low level visual navigation, and high angle of attack maneuvering. In addition, the SNFOs are required to practice tactical crew coordination tasks and to respond to simulated tactical engagements with information relative to bogey positions, energy states, and closures rates. All aircraft training is conducted in the T-2 aircraft. Upon completion of the VF Pipeline, SNFOs have completed the revised NFO Basic Training course and are reassigned to VF-86 for the next stage of NFO training. Approximately three weeks are allowed for the conduct of this pipeline.

### VA/VAQ/VS Pipeline

The VA/VAQ/VS, or Attack, Pipeline is similar to the Fighter Pipeline with respect to training activities, time requirements, and number of scheduled flights. It differs from the Fighter Pipeline in that the emphasis upon air combat maneuvering in the Fighter Pipeline is replaced by an increased emphasis upon visual navigation tasks in the Attack Pipeline. While instruction concerning airways navigation and defensive air combat maneuvering is retained, both the classroom and in-flight training received by SNFOs in this pipeline

stress low level day and medium level night visual navigation. Routine NFO cockpit duties continue to be practiced during all flights, eight of which are conducted in the T-2 aircraft while the remainder, including those in which visual navigation is stressed, are conducted in the T-39. Upon completion of the VA/VAQ/VS Pipeline, SNFOs have completed the revised NFO Basic Training course and are reassigned to VT-86 for the next stage of NFO training.

#### VAW Pipeline

SNFOs selected for the VAW Pipeline receive one day of academic training in airborne computer and radar systems. This completes their NFO Basic Training, and they are then reassigned to a RAG.

#### VP Pipeline

SNFOs selected for the VP, or Navigator, Pipeline complete a programmed text course in anti-submarine warfare. Following this two week course, they are reassigned to VT-29 or to the U.S. Air Force for advanced navigator training.

#### PERFORMANCE EVALUATION AND GRADING

A clear distinction is made in the revised NFO Basic Training course between training and evaluation functions. The SNFOs are advised in advance as to whether an activity is to be a training or an evaluation activity. The primary purposes of this approach are to eliminate unnecessary stress in those situations in which stress might reduce training effectiveness and encourage interactions of a didactic nature between SNFOs and instructing personnel without fear on the part of the SNFOs of exposing shortcomings and thereby reducing their course grades.

Written tests, typically of a multiple choice nature, but occasionally involving written solution to navigation or flight planning problems, are administered at the conclusion of units of classroom training. These units consist of periods of study of programmed textbooks, lectures, discussions, and other

activities which cover related subject matter. For example, one unit covers subject matter related to basic meteorology, another to computer systems, another to electrical engineering, another to Federal Aviation Regulations governing airways flight, etc. The units are of unequal length, varying from approximately one-half day's training activity to as much as a week's activity.

In addition to the written tests administered in the classroom, performance examinations are administered at specified times during training activities in Device 1D23 and in the two training aircraft. The subject matter of each examination covers the subject matter of the training in that vehicle since its initiation or since the preceding examination. An evaluation flight in the device or in the aircraft consists of a sequence of activities modeled after a particular operational mission. In the device, the sequence of activities is essentially identical for each SNFO. In the aircraft, such a high degree of standardization, although desirable from a psychometric point of view, is impossible because of variables such as weather and air traffic requirements. To the extent circumstances permit, however, these flights are equated for each SNFO, and care is taken to assure that the examiners attend equally to objective, observable behaviors on each such flight.

During these device and aircraft evaluation activities, the examiners employ a Progress Record Form (PRF) as an aid in standardizing their assessments of SNFO performance. The PRF consists of a listing of tasks to be performed and, where appropriate, performance tolerances required for successful completion of the evaluation flight. Using this listing, the examiner records whether the SNFO performs or does not perform the tasks required on that flight. He also indicated whether the particular performance was unsatisfactory, barely met the required standard, was generally satisfactory (the more common situation), or was significantly above average or outstanding. The training objectives for the subject matter of interest will have been met by the SNFO who

receives checks on the items required, and he then will be permitted to proceed to the next scheduled training activity.<sup>a</sup>

There are three examination flights in Device 1D23. The first is administered at the conclusion of the sixth period of instruction in the device, and its subject matter covers all aspects of airways navigation which can be simulated in the device. Subsequent examinations are given during the third period of dead reckoning navigation training in the device, and during the fourth period of radar navigation training in the device. It should be noted that SNFOs whose performance is unsatisfactory on the examination flights may be required to repeat the examination during a subsequent period, and the failed examination is treated as an additional period of training. Conversely, SNFOs whose performance reaches specified criterion levels more rapidly may be given an examination early and excused from additional training on that particular subject matter in the device.

A similar procedure is employed to evaluate SNFO airways navigation performance in the T-39 aircraft during Phase II of Core training. The performance criteria against which SNFO performance is evaluated consist of satisfactorily fulfilling all co-pilot and navigator functions during an instrument cross country flight. Since each training period in the aircraft consists of three such flights (one for each of the three SNFOs on board), any of these can serve as an examination flight. As soon as the SNFO is able to meet the specified performance criteria, he is evaluated, and his Phase II training is completed. Thus, as is the case with respect to training in the device, some SNFOs receive more training in the aircraft than do others, the amount of training received

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<sup>a</sup>The PRFs also are used during training flights to record progress toward the required objectives and as an aid in didactic discussions between SNFOs and instructors.

being determined by the amount required in order to demonstrate satisfactory performance during an airways navigation mission.

In evaluating SNFO performance in the T-2 aircraft during Phase IV, a similar procedure is employed. However, the nature of Phase IV training differs from that of Phase II in that Phase II training is all directed toward a set of objectives related to airways navigation, and all training flights are of basically similar content. In Phase IV training, however, the objectives of three of the five scheduled flights are unique to those flights. These objectives involve familiarization of the SNFOs with a variety of tasks, but there are no requirements for him to develop skills at performance of these tasks. Thus, they are treated only as training flights, and no evaluations are conducted with respect to the tasks involved.<sup>a</sup>

The remaining two Phase IV flights consist of a pair of flights with related subject matter, i.e., low level visual navigation. The second low level visual navigation flight is an evaluation flight during which specified performance criteria must be met. Students unable to demonstrate such performance on this flight are given additional training flights until the required skills have been attained.

Performance is graded in the device and in the aircraft according to two factors, and the grade is a composite score which weighs each factor approximately equally. The first factor consists of a score obtained on an evaluation hop which reflects how well the SNFO performed against the stated objectives for the particular activity involved. The second factor is a score which is determined by the number of training periods required in order for the student

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<sup>a</sup>The instructor may require an SNFO to repeat any of the flights if it appears to him that the SNFO did not obtain the required familiarity. No grades or other evaluation indices are assigned to such performance, however.

to meet those objectives, with a higher score reflecting earlier attainment. Thus, an SNFO can achieve an above average grade by demonstrating average performance earlier than the typical student, or by demonstrating superior performance after an average number of training flights. The two grading criteria are weighted so that there is no advantage to giving a superior student more training than he needs to meet the required training objectives and thereby increasing the direct cost of training.

Grades, or relative class standing, play a role in pipeline selection at the completion of Core training, as well as in motivating SNFOs to excel during training. Final class standing is determined by a composite score that gives weight to various evaluation grades according to their relative emphasis and judged importance. Classroom test grades constitute 45% of the weighting, flight evaluation grades constitute another 45%, and grades resulting from performance in the device account for the remaining 10%.

Performance during Pipeline training does not enter into SNFO grades. Each SNFO is required to demonstrate satisfactory performance, as measured against stated performance criteria (PRFs are used as aids in determining whether performance is satisfactory), but each pipeline activity is treated as a training rather than an evaluation activity.

#### TRAINING MANAGEMENT FEATURES

A number of training management features characterize the revised NFO Basic Training course. While each of their features can be found in other military training programs, their presence in the revised NFO Basic Training course is cited here for the benefit of readers who might not be familiar with them.

### Individualized Training

The individualized nature of the training in the device and in the aircraft has been described above, i.e., the amount of training received by each SNFO is determined by his individual rate of skill acquisition, and he is excused from subsequent training when he is able to demonstrate required skill levels at each task. The same general principle is also applied with respect to classroom training, where frequent use is made of programmed textbooks and other individualized and self-study training material, and SNFOs are encouraged to proceed through these materials as rapidly as they can. As each individualized unit is completed, the SNFO is tested to assure his comprehension of the assigned material. The tests are either oral quizzes administered by instructing personnel or are prepared written tests covering the material studied. It should be noted that these tests are for students' pacing through the individualized classroom training material, rather than for evaluation purposes per se, and grades on these tests do not enter into class standings. SNFOs who complete assigned self-study material and pass the required tests in less than the time scheduled for that activity have time available for review, additional study of their own choice, or recreational activities.

### Training Manager

The principal instructional personnel involved in the conduct of the revised NFO Basic Training course are the Training Managers (TM). These are experienced or especially trained instructors who are familiar with all requirements of the course and are able to conduct much, but not necessarily all, of the required instruction. Each TM is assigned a small group of SNFOs (approximately ten) and is responsible for their training while they are enrolled in the Core segment of the course. It is the responsibility of the TM to manage the training of the SNFOs assigned to him in such fashion that each SNFO attains all of the course

objectives in the minimum amount of time and training possible. In achieving this goal, he employs the resources of the Squadron--the course material, the training device, the training aircraft, and other instructional personnel--as well as his own skills, and adjusts the training given each SNFO to make it responsive to that individual's needs.

#### Small Group Instruction

SNFOs undergoing revised NFO Basic Training are assigned to individual TMs, each TM having responsibility for approximately ten SNFOs. While TMs work in pairs and train their groups of ten SNFOs as though they were all members of the same class (with the senior of the two serving as Lead TM), each TM retains responsibility for the progress of the SNFOs initially assigned to him. This small group approach enables each SNFO to maintain continuing contact with a senior member of the instructional staff, thus facilitating his access to individualized attention and early remediation of any deficiencies which may develop during training.

#### Peer Instruction

The revised NFO Basic Training course taps a major instructional resource which tends to be overlooked on many occasions. This resource is the Peer Instructor, an SNFO in a latter stage of training who assists the TM in the conduct of a training activity already mastered by the Peer. The Peer Instructor is employed in Phases I and III of the revised course, i.e., during the introduction of the SNFOs to Device 1D23 and during early airways and dead reckoning navigation training periods in it. Peers facilitate the conduct of this device training by individualizing the instruction beyond the degree achievable using only the assigned instructors and by emphasizing the early development of radio communication skills. Peer Instructing is a scheduled Phase III

activity for all SNFOs. It should be noted that the Peers themselves benefit from this instructional experience since it tends to reinforce skills they developed during Phases I and II and retards decay of those skills during a period of non-flying.

#### Functional Context Training

Wherever the subject matter of a training activity permits, that activity is conducted within the context of a simulated operational mission, and training is directed toward terminal rather than enabling objectives. This feature of the revised NFO Basic Training course is exemplified by the organization of training activities in the T-39 aircraft during Phase II. The training consists of a three-leg cross-country instrument flight with each leg originating at one instrument facility and terminating at another, e.g., from NAS Pensacola to NAS Meridian. During each of the three legs, a single SNFO performs all co-pilot and navigator tasks from mission planning through termination of the flight at its destination, while two other SNFOs observe his performance and await their turns to fly a subsequent leg. This procedure enables the SNFO to practice all aspects of his potential future role as a navigator within a total mission context.

#### Flexibility

The chief training management feature of the revised NFO Basic Training course is its flexibility. The TMs have full responsibility for the rate of progress and levels of achievement of their assigned SNFOs, and the training resources of the Squadron are at their disposal in fulfilling that responsibility. While the course is organized around scheduled training activities, the TM can call upon the available resources apart from those scheduled where they may be needed to facilitate the training of an individual SNFO. The emphasis is upon achieving the training goals of the Squadron within the resources available to it, and other considerations are secondary.

### Crew Assignment

During Phase IV training in the T-2 aircraft, and during Pipeline training in both the T-2 and the T-39, two SNFOs are assigned to each participating pilot, and that pairing of SNFOs and pilots is maintained throughout the respective flights. The purpose of this approach is twofold: to foster a rapport between students and instructors which will facilitate the development of the required skills, and to assure continuity of instruction from flight to flight not possible where assignments are random or unsystematic.

CHAPTER IV:  
LIMITED IMPLEMENTATION  
OF THE REVISED COURSE

INTRODUCTION

In the discussion of the ISD model in Chapter II, it was pointed out that the NFO Basic Training course developed during early stages of this project was subjected to a limited implementation, and its effectiveness was determined. The limited implementation was initiated in October, 1975, and was concluded in March, 1976. During that period, data were collected concerning time and effort needed for conduct of the revised course as well as concerning the achievement of participating SNFOs with respect to the training objectives. The course underwent further revisions as a result of experiences during this implementation. These latter revisions were relatively minor and dealt primarily with content sequencing and resource and personnel scheduling. The description of the revised course contained in Chapter III includes all these revisions. The purpose of the present Chapter is to describe the limited implementation of the revised NFO Basic Training course.

TRAINING MANAGERS AND STUDENT NAVAL FLIGHT OFFICERS

The implementation was limited to two groups of ten SNFOs working under the tutelage of two Training Managers, i.e., ten SNFO were assigned to each TM, although all of the SNFOs met as a group where group activities were appropriate. It should be noted that these 20 SNFOs represented a small portion of the SNFOs undergoing training at VT-10 at the time of this project. The other SNFOs were being trained in the then existing NFO Basic Training course, and there were occasions when resources needed for the efficient conduct of one of these courses were being used by the other. Therefore, there were inefficiencies in course administration that were judged to be a consequence of the simultaneous conduct

of two separate courses which made sometimes conflicting demands upon available resources. These inefficiencies probably would not have occurred had the revised course replaced, rather than been conducted in addition to, the existing course.

The SNFOs involved in the limited implementation were selected at random from among the SNFOs available for training on October 14, 1975, the date training began. Inspection of their personnel records after they were selected indicated that they were representative of SNFOs undergoing NFO Basic Training during Fiscal Year 1976. There were 15 Navy and 5 Marine SNFOs, and their rank was O-1 or O-2 (including recently commissioned officers and some who were commissioned during NFO Basic Training). The SNFOs were fully informed of the nature of the project as soon as their training began. Although they were selected to participate rather than being permitted to volunteer, each was queried as to his willingness to participate, and all responses were positive.

The two TMs were selected to participate in this project on the basis of two criteria. First they were experienced instructors in the existing course and were considered to be above average in effectiveness with respect to their teaching skills. Second, both TMs had expressed interest in participating in the project and in effecting changes in NFO Basic Training which might benefit the Navy. While these individuals were viewed as well suited to participate in a developmental project such as that described here, by no means were they considered to be uniquely qualified for such a role.

In addition to the TM, other Squadron personnel participated in the project. On all occasions in which the content or subject matter of the classroom material was such that neither TM believed himself sufficiently knowledgeable to supervise that instruction, another Squadron instructor who had such knowledge conducted that portion of the training. In addition, Squadron pilots conducted

all of the in-flight instruction in the T-2 aircraft, and they assisted the NFO instructors who conducted the in-flight instruction in the T-39. While the TMs served as in-flight instructors with some of the SNFOs during T-39 training, other Squadron NFOs also fulfilled that function with some others. The flexibility of the Revised Course makes it possible for various Squadron instructional personnel to augment the instruction given by the TM during the limited course implementation described in this report.

#### INSTRUCTIONAL MATERIALS

Resources available to the project did not permit major revision of existing training material for use during the limited course implementation. The extent to which the content of the available classroom material, e.g., textbooks, audio-visuals, prepared lectures, and written tests were consistent with the training objectives of the revised course was examined in the manner described in Chapter II. Where these resources were found to be deficient in that they did not contain information necessary to the attainment of the training objectives, the required additional material was prepared and was used during the implementation. An example of such additional material was the communication training tapes used during Phase I. These tapes are described in Appendix B.

A number of instances were encountered, however, where the available classroom material contained information which the project did not judge appropriate to retain. Reasons for such judgments were that the material was not relevant to the revised training objectives, or the material was redundant with material contained elsewhere in the course. Such unnecessary and redundant material was deleted, often simply by marking through the sections of prepared texts and lecture notes that were inappropriate. Thus, some classroom material used in the limited implementation was considered to be in "draft" or "marked for revision" form. Such deletions are noted in Appendix B.

Training material used in conjunction with training in Device 1D23 was prepared specifically for that purpose. It consisted both of newly prepared material and revisions to existing material. The revised device training made extensive use of existing computer programs, since resources were not available to reprogram the device in order to insert entirely new programs. Since Peer Instruction on the device had no counterpart in the existing program, new material was prepared to accompany that training.

Flight training in the T-39 and the T-2 also made extensive use of material in use in the existing course. The in-flight training activities in the revised course were changed from corresponding activities in the existing course primarily with respect to flight routes and sequencing of events, and these changes were accommodated by rewriting portions of the existing T-39 and T-2 Flight Handouts which related to these changes.

#### COURSE EVALUATION OBJECTIVES, RESULTS AND CONCLUSIONS

There were three principal objectives of the evaluation which took place during the limited implementation of the revised course: (1) to determine whether the stated training objectives could be met through the training provided in the revised course; (2) to determine the feasibility, from the training program management standpoint, of the training techniques employed; and (3) to provide a basis for further revision of the course as required by the fifth phase of the ISD model. The extent to which these objectives were met is discussed below.

1. Were the training objectives met? The criterion for successful SNFO performance in the revised course was attainment of all of the training objectives identified in Appendix A. Performance was determined with respect to these objectives in the classroom, using written tests, and in the device and aircraft, using performance tests. On the basis of the test data collected

during the evaluation, it was concluded that the training objectives could be met by SNFOs undergoing training in the revised course, and, in fact, were met by those completing the training conducted during this project. Further comments on this conclusion concerning the effectiveness of the revised NFO Basic Training course are presented below.

Attrition. Not all of the 20 SNFOs participating in the limited implementation successfully completed training. Two resigned during Phase I. These were AOCs graduates who had been commissioned after entering the course. Their achievement at the time of resignation was satisfactory, and their stated reasons for resigning were unrelated to their performance in the course being evaluated. Two other SNFOs resigned upon successfully completing Core training. Their stated reason was dissatisfaction with the pipeline for which they were selected. The achievement of these two students was well above average throughout the course. Finally, one SNFO encountered medical difficulties and was grounded for an extended time period, during which he could not be scheduled for flight training with other members of the evaluation group. While he continued to participate in all other activities of the revised course, he was considered to have attrited from the evaluation group for medical reasons. His classroom achievement and defice performance were satisfactory at the time of attriting. There was no attrition from the revised course for reasons related to achievement.

Three of the fifteen remaining SNFOs were consistently weak students and one or more of them would possibly have been referred to a Student Progress Review Board had they exhibited similar levels of achievement in the existing program. Such referral was not considered in the course under discussion here for two reasons: (1) because of the unique nature of the revised course when compared to the existing course, and because there was only one class involved in the limited course implementation, it was not feasible to set these weak SNFOs back

to a following class; and (2) there was a need for these SNFOs to continue in the revised course in order to maintain a sufficient number of students to permit evaluation of the training management concepts it incorporates. The weak SNFOs were given the individual attention and additional training they required, and each of them attained the course objectives before completing the Core training.

Classroom Achievement. Classroom achievement was determined by performance on classroom tests. The tests employed are described in Chapter III. Since the texts were being used in their revised form for the first time during the limited implementation, they had been neither standardized nor validated statistically, and absolute scores on them have no particular meaning except to permit a ranking of the SNFOs concerned. For the purposes of assuring a high level of achievement in the revised course, an arbitrary standard or minimum acceptable score was set on each test, and the SNFOs were required to "pass" each test at that level or higher. In the judgment of the participating TMs and the project staff, these minimum scores reflected attainment to the course objectives related to the content of the classroom instruction. Established VT-10 policies were followed with respect to SNFOs who failed to pass a particular test, i.e., retests were required. All participating SNFOs passed the required tests or retests.

Device Training. Three evaluation flights were scheduled in Device 1D23: one during Phase I at the conclusion of Airways Navigation training; the other two during Phase III at the conclusion of Dead Reckoning and Radar navigation training, respectively. SNFOs performance during these examinations was recorded by examining instructional personnel, using the Progress Record Forms described in Chapter III. To increase the objectivity of these performance evaluations, the PRFs were completed by qualified device instructors who did not otherwise participate in this project. The performance data thus obtained were

used to determine whether each SNFO had exhibited the specific navigation skills and behaviors described in the training objectives contained in Appendix A.

By contrast with classroom training, the training given on Device 1D23 covered content identical to that given in the existing NFO Basic Training course. The three evaluation flights scheduled in the device corresponded in content and sequence of events to three existing training flights in the device. Therefore, in addition to the recording of performance during these three evaluation periods using the PRF described in Chapter III, each of these three evaluation periods was graded in accordance with current VT-10 criteria applicable to each. Thus, the evaluation period in the device dealing with Airways Navigation was graded according to existing Squadron criteria applicable to successful completion of Airways Navigation training in the device. A similar procedure was applied with respect to both Dead Reckoning and Radar Navigation training in the Device, since the scheduled evaluation flights dealing with these subjects had corresponding flights in the existing course.

Thus, two criteria were available to determine whether the objectives of the revised NFO Basic Training course were met with respect to training in the device. One was the PRF, the checklist description of whether each of the behaviors required by the objectives had been performed within the specified tolerances; and the other was the grade assigned by an examiner (who usually was the same individual who completed the PRF) following existing Squadron procedures. In all instances in which PRF descriptive data showed that the required performance had been demonstrated, the performance was also graded at a satisfactory level using existing Squadron criteria. Prior to terminating their training in the device, each of the participating SNFOs successfully demonstrated their attainment of the course objectives relevant to 1D23 device training.

Flight Training. PRFs were also used during the examination flights in the T-39 and the T-2 aircraft, and the data describing student performance obtained using these performance checklists were used to determine whether the training objectives relevant to in-flight performance had been met. Each SNFO demonstrated satisfactory performance on his examination flights as reflected in the PRF data. As was the case with respect to performance evaluation in Device 1D23, the evaluation flights in the aircraft (A-4 in the T-39 and B-5 in the T-2) had counterpart evaluation flights in the existing course. Thus, it was again possible to grade those flights according to existing Squadron procedures as a means of verifying that the SNFO's examination flight performance was acceptable. Again, it was found that when the PRF descriptive data showed that a particular SNFO had met the required training objectives, his performance was graded at a satisfactory level using existing Squadron criteria for completion of that stage of training.

Even using the PRF, the measurement of SNFO performance in the device and in the aircraft is not a wholly objective matter. While the reliance upon the PRF as the performance reporting device is believed to have reduced the subjectivity normally associated with flight performance evaluation by standardizing the behaviors to which the examiner attended, the tolerances applied to each, and the manner in which observations of these behaviors were reported, an element of subjectivity remains in that the examiner still must exercise his judgment concerning the occurrence and recording of the event in question. Consequently, final judgment concerning the effectiveness of the revised NFO Basic Training course should be based, at least in part, upon the extent to which course graduates are successful in subsequent training activities and career assignments. Nevertheless, within the limits of the objectivity and validity of the evaluation data with respect to SNFO attainment of the training objectives of the revised NFO Basic Training course, it was concluded that those training objectives were met.

2. Were the training techniques feasible? There are no objective criteria against which to determine the feasibility of the training techniques employed during the limited evaluation of the revised NFO Basic Training course. In order to determine the feasibility of each technique, it was necessary to rely upon the judgments of the project staff. The opinions of the TMs and of other Squadron personnel who had become sufficiently familiar with the techniques involved were weighted heavily in reaching these judgments. The comments presented below with respect to the feasibility of the various techniques represent a consensus of the personnel involved. The techniques discussed here are described in Chapter III and in Appendix B.

Individualized Training. Individualized training in the classroom was found to be feasible only to the extent that the training could be administered using self-study material such as programmed textbooks. Where such material was available, SNFOs were observed to vary in their rate of progress, with the more apt SNFOs having more time available for review, study of additional material, and activities of a recreational/physical training nature of their choice. SNFO reaction to the relative freedom provided by this instructional approach was favorable, particularly among those who might not have had sufficient time to cover the required material in a fixed pace training program. The use of self-study material also facilitated the make-up of missed training where unavoidable absence from scheduled training activities occurred.

In Device 1D23, the individualization of Airways Navigation training made possible through the use of peer instructors was viewed favorably by all concerned and was judged to have raised the level of SNFO performance during early training periods. In addition, the conduct of Dead Reckoning Navigation training in the Device was organized in such fashion that SNFOs could demonstrate attainment of course training objectives at individual rates and thus could complete

training on an individual proficiency basis. The number of periods required for the conduct of DR training ranged from 3 to 7, with a mean of 4 periods for the 18 SNFOs receiving this training.<sup>a</sup> This individualized device training was judged feasible to administer and was viewed favorably by both SNFOs and instructional personnel.

By virtue of its one-on-one format, in-flight training is individualized in both the revised and the existing NFO Basic Training course, and its feasibility is unquestioned. In addition, however, the fact that each training and evaluation flight in the T-39 consisted of complete cross-country airways navigation flights made it possible for SNFOs to progress through Phase II flight training activities on an individual proficiency advancement basis until the required training objectives had been met. This practice was followed, and it was found to be feasible and was viewed favorably by the participating personnel. The training objectives were met by the SNFOs in from 3 to 6 flights in the T-39.<sup>b</sup> The mean number of flights required was 4 for the seventeen participating SNFOs. The median also was 4. In addition to being judged to be a feasible training management technique, it was noted that this individualization of advancement through Airways Navigation flight training, as opposed to requiring each SNFO to complete the number of flights required by the less apt students, resulted in a reduction in the requirement for scheduled T-39 flights.

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<sup>a</sup>Based upon experience during the limited course implementation, it was determined that SNFOs should be required to complete DR training in from 3 to 5 periods of training in Device 1D23, and the course description contained in Appendix B reflects that determination.

<sup>b</sup>Based upon experience during the limited course implementation, it was determined that SNFOs should be required to complete Airways Navigation training in from 3 to 5 flights in the T-39 aircraft, and the course description contained in Appendix B reflects that determination.

Except for the individualization of training inherent in the one-on-one format of in-flight training, no individualized training techniques were employed in the T-2 aircraft.

Training Manager. The use of experienced instructors who manage the training of a small number of SNFOs was judged to be a desirable feature of the Revised NFO Basic Training Course, but one whose feasibility is dependent upon the availability of adequately prepared personnel. If the TM training program outlined in Appendix B is implemented, and if the other principal features of the revised course are adopted (e.g., small group instruction and individualized training), the TM concept is entirely feasible. The concept was judged unworkable, however, were it to be imposed upon the existing course without adequate training of the personnel involved as well as concurrent adoption of other features of the revised course.

Small Group Instruction. The reaction of the SNFOs and of the TMs to this feature of the revised program was consistently favorable. It enabled a rapport to be established between students and instructors, a rapport which was judged to facilitate both learning and performance assessment, that does not exist in many other military training programs. When used in conjunction with the other training management features of the revised program, the small group approach to managing student training was judged entirely feasible.

Peer Instruction. Of the various training management features of the revised course, the use of Peer Instruction was met with the most consistently favorable comment. The TMs reported that it facilitated the conduct of early airways training activity in the device, and improved SNFO performance during those early activities was attributed in part to the individualized attention the Peers had provided. The SNFOs themselves also reacted favorably to the Peer-provided training. Finally, the Peers reported that their involvement in

the training of more junior SNFOs tended to reinforce their own learning, and their reaction also was favorable. It should be noted, however, that for the purposes of this project, it was necessary to obtain SNFOs to serve as Peer Instructors from the existing course, sometimes at the expense of their own training requirements. The use of Peer Instructors was judged to be a feasible feature of the revised program only to the extent that Peers are drawn from the same training course (but, of course, from a more advanced class) as the SNFOs being trained.

Functional Context Training. This training technique was employed wherever possible to the organization of training activities in the revised course, and it was judged to be feasible in those instances in which it was employed. An example of functional context training was cited in Chapter III, i.e., the organization of each T-39 Airways Navigation flight according to a mission model. The feasibility of training within a functional context should be examined judgmentally in the design of any training program, and the technique should be employed where judged appropriate.

Flexibility. There is a tendency for all large training programs to lose flexibility over time. From a purely program management standpoint, an inflexible course is easier to manage than a flexible one. This consideration is usually given more weight with high density courses than with low density ones. With respect to the flexibility of the Revised NFO Basic Training Course, this feature was judged to be a feasible and desirable feature during its limited implementation. While a desirable goal would be to retain that flexibility should the course be implemented on an unlimited basis, its feasibility would have to be determined at that time.

Crew Assignment. Crew assignment was found to be feasible during the limited implementation with respect to Core and Pipeline training in the T-2

aircraft and Pipeline training in the T-39. In addition, the reaction of both SNFOs and pilots was favorable. Crew assignment was not found feasible during Airways Navigation training in the T-39, because crew assignments could not be maintained after SNFOs began to complete that phase of training on a proficiency basis.

3. Was there a basis for further course revision? The third objective of the evaluation which took place concurrently with the limited implementation of the revised NFO Basic Training course also was met. Based upon the experiences gained, the course has undergone further revision, and those revisions have been incorporated into the description of the revised course contained in Chapter III and in the course material identified in Appendix B. In addition, a number of considerations related to future implementation and evaluation of the course were identified. These considerations are discussed in Chapter V of the present report.

## CHAPTER V: CONSIDERATIONS FOR COURSE IMPLEMENTATION<sup>a</sup>

This chapter is divided into two sections. The first deals with considerations and immediate requirements related to possible adoption by the Navy of the Revised NFO Basic Training Course, while the second section addresses areas of future development deemed necessary for successful long term application, effectiveness, and administrative efficiency of the revised course.

### IMMEDIATE REQUIREMENTS

#### Syllabus

The Revised NFO Basic Training Course, as described in Appendix B, is recommended for implementation with the exception of adding one week of 2F90 simulator training in Phase II of the Core program between T-39 flight support and flying. The rationale for this modification to the revised course evaluated during the present project is discussed below.

#### Time Requirements for Implementation

It will require approximately six months to prepare for the first class under full scale implementation. During that time it is recommended that the flight syllabus be shifted over to the Revised NFO Basic Training Course syllabus flights as soon as possible. This will facilitate the reduction of any excessive pre-flight pool of students. It will permit a smoother flow into an already stabilized flight syllabus, in terms of routes, evaluations, and instructor technique, during the ten week transition/phase out period after the first full syllabus Revised NFO Basic Training Course SNFOs report to the flight side. In addition, it will enhance the concepts of individual flight progress and maximum utilization of assets by enabling students instructed

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<sup>a</sup> This chapter was prepared by the project staff with extensive input from Training Wing Six and Training Squadron Ten personnel.

under either academic syllabus to fly together on the same mission.

During the six month preparation period, while the flight syllabus is being stabilized, academic efforts should be directed toward preparing Training Managers and toward briefing the squadron on the Revised NFO Basic Training Course syllabus and teaching techniques (with emphasis on individual progress), the functions of the Training Managers and Peer Instructors, and trends identified in the first test class. Furthermore, this time should be used to revise course training materials and written examinations.

#### Staff

Implementation of the Training Manager concept as described in this report will require an increase in the present instructional staff of VT-10. A portion of the increase will be temporary in nature and will be used to facilitate transition from the existing to the revised course. Some of the requirement for the increased staff may be met through use of personnel presently performing collateral duties in VT-10. Eventually, it is expected that the need for additional instructional staff will be reduced through the introduction of instructional TV, more extensive use of programmed texts and other self-study material and modifications to training devices which will facilitate their use.

#### Classrooms

To facilitate implementation of the revised course, within the limiting constraints of the current academic building, funding should be made available for modification of classroom space, such as subdivision of that space to provide for a learning center, flight/trainer planning spaces, study areas, a technical library, and a communications laboratory.

#### Training Aircraft

T-39. Based on daily launch statistics over the past year, which includes factors such as weather effects, and based on the FY 76 PTR, implementation of

the Revised NFO Basic Training Course flight scenarios would be facilitated by the availability of additional T-39 aircraft. In lieu of the acquisition of these aircraft, steps should be taken to expand the training syllabus to include additional simulator training, primarily in instrument interpretation and scan (the possible use of Device 2F90 for the purpose is discussed below). This expansion would maximize the benefits of actual flight experiences. Two alternative changes in the T-39 Airways Navigation flights during Phase II could also be considered for evaluation: (1) decreasing the number of students per aircraft from three to two, thereby eliminating the usual one hour delay enroute for fuel; and (2) shortening the enroute segments of the mission.

T-2. Current T-2 assets appear to be sufficient for implementation of that phase of training. If the T-2 flight syllabus should be expanded significantly to meet a shortage of T-39 aircraft, additional T-2 aircraft would be necessary.

#### Training Devices

1D23. Modification of Device 1D23 is desired to provide an intrabooth ICS capability so that more realistic voice communication training can be conducted by the Peer Instructor. This modification would permit the SNFO to utilize and adapt to headsets similar to those used during flight training and would reduce the distraction resulting from training being carried out in surrounding booths.

2F90. This instrument flight training device was not available for inclusion in the initial revision of NFO Basic Training and hence is not reflected in the course revision described herein. Although use of the 2F90 was not tested during the limited program implementation described in Chapter IV, the 2F90 has been tested and utilized effectively to train SNFOs in other instances. It has been observed that SNFOs who receive 2F90 simulator training prior to in-flight training demonstrate an increase in scan efficiency and instrument

navigation proficiency. Thus, it is recommended that the revised course described in Appendix B be expanded to include a minimum of three 2F90 simulator flights prior to the initial T-39 flight.

#### Programmed Texts

Because of their current role and immediate availability, extensive use was made of programmed texts in the development of the Revised NFO Basic Training Course. It was necessary to delete large portions in a number of these texts in order to reflect the enabling and terminal objectives of the revised course. All such deletions have been identified in Appendix B. In some instances, deletion of early or intermediate frames of a text tended to reduce its continuity and clarity. During the six month preparation time which will precede implementation of the revised course, all modified programmed texts should be reviewed, rewritten, and reprinted in the interest of training efficiency as well as to correspond to the objectives of the revised course.

#### Stabilization

Following direction to implement the Revised NFO Basic Training Course, there should be a one year freeze on course material (except to the extent described herein). This moratorium on change would include the six months of preparation time and the first six months of full implementation. The purpose of such a moratorium would be to enable shortcomings in the first revision to surface and be corrected on their own without being masked or compounded by additional revisions.

#### FUTURE DEVELOPMENTS

To assure further enhancement of NFO Basic Training beyond that achieved during this project, it is felt that factors affecting future developments must be taken into consideration at this time. Certain of these factors are described below. These are factors which have a direct impact on the time to train and the expenses of aircraft operation.

### Trainer for T-39 or T-2 Aircraft

The test class involved in the limited implementation of the revised course did, in fact, meet the required terminal objectives within the prescribed number of T-39 airways flights. However, their proficiency tended to diminish in the area of instrument navigation and copilot/airmanship qualities during subsequent flights which did not primarily involve instrument navigation. One means of remedying this tendency is to add training in airways navigation in a simulator or training device to supplement the T-39 flight time during Phase II. The use of Device 2F90 for that purpose has been described above. A possibly more suitable long term remedy would be use of a T-40/GAT-3 trainer configured for the T-39 aircraft. The decline in instrument navigation proficiency manifests itself primarily when the student enters the T-2 (Phase IV) portion of the revised course, which occurs after a period of 27 training days of no-flying. Another alternative to Device 2F90 would be a simulator or training device configured for the T-2 aircraft, the aircraft used in Phase IV. The essential requirement is a device in which the SNFO's instrument navigation and copilot/airmanship skills can be reinforced in preparation for their further use in flight.

### Pipelines

The NFO pipeline training in VT-10 contained in the revised program is one of the most significant changes that could be made to NFO training. This addition allows greater emphasis and time to be placed on the particular speciality or community to which the SNFO is destined, thus increasing his experience in that speciality. However, the maximum impact of specialized training can only be realized if a follow-on pipeline syllabus is developed for NFO advanced training at TRARON EIGHT SIX (TacAir NFOs) in addition to the existing pipeline training which follows graduation from VT-10 for other NFOs.

### Feedback

A system should be developed to facilitate feedback between NFO Basic Training and Advanced Training, the RAGS and fleet squadrons. Requests for and decisions concerning changes in basic training must be based in part on definite requirements identified at the advanced squadron training and fleet operation levels. During the development of the Revised NFO Basic Training Course, feedback from these sources was found to be of considerable importance in determining whether training was conducted in an operationally relevant context and in avoiding reference to obsolete concepts and equipment.

### 2F101

Consideration should be given to the feasibility of modifying the 2F101 simulator to enable the instructor to "fly" the mission from the console. The modified 2F101, a device not considered in the development of the Revised NFO Basic Training Course, would be a better simulator for VF/VA pipeline instrument training than the 2F90 (particularly since the 2F90 cockpit is configured for the A4 which is not flown in VT-10). However, the 2F90 could be used in Advanced NFO training in VT-86 with current simulator cockpits.

### 1D23

Modification is desired to the 1D23 trainer programming in order to provide more realistic turn rates, rates for ascent and descent, approach and departure training, mission playback via the console display, and expanded printout data for evaluation purposes.

### Audio-Visual Media

A program to make extensive use of instructional television (ITV) in NFO training should be investigated. Preliminary experience has already been gained by the Navy in the use of ITV in the training of personnel of the Imperial Iranian Air Force, a project unrelated to the effort reported here. Reasons for using ITV are numerous: cost effective usage of instructor manhours; standardization of student and instructor performance; high quality training regardless

of number of times repeated; reduced instructor load; effectiveness and efficiency in training instructors and enlisted personnel; ease of duplication and revision as training requirements change; and self-pacing capability, a feature that is an integral element in the Revised NFO Basic Training Course proposal.

#### Communications Laboratory

A communications laboratory is necessary to effectively and efficiently introduce and practice communications skills primarily associated with both radar and non-radar airways flight. During the limited implementation described in Chapter IV, audio cassette tapes, prepared from tower tape recordings and actual flights, were used in communication training. The tapes were adequate to test the validity of this method of introducing the communications environment, but they were of limited quality and utility. Because of the number and criticality of the communication tasks assigned the NFO and the skill with which he must perform those tasks simultaneously with other mission functions, it is recommended that a high quality, fully functional voice communications laboratory be developed for subsequent use. Such a laboratory would provide for monitoring high quality tapes varying in degree of difficulty and complexity and would provide for individual recording/playback of student responses. The laboratory might consist of twenty training stations, with individual recorders, two master tape recorders, and a monitor console.