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ABSTRACT

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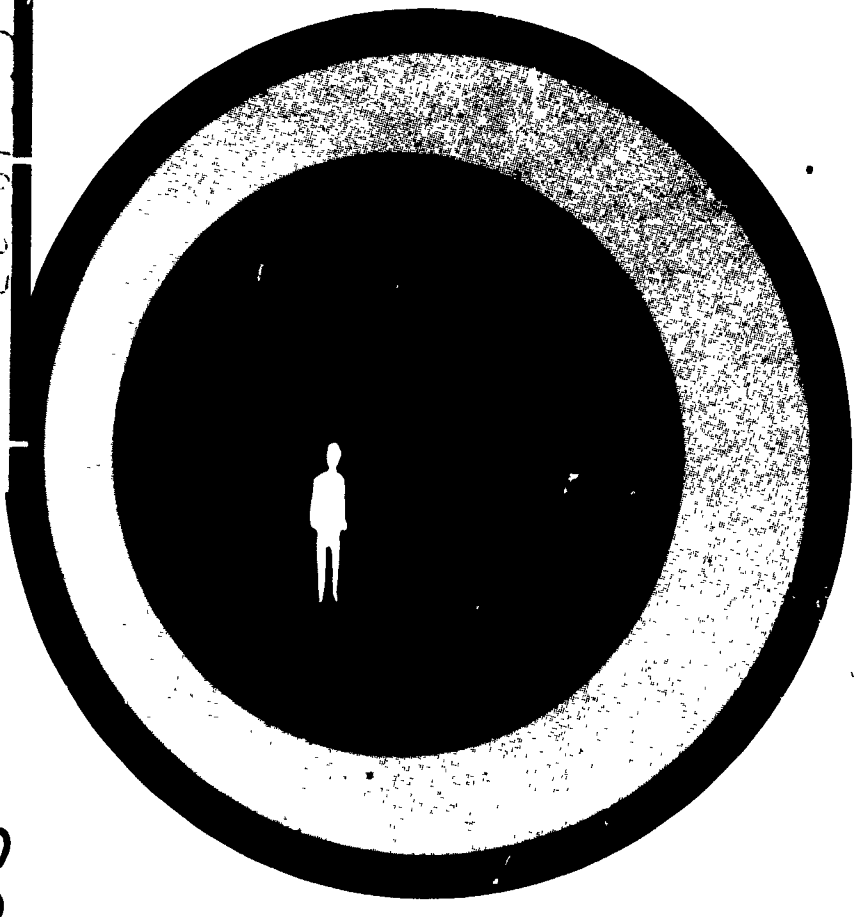

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AN ASSESSMENT OF U.S. NAVY TACTICAL TEAM TRAINING

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FOREWORD

This report presents the results of a study to assess the status of tactical team training within the Navy and to develop recommendations for improving team training operations. The work was performed by the Training Analysis and Evaluation Group (TAEG), a detachment of the Naval Education and Training Command. The excellent cooperation and assistance of Naval training personnel is acknowledged. Their frank and candid comments provided many insights into future directions for team training. Acknowledgment is also made of the assistance of Dr. Alfred F. Smode, Director of TAEG, for his counsel and for his contributions to the study.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

SECTION I

INTRODUCTION

The interdependence of human behavior is a prevailing feature in Navy operations, and effective teamwork or coordination is highly desired. In many structured task-oriented job situations, the effects arising from the interdependence of behavior influence system performance and, accordingly, are of consequence for training. The requirement for training is not only to enhance the capability of a team to perform according to formalized standard operating procedures and to handle contingencies as they arise, but also to enhance performance through coordination of team activities. Significant Naval resources are committed to team training both because of its importance and because of its considerable behavioral complextiy.

Unfortunately, a number of issues have yet to be resolved which impact on team training. There is also less than clear understanding of what is actually achieved through team training. Similarly, it is not clear which situations warrant a team training approach versus individual training and how best to establish appropriate learning environments for the training of team behaviors. What is clear, is that team training, particularly with appropriate training device support, plays an important role in assuring Fleet readiness.

Because of many unresolved issues and problems involved in team training and the need to place this type of training in perspective, Navy team training is being seriously examined.

BACKGROUND

The Chief of Naval Education and Training (CNET) provides training services and support to the Fleet in many areas. Because of the economic and operational importance of team training, this particular area was identified as one in which CNET might potentially assist the Fleet to utilize better current and projected resources and generally to improve the team training process. Accordingly, CNET directed that a study be conducted to develop an information base that could be used as a foundation for subsequent, more detailed explorations into specific tactical team training situations. The Training Analysis and Evaluation Group (TAEG) was tasked by CNET to perform the study.

PURPOSE

The purpose of this study was to compile information that would be useful to CNET and to the Fleet for future planning regarding the development of improved team training practices, procedures, and associated hardware and for resource management. To compile the documentation desired by CNET, a number of specific objectives were established. These objectives were to:

1. Describe the current status of team training within the Fleet; identify the various problems, issues, deficiencies, strengths, and philosophies concerning Navy team training; and determine the extent to which such considerations apply to each of the three Naval communities; i.e., air, surface, and subsurface.

2. Review and critically evaluate the findings in the technical literature regarding team training, specifically as they relate to current aspects of Navy team training.

3. Develop and recommend potential solutions to team training problems and develop recommendations for future conduct of team training.

APPROACH

Information necessary for the study was gathered from two principal sources: Navy units where team training is conducted and the technical literature pertaining to team training.

COLLECTION OF DESCRIPTIVE DATA. To obtain information concerning current tactical team training practices, visits were made to selected Navy units where such training is conducted. The rationale and procedures for selection of specific locations and the activities of the project team at these sites are described below.

Selection of Sample. At the beginning of the study, the complete range of Navy tactical team operations was examined. Various tactical teams involved in surface, subsurface, and air operations were identified, and the nature of the performance requirements imposed on these teams was preliminarily ascertained. A variety of sources (e.g., interviews with cognizant Naval personnel, descriptive documents, doctrinal publications) were used for this purpose.

Based on an analysis of this initial information and data, a decision was made to delimit the study to those situations wherein tactical teams significantly utilized synthetic devices for training. This approach provides a better understanding of performance requirements imposed on such teams since the training process is more accessible to examination. Also, this type of environment provides the greatest potential for incorporation of any recommendations developed by the study.

A listing of the installations visited during the study, the teams involved, and a description of the training activities at these sites are contained in the appendices of this report.

Visits to Field Units. The project team interviewed training personnel at field units visited. Questions asked addressed specific aspects of training practice; e.g., the way in which training objectives are established for programs, the manner in which training content is derived, and the mechanics of conducting training. In addition to interviewing training personnel, the project team also observed ongoing training at most of the installations visited. Documentation concerning course conduct and various syllabi was also obtained.

REVIEW OF TECHNICAL LITERATURE. At project initiation, a demand bibliography was requested from the Defense Documentation Center covering the area of team training. The Psychological Abstracts were also searched for relevant titles over the preceding 20-year period. Documents were obtained and the previous research and applied studies in tactical team training were reviewed.

DEVELOPMENT OF RECOMMENDATIONS FOR TEAM TRAINING. A number of recommendations concerning potential improvements in team training practices are made in this report. Partly, these recommendations are based on the experience of TAEG personnel gained in other training and training research contexts. For the most part, however, they were developed by comparing current practice with the literature findings.

FOCUS OF THE STUDY. In conducting both the literature survey and field portion of the study, a concerted effort was made to maintain focus on functioning intact teams. In this regard the "team" was considered as an organic whole and no special study emphasis was given to individual team members or individually performed functions. Thus, training regimes designed to instill proficiency on individual jobs (e.g., sonar operator, tactical coordinator) were not examined. The assumption was that individual proficiency had already been attained prior to entry into the team training program. Similarly, the position of "team leader" as an entity was not studied. The abundant social psychological literature concerning small group interactions, interpersonal processes, leader behavior, and similar topics was also excluded because of its questionable relevance to the highly structured nature of Navy teams.

ORGANIZATION OF THE REPORT

The remainder of the report is organized into four major sections. Section II discusses troublesome problems which affect the ability to conduct meaningful and definitive research and to delimit precisely the behaviors which team training programs should attempt to foster. Section

III describes current Navy practice in a variety of team training contexts. Section IV provides specific cross-comparisons of current "deficiencies" in training practice with the literature findings. Suggestions for changes are made. Section V presents the conclusions and recommendations of the study. Appendices are provided containing more specific details of training at the installations visited during the course of the study.

SECTION II

SOME TROUBLESOME PROBLEMS FOR TEAM TRAINING

A number of troublesome conceptual pr : .st in the team training area which affect the ability to perform de... :tive research and to focus precisely on optimum training stratagems. Largely, these relate to an inability to define precisely what is meant by a "good" team, or by coordinated team behavior, or, indeed, just what is a team. This section explores these problems and discusses the implications for the development of team training programs.

DEFINITIONAL PROBLEMS

Before beginning the business of training teams, it is essential that a clear understanding be held regarding what a team is so that training operations may be geared to produce it. Navy personnel use the term in equivocal ways--to refer to virtually any collection of individuals and units charged with a common overall purpose. In size, Navy tactical teams may range from two men in an aircraft to large multi-unit formations. Teams may be characterized by virtually any degree of formal organizational structure and permanency. While these prevailing views may be useful for many purposes, their utility for purposes of constructing training events and environments is questionable. More precise concepts are needed.

TEAMS. The research literature provides a variety of definitions regarding what a team is. Some of these are:

1. "Two or more operators working in a structured and task- or goal-oriented environment. The structure is said to be formal in ... that an organizational scheme has been imposed on the individuals which defines the functions to be performed, the sequence in which the functions must occur, and the links by which interindividual interaction (e.g., communications, passing products) may occur." (Briggs and Naylor, 1964)

2. "A synthetic organism with individuals as components." (Alexander and Cooperband, 1965)

3. "It is considered to be relatively rigid in structure and organization with well defined member tasks, roles, and communications links." (Klaus and Glaser, 1970)

4. "A task-oriented organization of individuals interacting to achieve a specific goal." (Horrocks and Goyer, 1959)

5. "Three or more persons working in concert toward a common, identifiable, and relatively immediate goal." (Daniels, et al., 1972).

SMALL GROUPS. Within the context of Naval operations, it is important for training purposes to distinguish between a team and a small group. Klaus and Glaser (1968) have noted that much of the research related to small groups is inapplicable to the study or training of teams. This is due to inherent differences between the two in structure and function. Studies of small groups typically involve the modification of organizational variables such as group structure. Team research normally emphasizes the manipulation of variables related to tasks and assumes a predetermined and rigid structure and communication network. Klaus and Glaser offer the following distinctions:

- "... a team is usually well organized, highly structured, and has relatively formal operating procedures--as exemplified by a baseball team, an aircraft crew, or ship control team. Teams generally:

  "1. are relatively rigid in structure, organization, and communication networks,

  "2. have well defined positions or member assignments so that the participation in a given task by each individual can be anticipated to a given extent,

  "3. depend on the cooperative or coordinated participation of several specialized individuals whose activities contain little overlap and who must each perform their task at least at some minimum level of proficiency,

  "4. are often involved with equipment or tasks requiring perceptual-motor activities,

  "5. can be given specific guidance on job performance based on a task analysis of the team's equipment, mission, or situation.

- "A small group on the other hand rarely is so formal or has well-defined, specialized tasks--as exemplified by a jury, a board of trustees, or a personnel evaluation board. As contrasted with a team, small groups generally:

  "1. have an indefinite or loose structure, organization, and communication network,

  "2. have assumed rather than designated positions or assignments so that each individual's contribution to the accomplishment of the task is largely dependent on his own personal characteristics, "3. depend mainly on the quality of independent, individual contributions and can frequently function well even when all or several members are not contributing at all,

"4. are often involved with complex decision-making activities,

"5. cannot be given much specific guidance beforehand since the quality and quantity of participation by individual members is not known."

A CONSENSUS. It is clear that small groups and tactical teams are different entities and that different training operations would be required to produce one versus the other. Still, the adequacy and accuracy of the definitions presented may be questioned because of the complex and variable nature of Navy tactical teams. Pat definitions leave many unanswered questions. For example, what are the boundaries of a team with respect to membership? Should intermember interaction or communication be a criterion as to what constitutes a team? Can an entire ship's complement be considered a team, or several different teams? Answers to such questions are needed if one is to develop effective training programs.

At this point, it may be more useful to consider a consensus rather than attempt a pseudo-precise definition of a team. It is the consensus of the authors sampled that a Navy tactical team will have the following minimum characteristics:

1. Be goal- or mission-oriented

2. Have a formal structure

3. Have assigned roles

4. Require interaction between members.

Thus, in deciding whether team training should be given a particular group of individuals, the criteria within this framework should be applied. Resulting training programs should be designed to foster achievement along these dimensions within the specific context in which the team (will) operates. The number of members becomes an irrelevant consideration.

TACTICAL DECISION MAKING. Some training personnel hold that a major activity or requirement of tactical <u>teams</u> is the making of decisions affecting short-term operations. This concept is discussed in detail in section V of this report. Before proceeding to that discussion, it is necessary to understand what is meant by the term, "tactical decision making." The following definitions have been used:

1. Tactical decisions are "those concerned with selecting a course of action and use of resources when in direct enemy contact or providing immediate operational support." (Brewin, 1964)

2. Tactical decision making "consists of diagnosing a situation and then selecting a course of action from the set of alternatives ... under conditions of uncertainty." (Kanarick, 1969)

3. "The act of fulfilling the responsibility for selecting those actions necessary to resolve an interaction with an enemy in the manner most favorable to the requirements of the decision maker's tactical unit .... Tactical decision making takes place in situations where fairly well-defined sets of significant events are possible and/or expected. The tactical and strategic objectives of the enemy, and the characteristics of his ships, weapons, etc., are to some degree known by the decision maker. A limited, largely predetermined set of actions are available to the decision maker through which he can attempt to forestall the enemy from achieving his goals ...." (Sidorsky and Mara, 1968)

It is generally agreed that tactical decision making involves the following:

1. Situation diagnosis

2. Hostile environment

3. Selection of optimum alternatives

4. Some degree of uncertainty.

Training given for enhancing this ability should include relevant practice under these conditions as modified for a particular context. More detailed recommendations for training tactical decision making are presented in section IV.

THE NATURE OF TEAM PERFORMANCE

Is a team merely a collection of individuals working together or is it something more than this? Is individual proficiency the key to effective team functioning or are there certain critical team skills which exist over and above individual proficiency? This issue cuts to the very core of the rationale for team training. Team training is conducted on the belief that something is learned in this way that cannot be learned by individual training alone.

An implicit assumption tenable to many involved in team training is that the team is "suprasummative of its parts." That is, it is something more than a collection of individuals performing their own jobs. This view holds that team skills exist, are trainable, and should be trained. There is the belief, articulated at some Navy units, that individual training alone will not suffice to produce individuals skillful in team situations. While individual proficiency was viewed as important to the overall success of the team, it was not considered to outweigh cooperative, compensatory, and coordinative aspects of teams. Thus, the team was viewed as "suprasummative of its parts." One view expressed was that team members could compensate for the performance of deficient members. But, the same training personnel also expressed a conviction that disruption of team effectiveness occurred when a member(s) of a functioning team was replaced. Presumably, this is so because the new member's abilities, strengths, and weaknesses are not known, and his general integration with the team has not been achieved. The implications are perplexing. On the one hand, the belief is expressed that the other team members can compensate for the performance of "deficient" members, but on the other hand, the suggestion is that they cannot.

In a somewhat similar vein, many training personnel expressed the view that the "better" teams were those in which the members had worked together for some period of time, hence, knew each other and were better able to compensate for and/or facilitate another's role. The overt suggestion again is that "better" teams are those in which members are (maximally?) familiar with each other. This belief implies the notion that a seasoned performer functioning well as a member of one team would not function well as a member of another similar team until after some indefinite period of acclimatization. If this is indeed the case, then any attempts to certify individuals rather than intact teams as "combat qualified" or "operationally ready" must be carefully reasoned.

THE PROBLEM OF COORDINATION

Training personnel have indicated that the main purpose of team training is to teach crew coordination. What actually is meant by coordination? Again, there are conflicting views which have different implications for training and for performance evaluation. What is coordination? Is it necessary to train it, and, if so, how should it be done? The literature tends to view coordination from the standpoint of the tasks that must be performed within the team whereas Naval personnel seem to view it more from the standpoint of the performer. Views of interaction and concepts of coordination vary depending on the referent situation and the assumptions made concerning crew behaviors.

With respect to coordination, two classes of events may occur that distinguish between different types of teams, or they may occur within the same team. These are established situations and emergent situations. In an established situation, crew interaction occurs where positions are highly structured in terms of responsibilities and operating procedures.

Relatively formal operating procedures and communications exist. Here, a wide range of behaviors is required and the results of performance are comparable to objective references.

In the established situation, events are repetitive and predictable and there are specified and detailed rules for handling them. In the emergent situation, events are unpredictable and there may be more than one equally good solution to a problem.

Coordination at times may result naturally from a sequence of properly planned and executed individual acts. It is argued that individual skills are the learned components while coordination (or group enhancement effect) emerges only as a result of high levels of individual proficiency. Within this framework, coordination refers to synchronized team interaction involving mechanical coordination by means of formalized standard operating crew procedures. Crew effectiveness in these routinized task situations is seen as the sum total of individual performances. (Smode, Hall, and Meyer, 1966)

Coordination, however, also results when members interactively perform in situations where there are no predetermined standards of performance. Here, improvisation and impromptu response invention is emphasized. (Smode, Hall, and Meyer, 1966) In training one would present task situations that had not been practiced to such an extent that performance had become routine, and the emphasis would be placed on the adaptive innovations developed by the team members. In this type of situation, effective performance would be regarded as something more than the summation of individual skills.

At a number of installations visited, training personnel described coordination in terms similar to those expressed in the literature. But, what seemed most important to them was a description of coordination as a type of interactive behavior which is peculiar to a given set (crew) of individuals. This type of behavior is difficult, if not impossible, to describe, define, or measure objectively. As a result, meaningful training objectives and methods to train this behavior are elusive.

DIFFERENT TYPES OF TEAM TRAINING

In addition to the problems engendered by the varying definitions and concepts of what teams are and do, there are certain other problems generated by the nature of team training establishments. There are two principal types of formally constituted team training establishments within the Navy system. One type is concerned with the training of individuals, generally new to the Navy, who have not previously been members of tactical teams. The second type of establishment conducts training for the benefit of already-established crews (e.g., TACDEW, Devices 14A2, 14A6). In the latter case, the purpose of training is not so much to establish team interactive skills as it is to maintain or enhance these skills in simulated mission contexts--or is it? The question of value of team training must be viewed from different perspectives.

The first "type" of establishment is exemplified by air squadrons which conduct tactics team training for newly assigned individuals. Currently, these units do not train crews for deployment to operational squadrons as crews. Rather, individuals are trained to function as crew members within a team context and are then sent to operational units on an individual basis. Some training personnel have indicated that it may be advantageous to train crews who would report intact to their operational units.

If crew members are able to develop complementary/supplementary behaviors (i.e., learn coordination) during a limited training period, it may ultimately be of little or no value as these "crews" are disbanded at the end of training. If "familiarity" is, in fact, a critical determinant of crew performance, it may be more efficient to provide crew training only to intact operational crews. This would allow either additional time for individual training or enable personnel to report more quickly to operational units.

At the present time, several operational squadrons send crews who have already received "team" training back to a training unit for team training. At this time, however, the intact operational crew undergoes training and the principal emphasis is on learning to function as a crew (i.e., develop crew coordination skills). Most often, this type of training is given prior to the crew's being scheduled for the (annual) readiness qualification check.

Apparently, the operational squadrons feel that the individuals sent to them from the team training program are not yet ready to function within a team. It is felt that "something" has not been achieved that is needed for effective team functioning. Presumably, this something is related to the more intangible social aspects of small groups. Another possibility is that individuals reporting to their operational units have not received sufficient individual positional training.

SUMMARY

It seems appropriate to attempt to draw together some of the conflicting and troublesome notions that pervade the domain of teams and team training. While everyone professes intuitively to be able to recognize a good team--the "I'll know it when I see it" phenomenon--no one seems to be able to articulate its dimensions with sufficient clarity to permit the development of training procedures for producing it.

Neither can anyone decide, unequivocally, if a team is simply a collection of individuals performing separate jobs in a group context, or if there are unique trainable team skills that exist over and above individual functions. The matter of coordination training is also nebulous since, as currently envisioned, coordination seems to be encapsulated within a social context rather than within a task context requiring skilled sequences of actions. How do we train individuals to "like" (?) each other? Succeeding sections of this report will examine these issues.

SECTION III

CURRENT PRACTICES IN NAVY TEAM TRAINING

Information concerning current Navy team training philosophies and practices was obtained at various training units. Appendix A identifies the units visited and appendix B provides brief descriptions of the training programs conducted at these units. This section summarizes features of these programs and provides evaluative comments. Of particular interest are the objectives of training, training content, and the way in which training programs are conducted.

TRAINING OBJECTIVES

Within modern educational technology, the term "training objective" has a precise meaning. Procedures for establishing training objectives under the systems approach to training methodology are explicated in the following section. But, for the present discussion, consider that training objectives are statements of the intended outcome of a particular course of instruction. They state in specific terms what a trainee will be "like" (i.e., what he must know and be able to do) at the completion of instruction. Explicit observable behaviors are stated. One intent of establishing specifically and precisely stated objectives is to insure that all students in a course receive a minimum amount of standardized instruction. Another is, of course, to provide explicit standards against which student progress in training and achieved proficiency can be evaluated. At present, objectives such as these are notably absent in most Navy team training programs.

Within the Navy, training objectives, most often, are conceived in rather loose and general ways. Higher level commands establish objectives for the training unit to achieve. At the training unit, training personnel convert these general objectives into smaller blocks for encapsulation within a course syllabus. Most often, these objectives retain a generally loose structure and are stated in global, nonprecise and nonbehavioral terms. Training personnel who establish course objectives at this level do so mostly on the basis of their own previous experience in operational situations--not training situations. Frequently, individual ships' Commanding Officers also affect the establishment of "training objectives." They do this by "requesting" training personnel to provide some specific type of training to their crews to alleviate some presumed deficiency in performance. This training is then given as an alternative to some prescribed and more standard program of instruction. Ideally, more job and situational analyses should be conducted to determine what training is actually required.

There are, however, some notable exceptions to the pervasive "soft" approach to the development of training objectives. This is particularly true in the air community. Training personnel at air units have adopted a task-analytic approach for acquiring systematically the task information needed for the development of training objectives. This approach represents a significant improvement over the essentially a priori methods of arriving at objectives by intuition based on experience or face validity. Given the lack of explicit training objectives, it is apparently unclear to many training personnel what they should attempt to achieve in training. When asked to verbalize what their objectives are, training personnel at most units visited could not readily define them except in very general terms.

Stated training objectives, most often, addressed the behaviors of coordination and/or decision making. But, as noted in the preceding section, there is some confusion as to what these terms mean. Since clear, explicit answers could not be obtained to direct questions regarding objectives, other attempts were made to discover what objectives might be implicit in the minds of training personnel. One such consisted of attempting to define the ingredients of good performance When asked to define the characteristics of a good team versus those of a bad or fair team, the best answer that could be obtained was, "a good team can be counted on to get the job done consistently."

Such imprecise information is of little value in defining training goals (i.e., developing objectives) so that well-ordered training programs can be developed for achieving some known graduate output quality. Based upon interview data, it would seem then that training personnel are not quite sure what specific objectives should be established or how to go about systematically identifying what specifically team training should achieve.

Most of the training personnel at the team training facilities visited have attended an instructor training school where they have been briefly exposed to the development of behavioral objectives using a task-analytic approach. However, those key personnel interviewed expressed a need for greater training and/or assistance in this area of educational technology.

TRAINING CONTENT

Ideally, training content should be established out of consideration for the training objectives established for particular programs of instruction. Content should be selected which will permit trainees to acquire the behaviors stated in the objectives. This is not a simple process since a translation is required from objectives to the specification of appropriate learning situations. Also, this content must be appropriately "packaged" to optimize student progress and proficiency. Such considerations were not noted in most current Navy team training programs.

The content of these team training programs originates from three principal sources. In some cases, a task-analytic approach has been employed to determine job requirements objectively. Resulting job-referenced objectives then may serve as the basis for the development of training content. Here, training content is designed to foster behaviors identified through the task analysis as necessary for successful on-the-job performance.

Most often, however, training content is the result of design by "expert consent." As almost all instructors assigned to training facilities have had some recent Fleet experience, they are relied upon to apply their experience in determining training content.

Another common approach in the development or modification of training content is to permit individual ships' Commanding Officers to determine what kind of training is appropriate for their respective crews. In a typical situation of this type, certain basic scenarios exist. These represent the kinds of tactics or missions performed by a given weapons platform. These scenarios are then modified to meet the requirements of a particular crew according to the expressed needs of the officer in charge of that crew.

TRAINING PRACTICES

Formal tactical team training[1] is conducted in two basic crew composition configurations: (1) School-assembled crews, and (2) intact operational crews. In a typical initial or transition training school, individuals are either arbitrarily assigned to crews based on number constraints (i.e., small class sizes) or crews are assembled based on some "optimal" mix of strong and weak students. Team training organizations concerned with refresher or proficiency training characteristically receive intact operational crews. But, it has been pointed out by training personnel that the ship's Commanding Officer may on occasion send individuals for training who do not normally occupy the same position on the ship for which "refresher" training is being given. Sometimes this may be attributed to legitimate cross training but in other instances, it may reflect simply "making up the correct number" of trainees to send to the training unit.

With the exception of certain types of refresher training, team training normally consists of complementary classroom, simulator, and in some cases, underway training. Simulator training typically consists of exercising a given crew, or some combination of crews, in a series

[1] At-sea exercises are not considered in this discussion although many of the points made may apply to that environment as well.

of scenarios of graded difficulty. The scenarios are designed to model tactical situations which might be encountered in an operational environment. Some attempt is normally made in the initial phase of training to establish the relative proficiency of a given crew vis-a-vis the scenario exercises available. From this initial assessment of crew proficiency, a start point is determined for the difficulty level (or, perhaps more accurately, the complexity level) of subsequent exercises.

During the course of training in the simulator, trainees receive differential amounts of feedback regarding their performance as a function of student/instructor ratios. Virtually all feedback provided to the trainee is negative; i.e., attention is called to errors rather than reinforcing desirable actions. No formal policy of feedback was evident at any of the training facilities visited. Several training personnel expressed the philosophy that trainees should "learn by their mistakes." It is common practice to hold a debriefing session after a problem run to discuss; e.g., the performance of trainees, tactics selection, decisions. Usually, the debriefing is conducted by instructor personnel who describe shortcomings as observed and encourage interaction by crew members in explaining their rationale for certain actions and decisions. In some cases, where there is no one-best or textbook solution to problem evolutions, alternate courses of action are discussed.

Attempts to measure trainee performance during scenario exercises vary considerably. In some cases, no real attempt is made. It is simply assumed that if exercise scenarios closely model real-world tactical situations, "team" behaviors will be required for successful conduct of the exercise. If a given crew completes an exercise with some measure of success, it is further assumed that the crew received training in these behaviors. In other cases, overall team performance may be assessed or individual performance may be assessed. The following means are most commonly employed:

1. Automated recording of kill scores, tactics selection, weapons expenditures,

2. Totally subjective evaluations of performance given by training personnel,

3. Weighted performance scoring checklists, completed by trainers, and

4. Combinations of the above.

By far, the most common means of evaluating performance is overall subjective evaluation. In such cases, performance is usually scaled in terms of SATISFACTORY/UNSATISFACTORY, or some variation thereof. Where detailed checklists are used, each individual or key individuals of the crew receive a numerically weighted score. This is based on the instructor's subjective evaluation of how well the "student" performs various tasks within his function. The team scorc, then, is arrived at through some weighted combination of individual scores--generally a simple summation. The difficulties of this approach are discussed in detail in section IV.

SECTION IV

DISCUSSION OF TEAM TRAINING PRACTICE AND RESEARCH

The majority of the team training programs examined during the study failed to reflect the findings of research efforts conducted for purposes of deriving principles for improving team training. Perhaps the major reason for this shortcoming is the lack of an appropriate vehicle for translating research findings into plain-language recommendations useful to those tasked with providing training. This section provides implementable recommendations for training improvement.

Deficiencies which were noted in training program development and practice are discussed. The final subsection, Training for Tactical Decision Making, is presented because of this topic's perceived importance for team training. Many of the points made apply not only to tactical team training but also to team training in more general terms.

TRAINING OBJECTIVES

The most critical deficiency of current team training programs is the lack of clearly stated, definitive objectives for training to achieve. In most cases, a sound, systematic approach has not been applied to the identification and analysis of tasks for establishing training goals. The tasks that team members are required to perform (most notably, the team interactive tasks) in an operational context should be identified and carefully analyzed. This analysis should be aimed at defining those behaviors, skills, and knowledges which are critical to task performance. The product of the analysis would serve as the basis for developing meaningful criterion-referenced training objectives and performance standards.

Smode (1971) presents a comprehensive, detailed approach to the systematic development of training objectives. The following sequence of steps is suggested:

1. Describe and analyze the operational system. Assemble pertinent information on the operational system. This should include a description of the system and its components, the operational and tactical environment, and the primary mission profiles.

2. Define the task structure. Make an inventory of the duties associated with each position and the tasks associated with each duty.

3. Conduct a task analysis. Formal task analyses should be conducted to determine detailed task structures and to assess the importance and criticality of tasks for training; e.g., tasks that are

important to system effectiveness, have high skill requirements, and will yield improved performance through training. (Rankin (1974) presents a procedure for developing task information.) A selection of tasks for training is then made.

4. Prepare detailed task statements. For those tasks that have been identified for the training system, detailed task statements are prepared. The goal of this effort is to determine the skills and knowledges required for task performance. The product of this effort is an organization of tasks to be performed and the component skills and knowledges that are involved in each task. The task statement defines the performance elements in the expression of the training objective.

5. Express the task statements in the form of training objectives. Where the intended performance situation is defined, the meaningful units of performance are identified and selected and the necessary immediate learning needs are established. These should describe clearly what the trainee must do to satisfy the objective. The formal statement of the training objective will have three essential characteristics. It will specify:

- What is to be trained (i.e., the task to be performed stated in explicit, observable behavioral terms).
- The conditions under which mastery of the objective is to be demonstrated.
- The standard of performance, or minimum level acceptable.

The above is an abbreviated overview of the steps to be taken in a systematic approach to the development of training objectives. Smode (1971) offers a more detailed rationale for the process as well as examples. Usually, an additional step is accomplished which involves an analysis of the characteristics of the student input. Incoming students may already possess certain job required skills and knowledges. If so, there is no need to establish training objectives for these items. Thus, a kind of subtraction process is used in establishing objectives. This involves a critical comparison between skills and knowledges required on the job and current capabilities of students.

TRAINING CONTENT

It was noted in the preceding section that ideally training content is based upon explicit training objectives derived through some systematic procedure. At most training units, this is not the case. Usually, content is selected by some rational, intuitive process. While there is no firm evidence to suggest that training content derived in this way is not valid, there is also no clear evidence, other than opinion, to suggest that it is. Because of the lack of objectives, there is little more that can be said about this issue. Some suggestions for developing training content are, however, presented below under the Modeling subsection of Training for Tactical Decision Making.

FEEDBACK FROM OPERATIONAL UNITS. A major consideration in designing any training program is relevance to operational requirements. The ultimate criterion for training is the demand created by real-life mission accomplishment. The problem, then, is how best to translate mission requirements into training goals on some continuing basis to insure the relevance of content to operational requirements.

The training facilities visited during the course of this study employ instructor personnel who have had Fleet operational experience, representing various degrees of recency. The experiences of these personnel serve as one form of valid input in relating criterion demands to the training realm. This approach alone, in updating training requirements, exhibits two notable shortcomings: (1) Inputs are made on an individual basis, reflecting the subjective biases of individuals, and (2) the timeliness of such inputs is highly variable. At best, there is some lag between changes in operational requirements and the reassignment of knowledgeable personnel to instructor duty.

Most facilities sampled employ some method to establish liaison with operational units for the purpose of updating training content. The following methods are employed by various facilities to obtain information:

1. Questionnaires sent to operational commanders

2. Critique questionnaires completed by students

3. Operational Readiness Inspection (ORI) results

4. Visits by school liaison officers to operational units

5. Visits to operational units by "special" training teams.

In most instances, the level of specificity of the feedback information is not conducive to identifying specific aspects of training which should be changed. At best, gross information such as "more practice is needed on X" is obtained.

The fact that these efforts have been established indicates that training personnel have acknowledged the need for such a vehicle. However, considerable variability exists in the kinds of information solicited, the means of obtaining the information, and the timetables for obtaining feedback. In order to systematically obtain consistent, reliable, and timely feedback, organizations tasked with providing training should establish a formally articulated scheme for obtaining such information. This might include the following considerations:

1. Establish a formal liaison with appropriate counterparts in user organizations within operational commands.

2. Format the instrument of feedback for:

   a. Changes in mission, tactics, procedures

   b. Changes or modifications to hardware/software

   c. Evaluations regarding the adequacy of personnel training.

3. Determine the optimum frequency for feedback reporting.

4. Establish a system to facilitiate ad hoc reporting.

5. Establish a follow-up and change agent capability to implement modifications as efficiently as possible.

The TAEG is currently engaged in an in-depth study of the variables related to feedback systems. Products of this effort will include a comparison of methodologies for obtaining Fleet feedback and specific recommendations for implementation of a system.

TRAINING PRACTICES

One noticeable deficiency in the way in which training is conducted at team training units is the lack of systematic procedures for providing feedback information to the trainee(s) while he is learning team skills. This may stem from a number of factors, one of which is a lack of a valid assessment system for gathering information about trainee performance. These topics are discussed below.

PERFORMANCE ASSESSMENT. Student performance assessment is vital for the effective control of training. There should be some means of determining how well students are progressing in training so that appropriate guidance can be given and for determining final achieved proficiency levels. Ideally, objective and valid performance criteria and a measurement system for obtaining and comparing student performance data to these criteria, or standards, will exist for a training system.

Performance Criteria. The final component in the training objective is the specification of the standard of performance that must be met to indicate achievement of the objective. For a given situation, critical behavior and/or incidents which significantly impact success or failure of the mission evolution must be identified and weighted or prioritized. Standards for acceptable individual performance and for team performance are needed. These criteria may be expressed in terms of, for example, error tolerance, timeliness, procedural accuracy, hits, tactics selection.

Performance Measurement. Most often, trainee (and team) performance is evaluated subjectively according to standards held implicitly by individual instructors. Recently, however, some attempts have been made to make the process more objective. For example, Commander Third Fleet has levied the requirement that ships receive a numerical grade for performance. The intent is that these grades be used for comparing states of readiness or effectiveness of ships. The initial attempt at determining this rating consists of using a weighted checklist to score such functions as plotting, asset management, tactical decisions, and communications. Individual performance is evaluated and a given ship's score is the cumulative sum of individual and sub-team scores. This approach is of suspect validity and appears deficient in a number of areas. Values assigned to individual contributions are based more on intuition and assumption than on hard data. Also, the rating of one individual or sub-team may be an artifact of another individual or sub-team's performance. Training personnel, recognizing the need for some form of staff assistance in resolving the problem of individual as well as crew performance measurement, expressed considerable distress with the inadequacies of this rating system.

For measuring team effectiveness, an essential difficulty remains--that of defining team skills. Horrocks and Goyer (1959) have described the dimensions of team performance as those of attitude and interaction. Attitude skills include conformity, identity, and confidence. The interactive skills include such specifics as integration, coordination, performance, communication, and flexibility. But, how does one objectively measure these items?

The ambiguous nature of such terms as attitude and coordination used to describe so-called team behaviors must be dealt with at the onset of any attempt to assess relative qualitative/quantitative facets of these activities. If such behaviors are identified as critical to team performance during the task-analytic phase, they must be functionally defined in terms that evaluators reliably agree upon. If, for example, effective communication is deemed to be a critical behavior to be assessed, raters should have in their repetoire of evaluative skills, behaviorally-anchored criteria against which interpersonal communication can be meaningfully judged. It has been demonstrated rather convincingly (Bray and Grant, 1966) that raters can be trained to make reliable assessments of behaviors which are difficult, if not impossible, to quantify objectively. Training Navy personnel to become "expert judges" for purposes of rating team performance might significantly improve the assessment process and lead ultimately to a clearer understanding of the components of "good" team behavior.

Development of a Measurement Methodology. What is needed for team training is an objectively based performance measurement system. This should consist of performance standards and means for obtaining, processing, and comparing student "scores" to the standards for arriving at summary evaluations and for giving the student feedback on how well he is doing during training. Chesler (1971) suggests six steps for developing an evaluation methodology. Although this work was done in an effort to automate scoring of performance, the underlying principles are valid for developing a measurement system. The steps are:

1. Identify system entities for which performance evaluation is required.

2. Identify major types of operations for each system entity.

3. Determine training objectives for system entities and types of operations.

4. Determine variables to be used as performance measures and how the variables will be recorded and processed.

5. Determine variables to be used as situational measures and how they will be recorded and processed.

6. Determine how performance data will be analyzed, interpreted, and used for evaluation purposes.

Despite a seemingly sound methodological approach to the development of performance measures, there appears to be no simple solution to the criterion problem. Chesler (1971) discusses this dilemma vis-a-vis the above approach:

> The first five steps of the methodology proposed ... provide a refined list of performance and situational variables. They do not provide a final list, that is, a relatively permanent set of variables considered satisfactory for evaluating trainee proficiency. As it stands, the refined list ... represents a consensus of instructor opinion of variables which tentatively assess trainee performance. The next

step is to analyze data obtained in training situations. Statistical analysis can help to reduce the number of variables. Instructor usage demands the convenience of a few, rather than many, performance measures. Some variables may correlate highly with others, and can be eliminated. Other variables may show very little spread in range of scores, so that they do not differentiate among trainees. Still other variables may yield results that do not agree with prevailing opinion of what constitutes good and poor performance. Clearcut, meaningful scoring procedures do not easily result from analysis of such performance data. Upon examination, this problem inevitably boils down to a lack of criterion performance variables which are all of the following: objective, recordable, discriminatory, and--most important --acceptable to a consensus of persons familiar with the tasks and skills of concern. This is the criterion dilemma, which is especially severe for closed-loop, interactive team and multi-team situations. Objective criteria for military operations, that is, acceptable indices of good and poor performance, are difficult to define. Interactive group situations in the civilian world present the same difficulty.

For a further discussion of the criterion dilemma as well as a detailed methodological approach to the development of performance measures, the reader is referred to a series of research efforts by Systems Development Corporation, Santa Monica, with reference to project "NORM." (Cunningham, et al., 1965; Sheldon, et al., 1966; Sheldon and Zagorski, 1965, 1966)

FEEDBACK/KNOWLEDGE OF RESULTS. Some form of feedback, or Knowledge of Results (KOR), is essential to the learning process. Trainees need to know how well they are doing during training to insure that they are acquiring the proper information and for appropriate redirection of their effort. At virtually all units visited during the course of this study, however, KOR was treated casually, and a variety of nonsystematic techniques were used for providing such information to trainees. How much, when and what kind of feedback trainees receive seems to be a function of individual instructor practice rather than unit practice or policy. Kanarick, et al., (1972) in reviewing the research literature on feedback concluded that, "Performance feedback is unquestionably the single most important parameter in team or individual training."

Investigations of how KOR affects individual and team training have been included in many research efforts (e.g., Alexander and Cooperband, 1965; Klaus and Glaser, 1968; Briggs and Johnston, 1966; Glaser, et al., 1962; Horrocks, et al., 1960; Cockrell and Sadacca, 1971).

Much of the laboratory research on KOR, focusing on individual operators, has been summarized and discussed by Annett (1961). Alexander and Cooperband (1965) have summarized the relevant research dealing with team performance.

Alexander and Cooperband (1965) discuss some of the problems in providing KOR for team training. These problems arise from three considerations:

1. There may be several criteria of effective team performance with no clearcut trade-offs among them. These criteria may be vague and difficult to state objectively and may change during system operations.

2. In order for a team to operate effectively, it is necessary for its members to develop and maintain individual skills as well as skill in working together. There is a possibility that these skills may require different feedback procedures which may mutually interfere.

3. When a complex system operates, there is usually a large volume of information available about the state of the environment, the state of the system, and the performance of system personnel. Some of this information may be conducive and some inimical to effective learning.

Team members receive feedback information from two sources. Intrinsic Knowledge of Results (IKOR) is feedback inherent in the tasks themselves. It is received while the team is performing its tasks, depending on the communications structure of the system, the kinds of displays available, and the rules for information dissemination. Extrinsic Knowledge of Results (XKOR) is feedback provided by a source external to the system, such as inputs from a training instructor.

Briggs and Johnston (1967), in reviewing the research on KOR have suggested the following tentative conclusions:

1. In operational situations where it is not possible for one member to compensate for the deficiencies of another, the use of direct or individual-specific KOR is desirable.

2. A team composed of low-ability personnel can be expected to improve under either direct (i.e., to the individual) or "confounded" feedback conditions during training. However, high-ability team members benefit more when training under direct feedback and may even deteriorate somewhat under confounded feedback conditions. Confounded feedback occurs when information is given concerning team performance without regard to individual performance.

3. In a team context, the members will attempt to maximize that aspect of performance about which they receive specific (individual) XKOR. Further, this maximization will be attempted even at the expense of other characteristics of team performance. If only one aspect of performance is seen as important, then feedback on that aspect will achieve the desired result. However, if two or more aspects of performance are important, then feedback on only one aspect may result in performance which is inferior on other criteria.

4. Teams experiencing a change in specific KOR will adjust their outputs so as to maximize that aspect of performance now being emphasized by extrinsic feedback. However, if a change is made from simple to compound KOR, teams will be more conservative and persist in emphasizing that aspect of performance which previously was the subject of extrinsic feedback.

5. Concerning the appropriate mix of general (team) and specific (individual) feedback, it was found that if highly specific performance feedback is given too early in team training, it would actually interfere with skill acquisition. Apparently, trainees are not ready to use such specific information. Specific KOR, then, should be provided only after a period of more general feedback.

A major source of difficulty in team training appears to be the identification and correction of individual errors. According to Alexander and Cooperband (1965), the feedback of error information probably leads to increased performance proficiency when the objective of training is to develop precision in applying operational rules; i.e., learning to respond to recurrent events. But, if the training objective is to learn to respond to unique events in an adaptive way, it is possible that feeding back error information might tend to perpetuate current procedures. In many complex team tasks, there are often many alternative correct procedures, making error identification very difficult.

There are implications from laboratory research in team training for the development of feedback or reinforcement practices. Horrocks, Krug, and Heerman (1960) concluded that KOR should be supplied immediately to each team member, but in varying ways as the task becomes more difficult. Klaus and Glaser (1968) have likewise concluded that reinforcement should vary as a function of training state. Basically, these authors recommend that extensive reinforcement be provided during early stages of training while progressively leaner reinforcement ratios may be provided as the trainee(s) becomes more proficient. Regarding team reinforcement, Klaus and Glaser (1968) recommend that team practice result in clear and immediate reinforcement following each correct team response. They suggest that practice without team reinforcement for criteria-level performance will more than likely lead to a decrement in team proficiency.

Glanzer and Glaser (1957) studied performance in three types of Navy teams: Combat Information Center (CIC), ship control, and gunnery. Their observations included the kinds of errors made, the positions making the errors, the corrective procedures used, and overall ratings of morale and efficiency. Recommendations concerning the training of teams were presented as follows:

1. In the early stages of training, senior level team members were observed to contribute a large number of errors and had difficulty in making necessary corrections. It was suggested that during this stage of training, additional participants should be assigned a share of the supervisory load of senior level personnel.

2. Team members should be made aware when their efficiency with respect to the correction of errors is low to help emphasize their responsibility for correcting errors.

3. Error data should be made available to teams during the course of training to aid trainees in setting their own emphases for training.

4. Extensive error data recording may also aid those responsible for determining the composition of teams and the functions of team members.

Unfortunately, many relevant questions which would logically arise in attempting to apply KOR to a team training situation are, at best, only partially answered by the laboratory research in this area. A partial list of such questions follows:

1. When should information be provided?

2. What information should be provided?

3. Who should receive feedback?

4. How should KOR be provided?

5. Who should provide KOR?

6. How much of what kind of KOR should be provided at various learning stages?

There are no simple answers to these questions as many parameters within the context of team training differentially affect the use of KOR. If KOR is to be used effectively, training personnel must be aware of the existing guidelines regarding feedback and establish a systematic policy of application for their respective training environments. Many of the above questions can be answered by examining task and mission analyses vis-a-vis the objectives of training and the "critical incidents" contributing to mission success/failure. Training scenarios should be analyzed to determine critical procedures, decision points, communications, and coordinated activity which may be directly or indirectly linked to the mission outcome. This process, although subjective in nature, might be accomplished by a consensus of knowledgeable instructors. A feedback schedule may then be established for critical mission events.

CONCEPTS OF TEAM TRAINING

A number of items arose during the course of the study in conversations with training personnel which have implications for the conduct of team training and views of team performance. These are discussed below.

INDIVIDUAL VERSUS TEAM TRAINING. Technically, the question of whether individuals functioning in a team setting require unique skills which can only be developed through training in a team context remains unsolved. Glanzer (1965), in discussing a series of studies of Navy team training, concluded that team training was inefficient and wasteful in terms of gain per trainee manhour. However, this same investigator stated that since the critical stimuli for individual tasks in the team context were difficult, if not impossible, to isolate, team training was necessary.

While a number of studies have shown that individual proficiency is the key to effective team functioning (e.g., Klaus and Glaser, 1968; Horrocks, Krug, and Heerman, 1960), there are instances when whole-team practice may be beneficial. Alexander and Cooperband (1965) propose that whole-team practice should be effective when:

1. The team training stresses the acquisition of coordinative skills,

2. Design of the tactical system is inadequate in that there is a discrepancy between the formal and informal rules of operation,

3. The social facilitation provided has a beneficial effect on the acquisition of individual skills, and

4. Most importantly, the tasks being trained are such that exhaustive formal rules cannot be stated and the procedures must be developed by the team in the process of task accomplishment.

There is some evidence to suggest that team training given before individual proficiency has been achieved may, in fact, cause a decrement in individual proficiency. Horrocks, Krug, and Heerman (1960), using three-man teams performing in a laboratory setting, concluded that when team coordination was emphasized early in training, individual skill acquisition was hampered. Klaus and Glaser (1970) likewise concluded that the key to effective team training is individual proficiency, and that the team setting is neither an efficient nor appropriate place to acquire individual skills. Their data indicate that overall team performance levels predicted from individual proficiency scores tend to be overestimates. This suggests that even with team members who are competent individuals, the necessity for interaction in a team setting subtracts from individual task performance.

MEMBER REPLACEMENT. Laboratory investigations of team versus individual training have manipulated the variable of member replacement. Such studies have produced conflicting results. Studies by Horrocks, Krug, and Heerman (1960) and Briggs and Johnston (1967) have indicated that member replacement may be relatively unimportant, with its effect, at worst, temporary and dependent on the skill levels of the individuals involved. On the other hand, Schrenk, Daniels, and Alden (1969) found member replacement to be the major variable in downgrading team performance. Such results must be tempered with the fact that laboratory studies of this type characteristically fail to model the real-world environment with true fidelity due to factors such as the behavioral complexity of group dynamics and Hawthorne effects (i.e., an enhancement of performance stemming from the knowledge that one is being observed).

SOCIAL INFLUENCES. Of particular interest are the underlying social aspects of team behavior which seem to affect performance. There is a paucity of research literature dealing with the social conditions which may affect training and performance of Navy tactical teams. The manifestation of "team awareness," adaptive, as well as creative behavior, seems to be crucial to effective team performance. Yet, such ambiguous constructs defy clear definition, much less the development of criterion-relevant training objectives. These phenomena would appear to occur when other determinants of team performance (e.g., individual proficiency) are optimized.

TRAINING FOR TACTICAL DECISION MAKING

Most tactical team training situations involve training in/for tactical decision making. The present authors do not consider tactical decision making to be a team behavior, per se, but rather view it as an individual function. Many Navy personnel involved in team training, however, do tend to view "the team" as an organismic whole capable of and, in fact, responsible for, making tactical decisions.

THE NATURE OF NAVY TACTICAL DECISIONS. In the tactical team context, decision making is perceived as ranging along a continuum bounded on one extreme by purely procedural type decisions and judgmental type decisions on the other. Procedural decisions are those involving the established techniques for the selection of appropriate alternatives. Here, the variables affecting the outcome of the decision are known and quantifiable. Judgmental decisions involve the selection of alternatives where techniques are flexible and variables affecting the outcome are ambiguous. The decision-making spectrum, then, is moderated by degrees of uncertainty most often expressed as objective and subjective probabilities.

In a given team training situation, it is appropriate to determine who makes what kinds of decisions. In every tactical team operation observed, the nature of decisions was dictated by the structural hierarchy of the team. The most subordinate team members (e.g., sensor operators, plotters, talkers) are normally concerned with very basic decision tasks. These involve selection of alternatives based upon established procedures. The degree of uncertainty in this type of decision task is minimized, thereby requiring the individual to be well-versed in established procedures or techniques, with little concern for skillful judgment.

The degree of uncertainty or ambiguity normally associated with decision making is most apparent in the decisions required at the higher end of the command hierarchy. CIC evaluators, TACCO's, and ships' Commanding Officers, for example, must cope with decision tasks involving numerous parameters which are often only partially quantifiable. It is at this level of the decision-making spectrum that such tasks are often referred to as an "art." As the degree of uncertainty increases, the individual responsible for making decisions must be able to draw upon an appropriate degree of experience in the given stimulus situation to efficiently apply subjective probabilities to those parameters affecting outcomes which are only partially known. The classical approach to developing this type of expertise is to give decision makers practice in the stimulus environment either in an operational context or by simulation.

Once it is determined that tactical decision making should be an integral part of a team training program, the question arises of how best to translate this requirement into behavioral objectives. Current approaches to training decision-making behavior include: (1) Generalized training in the behavior of decision making, (2) training in highly specific (platform, tactics) situational problems, and (3) training involving scenarios designed to model operational conditions.

GENERALIZED TRAINING. Kepner and Tregoe (1965) suggest that generalized training in the behavior of decision making is transferable to more specific decision-making situations. They have provided services to several major industries in the form of a one-week training program which focuses on management decisions. This course emphasizes the behaviors or processes one should perform in making decisions. Kanarick (1969) has suggested that this type of training would be amenable to training decision making in a tactical situation. Empirical data are lacking regarding the effectiveness of such training. However, it seems logical that training in the component tasks and behaviors of the decision process would enhance the training of tactical decision making.

Recently, the notion of generalized training objectives has been advanced (Pesch, et al., 1974) as a means for providing training applicable to a wide variety of tactical decision-making situations. These objectives reflect certain generic behaviors which have been found to be associated with proficiency, or quality of performance, in a number of decision-making contexts. Items such as "Probability Generation," "Problem Visualization," "Adaptability," and "Autonomy" are seen as desirable qualities. Consequently, problems are contrived for training in which individual decision makers are given practice which requires the exercise of these behaviors and student performance is evaluated in these terms. These objectives are assumed to be relevant to all Naval platforms (i.e., air, surface, and subsurface) but the manner in which the objectives are fulfilled varies as a function of the particular platform. That is, a tactical decision maker to be assigned to a submarine would be given training specific to submarine capabilities and would use this information (e.g., own ship maneuverability, weapon kill probability and range data, optimum attack angles and distances) in achieving the generalized objective.

SPECIFIC TRAINING. Situation-specific training in tactical decision-making is provided by the Tactical Action Officer (TAO) courses offered at San Diego and Dam Neck. The course provides training relevant to the capabilities of U.S. Naval warfare assets, CIC management, and decision making in a high-threat environment. Classroom lectures are augmented with realistic battle scenarios placing students in pressure-oriented situations. The TACSIT technique is used to simulate tactical situations encountered in the CIC, using either paper and pencil exercises or slides. Two particular areas are stressed--knowledge of weapons systems and tactics, and tactical decision making. At present, there is no known measure of the effectiveness of this training. It is assumed that such concentrated exposure to dilemmas requiring tactical decision making will transfer to the operational setting, with the net result being more efficient decision-making behavior.

MODELING. By far, the most common approach to training in tactical decision making involves the use in synthetic training devices of practice scenarios designed to model operational tactical situations. These trainers are used in lieu of more expensive and logistically cumbersome underway training. The expressed objectives of training in such devices are almost always articulated in terms of crew coordination, tactics, communication or tactical decision making. The underlying assumption is that if individuals are given the opportunity to practice war games under simulated conditions, they will improve their decision-making (as well as other) skills. This seems to be face valid; however, there is a pervasive lack of clearly delineated behavioral objectives to guide resulting scenario development to focus on the behaviors to be trained.

At first glance, it would appear that the development of problem scenarios is a relatively simple and straightforward matter requiring only the establishment of conditions that one might expect to encounter in an operational situation. However, if one is to take the business of training seriously, then scenario exercise development and their employment as training content require more serious consideration than is apparently now given.

For effective training, successive exercises, or scenarios, should be organized in a manner which is most advantageous to the shaping of student behaviors. Generally, this can be accomplished best through the use of a defined, standardized series of exercises graduated along a continuum of difficulty. This can be achieved in a number of ways depending upon the characteristics of the particular device that is used in the training program and the nature of the instructional requirements. Smode (1972) describes a number of considerations relevant to ways of manipulating problem difficulty.

". Easy to hard continuum--This organization is based on the nature of the task and on a continual increase in the events provided in training (and, therefore, on the demands placed on the student). Involved is a logical progression of training content from simple to increasingly more difficult sequences of performance....

". Procedural to fully integrated continuum--This difficulty dimension is reflected in an exercise series wherein initial exercises are concerned with procedural adequacy. From this, more complex training objectives are installed (in which previously accomplished objectives are included in that they represent building blocks for more complex activities). Thus, later exercises emphasize full utilization of the portions of the system trained in earlier exercises.

". Conditions of performance--Task difficulty may also be manipulated by providing increasingly stringent conditions on performance. The classes involved here include: the speeds of event happenings (e.g., faster own-ship and target speeds), environment degradation (e.g., variable winds and speeds, variability in water conditions), and stimulus degradation (e.g., intermittent targets, garbled communications).

". Error tolerances--Task difficulty may be increased, all other things equal, by imposing increasingly stringent error requirements on adequate performance, as a function of stage of training (e.g., precision demanded in manual control responses).

". Stimulus supports--Similar task sets may be varied in difficulty as a function of the amount of stimulus supports built into an exercise (e.g., prompts, cues, knowledge of results, stimulus enhancement).

". In some situations a graduated difficulty continuum is not an issue. The requirement is to provide exposure to a range of events and happenings which occur in the operational counterpart. This recognizes that the ordering of materials is as important as the difficulty progression in learning. Certain job situations involve the acquisition of a set of skills before additional skills can be mastered and these may be no more difficult than the preceding set. This is particularly so in cognitive tasks and in verbal learning. The familiar part-task to whole-task learning progression is meaningful here. Thus, this approach favors situations where subtasks are progressively added to the learning situation so that the amount of information learned increases as a prelude to handling other aspects of the job. The human factors requirement is to specify the range of these events so that they may be simulated in the appropriate instructional contexts (i.e., coverage of all relevant events)."

Such considerations, if applied, would permit greater control over training and a better understanding of what is being learned by the students. For each scenario, it is necessary that standards of adequate performance be established and error tolerances for each exercise stipulated. It is also desirable that some means be available for ready modification of scenarios to permit deviations for individual student (or team) progression.

IMPROVING THE TRAINING PROCESS. Kanarick (1969) has summarized the decision-making literature relative to training and is critical of the apparent lack of integration of research findings with practical approaches to training. Considering the use of operational team trainers, Kanarick poses four questions which have important implications for the training of decision-making behavior:

1. Is feedback provided immediately?

2. Is feedback specific enough to be useful to the trainee?

3. Are trainers designed to minimize the learning of stereotypic or perseveratory behavior?

4. Do training programs attempt to compress experience for the trainees to permit exposure to the types of decision situations they are likely to encounter?

Immediate Knowledge of Performa . Numerous studies have highlighted the importance of providing feedback to the trainee concerning his performance (e.g., Annett, 1961; Kinkade, et al., 1965; Klaus, et al., 1965; Rosenberg and Hall, 1958; Sidorsky and Simoneau, 1970). Feedback can be: (1) Intrinsic (inherent in the operational system) or extrinsic (provided by an external source), (2) immediate (occurring immediately after an observed event) or delayed (occurring sometime later), and (3) direct (given to an individual regarding his performance) or confounded (given to an individual concerning the team's performance, regardless of the individual's performance).

It is generally accepted that immediate feedback favors learning more than delayed feedback. Immediate extrinsic feedback, however, is not always desirable (Klaus, et al., 1965), because trainees may learn to expect this in the operational system where such feedback does not exist. Consequently, such feedback when used to facilitate learning should be gradually reduced to that inherent in the operational environment.

Both intrinsic and extrinsic feedback are desirable in most training situations. Extrinsic feedback, which is usually delayed, tends to complement the inherent intrinsic feedback, which is usually immediate. Most often, direct feedback is preferred over confounded feedback. Because confounded feedback is often independent of an individual's performance it may reward a trainee for his deficiencies and punish him for his good performance. An example of confounded feedback, which occurs far too often on existing training devices, is that of judging the quality of team and individual performance on the basis of whether or not a "hit" was made. That a team achieved, or missed, a "hit" indicates very little concerning the team or individual operator's performance. For effective training, feedback should be instructive regarding what was done.

Specificity of Feedback Information. A wide spectrum of team training situations was observed during the course of this study. These ranged from four-man weapons system trainers (e.g., the 2F92) to multi-team trainers (e.g., the TACDEW and 14A6). At virtually all units, feedback, when administered, was aperiodic, unstructured and subjective in nature. In no case was the subject of feedback formally addressed as a matter of training philosophy or technique. Feedback provided to trainees in most situations consists of post-exercise debriefings where decision errors are discussed.

The practice of immediate feedback appears to vary with individual instructors and with the instructor-student ratio. In the case of fairly small weapons system trainers (e.g., 2F87, 2F92) the instructor-student ratio is commonly as high as 1 to 2. In these cases, instructors can closely monitor individual actions and correct errors "over-the-shoulder." However, in most instances, the practice of "letting students learn by making their own mistakes" is followed. This procedure is wasteful of training time and not optimally conducive to learning. When errors are made during training exercises, the better procedure is to immediately indicate the error to the trainee, determine (with the trainee) the specific nature of the correction required and then continue the training problem. This procedure, of course, would not be followed in a graded exercise. In the more complex trainers (e.g., 14A2, 14A6) the instructor-student ratio is considerably lower. In these training environments, immediate extrinsic feedback is virtually nonexistent except for occasional intercom information from the problem control center regarding gross errors.

The benefit of feedback to the trainee, in terms of specificity, is closely related to the immediacy of the feedback. Where the instructor-student ratio is sufficiently high to provide over-the-shoulder monitoring and feedback, the frequency and specificity of feedback (almost always negative) is maximized. In training environments where feedback occurs principally during post-exercise debriefings, specificity is diluted by time constraints as well as memory. In such cases feedback rarely benefits those other than key decision-making personnel such as the CIC evaluator or TAO.

Stereotypic and Perseveratory Behavior. Sidorsky, et al. (1964), describe five behavioral criteria for measuring performance effectiveness in decision-making situations. These criteria reflect traits of the decision maker which can significantly influence the outcome of tactical situations. They are:

"(1) Stereotypy, i.e., the tendency of a decision maker to respond in a manner that is unnecessarily correlated with some other factor(s) in the tactical situation. The response is thus rendered predictable.

"(2) Perseveration; i.e., the tendency to persist with a particular response or interpretation after the accumulated data make a different response more reasonable.

"(3) Timeliness; i.e., the extent to which the decision maker achieves a proper balance between the amount of time available and the amount of time taken to reach a decision.

"(4) Completeness; i.e., the degree to which a decision maker avails himself of all relevant information.

"(5) Series Consistency; i.e., the extent to which a decision maker responds consistently in a series of sequentially dependent or interrelated actions."

The objective of minimizing stereotypic and perseveratory behavior was not formally articulated at the training facilities visited. Although feedback policies are not formally established by most team training establishments, most instructors appear to attend to errors of perseveration, timeliness, and completeness. In situations involving tactical decisions of a largely judgmental nature, the correctness of the decision is often a secondary consideration. It is implied that if stereotypy and perseveration are minimized, and the decision is timely and consistent, then the probability is increased that the decision will be a correct one. This implication is consistent with the philosophy that there are often several approaches to the solution of a given tactical problem, rather than one best solution.

Time/Experience Compression. Synthetic training devices have many advantages for training that are not inherent in an operational environment. Among these are the ability to compress time both for maximizing training benefit and for developing advanced competencies that normally would be acquired solely on the basis of experience accrued over a number of years.

Tactical team trainers employ training scenarios designed to model real world (potential) tactical situations and these problems are usually run in real time. Speeding up problem development in a trainer would allow more time for trainees to actually work in areas or on problems where training is needed rather than wasting time performing routine tasks while awaiting the unfolding of critical events. Similarly, and interactively, trainer time should be used to short-circuit experience requirements by being used to create a wide variety of challenging and difficult problems, especially those that might rarely be encountered at sea. Thus, trainees could become "experienced" in far less time than required in the normal progression of events. While it may be argued that current practice does, in fact, attempt to compress time and experience, it was not apparent at the sites visited that concerted, systematic procedures were in effect to attempt to achieve these desirable ends.

SECTION V

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

This study was undertaken to compile resource documentation for CNET and Fleet use in future planning and studies regarding team training. The study sought to determine the current status of team training in the Fleet and to identify deficiencies in practice; review the findings of the technical literature relevant to improvement of team training practice; and to make recommendations regarding future conduct of team training.

Although no attempt was made to measure training effectiveness, per se, it was apparent that much of existing team training practice represents a significant departure from contemporary educational technology. It is difficult to determine objectively just what specifically is accomplished by team training, and it is clear that much could be done to improve the team training process. Naval training personnel, for the most part, apparently do not possess a clear understanding of what specific objectives should be accomplished by team training. Training objectives are stated in loose, general ways not optimally conducive to the development of well-ordered training programs. Most of the training programs examined fail to reflect the application of the systematic procedures of current educational technology for training program development. Training is conducted largely through the medium of practice with nonstandard but structured training exercises. However, deliberate, systematic application of KOR for trainee guidance and error correction is noticeably deficient in most cases. Clearly stated, objective criteria and procedures for evaluating team performance are apparently not available.

The research literature contains many useful suggestions for improving the process of training teams. These findings, however, have largely not been applied to team training. This study examines this literature and makes a number of specific suggestions for training improvement.

It would appear that in many instances too much emphasis has been placed by the training establishment on attempting to produce teams rather than attempting to produce highly qualified individual performers. There is much research to suggest that individual proficiency is the key to effective team performance and that the coordination required within a team naturally emerges as a result of high levels of individual proficiency. Thus, greater emphasis should be placed on individual training, both initial and refresher, and some testing routines should be developed to insure individual competency prior to participation in team training exercises. The conclusion is not that team training should be discontinued but rather that more emphasis should be shifted to individual training.

RECOMMENDATIONS

Specific recommendations dealing with particular aspects of team training practice are presented in the body of this report. These deal largely with developing objectives for training to achieve, composing a training environment, and conducting training exercises. Such specific recommendations are not repeated here. Rather, the recommendations which follow are more general, reflecting broader considerations of more direct interest to CNET than to Fleet training schools.

1. The more widespread application of the systems approach to tactical team training should be encouraged. Better identification (than currently exists) of the tasks requiring performance by men within teams is needed. This should include all of the interactions, communications, coordination, decision making, and compensatory activities required in the performance of specific missions. These data, which can be derived by appropriate job study techniques, should include acceptable standards of performance plus relevant contextual factors which influence mission performance. Given these objective data, meaningful training objectives can be developed and appropriate programs of instruction written for their achievement.

Currently, in-house Fleet training establishments lack the necessary resources to accomplish much of the work that would be required. Accordingly, CNET could make resources (especially personnel versed in training system design) available to the Fleet for necessary consulting and also encourage the use of contract sources.

2. A model program should be developed in the area of tactical team training. This program would serve as an example for Fleet training establishments to emulate in developing subsequent programs. The program should consider not only the functioning team selected but also specific positional requirements. It is expected that in most cases, recommendations for improving team training would include recommendations for restructuring individual training as well.

3. Funding requests for the conduct of research studies in the area of team training should be carefully examined. TAEG believes that fiscal emphasis should be on the application of current knowledge to practical training situations in a field environment rather than on the conduct of research within a laboratory environment. Similarly, requests for synthetic team training devices should be carefully examined to determine if alternate, less costly approaches (e.g., low fidelity devices, part-task trainers) might not be sufficient for accomplishing the training that is actually required. TAEG believes that not all situations identified by the Fleet as requiring a team training approach do, in fact, require it.

4. Methodology should be developed for Fleet use during underway training and/or operational exercises for identifying critical performance variables in team tasks. Data collected could subsequently be used for development of criterion tests and/or training objectives. Conceivably, such data could also be generated and collected by exercising experienced teams in standard exercises on selected team training devices.

5. A function to be charged specifically with maintaining cognizance of research and development efforts that affect team operations and/or training should be established. Appropriate "events" would be translated directly into action recommendations and CNET assistance would be provided for implementation of recommendations.

6. A study to identify the variables and situations which determine the legitimacy of a "team" is recommended. This effort would develop a set of "decision rules" for determining when or where a team training approach would be desirable or mandatory versus reliance on individual training alone. The present study provides background material for the initiation of such an effort.

7. Assistance should be provided to the Fleet in the development of performance assessment schemes (see, e.g., page 27 of this report) for determining quality of team performance. This effort, properly conducted, would require considerable developmental work but would result in a potentially high pay off.

8. Consideration should be given to the development of a "module" of instruction for inclusion within appropriate instructor training courses (or for field use) that would be aimed at teaching instructors to use rating and ranking techniques for performance assessment. These techniques would be extremely valuable in situations such as team training where more objective, quantifiable performance criteria are not readily available.

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APPENDIX A

ACTIVITIES VISITED

4 - 7 Feb 1974	Patrol Squadron 30-VP 30 Patuxent River, MD
	Fleet Aviation Specialized Operational Training Group Atlantic Fleet, Detachment Pax River Patuxent River, MD
19 - 22 Feb 1974	Patrol Squadron 31-VP 31 Moffett Field, CA
	Fleet Aviation Specialized Operational Training Group Pacific Fleet, Detachment Moffett Moffett Field, CA
25 - 29 Mar 1974	S-3A Fleet Introduction Team (FIT) San Diego, CA
	Training Command U.S. Pacific Fleet San Diego, CA
	PQS Development Group San Diego, CA
	Fleet Combat Direction Systems Training Center, Pacific San Diego, CA
	Fleet Combat Systems Training Unit, Pacific San Diego, CA
	Navy Personnel Research and Development Center San Diego, CA
13 - 15 May 1974	Naval Submarine School Groton, CT
9 - 14 Jun 1974	Naval Postgraduate School Monterey, CA
	Fleet Anti-Submarine Warfare Training Center, Pacific San Diego, CA
	Navy Personnel Research and Development Center San Diego, CA

9 - 13 Sep 1974	ASW Tactical School, Atlantic Norfolk, VA
	Fleet Combat Direction Systems Training Center, Atlantic Virginia Beach, VA

APPENDIX B

DESCRIPTIONS OF TRAINING PRACTICES AT SELECTED NAVY TEAM TRAINING ESTABLISHMENTS

This appendix presents a summary of the training programs in operation at units visited during the study. Discussions with training personnel emphasized their approach to team training, the conduct of training, performance measurement, and quality control practices (i.e., feedback mechanisms). A broad range of weapons system training complexity was sampled. This included training of relatively small teams (e.g., aircrews) as well as multiunit, highly complex interactive teams.

The most common setting for the conduct of tactical team training involves the use of complex simulators. These devices represent varying degrees of simulation fidelity with respect to operational hardware, depending upon the goals of the training efforts. Where objectives of training focus on the development of equipment-specific procedures, as well as team interactive skills and tactical employment of a platform (e.g., operating equipments and fighting the vehicle), high fidelity simulators have been developed. In multiship training environments, trainers are not designed to provide basic training in vehicles or equipment operation. Rather, equipments and vehicles are simulated from a functional point of view emphasizing coordination, control, and decision-making activities.

In accordance with a stated objective of this study; i. e., to provide resource documentation related to team training, a description of the training practices for major team training devices is provided.

TRAINER: Device 2F87, Weapons Systems Trainer (WST).

TRAINING UNIT: VP-30, VP-31.

PURPOSE: The mission of VP-30 and VP-31 is to indoctrinate and train pilots, NFO's, aircrewmen, and maintenance personnel in all aspects of P-3A/B and P-3C operations.

TRAINER DESCRIPTION: Device 2F87 duplicates the interior arrangement and appearance of the P-3C aircraft. Five trainee stations simulate corresponding stations in the aircraft: TACCO, NAV/COM, SO's 1 & 2, SO 3.

The device control facilities in the P-3C WST (Tactics) include an aircraft control console, a tactics instructor's console, and an operational console with a tactical situation display plotter.

The simulation computer complex consists of three Honeywell DDP-516 computers and peripheral devices to: perform all computations necessary to determine relative positions of the simulated aircraft, sonobuoys, and targets; simulate the ASW tactics systems; and produce realistic environmental conditions and target signals.

POSITION DESCRIPTIONS: Crew positions in the P-3C consist of Pilot, Copilot, Flight Engineer, Tactical Coordinator (TACCO), Navigator/Communications Officer (NAVCOM), Sensor Station 1 & 2 Operators (SO 1 & 2), Sensor Station 3 Operator (SO 3), Ordnanceman, Flight Technician, and Observers.

TRAINING OFFERED: Replacement Pilots, NFO's, and enlisted personnel attend two training facilities related to P-3 aircraft operations: Fleet Aviation Specialized Operational Training Group (FASOTRAGRU) and Replacement Patrol Squadron (RVP) training. There are currently two FASO training schools--FASOTRAGRULANT, NAS Patuxent River and FASOTRAGRUPAC, NAS Moffett. There are two RVP squadrons, VP-30 and VP-31, each co-located with a FASO training facility. The OFT and WST simulators are shared by both training schools.

The FASO provides basic familiarization and part-task training for first and second tour pilots and NFO's, as well as a basic course for enlisted personnel. The pilot curriculum lasts approximately 6½ weeks and includes basic weapons systems familiarization, crew interrelationships, oceanography, ASW tactics, EW concepts, sensor operation, and positional training in cockpit trainers and OFT's. The curriculum is somewhat modified for second tour pilots because of their prior training.

FASO training for NFO's lasts approximately 9½ weeks and includes basic weapons systems familiarization, oceanography, underwater acoustics, ASW tactics, sensor operation, EW concepts, airborne communications procedures, and positional training. Positional training during this phase is conducted on an individual basis with no crew interaction.

RVP training for pilots consists of ground school, instrument training, and tactics. The curriculum lasts approximately 19½ weeks. In addition to training in the OFT and WST simulators, nine aircraft flights are scheduled. By the ninth flight, the pilot must be thoroughly familiar with NATOPS procedures and pass a COMNAVAIR instrument check.

The RVP curriculum for first and second tour NFO's lasts approximately 17 weeks and includes training in aircraft and weapons systems, navigation, data processing systems, emergency procedures, and tactics. As first tour NFO's are assigned as NAVCOM's for 1-2 years, training for this group consists of approximately 75 percent NAVCOM and 25 percent TACCO training. Second tour NFO's normally function as TACCO's in their operational units and receive approximately 75 percent TACCO and 25 percent NAVCOM training. Crew training is provided in the WST trainers and in the air during two navigation and six ASW training flights.

CONDUCT OF TRAINING:

The expressed purpose of RVP training is to teach crew coordination. Students are organized into crews according to the positions for which they are being trained. In the WST, the trainees "fly" simulated ASW missions. These missions are graduated in difficulty from very simple scenarios early in training to more complex exercises toward course completion.

PERFORMANCE MEASUREMENT: Student performance is evaluated throughout FASO and RVP training, either on a weekly basis or upon completion of a particular block of instruction. Trainees are evaluated by instructor personnel on a variety of dimensions. Performance on each variable is rated as Above Average, Average, Below Average, or Unsatisfactory.

FEEDBACK: Feedback to trainees regarding their performance is normally in the form of technique guidance and error correction. During the early phases of training, students are given immediate and frequent knowledge of results in an effort to guide appropriate actions and responses. In the more advanced stages of training, it is the policy to allow trainees to "learn by their mistakes." There is no formal practice of providing positive reinforcement for desired responses; however, individual instructor technique may allow for some positive feedback.

The content of training scenarios as well as general course content is updated through various feedback loops. Recommendations are solicited through questionnaires completed by trainees at the completion of training and at some period of time after they have reported to their operational units. Training personnel periodically visit operational units to discuss recommended changes and to compare operational needs with training objectives. NATOPS standardization/evaluation teams provide feedback, primarily to the FASO, regarding performance.

FAIRWINGSPAC has established a Tactical Training Team (TTT) which travels to Fleet operational units to augment team training efforts and identify weaknesses. The TTT provides feedback to VP-31 and the FASO in the form of recommended changes to the training curriculum and for scenario updating.

TRAINER: Device 2F92, S-3A Weapons System Trainer (WST).

TRAINING UNIT: S-3A Fleet Introduction Team (FIT), North Island, San Diego, California.

PURPOSE: The FIT is responsible for the initial development of training programs and material for the S-3A aircraft. Positional training will be conducted by the Fleet Aviation Specialized Operational Training Group (FASOTRAGRU), and crew training will be conducted by the Replacement Patrol Squadron, VS-41.

TRAINER DESCRIPTION: The 2F92 consists of an Operational Flight Trainer (OFT) and the WST. The OFT contains the pilot and copilot positions mounted on a six-degree of freedom, motion platform. The WST is a separate static simulator containing Tactical Coordinator (TACCO), Sensor Operator (SENSO), and pseudo copilot positions. The 2F92 has four modes of operation:

(1) Integrated Mode - All crew stations (pilot, copilot, SENSO, and TACCO) are manned and operational, functioning in their normal manner in a single coordinated mission.

(2) Flight Mode - Pilot and copilot stations are manned and operational. The flight operator has displays and controls to set up the aircraft configuration. The flight instructor can monitor and introduce various conditions or malfunctions.

(3) Tactics Mode - The TACCO and SENSO stations are manned and operational with the addition of an alternate or pseudo copilot station, located in the tactics module. The tactics device operator can input data normally provided by the pilot.

(4) Simultaneous Independent Mode - The simulator can be operated independently and simultaneously in the flight and tactics modes. Although the on-board computer is shared by both functions, it can be programmed to simulate portions of both without restricting training effectiveness.

POSITION DESCRIPTIONS: The four positions of the S-3A are simulated in the OFT and WST:

OFT--Pilot, Copilot

WST--TACCO, SENSO.

In addition, the WST contains a pseudo copilot position to accomplish Weapons Systems Training (Mode 3) independently of the OFT. This is provided to include the critical role of the copilot position in accomplishing the ASW mission.

TRAINING OFFERED. The team training program, at the time of TAEG's visit to the FIT, was in the early stages of development, so specific details cannot be reported at this time. In general, RAG training will last approximately 90 days for pilots, 75 days for SENSO's, and 70 days for TACCO's. This training will consist of a combination of classroom presentations, CAI, integrated crew training in the WST (8 "flights"), and four live ASW missions in the aircraft itself. Scenarios for the WST are being developed in-house. Courseware, Inc., is providing consultation assistance for the development of the CAI portion of training. The in-flight training program is being developed by the Lockheed Aircraft Corporation. In addition, NPRDC has provided technical specialists to assist in developing a Systems Approach to Training (SAT).

CONDUCT OF TRAINING: N/A

PERFORMANCE MEASUREMENT: Training flights, either WST or aircraft, are prebriefed and debriefed similarly to operational ASW missions. Actions taken during the ASW evolution are recorded and replayed for debriefing and evaluation. Critical parameters for each posision have been identified and are scored during training exercises.

FEEDBACK: Trainee performance is monitored from the instructor consoles during WST training. Close monitoring and guidance are provided early in training with less provided as the trainee progresses. During live flights, a training instructor will occupy one of the operational positions in the aircraft to provide guidance to the remainder of the crew. The physical constraints of the aircraft prohibit a designated instructor station on-board. The overall mission is critiqued during the postflight debriefing. It is too early in the development of the training program to receive significant feedback from operational units. Trainees, however, are asked to comment (via questionnaire) on various portions of the training at its conclusion.

TRAINER: Device 14A2, Surface Ship ASW Early Attack Weapons Systems Team Trainer.

TRAINING UNIT: Fleet ASW Training Center, Pacific.

PURPOSE: Device 14A2 is used to train surface ship crews in the proper utilization of operational ASW systems. Training emphasizes the procedural, tactical decision making, and crew coordination activities in operating and employing ASW weapons systems. The device provides for indoctrination of personnel in ASW procedures and evaluation of tactical situations. The trainer is also used in developing and planning advanced Naval undersea defense tactics.

TRAINER DESCRIPTION: Device 14A2 duplicates the physical configuration of major operational compartments and equipments of surface ship ASW attack weapons, and simulates their functional operation and responses such as target detection, fire control solution, and weapon launching and tracking.

The trainer occupies over 3000 square feet of floor space, divided into six operating areas: Underwater Battery Plot, Combat Information Center, Launcher Captain's Control Station, Conning Station, the unattended Computer and Projection Equipment Room, and the Problem Critique and Display Room.

1. Underwater Battery Plot (UBP) - This station contains mockups of sonar, fire control equipment, and associated communications equipment. Training in sonar target acquisition is provided by a simulated Sonar Set. Training in the conduct of ASW attacks is provided by simulated attack consoles.

2. Combat Information Center (CIC) - The CIC is the area for collection, evaluation, dissemination, and display of the own ship tactical situation. Trainees at this station gather information to maintain plots of targets, own ship, and other vehicles in the problem. Range and bearing information of submarine targets is reported from Sonar in UBP. Surface vehicle information is furnished by simulated radar, also originating

in UBP. Equipment in the CIC consists of plotting and status boards, a MK6 Dead Reckoning Tracer (DRT), two radar PPI's, an NC-2 Plotter, two boards containing communications, course, speed, and wind indicators, an AN/WSA-1 Control Indicator, and the ASW Alarm.

3. Launcher Captain's Control Station (LCCS) - The LCCS provides training in operating the Launcher Captain's Control Panel. This unit supplies information concerning the ASROC missile and launcher status to the trainee Launcher Captain. Controls on the panel permit the Launcher Captain to position the simulated launcher, select a launcher cell, select a missile or torpedo, and complete auxiliary firing.

4. Conning Station (CS) - The trainee Officer of the Deck (OOD) directs own ship movements in the CS. The OOD maintains communications with other units by radiotelephone, with internal stations by sound powered circuits, and monitors information displays. Target position and weapon status are displayed on a Position Indicator. Before a simulated weapon can be fired by trainees in UBP, the OOD must approve by operating the proper controls on the Position Indicator. Using the helm control unit in the CS, the trainee helmsman maneuvers the ASROC ship by manipulating controls to set in speed, course, and rudder angle orders.

5. Support Units - Two support units, either destroyers or cruisers, may be controlled from the Instructor's Console to provide training in coordination of ASW tactical maneuvers.

   Three support aircraft, either fixed-wing or helicopters, may also be controlled from the Instructor's Console to provide training in coordinated air-sea ASW tactics.

   Two target submarines may be operated from the Instructor's Console to provide realistic target characteristics for own ship trainees.

6. Computer and Projection Equipment Room - Vital functions of Device 14A2 are controlled by the SDS-930 digital computer. These functions include position and motion data generation for problem vehicles, simulation of various weapons characteristics, and system function tasks such as track projector time-sharing or display selection.

7. Problem Critique and Display Room - A problem display system, consisting of an automatic plotting projection system and an 8'x8' screen, is provided to enable the instructor to keep track of problem progress. Two automatic plotting type projectors receive multiplexed inputs and project a distinctive image and track for each vehicle in the problem. A reference projector provides reference grids and other fixed data to the display.

8. Instructor's Console - The Instructor's Console, located in the Problem Critique and Display Room, is usually manned by three or more instructors. To set up a training situation, the instructor selects the appropriate ocean problem area scale, wind direction and velocity, and course and speed of the target submarines, support units, and aircraft. Devices showing radar and sonar data, support and target vehicle position information, and weapon operation are part of the instructor's equipment. Team performance is monitored by the instructor who may freeze the problem at any point for critique. Target hit assessment is also provided by the instructor at the console.

POSITION DESCRIPTIONS: Training is provided for a variety of positions within the spaces described above. They include:

CIC	UB Plot
Evaluator	ASW Officer
CIC Officer	Geographic Plotter
Plotters (2)	Firing Panel Operator
ECM Operator	Sonar Supervisor
ASAC	Sonar Operator
Status Board Operator	Standby Sonar Operator
Surface Radarman	
Radar Supervisor	

Bridge	LCCS
Commanding Officer Officer of the Deck (OOD) Junior OOD Surface Radarman RT Talker Helmsman	Console Operator

TRAINING OFFERED:

Team training is conducted under the ASW Training and Readiness Improvement (TIP) Program. This is a four-phase program for CRUDESPAC units covering the range of coordinated ASW activities from very basic to complex multiship exercises. The first three phases of training are conducted at the FLTASWSCOL, and the fourth is an at-sea exercise.

Phase	Type	Trainer	Length	Ships
I	Basic	14A2	2.5 days	1
II	Command and Control	14A6	2 days	2-4
III	Coordinated Operations	14A6	2 days	4-10
IV	Multiship	At Sea	2 days	

Upon completion of all four phases, COMCRUDESPAC certifies that the ship is a qualified ASW escort.

CONDUCT OF TRAINING:

Phase I

1st Half-day

One 15-20 minute problem.
45 minute lecture period to include team organization, basic plotting, contact reporting, multiple ship procedures.
Approximately two hours of single ship trainer problems.

2nd Half-day

20 minute lecture period to include TDA, datum plotting and reporting, aircraft employment.
Approximately 2½ hours of trainer problems, working up to two aircraft.

3rd Half-day

30 minute problem, single ship and two aircraft.
50 minute lecture to include SAU approach, SOA CDR, attack and support methods, lost contact procedures, LLA, C of C, classification.
1½ hours of trainer problems, dual ships.

4th Half-day

3 hours of dual ship including two aircraft.

5th Half-day

Two exercises--one practice and one graded.

Phases II-IV

These phases are of increasing complexity. Details are classified CONFIDENTIAL and may be found in CRUDESPACINST C3590.15B.

PERFORMANCE MEASUREMENT: During training exercises, the performance of participants is evaluated using checklists. These are lists of critical actions which must be performed by various functional areas, such as plotting, asset management, tactical decisions, communications.

Overall problem evolution may be monitored from the problem control room and individual performance at the mockups. Many of the criteria for performance (e.g., plotting, internal communication) must be monitored in the mockups.

FEEDBACK: Feedback to trainees regarding their performance is minimal during exercises Key personnel are given guidance when errors in; e.g., procedures or tactics are observed. Otherwise, most feedback occurs during postexercise debriefings.

TRAINER: Device 14A6, ASW Coordinated Tactics Trainer.

TRAINING UNIT: Fleet ASW Training Center, Atlantic; Fleet ASW Training Center, Pacific.

PURPOSE: The purpose of these training centers is:

- To provide formal training to individuals and anti-submarine units in all phases of coordinated and intertype ASW tactics and techniques in the multithreat environment;
- To assist in the evaluation of current coordinated ASW tactics and the development of new tactics;
- To train personnel in the operation and tactical employment of surface, subsurface, and shore-based ASW sensors, underwater battery fire control systems, ASW weapons, and allied equipment;
- To provide, as practicable, operational training in the various aspects of shipboard operations and functions which cannot profitably and adequately be conducted onboard ship.

TRAINER DESCRIPTION: Device 14A6 is designed to train decision-making personnel in the tasks they must perform when engaged in coordinated ASW tactics. Simultaneous operation of 48 vehicles of various types and a multiplicity of sensors can be simulated. Communications facilities simulate the various radio channels employed operationally to coordinate all phases of an ASW mission from search through attack. Device 14A6 provides a synthetic environment within which ASW personnel can practice collecting and evaluating ASW information, making decisions, and implementing the decisions based on this information. The device is not intended to train equipment operators; therefore, simulated equipment does not resemble Fleet equipment. Functional characteristics of the simulated equipment are similar to Fleet equipment.

The device has the capability for simulating the simultaneous and independent movement of the following vehicles:

1. 18 destroyers (DD) or submarines (SS)

2. 16 aircraft, either fixed wing (FW) or helicopter (HS)

3. 1 aircraft carrier (CVS)

4. 9 drone anti-submarine helicopters (DASH) or weapons

5. 4 instructor-controlled target submarines (SST).

One flag plot is simulated and may be associated with either the CVS or DDA. Sixty-four sonobuoys are simulated and may be carried by both FW and DD's. Sonobuoy type/techniques simulated are: echo ranging, CODAR N-S, CODAR E-W, JULIE, LOFAR, nondirectional passive, directional passive, and directional active. The device simulates the following sensors:

1. Active Sonar (AS)

2. Direct Vision

3. Electronic Countermeasures (ECM)

4. Infrared (IR)

5. Magnetic Anomaly Detection (MAD)

6. Passive Detecting Sonar (PDS)

7. Passive Ranging Sonar (PRS)

8. Radar

9. Sonar Intercept

10. Trail.

The areas of primary concern to the trainees are:

1. DD/SS Command Centers

2. CVS Command Center

3. Flag Plot Command Center

4. Aircraft Command Centers.

The critique area seats approximately 300 and serves several purposes in the training situation. Prior to problem start, the trainees may be assembled and pre-briefed on the problem set-up and conditions to be encountered. While a problem is being conducted, an audience may view the progress on projection screens. This information is also visible to the instructors at their stations in the balcony. When a problem is completed, the trainees may again be assembled in the critique area for problem evaluation and debriefing.

POSITION DESCRIPTIONS: Multiposition training is offered. Personnel from DD, SS, CVS, A/C, etc., units; e.g., commanding officers, CIC evaluators, approach officers, pilots, TACCO's, etc., as well as equipment operators, plotters, talkers, etc., may participate.

TRAINING OFFERED (TRACENLANT): ASW in the Total Threat Environment: 1 week, 5/year. The purpose of the course is to train senior officers from all types of ASW units for prosecution of all phases of coordinated ASW tactics. Attendance is generally limited to Lieutenant Commander and above with extensive ASW experience serving in, or prospective for, ASW billets. Heavey emphasis is on class discussion at the OTC level.

ASW Operations: 2 weeks, 4/year. The purpose of this course is to train all officers of ASW surface ships, submarines, air squadrons, and ASW staffs in the planning and execution of all phases of coordinated ASW tactics. Attendance is generally limited to officers in, or prospective for, ASW billets who are familiar with their respective ASW type tactics, but do not have the seniority and experience for the senior course above. The emphasis is on practical drills on the tactical floor and the 14A6 trainer to illustrate coordinated intertype tactics.

Introduction to Coordinated ASW: 1 week, 4/year. The purpose of this course is to train junior officers and senior enlisted (E6 and above) with little or no coordinated ASW experience so they may become effective members of an ASW team. This course supersedes the CV Indoctrination Course and is still appropriate for training CV personnel with increased emphasis on CV operation. Reserve officers and civilian government employees may attend.

ASW Environmental Course: 2 days, 4/year. The purpose of this course is to train officers to understand the effect of environmental conditions on ASW sensors and in the use of environmental prediction techniques. Emphasis is on the North Atlantic and Mediterranean areas.

CONDUCT OF TRAINING (TRACENLANT):

Presail - A presail exercise normally consists of three days of preparation for an immediate exercise at sea. Unit commanders and senior decision makers from each of the exercise participants attend the presail. The OTC's staff conducts a briefing of the exercise requirements, objectives, and unique features during the first day. The remainder of the presail period is spent in the 14A6 exercising the participants in the actual Operation Order in the expected scenario. Procedural difficulties are corrected and each command gains a better appreciation of their role in the exercise and the capabilities and limitations of the other players.

Coordinated ASW - Basic and advanced training is conducted for groups of varying composition, backgrounds, and numbers. These sessions of one to three days each stress the effect of combining different types of ASW vehicles in basic tactics and/or advanced procedures. This training gives evaluators and future OTC's the opportunity to experiment to see what will work and what will not. The trainer staff provides critique and guidance while acting as a sounding board for new ideas.

Type Tactics - The trainer provides an inexpensive testing ground for units to train in individual tactics and to experiment with new ideas. Individual OOD's, evaluators, OS's, PPC's, TACCO's, and others may practice individual unit tactics. The junior officers and their enlisted crew members may practice tactical maneuvering and signal drills. Communications procedures may be refined. New capabilities may be exercised; e.g., LAMPS familiarization. New tactics may be developed and evaluated. These exercises may be conducted in real time, or at ½, 1, 2, or 4 times real time. Virtually any exercise at sea which requires communication, coordination, maneuvering, and decision making may gain something from practice in the 14A6 trainer prior to going to sea.

TRAINING OFFERED (TRACENPAC): The surface ASW training program involves the use of two trainers--14A2 and 14A6. The ASW training center currently uses a program of phased ASW training which was developed in conjunction with COMCRUDESPAC. This program has been incorporated into the COMCRUDESPAC Battle Readiness Competition Manual. Three of four phases are conducted at the FLTASWTRACEN, while Phase IV is conducted at sea.

Phase	Type	Trainer	Length	Ships
I	Basic	14A2	2.5 days	1
II	Command and Control	14A6	2 days	2-4
III	Coordinated Operations	14A6	2 days	4-10
IV	Multiship	At Sea	2 days	

Upon completion of all four phases, COMCRUDESPAC certifies the ship as a qualified ASW escort.

CONDUCT OF TRAINING (TRACENPAC): The details of Phases II-IV are classified CONFIDENTIAL and can be found in CRUDESPACINST C3590.15B.

PERFORMANCE MEASUREMENT: Normally, the Training Officers (TO's) remain in the problem control area where they can monitor the entire ASW evolution and maneuver targets by console actions. The TO's monitor that portion of the coordinated exercises which correspond to their own operational speciality; e.g., air ASW officers monitor primarily air ASW, surface ASW officers monitor surface tactics. TO's will, as time permits, occasionally enter various command centers to observe specific operations more closely.

Neither crew nor individual performance is "measured," per se, during team training exercises. Ship's crews are rated either SATISFACTORY or UNSATISFACTORY based upon whether or not, in the judgment of the TO's, they showed improvement during the course of training.

FEEDBACK: Feedback to trainees from the TO's is normally by voice intercom from the problem control area to the command centers. Occasionally, trainers will enter the mockup areas to provide more specific feedback information. It is the general policy to passively accept correct responses, while critique or suggestive comments are provided when significant errors are detected. The OIC (TAO, evaluator, etc.) of the command center is given such feedback as a matter of policy. When impractical to do this, feedback may be given to individuals directly.

Most evaluative comments or critique are provided in the postmission debriefing session. Here, the major decisions (e.g., weapons deployment, tactics selection) are discussed with the participants to determine their efficacy and rationale. In such exercises, there is often no one-best tactical decision, so discussion of alternatives contributes to the learning process.

Feedback to the school regarding; e.g., the content of training and realism of scenarios, consists of solicited comments by the OIC's of those crews reporting for training.

TAEG Report No. 18

TRAINER: Device 21A37/4, Submarine FBM Training Facility.

TRAINING UNIT: Naval Submarine School, Groton, Connecticut.

PURPOSE: Device 21A37/4 provides training in offensive and defensive tactics for nuclear attack center crews. Surface or subsurface maneuvers may be accomplished, and training may be given independently or in coordination with other units. Instruction of senior command and staff officers in direction and coordination of submarine task groups with surface support units may also be given.

TRAINER DESCRIPTION: The trainer is housed in a three-story building. It consists of three simulated submarine attack centers, a complex computer system, and a tactical display room. The attack centers combine operational and simulated equipment. Mockups of attack centers represent several classes of nuclear submarines. Major equipment consists of a fire control system, navigation and plotting equipment, target detection equipment (sonar, radar, and periscope), and communications systems.

A central digital computer provides problem generation, position, and motion data generation. Up to 41 different vehicles can be included in training problems. A projection system in the attack centers permits both in-progress monitoring and postfire analysis of training problems. Attack centers can be operated independently or operation can be coordinated to provide SSN versus SSN training. Fifteen different classifications of targets are currently available, 12 at any one time.

POSITION DESCRIPTIONS: The following positions and functions may be trained in the attack centers:

Sonar Operators	Fire Control Coordinator
Sonar Supervisor	Approach Officer
Plot Coordinator	Attack Control Console Operator
Attack Director	Attack Director Operator
Analyzer Operator	

TRAINING OFFERED: Enlisted Basic Training

The mission of the Enlisted Basic Training Department is to prepare enlisted personnel for initial assignment to an operational submarine. Instruction is given in standard submarine organization and regulations, interview communications, and submarine safety. General descriptions of submarine systems and principles of operation are also given. The length of the course is six weeks (four weeks for nuclear propulsion trained men).

Enlisted Advanced Training

The Advanced Training Department offers instruction in equipment operation and maintenance for weapons systems, fire control equipment, sonar/electronic/communication equipment, diesel engines, etc.

Officer Training

The Officer Training Department provides instruction in; e.g., surfaced and submerged control of submarines, tactics, navigation, and administration.

The Submarine Officers Basic Course is six months long. Over 650 instructional hours in basic navigation, tactics, engineering systems, casualty control, and weapons systems are given.

The Submarine Officers Indoctrination Course is an abbreviated course given to prepare officers to serve as a junior division officer on a nuclear submarine.

The Submarine Officers Advanced Course convenes quarterly. The course is six months long and is designed to prepare qualified submarine officers for department head responsibilities.

Numerous individual advanced training courses ranging from one to two weeks in length are also given. These are offered specifically to submarine officers from SUBLANT. They include advanced and refresher training in tactics, submerged conning and navigation, and sensor and weapons system intelligence.

CONDUCT OF TRAINING: Detailed descriptions of training practice may be found in the "Training Guide for Submarine Weapons Delivery," published by the NAVSUBSCOL (classified CONFIDENTIAL).

PERFORMANCE MEASUREMENT: Individual performance is evaluated by instructor personnel during training exercises. Scoring sheets have been devised for positions, and trainers rate the "critical" actions performed at each position on a five-point scale: AA, A, S, BA, U. Each position is assigned a maximum possible weighted score based on the perceived importance of each position. The "Individual Effectiveness Factor" is a sum total of the weighted individual scores. In addition, team performance is scored by using weighted checksheets. Checklist items cover such factors as communications, coordination, tactics, stealth/concealment, sensor use, torpedo evasion, and collision avoidance.

FEEDBACK: During exercises, feedback to trainees consists of general technique guidance and error correction. At the conclusion of an exercise, the team is debriefed and, if appropriate, scoring is discussed.

The school itself obtains feedback regarding training requirements from operational readiness test results and from individual commanders.

TRAINER: Anti-Shipping Missile Defense (ASMD) Reaction Trainer, Combat Systems Trainer (CST).

TRAINING UNIT: Fleet Combat Systems Training Unit, Pacific. Team Training was discussed at this unit upon the recommendation of COMTRAPAC.

PURPOSE: The mission of this training facility is to provide combat systems training and Anti-Ship Missile Defense (ASMD) reaction training for units of the Pacific Fleet. Mobile pierside trainers are used.

TRAINER DESCRIPTION: The ASMD Reaction Trainer consists of van-mounted equipment (e.g., AN/SPH-1, Radar Video Recorder (RAVIR); 15E27, EW Recorder) which is used to present coordinated scenarios. Data are electronically displayed on ships' radar repeaters and EW analyzer scopes. Tracking, detection, threat signal recognition, evaluation, and reaction procedures for ASMD may be practiced.

The CST is a self-contained trainer housed in a semi-trailer. It is compatible with DLG26 and DLG16 class ships. The CST provides progressive training to all radar operators including fire control radar operators. Single or multiple targets, slow or fast moving, in a clear or ECM environment, may be flown depending on the experience of the radar operators and the level of training desired. Training is accomplished with radar transmitters not energized, thereby eliminating interference with other shipboard functions and in-part transmitter restrictions.

POSITION DESCRIPTIONS: Positions manned during team training are a function of the class of ship requiring training. Training is conducted under Condition III watch manning.

TRAINING OFFERED: ASMD Reaction Training - This 5-day course provides CIC and Weapons Control personnel in AAW ships, training in detection, threat signal recognition, evaluation, and reaction procedures for ASMD. Through use of mobile vans containing the AN/SPH-1 Radar Video Recorder (RAVIR) and 15E27 simulator, simulations of anti-ship type missiles are presented to develop procedures for and decrease reaction time in countering these threats. The ship is berthed dockside and no movement is required during the training period.

Combat Systems Training - This course lasts 10 days and provides intermediate and advanced CST for CIC, Weapons Control, EW and Fire Control Condition III watch personnel in TERRIER/TARTAR equipped ships. Training is provided in target detection, threat signal recognition, evaluation, missile systems designation, lock-on, tracking, missile engageability evaluation, and EW defensive actions for surface and air threats.

CONDUCT OF TRAINING: The devices described are used to stimulate the sensors/fire control systems of ships in dock. Problem generation and control are accomplished from the stimulator vans. Instructor personnel provide over-the-shoulder monitoring and evaluation on board the ship.

Scenarios are graduated in difficulty and cannot be altered during training exercises. The ASMD scenarios last approximately 25 minutes and may contain landmass and shipboard-originating missiles and attacking aircraft. EW tapes are also used to match radar video inputs for ECM/ECCM training. CST scenarios last three to four hours and contain attacking surface craft, aircraft, missiles, and ECM.

PERFORMANCE MEASUREMENT: During training, instructor personnel rate performance at two points. Operator performance is rated at the onset of training to determine an appropriate starting point for mission scenarios. Exercises are not formally scored again until the final "test scenario." Individual proficiency is rated using weighted checklists, based on an analysis of position functions. Team performance is scored according to the number of targets detected, engaged, kills, etc., as a percentage of the maximum possible score. In using the T1, these team performance criteria are scored and stored by the computer. They then serve as a means for comparing performance of similar ships.

FEEDBACK

Feedback to trainees during exercises consists of over-the-shoulder performance monitoring and guidance. There is no formally stated policy of feedback. Trainees are normally debriefed on performance at the conclusion of training exercises. The exercises which are scored provide feedback information for both individual and team performance. A given ship's performance during training is reported to the appropriate operational command via letter.

In an effort to maintain currency and relevancy of training porgrams, the training unit maintains liaison with type commanders, combat systems, and shipboard missile weapons support activities, electronic warfare activities, service schools, and other training activities in matters relating to combat systems and shipboard missile weapons systems.

TRAINER: Tactical Advanced Combat Direction and Electronic Warfare System (TACDEW).

TRAINING UNIT: FLTCOMBATDIRSYSTRACENPAC, San Diego, California; FLTCOMBATDIRSYSTRACENLANT, Dam Neck, Virginia.

PURPOSE: The FLTCOMBATDIRSYSTRACENPAC and FLTCOMBATDIRSYSTRACENLANT conduct team training in basic CIC and advanced anti-air warfare employing the TACDEW training complex.

TRAINER DESCRIPTION: Training is conducted in CIC mockups typical of the ships on which trainees serve. Team and multiteam training are accomplished. The training complex includes the following:

1. Air Intercept Control (AIC) training mockups
2. Airborne Tactical Data System (ATDS) mockup
3. Carrier Air Traffic Control Center (CATCC) mockup
4. Command and Decision (CAD) mockup
5. CA, DD, DDG, DLG, and DE CIC mockups
6. CVA and DLG CIC mockups (NTDS)
7. Electronic Warfare (EW) mockup
8. Problem Control and Evaluation (PC&E) center
9. Computer and Supporting (C&S) equipment spaces
10. Radar and other supporting equipment spaces.

POSITION DESCRIPTIONS: The mockups are designed to accommodate those tactical team members normally occupying positions within the listed CIC's, AIC, etc.

TRAINING OFFERED (TRACENPAC): TACDEW training capabilities include the following areas of Naval warfare:

1. AAW training, including CAP, SAM, and AAM for TDS and non-TDS units

2. ASW training including sonar information and ASW weapons simulation

3. Amphibious training for individual ships and task forces

4. Surface tracking and tactics training

5. TDS operator and team training

6. Electronic emission generation for ECM/ECCM training

7. Missile systems simulation for WDE/WDS team training

8. Realistic aircraft and radar simulation as well as facilities for live radar and air intercept controller training

9. Shipboard CATTC environment for CCA team training (SPN35/SPN42)

10. ATDS facilities for E2A/E2B team training

11. Strike operations environment for SAR and PIRAZ team training

12. Land mass simulation for radar-assisted piloting team training

13. Shore bombardment team training.

CONDUCT OF TRAINING (TRACENPAC): Components within the TACDEW facility can be used for basic operator training, sub-team, team, and multi-team exercises. Normally, refresher or proficiency training is provided for ship's crews while in port. A data link capability expands TACDEW training to NTDS ships within range. Simple exercises for console operator familiarization or multiship exercises can be transmitted to ships in port or at sea. These ships can be combined with TACDEW mockups to form a single integrated training task force.

FLTCOMBATDIRSYSTRACENPAC has designed an integrated combat systems training program which includes participation of two additional training establishments, FLEASWTRACENPAC and FLTCOMBATSYSTRAUPAC. The emphasis of this program is on standardized evaluation and reporting procedures. Five phases of instruction are involved:

Phase	Type	Trainer	Length	Ships
I	Basic CIC	TACDEW	2½-3 days	1-6
II	Advanced CIC	TACDEW	2-2½ days	1-6
III	Basic Combat Systems	TACDEW, RAVIR, 15E27, ENSYN, Supporting Arms	3 weeks	1-6
IV	Advanced Combat Systems	TACDEW, T-1, RAVIR, ENSYN	3 weeks	1-6
V	Flagship Command and Control	TACDEW	Conducted with Phase IV	1

Plans are that this training will be provided by a combination of the FLTCOMBATSYSTRAUPAC, the Technical Guidance Unit, and COMPHIBPAC, as well as FLTCOMBATDIRSYSTRACENPAC. Portions of each phase do not apply to all ships, but the system is adaptable to providing the right mix and appropriate trainer(s) for each class of ship.

PERFORMANCE MEASUREMENT (TRACENPAC):

The training evaluation section of the computer master simulation program selects and stores training exercise data and trainee responses. For example, a hostile aircraft radar track requires interception within definite time limits. Both hostile and friendly intercepting tracks may be selected and stored by the computer and later reproduced for evaluation and training critique.

A total, weighted score for each team is used to denote "quality" of performance. Individual crew positions are listed and weights are assigned, by "expert consensus," to each position's contribution to problem solution. For example, a radar control officer position may have a weight of 20, while a phone talker on the same crew has a weight of 5. Individuals are rated on a detailed performance checklist with a maximum score equal to the assigned weight. If a phone talker then performs all functions correctly, he may achieve his maximum score of 5. The position scores are summed to obtain a team score.

<u>FEEDBACK (TRACENPAC)</u>: The performance of each ship is reported by letter to the ship, the immediate superior in command, and to type commanders. Statements address the following factors:

1. Preparedness
2. Performance deficiencies
3. Progress
4. Numerical grade
5. Recommendations.

Feedback given during training consists of comments regarding errors in technique, decision points, etc. At the conclusion of a training session, the crews are debriefed. Significant incidents in the exercise are recounted. Decisions, techniques, tactics selection, etc., are discussed and errors are critiqued.

<u>TRAINING OFFERED (TRACENLANT)</u>: <u>CIC Team Training</u> - The purpose of this course is to train CIC teams in basic procedures and functions. Lectures and mockup training are featured. Training is conducted in a simulated single ship environment. Training is available in the following areas, and the individual team selects the areas in which they desire to train:

1. Surface tracking, plotting, and reporting

2. Line formations and maneuvering

3. Screens and screening procedures

4. Naval gunfire support

5. AAW procedures

6. Boat wave control

7. Transport/logistics and replenishment formations.

Multithreat CIC Team Training - The purpose of this course is to exercise NTDS and non-NTDS ships' CIC/Weapons personnel in AAW, ASW, EW, and surface warfare functions in a Fleet multithreat environment. The course consists of briefings, lectures, and mockup exercises encompassing all facets of Naval warfare. Training may be in the following areas:

1. Functions of CIC team members

2. Staff, CIC/Weapons team coordination

3. Fleet doctrine and procedures

4. Communications procedures

5. Use of OP-orders

6. Mockup exercises

7. Mockup critiques

8. Threat briefings.

Radar Navigation CIC Team Training - The purpose of this course is to provide CIC radar navigation teams with a complete background in radar navigation methods, rules of the nautical road, and navigational chart preparation, and to permit CIC teams, by use of the radar navigation mockup, to become proficient in all phases of shipboard radar navigation. This course consists of lectures and practical application in the mockup of swept channel and low visibility radar navigation, in medium to heavy shipping density situations, encompassing the following:

1. Rules of the nautical road

2. Navigation aids

3. Chart preparation

4. Scope set-up and interpretation

5. Navigation log

6. Duties of CIC navigation and shipping situations

7. Precision anchoring.

CONDUCT OF TRAINING (TRACENLANT): Training objectives are tailored to meet each team's particular needs as initially expressed by the OIC or ship's Commanding Officer. Once a Commanding Officer has expressed his needs, training cadre select an aopropriate basic scenario which is considered to be of "average" difficulty. The concept of average difficulty level is based on the experience of training personnel as to what they feel an average crew should be able to do. Once the crew in training has run through such a scenario, some determination is made as to their actual state of proficiency. The basic scenario is then simplified or complicated accordingly. Subsequent scenarios are made increasingly more difficult as team competency develops.

PERFORMANCE MEASUREMENT (TRACENLANT): Neither crew nor individual performance is measured during training in the mockups. At the end of a training program, crews are rated as either SATISFACTORY or UNSATISFACTORY. Ratings are based on the judgment of trainers regarding team improvement during the course of training. This practice is said to allow for flexibility in scenario development with an emphasis on training and not on grades or scores.

FEEDBACK (TRACENLANT): Training officers normally remain in the problem control area to monitor the overall problem evolution. In addition, two instructors are assigned to each mockup to observe individual positions and actions. It is the policy of training cadre to give feedback to the mockup supervisor rather than to individuals. Correct responses are not specifically noted; however, feedback or critique is given when technique or decision errors are noted. At the end of each problem run, the entire team is debriefed by the mockup instructor. At the conclusion of all training in the sequence, the crews are again debriefed. Positive feedback, if any, may be provided during these postmission debriefings. Crews have the opportunity to discuss key decision points, tactics selection, etc., with other crews and trainers at this time.

The training facility receives feedback from operational personnel (e.g., Commanders, evaluators, TAO's) at the conclusion of training. Senior officers and enlisted personnel solicit opinions and suggestions from their respective crews regarding the realism and effectiveness of trraining and transmit this information to training personnel.

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