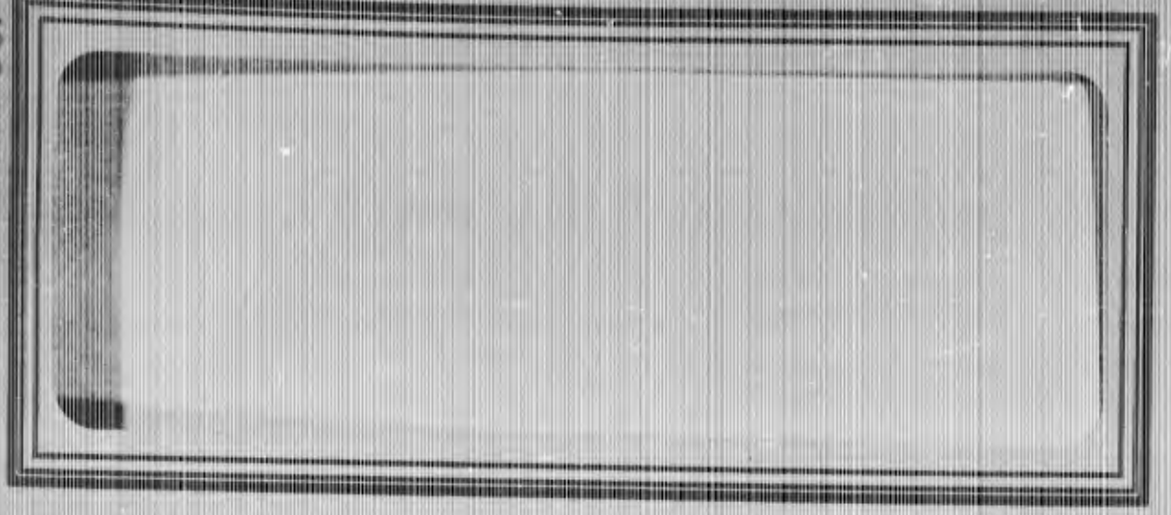

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DEPARTMENT OF PSYCHOLOGY
UNIVERSITY OF SOUTHERN CALIFORNIA

Technical Report No. 14

AN ANALYSIS OF OFFICER BILLETS IN COMBAT INFORMATION CENTERS: METHODS

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PREFACE

This report, the fourteenth technical report in a series produced by the Electronics Personnel Research group, is the first to be concerned with CIC personnel problems. It describes the nature of the research project, and the descriptive methods used in its first phase.

Reports numbered fifteen and sixteen will present the results of applying these methods to the analysis of officer billets in CIC; while other subsequent reports will be concerned with the quantitative phase of the project, in which criterion measures will be developed to use in qualifying officers for CIC duties.

ACKNOWLEDGMENTS

The research reported in this series reflects the contribution of a large number of persons within the Military Establishment. Grateful appreciation for this assistance is extended to the Personnel Analysis Division, Bureau of Naval Personnel; the Personnel and Training Branch of the Psychological Services Division of the Office of Naval Research, and the Electronics Coordinator's Section of the Office of Chief of Naval Operations.

Appreciation is expressed to the Commanders of the Cruiser Destroyer Force, Air Force, and the Amphibious Force, Pacific Fleet, for permission to observe aboard ships in their commands. Sincere gratitude is extended to those officers aboard the twenty-three ships in the sample who so graciously gave their cooperation during the fleet observation, despite having little time to spare from their duties.

The authors also wish to acknowledge the contributions of members of Electronics Personnel Research who underwent extensive CIC training and served as relief observers: Mr. Harold R. LaPorte, Jr., Mr. John E. Hills, and Mr. Nicholas A. Bond, Jr.

ABSTRACT

This report is one of a series to be concerned with the development of standards for the qualification of officers in CIC duties. The nature of the problem is discussed in the first portion of the report. The remainder is devoted to an explanation and description of three job analysis methods which were developed for the descriptive phase of the research. These methods were based on complementary viewpoints for describing a job, and were designed to yield complementary results. The specific forms and instructions associated with these methods are presented in the appendix.

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I. INTRODUCTION

To obtain advance information about the enemy's location, capabilities, and intentions; and to communicate effectively with his own forces, always have been great problems for the military commander. During the early days of naval warfare, the slow speed of ships and the short range of weapons permitted ample warning of impending attack. As an action developed, command and control stations were kept informed of tactical events by means of a system of visual lookouts and visual signals. Since that time, the offense has developed capacities for striking on the surface, from below the surface, and from the air with fantastic speed and deadly accuracy.

More and more intricate information systems have been required to keep pace with the rapid development of the techniques of war. One of the most complex of these systems was established aboard U.S. Naval vessels during World War II. These Combat Information Centers have become indispensable to naval operations, but their complexity has created many perplexing problems in training, human engineering, systems organization, and managerial utilization of manpower.

This report is one of a series by Electronics Personnel research, University of Southern California, to be concerned with personnel

problems associated with CIC operations.[1]

It describes the problem area and the methods used in an analysis of officer billets in CIC; a necessary preliminary step in developing standards for three CIC officer qualification levels. This primarily methodological report is intended to assist in interpretation of the data to be presented in subsequent technical reports, as well as to be of service to professional workers in this field who encounter similar analytical problems.

The Reason for the Research

Representatives of the Chief of Naval Operations, and of the Personnel Analysis Division, Bureau of Personnel, suggested the need for a study of the officer billets and functions in CIC, to develop criteria for the qualification of officers in CIC billets, and to furnish useful information to management echelons responsible for selection, training, and utilization of CIC personnel.

Interest also was expressed in these related problems: comparing tests developed by the study with other measures; identifying psychological variables which should be considered in designing selection measures and training procedures for CIC officers, evaluating team performance; and finding better ways of measuring complex technical skills.

The Objectives of the Research

The chief objectives of the research are as follows:

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[1] See also Technical Reports Nos. 15 and 16.

1. Detailed descriptions of officer roles in CIC as related to ship type, qualification level, and tactical situation.

2. The identification and definition of the critical requirements of effective officer performance in CIC.

3. The development of practical proficiency measures useful as officer qualification standards in CIC.

Secondary objectives are concerned with a study of the related problems mentioned above. Research in the area of team performance is particularly important, because of the universality of the team concept in military operations, and the relative paucity of reliable techniques for evaluation of this type of performance.

II. THE NATURE OF THE PROBLEM

There are several points of departure for criterion research. If the job requirements to be included in the criterion are already known in sufficient detail, it may be that test development can be undertaken immediately, without any danger that the tests will measure the wrong variables. This is not apt to be possible for criteria intended to predict proficiency of human performance, unless its end products are so tangible that measuring techniques can be applied directly to them. The more usual situation here is one in which the performance under consideration is complexly determined, and produces many different results not amenable to direct measurement, or even to observation. This is particularly true of officer performance in CIC.

Under these circumstances, qualitative analysis of the per-

formance, its determinants, and its end products necessarily must precede attempts at quantification of pertinent variables.

The Role of Job Analysis in Criterion Research

It has become conventional to conduct a job analysis as the first stage in a criterion development program for the reasons above, and also because existing job descriptions and analyses available at a given time usually have been developed for some other specific purpose and are not adaptable to the objectives of the research. Job analysis has several fundamental contributions to make in this type of program:

1. Familiarization of the persons conducting the research with the subject matter of the job.
2. Detailed specification of the requirements of the job.
3. Discrimination among related jobs in terms of their requirements.
4. Identification of pertinent requirements suitable for quantification in a criterion measure.
5. Evaluation of the influence of situational variables as determinants of performance requirements.

Variables Complicating the Analysis of Officer Billets in CIC

Factors Inherent in Military Operations

The phrase, combat factor, might be used to group those variables which cause differences of unknown magnitude between the observed job and the "pay-off" job performed only under combat conditions. As a result of this factor, the job described by empirical means may, indeed, differ from the ultimate job one wishes to predict. However, the basic assumption of peacetime military training is that it anticipates the requirements of wartime performance insofar as it is possible to do so. While it is not the responsibility of the job analyst to at-

tempt to assess how nearly this assumption is justified in any particular case, he can recognize the problem, and pursue in those observational situations available to him, dimensions of performance which can be extrapolated from peacetime levels to the hypothetical future combat level.

It is convenient to use another phrase, the obsolescence factor, to characterize the effects on current military tactics and procedures of the development of new weapons systems. The military job which is observable today merely is one of a series of jobs which must evolve with these weapons systems.

Again, it is not the responsibility of the job analyst to originate military procedures or tactics. These are in the structure of the observational situation. He should recognize that they will change, but he can assume that there will be at least a degree of generalization to the hypothetical future job, of the performance dimensions he identifies by empirical means.

While both of these factors limit the usefulness of current Naval operations as observational situations from which to develop standards for CIC officer qualification, they are the facts of life. There not only must be some empirical basis for such criteria, it also is possible for criteria to grow with the general evolution of requirements in the performance area for which predictors are being developed.

Factors Inherent in the Information System

The officer's job in CIC is embedded in a context of team performance. Preliminary observations indicated that the CIC team is

by no means a rigid system in which each individual performs only one function. Instead, it is a group organization intermediate between complete specialization of each individual's functions and complete interchangeability of its members. Nor, are there unvarying routes by which information flows through CIC. Each individual serves to an extent for information storage, reacting with other individuals, and the situation, in a fashion which moves some information through CIC by a number of alternative means, some quite informal. Finally, the traditional information processing phases of collection, display, evaluation, and dissemination appear to have only relatively loose correspondence to team organization.

These observations also indicated that the officer's job in CIC is influenced by the proficiency of the rest of the team. For a simple illustration, one might consider the situation where all other members of the team were experienced, highly motivated, and highly competent. Under these circumstances, the supervising officer might have little to do. On the other hand, if the officer found himself in charge of a CIC team whose members were inexperienced, poorly motivated, and incompetent, his own job would be a great deal different.

It also was apparent that there are important situational determinants of both the individual officer's and the CIC team's functions. Since CIC disseminates information about events of tactical significance, its internal processes necessarily have to be adjusted to meet the requirements placed on it by different tactical situations. As a result, instead of one, there are a whole series of performance situations in CIC, each modifying, to some degree, the officer's general

role there.

These considerations suggested that one of the first tasks of the research would be to tease out from their team context the details of the officer's job in CIC, taking into account the influence of the team's performance; and to delineate his role in the different performance situations created by tactical conditions.[2]

Definition of the Descriptive Sample

It was necessary to consider the variety of CIC's in the Navy and the resources of the project, and to arrive at an observational sample which would be both practical and relatively comprehensive.

The three CIC qualification levels, CIC Officer, Assistant CIC Officer, and CIC Watch Officer, are found in a group of billets distributed among ship types, aircraft, training establishments, and staffs. Many of these billets are in CIC's which must perform several different functions, depending on the tactical situation. Presumably, this distribution introduces heterogeneity into the performance requirements for each qualification level.

As the point of entry into the billet family, however, the CIC Watch Officer level is fundamental in the qualification of officers for CIC duty. So far as ship types are concerned, CIC's in combatant ships were judged to be more important than those in non-combat-

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[2] The rather voluminous publications, such as the Naval Warfare series, containing information pertinent to CIC doctrine, procedures, and equipment, provide the technical background necessary for the CIC officer to do his job. They do not, however, precisely describe the job he has to do. In this respect, they are somewhat analogous to the rule books for playing a game, albeit a very important and sometimes very dangerous one.

ant vessels.

Consequently, the decision was made to concentrate observations on the destroyer, carrier, and cruiser types, allowing the proportions of officers at each level on the ships in the sample to determine the representation of qualification levels. Relatively specialized CIC's, such as those in aircraft and submarines, were recognized to be important, but could not be included in the sample. Observation of sixteen destroyers, four cruisers, four carriers, and one AGC, was planned.[3]

The Descriptive Frames of Reference

There are many viewpoints for describing a job. Adoption of a particular one, which immediately limits the scope of the description, depends upon the ultimate use of the description, the pros and cons of known descriptive techniques, and the nature of the job to be described.

For criterion research, job description should identify those performance dimensions both important to the job and measurable by psychometric methods. The descriptive techniques which generally are most successful contain a minimum of inferential steps between what is being observed and the final data. In the present study the nature of the officer's job in CIC will be examined in terms of his role in the information system and in terms of CIC functions, determined by tactical situations, which modify this role.

The viewpoints discussed below are potentially useful to the research. Each of the methods which was applied to the development of job description data was based on one of them.

The Activity Level: Discontinuous Performance.

This viewpoint is based on the assumption that a population of relatively observable activities are involved in the collection, display, and evaluation of information, and its dissemination at various CIC functional levels. The sample of these activities performed during a particular time interval, by a specific officer in a particular CIC, is determined by the tactical situation, the officer's and other CIC personnels' characteristics, the physical facilities of CIC, and doctrine.

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[3]Uncontrollable circumstances made only two cruisers and three carriers available during the data collection phase of the research. The detailed characteristics of the final sample will be included in a later report.

The population of activities necessary for the operation of this information system provides a common denominator for delineating the officer's current role in the system by activity sampling procedures applied at different qualification levels, in different CIC billets, and in different tactical situations. Many of the critical requirements of effective officer performance in CIC may be identified in the descriptions collected from this viewpoint, which may be called atomistic if discrete activities are sampled, or molecular if sequences of discrete activities are sampled.

It is obvious, however, that others would be overlooked. Samples of separate activities might not clearly reflect general, or molar, requirements in the performance situation, such as the need for the officer to have a guiding conception of what he and his CIC team are supposed to do, or the need for him to integrate a variety of symbols into a visualization of tactical events.

The Functional Level: Continuous Performance.

OpNav Inst. 1211.2 defines four general CIC functions: basic, control, assist, and coordinate, and lists specific tactical situations associated with each.

These tactical situations may be characterized as a series of problems to be solved by the interdependent efforts of CIC and pertinent control stations. It can be assumed that the officer in CIC is forced to learn his part in this solution in order to perform effectively. In terms of this molar viewpoint, the CIC officer's job is one of "staying ahead of" a series of tactical events by anticipating the demands which will be made of him and his team, efficiently supervising the team, and proficiently discharging his responsibilities to control stations. In this sense, the specific activity he performs at any one moment is embedded in this continuous performance, with its own over-all requirements which may be apparent only from a molar viewpoint.

III. THE DESCRIPTIVE METHODS

Although the methods discussed below were constructed for this research, they merely are specific examples of a limited number of general approaches available for job description. The man doing the

job may be observed while performing, he may be asked questions about his work, someone else familiar with the job may be questioned about it, or the person doing the research may attempt to put himself in the position of the man doing the job. To use any of these approaches effectively, the observer must to some extent become familiar beforehand with the subject matter of the job he seeks to describe, particularly if it is as technical as that of the officer's job in CIC.

Consequently, education of observers in CIC subject matter as well as in the use of the descriptive methods was necessary. This was accomplished by approximately 100 hours of briefing sessions devoted to the mechanics of CIC operations, and by a thirty-one page observer's manual which contained both detailed instructions for the observer's general conduct aboard ship and for the collection of data.

The Experience-Oriented Techniques

The operations and forms in this group[4] are called experience-oriented because they contained a series of implicit questions which officers in the sample answered on the basis of their experience in their present CIC billets. These techniques were designed to circumvent the obvious temporal limitations of direct observation of performance by sampling a broader range of performances than could be directly observed in a comparable time interval. They consisted of seven steps, each devoted to a particular data collecting operation, and each having its own detailed instructions for the subject to read. In format, they were relatively self-administering, although an observer always was

[4] See Appendix 4, p. 29.

present to insure that the officers completely understood what was wanted. These seven steps are summarized below.

Description of the Techniques

Step 1: Biographical Information. This form contained ten items which solicited the following types of information from each officer in the sample:

a. Identification: name, rank, serial number, and CIC Qualification Code number.

b. CIC school training: name of course, location of school, and length of training in months.

c. Months experience in CIC: by qualification levels and ship types, including present ship.

d. Qualification in air control: months experience as air controller and relative frequency of types of control while aboard present ship.

e. Experience in ten other CIC and related billets: in terms of ship type, command, school, or station, and number of months.

f. Experience in CIC aboard present ship: in terms of proportion of time spent at General Quarters and Condition Three Watches.

Step 2: Tactical Situations. This was a checklist designed to ascertain which of a list of sixteen different tactical situations the officer had experienced as an officer in CIC and the relative frequency with which he had experienced them while aboard his present ship. Only those who had been aboard the ship for one month or more were asked to do this and subsequent steps.

Step 3: Activity Sampling. Each officer who completed the second step was given a deck of 3 x 5 cards containing 342 statements, each of which represented a separate CIC activity. These statements

were about equally divided among four major categories: interactions between the officer and control stations, interactions between the officer and the rest of the CIC team, information processing by the officer, and equipment operation by the officer. They included activities associated with collection, display, evaluation, and dissemination of information, and with supervising the CIC team.

The officer was asked to sort through the deck, selecting from it those statements representing activities he recalled having performed while aboard his present ship.

Step 4: The Relation of Activities to Tactical Situations. This step utilized data collected by the two preceding steps. The observer prepared a checklist for each officer by writing in the left column of a matrix, eight of the tactical situations the officer had checked in Step 2, in the order of their frequency of occurrence, as indicated in that step. Air control always was included in the eight situations if the officer was a qualified air controller.[5]

The officer then was instructed to consider each activity statement he had selected in the Step 3 cardsort (i.e., those activities performed on present ships). After recording the card number in the top row of the checklist, he placed a check mark in the cell opposite each tactical situation during which he had performed the activity.

This operation was designed to relate activities to tactical situations in a fashion which would weight each CIC activity in terms of its relative generality in the heterogeneous performance situations

[5]This was done because of the increasing importance of the air control function.

in shipboard CIC billets; and also in terms of its importance in specific performance situations. It was recognized that there were aspects of the officer's job which were performed outside of CIC, while he was off watch. Activity statements related to these aspects could be placed in a separate pile during the Step 4 operations, and not entered in the checklist.

Steps 5 and 6: Relative Difficulty of CIC Activities. Using the sample of statements he had selected in Step 3 (representing CIC activities he had performed in his present billet), in Step 5 each officer divided this sample into two approximately equal piles, one containing statements representing activities he considered to be relatively easy, and the other containing activities he considered to be relatively difficult.

In Step 6, the officer sorted through the sample of relatively difficult activities and selected ten which he had found to be the most difficult to perform of all those represented in the sample of activities he had done while in his present billet.

Step 7: Requirements Underlying Difficult Activities. In this final step, a checklist provided fifteen statements related to such common psychological abilities as manual and perceptual skill, reasoning, decision making, concentration under stress, and verbal comprehension. The officer was instructed to select the three most pertinent statements for each of the ten activities he had identified in the preceding step as very difficult for him to perform, and to rank these three statements in order of their importance in determining the difficulty of the activity.

This step was intended to highlight some of the ability requirements which are relatively critical in the performance of difficult CIC activities.

Objectives of the Techniques

The experience-oriented techniques using discrete CIC activities as the described units, were designed to locate each activity along three major dimensions: proportion of the officer sample who had performed it in present billet, the extensiveness of its performance in different tactical situations, and its relative difficulty. These dimensions provide part of the data to be used for delineating the officer's role in CIC, for discriminating among Qualification Code levels, and for distinguishing activities which should receive emphasis in criterion development.

The Performance-Oriented Techniques

These techniques[6] required the presence of an observer in the performance situation, to collect data during the performance to be described. While such direct observation has limitations, it has the advantages of eliminating the job incumbents' memories from the descriptive processes, and of giving observers the personal contact with the job which is indispensable to realistic interpretation of the results of other descriptive methods.

Description of the Techniques

The central method was called the diary, although it differed in

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[6] See Appendix B, p. 63.

important respects from the ordinary narrative account of sequential events which commonly bears this title. To cope with the complexities of the operating CIC information system, certain restrictions were placed on the scope of the events to be described, and recording procedures were devised to reduce the heterogeneity of observable individual responses to tractable categories.

Observers were trained to select one officer-member[7] of the CIC team as the principal subject during any one observational session in CIC. The ensuing action was described in reference to this subject. All objects, whether other CIC team members, control stations, or equipment, with which the principal subject interacted, were identified and the type of interaction was noted. Thus, inputs to the subject were described as well as his outputs.

CIC Activity Recording Form A

Recording was facilitated by this form and a list of 26 abbreviated code words with standardized definitions. Form A contained six columns, each designated for a particular type of data. The column headings, and their meanings are as follows:

> Time Phase: Two types of data were recorded in this column: the time at which an activity being described occurred, and the time at which a tactical problem changed from one phase[8] to the next. Observers used timers with luminous dials, and recorded time to the nearest fifteen seconds.

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[7] Always either a CIC Watch Officer, the Assistant CIC Officer, or the CIC Officer.

[8] Four general phases were defined for the chronological development of tactical problems, as related to CIC operations: preparation for the problem in CIC, initiation of the external events of the problem and approach to the commitment point, action, and readjustment in CIC after the action. These will be explained in more detail in a following section.

Activity Code: In this column was entered the appropriate code word, in abbreviated form, which enumerated the action in each activity being described.

Person-Station-Thing: The object with which the principal subject interacted was identified here. There were four general classes of these objects: control stations external to the ship; control stations on the ship, including the bridge; other persons in CIC; and equipment such as repeaters, R/T and S/P phones, and plotting instruments.

Via: The means by which the principal subject interacted with other objects was noted in this column. For example, verbal communication was accomplished via radio telephone, sound-powered phone, MC system, or unaided voice. If a telephone talker was involved in the transmission, this also was noted.

Gist: This was the widest column on the form, to accommodate short sentences describing the contents of the principal subject's interactions. Thus, if he communicated with the bridge, the specific information he sent up would be identified in this column.

Code Word List: This last column, on the right edge of the form, listed for quick reference purposes the twenty-six code words the observer used. Although observers were required to memorize these words and their definitions, there were occasions in CIC when the speed of the action, combined with the remarkable instability of the destroyer type, made this reference column useful.

While these standardized procedures helped to insure accuracy of the data, and to decrease data reduction problems, it was recognized that some of the inherent limitations of direct observation remained. R/T and S/P inputs to the principal subject were not available to the observer when the subject wore earphones. There would be times when his verbal output would be hard to hear above background noise. While his recurrent visual scooping of various displays in CIC could be observed, it might not be possible always to determine the information received from this activity.

For these reasons, the observers were taught to record along a generality-specificity continuum. Whenever possible, their entries were extremely specific, identifying in the Gist column the content of the activity as well as other details called for by the column headings of Form A. When situational conditions made this degree of specificity impossible, the observers recorded at a more general level in the Gist column, until the conditions changed. With this procedure, it was possible always to identify the type of interaction between the subject and other objects in the performance situation, and usually to identify the specific contents of the interaction.

Diary Recording Form B

The second technique in this group was used for describing critical incidents which occurred in CIC while the observer was present. Three types of these incidents were defined with reference to the principal subject: errors he committed, activities he performed to compensate for his or someone else's errors, and activities he performed which were outstandingly successful. The observers were trained to look for objective evidence, rather than to rely on their own judgment to define errors and success.

They marked the entries in CIC Activity Recording Form A which identified the points of occurrence of the critical incidents, and then at a later time completed Diary Recording Form B, noting four types of information about each such incident:

Identification: Type of incident and time of occurrence.

Observed Signs: The objective evidence for classifying an activity as a critical incident.

Antecedent Conditions: The events immediately preceding the incident which relate it to the general context of events.

Nature of the Activity: Who was involved, what was being done, and why.

The data from Form B was intended to describe extreme ranges in performance adequacy, as well as to indicate points in the information system where errors tended to cluster.

Supplementary Forms

Besides the entries on Form A and Form B, the observer recorded a considerable amount of supplementary information for each observational period, on the three forms described below.

The CIC Physical Layout Form. It was designed to insure that the observer would be ready to follow the action in a particular CIC. He was required to make a preliminary examination of the CIC space, locating and identifying radars and repeaters; R/T and S/P units, phones, and switches; gyro repeaters; target designators; and other equipment which the principal subject might use during an observational period. The form contained a series of boxes which could be used to diagram the location of equipments with reference to bulkheads, overhead, and deck, and blank lines for writing in circuit designations, radar types, etc.

The Watch Situational Content Form. This required the observer to note thirteen items of information about each observational period. These items identified the ship, observer, readiness condition in CIC during the action, type of tactical situation, relation of own ship to other ships, call signs and meanings, source of exercise plan, pri-

mary subject, other officers present in CIC, R/T and S/P circuits specially set up for the exercise, and equipment out or malfunctioning during all or part of the exercise.

The Recapitulation of Exercise Form. This form was devoted mainly to furnishing cues for the observer to follow in describing certain temporary changes in CIC intended to adjust team members and equipment to the specific requirements of the sequence of events in a tactical situation. This form listed items for each of four chronological phases usually distinguishable in these situations. It also provided a space for the observer to summarize the action he had observed, describing in brief narrative style salient aspects, such as plotting and communications practices, which might not be obvious from the diary entries.

These three supplementary forms required the observer to orient himself in CIC sufficiently to observe the action accurately, and furnished a context for interpreting the entries in Form A.

Objectives of the Techniques

The performance-oriented techniques were designed to yield in their descriptions identification of important performance dimensions for officers in CIC, complementing those identified by means of the experience-oriented techniques. The performance-oriented techniques were particularly suited to:

1. Describe the interactions between the officer and the remainder of the CIC team.

2. Assess the effects of situational factors on the officer's performance in CIC.

3. Relate CIC activities to a time dimension.

4. Check the validity and inclusiveness of the population of activity statements used in the experience-oriented techniques.[9]

5. Orient observers in CIC operations.

The Consultant-Oriented Technique

While the two groups of observational methods which have been described embody atomistic or molecular viewpoints, using the discrete activity as the described unit, this technique takes a molar view of the officer's job in CIC, using the tactical situation as the descriptive unit. It is called consultant-oriented because it was designed to be used with specially selected officers whose experience and proficiency in CIC, combined with an ability to analyze complex problems, qualified them as consultants.

The objective of the method is a thorough analysis of the CIC Officer's job in different tactical situations. A tactical situation, whether training exercise or not, is conceived of as a relatively short sequence of events, often involving action against an "enemy," which superimposes special functions on the routine functions of CIC.

The fundamental assumption of the method is that shipboard experience will force the CIC Officer to integrate knowledge learned from training schools and publications into a performance potential matching, at least to a degree, the performance requirements imposed on him by

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[9] Although all these statements were carefully checked and edited by CIC consultants before being used, it was anticipated that direct observation in CIC would uncover areas of performance which had been overlooked.

the progression of events in tactical situations. A corollary assumption is that the most experienced and most proficient CIC Officers not only will have a superior performance potential, but also will have learned the critical limits of the information processing system, in terms of factors which frequently complicate or jeopardize the adequate discharge of CIC's responsibilities to control stations.

Description of the Technique

CIC Information Consultant Analysis. In order to structure the problem sufficiently to insure comparable results from different consultants, this booklet was developed. The booklet contained an explanation of the problem, the instructions, and the forms associated with the technique. It was divided into three major sections: introduction, identification, and technical information.

The important portion of the introduction was an explanation of the two descriptive dimensions of the technique: basic aspects of the CIC Officer's job in tactical situations, and time phases in tactical situations. The task for the consultant was to describe the basic aspects of the CIC Officer's job in terms of each of four time phases. To give him an overview of this somewhat complex task, the two dimensions were outlined as follows:

I. Basic aspects of the CIC Officer's job in tactical situations:
   A. Necessary steps:
      1. Information which the CIC Officer must have.
      2. Decisions which the CIC Officer must make.
      3. Activities which the CIC Officer must perform.
   B. Common complicating factors and remedial steps:
      1. Complicating factors which may handicap CIC performance:
         a. Long range.
         b. Short range.
      2. Remedial steps the CIC Officer can take:
         a. Long range.
         b. Short range.

II. The time phases in a tactical situation
   A. Phase I: Preparation.
   B. Phase II: Initiation-approach.
   C. Phase III: Action.
   D. Phase IV: Readjustment.

Each of the headings in the outline was explained in detail in the introductory section of the booklet. The three headings under Necessary steps refer to information, decisions, and activities directly related to each phase of a specific tactical situation, rather than to more general requirements. The headings under Common complicating factors and remedial steps were designed to elicit descriptions of some of the critical limits of the information processing system, such as common equipment failures and common human errors, as well as descriptions of some of the specific measures CIC Officers can take to compensate for these factors.

The time phases in a tactical situation listed in Part II of the outline provide a common sequential basis for analyses of the CIC Officer's job in different tactical situations, and emphasize the temporal relationship between CIC information processing and tactical events. Each phase was defined for the general case, to guide the consultant in setting up phase boundaries for specific situations. It was recognized that such boundaries might not be clearly discriminable in some tactical situations. These exceptions were discussed in the instructions to the consultant. The general definitions of the phases are as follows:

> Preparation: The preparatory adjustment necessary in CIC when some particular tactical situation is known, or expected, to be imminent. It can be thought of as the "peaking up" of CIC team and equipment, presumably already generally prepared by long range training, to cope with a specific situation. When situations occur without advance warning, this phase overlaps with the next one. Otherwise, it ends when the second phase begins.

Initiation-approach: Some precipitating event, such as a radar or sonar contact, or order from command, begins the tactical situation. In this phase, events build up to the critical time when control stations commit themselves in the mission. This phase ends when the third begins.

Action: Control stations commit themselves by firing weapons or by taking other appropriate action. In some situations, this may be a relatively long phase, depending on the number and type of targets involved, and the type of mission.

Readjustment: This phase begins when the action in the situation is over and objectives of the control stations either are gained or lost, or the reason for the action no longer exists. The condition of readiness in CIC is returned to the level which was set before Phase I.

The identification section of the consultant's booklet contained a short biographical data sheet for him to complete, and a checklist of twenty tactical situations. He could choose any of these situations for analysis, always specifying the type of ship he was going to consider, and whether he was describing the group or individual ship CIC Officer's job.

The last section of the booklet contained forms for the consultant to use in supplying the information requested of him. Essentially, these forms were composed of the headings in Part I of the outline, accompanied by blank lines. They were repeated for each of the four time phases.

Objectives of the Technique

The consultant-oriented technique was designed to tap at least a portion of the guiding conceptions of his job which the CIC Officer must develop in order to perform effectively in specific tactical situations, both as an information disseminator and a CIC team super-

vior. The organization of the technique structured the description of these conceptions in terms of the requirements of the performance situation. Analysis of the results is expected to identify critical requirements for effective officer performance in CIC, under various tactical conditions, in terms of the molar viewpoint lacking in the other techniques, thus complementing their results.

Administration of the Methods

The job analysis procedures which have been described above were administered during two data collection periods. The experience-oriented and the performance-oriented techniques were used in a period of fleet observation extending from 12 February to 11 June, 1954. During this period, the entire professional staff of Electronics Personnel Research served as observers, and took their turns riding ships.

Usually, one observer rode each ship for the entire operational week. Exceptions were fleet exercises, which often occupied two weeks, and the heavy ships, to each of which two observers were assigned. The work load during such a week was rather heavy, since the observer was required to administer the experience-oriented methods to all CIC Officers, Assistant CIC Officers, and CIC Watch Officers who had been aboard one month or more, as well as to observe each of these officers in CIC either during General Quarters or cruising watches, whichever was most appropriate.

Generally, the observer boarded the ship on Sunday evening. After making the Captain aware of his presence and objectives on Monday morning, the observer proceeded to CIC and became acquainted with the CIC Officer. At this time, he again explained his objectives, always em-

phasizing their non-evaluative character, and made arrangements both for administering the experience-oriented techniques to all the pertinent officers, and for observing in CIC during operations. He also examined the physical layout of CIC and completed the CIC physical layout form.

After this, individual officers were interviewed at their convenience during the week, whenever the observer did not have to be in CIC. They were re-interviewed very briefly again at the end of the week, when each officer was asked to repeat one step of the card-sort. This was done to obtain test-retest data from which to compute statistical reliabilities.

Direct observation in CIC was begun very slowly and carefully, and its general purpose was explained to the CIC personnel before it was started. In most cases, they became accustomed to the presence of the observer, who was instructed to be as unobtrusive as possible while in CIC.

As has been mentioned, the observers were provided with an observer's manual, which not only contained all the forms and instructions necessary for the two groups of techniques used aboard ship, but also attempted to cover the predictable social situations the observer would find himself in, and to indicate the attitudes and conduct most apt to maintain good relations with Naval personnel.

The consultant-oriented technique was not designed for mass administration. The nature of the analytical thinking and experience it required limited the number of officers who could qualify as subjects. The amount of time required for completion of one analysis

for a tactical situation prohibited its use aboard ships.

Consequently, the San Diego area was combed for officers, reserve or on active duty, who had the qualifications and the time to do this type of work. Several were located, and some analyses have been completed. This portion of the data collection program is continuing.

IV. SUMMARY

This report has sought to describe the salient aspects of a research project concerned with establishing criteria for the three officer qualification levels in CIC: CIC Officer, Assistant CIC Officer, and CIC Watch Officer.

Because of the complexity of the performance area for which predictors are being developed, it was deemed necessary to initiate the research with a thoroughgoing descriptive phase, to define, in terms amenable to quantification, those dimensions of the officer's performance in CIC which represent critical requirements. Three groups of techniques: experience-oriented, performance-oriented, and consultant-oriented, were devised to accomplish this objective. These methods were designed to yield complementary results by examining the officer's job in CIC from different viewpoints, and by taking into consideration the effects of situational and other determining variables on job requirements.

The experience-oriented technique (consisting essentially of 342 activity statements about CIC information processing and a series of checklists) sampled the officer's CIC experience aboard his present ship. Their chief advantage, so far as the other methods are concerned,

was the fact that they utilized the officer's past experience for the descriptions they yielded, thus covering a broad range of performances, and saving observational time.

The performance-oriented techniques placed the research personnel directly in the performance situation, and required direct observation of ongoing performance for their data. These techniques had the advantages of immersing the job analyst in the context of CIC operations, and of relying on trained observers for their results. They were based on the assumption that no amount of forms can entirely replace the value of personal observation.

The consultant-oriented technique was designed to complement the other two methods by describing aspects of the CIC Officer's job which are relatively non-observable, such as the mental picture, or guiding conceptions, he must develop in order to organize his own and his CIC team's efforts into effective performance.

The first two groups of techniques were used aboard seventeen destroyers, three carriers, two cruisers, and one amphibious command ship during fleet and type training exercises off the Pacific Coast. The advantages of going to sea to collect data have been dwelt upon in other reports, but are worth mentioning again. While at sea, the personnel to be observed are in their job environments and are more accessible to interview techniques requiring a considerable amount of their time. They are apt not only to be better motivated to discuss their jobs, but also better able to remember pertinent details, by virtue of being surrounded by the proper stimulus context.

The consultant-oriented technique, which calls for lengthy tech-

nical analyses of the CIC Officer's job in specific tactical situations, is being used with certain highly qualified consultants who are capable of analyzing the job in the necessary detail and with the necessary insight into its requirements.

****

APPENDIX A

The Experience-Oriented Techniques

Description of the Research

The observer who handed this booklet to you is a member of a research project which has its headquarters at the University of Southern California, in Los Angeles. This research group has been asked by the Office of Naval Research, Washington, D. C., to undertake a detailed study of CIC personnel activities.

The observer's immediate job while aboard your ship will be to learn as much as he can about CIC functions and activities. He is not attempting to evaluate any individual, CIC team, or ship. The information he collects will be of a descriptive nature. Your identity, and that of your ship, will be protected by a code. Reports the research group publishes will have a restricted distribution and the data will not refer directly to any one person, ship, or command.

The underlying philosophy of the research is that the man doing a job is the one individual who knows the most about certain aspects of his job. This is why the observer will ask you some questions and give you some forms to work over. He will sincerely appreciate your cooperation.

Since our research project involves several different problems, some of which are unrelated to CIC, the observer on your ship may not know very much about some technical subject matter with which you, as a CIC expert, are familiar. Each person employed by the project is required to take his turn riding ships, although he may spend most of his time ashore working on problems which have nothing to do with CIC. However, the observer on your ship has been trained in the use of observational methods and has been given a basic orientation in CIC functions.

General Instructions

This booklet contains all of the forms you will be asked to complete. There are only three, all short. The only other thing the observer will ask you to do will be to sort a deck of cards. Exactly what we would like you to do is explained in the following pages.

You may already have noticed the observer in CIC. He has been given the job of describing certain activities he sees there and of learning all he can about the operational aspects of CIC. His presence there should be ignored, so far as your own activities are concerned. He may ask an occasional question, or, if the weather is a little rough, disappear at intervals. Just remember that he is <u>not</u> there to evaluate you or anyone else, and go on with your job as though he were not present.

The specific instructions for you to follow begin on the next page. They are written in the form of steps, and specify what you are to do in giving us the information we want. If the procedure at any point is not clear ask the observer. Be sure to take your time. We would prefer that you do this when you have plenty of time to finish in one session. The observer will discuss this with you and make an appointment.

Step 1: Turn to the Biographical Information Form on the next page and use the blank spaces to provide the information requested. When you have finished go on to Step 2.

Biographical Information

Name: _____

Rank: _____ USN( ) USNR( )

Serial No.: _____

CIC Qual. Code: 16.60 ( ) 16.61 ( ) 16.62 ( ) 16.63 ( )

1. Indicate the number of months you have been assigned aboard this ship as:

   CIC Watch Officer _____ mos.

   Ass't CIC Officer _____ mos.

   CIC Officer _____ mos.

2. List your previous experience in CIC, giving the type of ship, your classification, and the number of months you were assigned in each case:

(Type of Ship)	CICO	Ass't CICO	CICWO	No. Months

3. Are you qualified as an air controller at the present time?

   Yes ( ) No ( )

4. List your present primary and secondary duties:

   Primary Duty

   _____

   _____

   Secondary Duty

   _____

   _____

5. Of the total time you spend on duty in CIC aboard this ship, indicate the approximate percentage of the time spent at General Quarters and the approximate percentage of the time spent during routine cruising watches:

General Quarters ____%

Cruising Watches ____%
Total..... 100 %

6. Indicate the CIC courses you have completed, the location of the school, and the length of the course in weeks:

CIC Course	Location of School	Weeks

7. If you have ever served in any of the following capacities, indicate which - the type of ship, the command, or the location of the shore station, whichever is most pertinent; and the number of months you served:

		(Ship Type)	(Command)	(School or Station)	Mos.
a.	Instructor at CIC school	( )			
b.	CIC Staff Officer	( )			
c.	ASW Officer	( )			
d.	Gunnery Officer Assistant Gunnery Officer Gunnery Liason Officer	( ) ( ) ( )			
e.	Communications Officer	( )			
f.	Electronics Materiel Officer	( )			
g.	Radar Control Officer	( )			
h.	Radar Observer (aircraft)	( )			

BioData-3

Air Controller Information

1. Months you have served as air controller on this ship _____

2. Approximate number of times you have controlled* aircraft during this time:

		(number of times)
CAP (LVI)	_____	
CAP (HVI)	_____	

Others:

		(no. of times)
_____	_____	
_____	_____	
_____	_____	
_____	_____	

*Control includes all situations in which you were in communication with airborne aircraft and issued instructions to such aircraft with respect to courses to fly (search plans), location of target, etc., ranging from the positive control situation for CAP to control of tractor planes, and search planes.

Step 2: On the next page is a checklist which is mostly self-explanatory. Its purpose is to give us an idea of the extensiveness of your duties in CIC.

What is wanted in each section is explained at the beginning of that section. When you are finished, go on to Step 3.

Some of the items in this checklist will not apply to your CIC duties aboard this ship, since it is intended for use with several types of ships.

Step 2 Checklist

1. Examine the following list of tactical situations or conditions. In Column I check those in which your ship has been engaged while you were on duty in CIC. (In doing this, include training exercises and take the time the ship was operating while you were assigned to your present duties in CIC as the basis for your answers.)

		I	II
A.	Maneuvering in Formation or Screen (Include Independent Steaming)	( )	( )
B.	ASW: A/S Surface Operations (Searches and Attacks)	( )	( )
C.	ASW: H/K Operations (Searches and Attacks)	( )	( )
D.	Air Control (Check only if you were the controller)	( )	( )
E.	AA Gunnery Coordination	( )	( )
F.	Other Air Defense Operations (Include A/C if you were not the controller)	( )	( )
G.	Air Operations (Check only if your ship is a carrier)	( )	( )
H.	Shore Bombardment	( )	( )
I.	Amphibious Landing Operations (Other than Shore Bombardment)	( )	( )
J.	Replenishment at Sea (In Task Force)	( )	( )
K.	Picket Duty (Tomcat and/or Watchdog)	( )	( )
L.	Other Picket Duty	( )	( )
M.	Radar Navigation near coastlines (Include VFR)	( )	( )
N.	Search and Rescue	( )	( )
O.	Passive ECM and/or Jamming	( )	( )
P.	Torpedo Attacks by own ship	( )	( )

2. In Column II, indicate the approximate relative frequency of occurrence of the situations or conditions you have checked in Column I. Write a 1 in the space opposite the most frequently occurring situations, a 2 opposite the next, and a 3 opposite the least frequently occurring situations. Again, use the time this ship was operating while you were aboard and had your present duties in CIC.

Step 3: (In this step, you will not need this booklet. The observer will ask you for it, because he needs it to prepare for the subsequent steps.)

The observer now will hand you a deck of cards. If you examine the cards, you will find printed on the front of each a sentence or two describing an activity in CIC. On the back of each card is a grid. Pay no attention to the grid, it merely is a recording device.

When you read the "activity statements"* you undoubtedly will see many which describe activities you personally never do in CIC. For example, some ordinarily are performed by radarmen. We realize this; the inclusion of such statements in the deck is intentional.

Your task will be to sort the deck of cards into two piles. Put cards describing activities you have done while aboard this ship, even if only once or twice, or if done only while temporarily relieving someone else, in one pile. Put cards describing activities you never have done at all while aboard this ship in the other pile. When you are finished, inform the observer. (Refer to the definitions of terms on the following page whenever necessary.)

*Because of its length, the list of activity statements is omitted from this report.

Step 4: Turn to the following page and examine the two duplicate checklists. Note that a space is provided along the top margins for entering card numbers. Along the left sides the observer has written in the tactical situations or conditions which he wishes you to consider in this step.

The operations you are to perform are as follows:

a. Take the deck of cards you have selected as representing CIC activities you have done aboard this ship. Consider each card in turn. If the activity represented by the statement on the card is one which obviously has no relationship to tactical situations, put the card in a separate pile. Such an activity would be, for example, shipboard training of radarmen while they are off-watch. You could not have performed this in CIC during a tactical event.

If you recall performing the activity during one of the tactical situations listed at the left of the checklist, write the card number at the top of the checklist, and place an X in the rectangle formed by the intersection of the card number column and the tactical situation row.

b. Repeat this operation for each card you have selected.

c. When you have finished the first checklist,* go on to the second. It is exactly the same as are those on succeeding pages. They were arranged in this fashion to make it easier for you to record.

d. Inform the observer when you are finished.

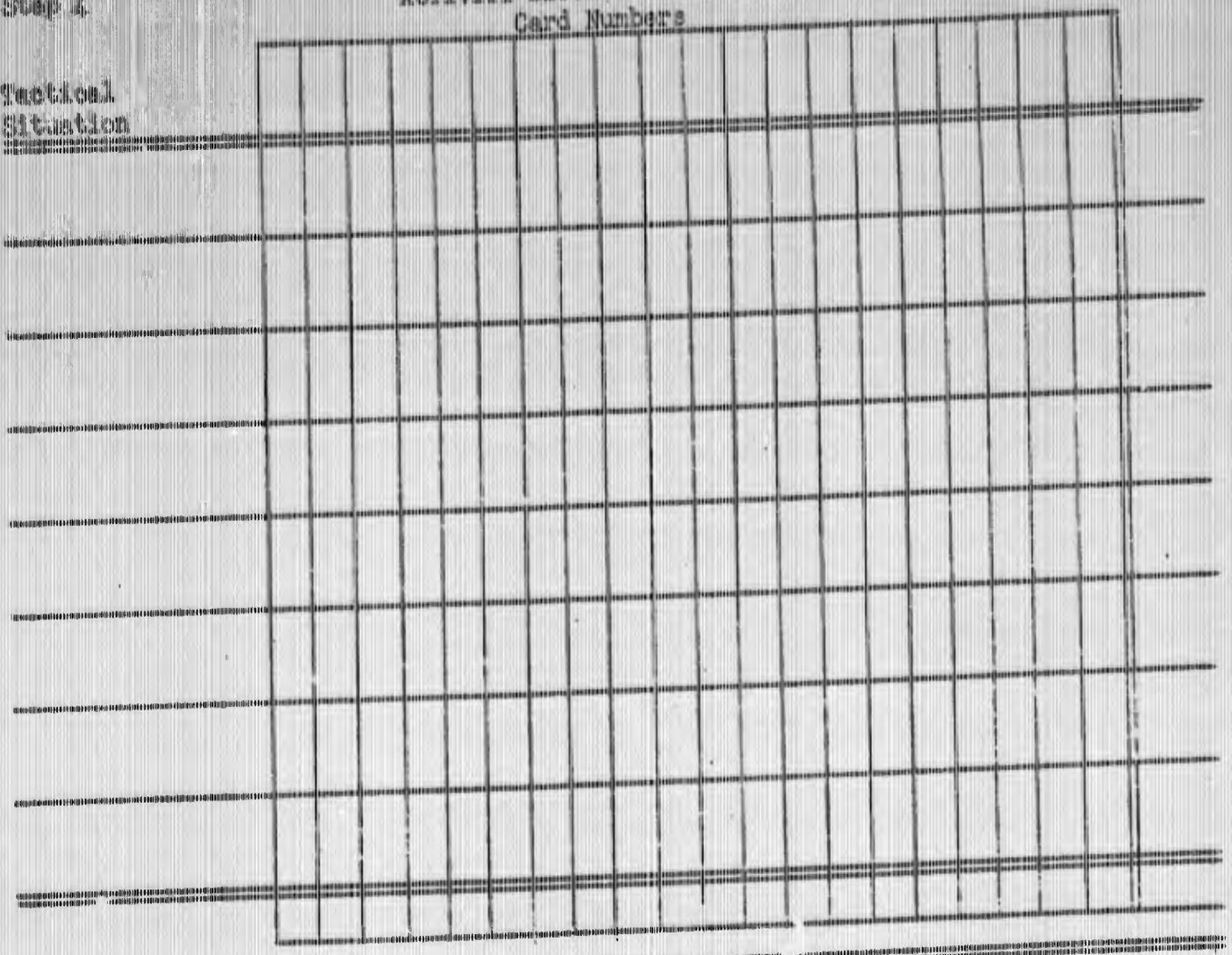
---

*From three to five sheets of these checklists were used by a subject. All were the same as the example included in this appendix.

Step 4. ACTIVITY-SITUATION CHECKLIST Sub_____

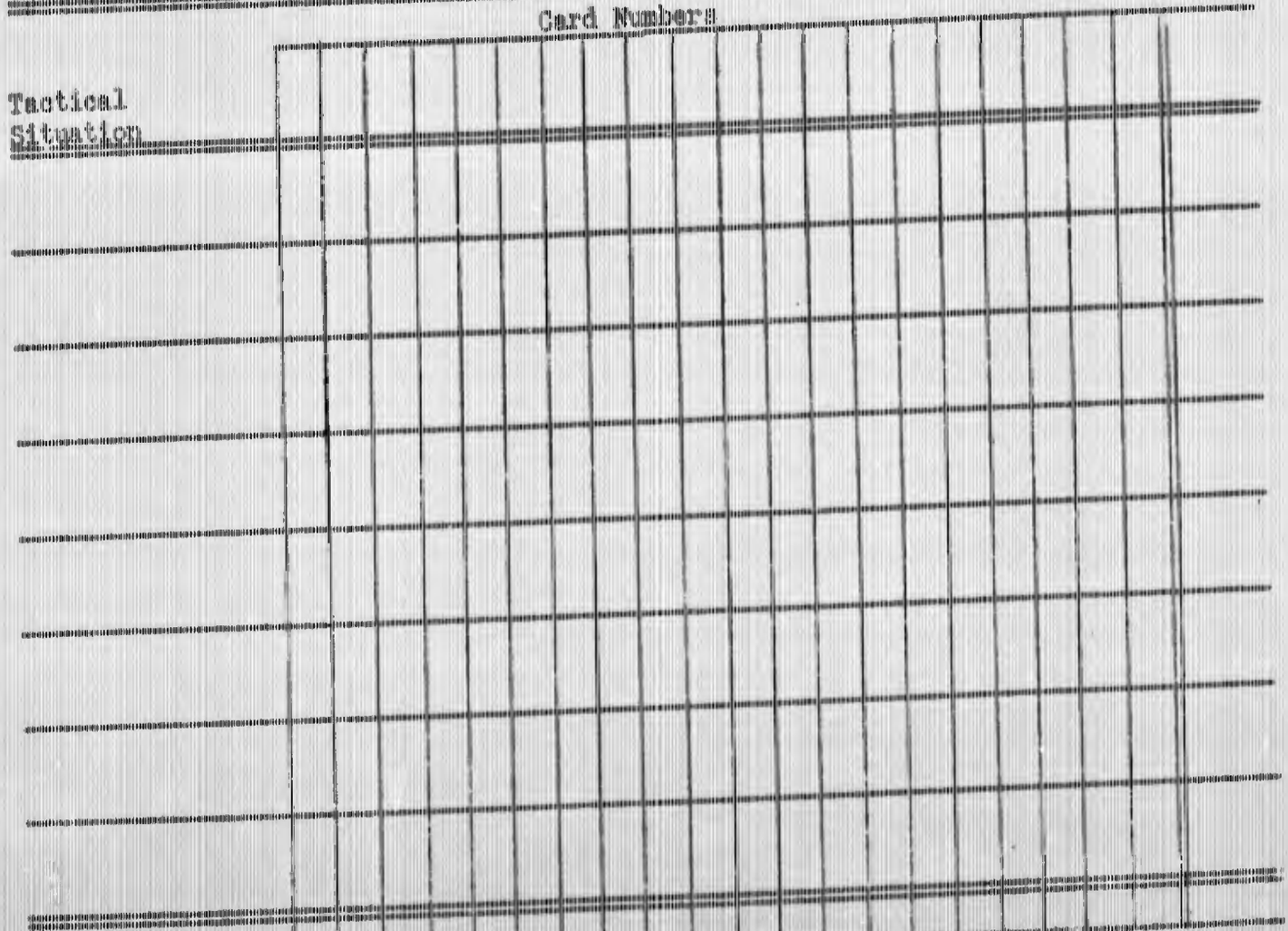
Card Numbers

Tactical Situation



Card Number

Tactical Situation



Step 5: In this operation, sort through the sample of cards, placing them in two piles. Select the statements representing activities which you have found to be somewhat more difficult to perform than the other activities represented in the deck. Place these more difficult activities in one pile. Place the other activity statements, representing easier activities, in the other pile.

You might think of an activity as being difficult either because of the skill or knowledge involved, or because it usually must be performed in situations which make extra demands of you. In this sort through the cards, work rather rapidly and do not hesitate over a judgment too long.

When you finish, each of the two piles should contain roughly one half of the cards.

Step 6: Now, as soon as the observer has finished recording, sort through the "more difficult" pile of cards and select those TEN cards representing activities which seem to you to be the most difficult ones for you to perform, under the circumstances in which they usually are done.

Inform the observer when you are through.

Step 7: (This is the last step.) First, read over the list of requirements on the next page. Most of these requirements are related to general, fundamental human abilities.

Use each of the ten cards you selected in Step 6. Consider the activity represented by the card in relation to the list of requirements.

For each activity statement, select three requirements which you believe are most involved in the activity, and which, so far as you are concerned, make the activity relatively difficult.

Enter the number of the card in a space in the top row of the checklist marked card number. Check each of the three requirements you selected for the activity, in this fashion:

Write a 1 in the column under the card number, opposite the requirement which you believe most demanding on you, of the three you are considering. Place a 2 in the cell opposite the more demanding, and a 3 in the cell opposite the least demanding of the three requirements.

Repeat the operation for each of the ten cards. You may write in additional requirements you feel are important on the next page after the checklist. Inform the observer when you are finished.

We realize that this has been quite a job to ask you to do. Your cooperation with the observer is greatly appreciated. Thank you.

ELECTRONICS PERSONNEL RESEARCH
University of Southern California

Step 7

Card Numbers

Requirements underlying the performance of activities

1. Requires manual skill in adjusting equipment controls
2. Requires manual skill in using plotting and computing aids
3. Requires extensive knowledge of operating procedures for electronic equipment
4. Requires precise reading of dials or indicators
5. Requires performing computations or conversions mentally
6. Requires finding one or more unknowns from a set of knowns
7. Requires forming a mental picture of tactical events outside CIC
8. Requires prediction of future movements from current information
9. Requires anticipation of what another individual in CIC is going to do, or need
10. Requires anticipation of the needs of control stations
11. Requires decisions based on evaluation of several related factors
12. Requires rapid performance with no time for correcting errors
13. Requires mental concentration during confusing or exciting events
14. Requires understanding technical language
15. Requires selection of pertinent facts from a mass of information

Step 7

Additional Requirements

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

5. _____

_____

APPENDIX B

The Performance-Oriented Techniques

CIC ACTIVITY RECORDING FORM A

OBSERVER_____ DATE_____ SHIP_____ CONDITION_____

P.S. CODE_____

(A) TIME-BASE	(B) ACTIVITY--CODE	(D) PERSON--STATION--THING	(E) VIA	(C) GIST	CODE WORD LIST
					ADJ
					ASK
					ASN
					CHK
					CHT
					CST
					COR
					DR
					FLR
					INF
					INP
					INS
					LOG
					LYO
					OPR
					ORD
					PLT
					REC
					RMD
					RLY
					SGN
					SHW
					SLV
					STR
					VEC
					WRN

DIARY RECORDING FORM B*

Describe each of the three types of critical incidents in these terms

1. Time Identifier _____ 2. Event Phase _____

3. PER. PACK. CESS (check one)**

4. Observed Signs _____

5. Antecedent Conditions _____

6. Nature of the Activity _____

*The three supplementary forms discussed in the text are omitted from this report.

**Code words for each type of incident.

APPENDIX C

The Consultant-Oriented Technique

CIC INFORMATION: CONSULTANT ANALYSIS

Task B
Electronics Personnel Research
University of Southern California

Project Designation NR 153-093
Contract Nonr-225(02)

INTRODUCTION

The University of Southern California has been requested by representatives of the Chief of Naval Operations and the Bureau of Personnel, Washington, D. C., to undertake a detailed description and analysis of certain officer billets in CIC.

A program for accomplishing this objective has been developed and currently is underway. One part of this program is concerned with the collection of information about certain aspects of the CIC Officer's job in common tactical situations, as he has learned it through shipboard experience.

THE PROBLEM

Written doctrine specifies general responsibilities of CIC and furnishes much technical information insofar as many tactical situations are concerned. However, we feel that a CIC Officer has to learn more than the material which is available in publications. It seems reasonable to believe that specific tactical situations pose for him special learning problems which can be solved only by an integration of information from publications (and schools) with extensive experience aboard a ship. He needs to learn what has to be done in order to meet the demands a particular tactical situation places on CIC.

We wish to analyze "what has to be done" in terms of (a) Necessary steps, and (b) Common complicating factors and remedial steps. In this analysis, necessary steps include: (1) Information the CIC Officer needs, (2) Decisions he must make, and (3) Activities he must perform as a tactical situation develops.

These necessary steps and the second aspect of "what has to be done." Common complicating factors and remedial steps, will be defined in more detail later.

In the analysis of tactical situations as events which make special demands on the CIC Officer and his team, the time relationship between the occurrence of the "external" action of the situation and the anticipation of that action by "internal" activities in CIC is important. In some tactical situations, at least, there is a "critical time," corresponding to the moment weapons control stations must commit themselves. Before, and up to this "critical time," there appears to be some opportunity in CIC for choice of alternatives, correction of errors, and other adjustive operations to occur. But, as this critical time approaches, such opportunities probably diminish. This time relationship will be taken into account in the analysis of tactical situations as progressively developing events, by considering the following time phases: I. Preparation, II. Initiation-Approach, III. Action, and IV. Readjustment. The meaning of these time phases will be discussed later. (It is recognized that not <u>all</u> tactical situations contain clearly discernible phases, and that in these cases this part of the analysis may be difficult to apply.)

To insure a uniform frame of reference for the information we need, a standard outline has been developed which embodies the above points. This outline is based on the conception of a tactical situation (e.g., shore bombardment) as an event which superimposes certain additional functions and activities on those ordinarily required of CIC during "steaming watches."

We are consulting you as an expert in CIC who has accumulated in-

valuable practical knowledge through shipboard experience. We would like for you to read over the outline and its description as set forth below and then to work through the remainder of the material, following the instructions which precede each section.

THE OUTLINE

This outline has two descriptive dimensions: (1) "What the CIC Officer has to do," and (2) The four time phases which are applicable to many tactical situations:

I. Basic aspects of the CIC Officer's job in tactical situations.
   - A. Necessary Steps:
     1. Information which the CIC Officer must have.
     2. Decisions which the CIC Officer must make.
     3. Activities which the CIC Officer must perform.
   - B. Common Complicating Factors and Remedial Steps:
     1. Complicating factors which may handicap CIC performance:
        - a. Long range
        - b. Short range
     2. Remedial steps the CIC Officer can take:
        - a. Long range
        - b. Short range

II. The time phases in a tactical situation:
   - A. Phase I: Preparation
   - B. Phase II: Initiation-Approach
   - C. Phase III: Action
   - D. Phase IV: Readjustment

To establish what is meant by each, an elaboration of these headings follows. They are discussed in the same order as listed in the outline.

(I. Basic aspects of the CIC Officer's job in tactical situations.)

A. Necessary Steps. These should be thought of in terms of the information the CIC Officer must have, the decisions he must make, and the tasks he must perform during a particular time phase - in order to insure that he and his CIC adequately discharge their responsibilities

to command and other stations. Probably no two occurrences of the same tactical situation are exactly alike, and therefore each occurrence may involve some unique information, decisions, or activities. But, there must be a basic group of each of these three aspects of the job which is common to nearly all occurrences of a particular type of tactical situation.

Information which the CIC Officer must have should be thought of as that which is immediately related to the tactical situation, rather than general knowledge the CIC officer also needs. Decisions which the CIC Officer must make would be those he usually is confronted with during a particular time phase, either with respect to supervising his team or with respect to evaluation and dissemination of information. Activities which the CIC Officer must perform are to be considered in the same immediate relationship to the tactical situation: What must a CIC Officer do at a particular time phase to make sure that his team will function properly and that his CIC's part in the situation will be done, including those things he must make sure members of his team do?

B. Common Complicating Factors and Remedial Steps. The two aspects of this are:

Complicating factors which may handicap CIC performance. This heading refers to more or less accidental events, as well as to human deficiencies and errors, which jeopardize the success of a CIC's performance during a particular time phase. Obviously, there are both long range complicating factors (e.g. shortage of trained radarmen) and short range factors (such as equipment failure during a time phase). Both of these are included under this heading, although the short range factors have more immediacy and may therefore require more positive action from the

CIC Officer.

Remedial steps (LR and SR). This heading refers to action the CIC Officer may take to compensate for, or correct for, the occurrence of one or more complicating factors during a time phase. For example, he may be able to switch to a secondary circuit if communications fail on a primary circuit. Of course, he may not be able to do anything about some of these complicating factors during the time phase. Long range remedial steps, such as shipboard training programs, also should be mentioned where appropriate.

(II. The time phases in a tactical situation.)

The beginning and end of each of these phases will be described in general terms. In understanding what we mean by time phase, it will be helpful to think of two parallel series of events in a tactical situation: those events which occur external to CIC, and those which occur inside CIC more or less in anticipation of the external events. The descriptive material we want for each time phase pertains to events inside CIC, but the beginnings and ends of the time phases usually are determined by the external events.

PHASE I: Preparation. We are interested here more in the immediate preparation which takes place when some particular tactical situation is imminent, rather than in long range training. This phase begins when CIC receives word that a specific tactical situation (e.g., air control, ASW search and attack, shore bombardment, etc.) is imminent or is going to take place at a specified time. The phase ends at that time specified for the beginning of the tactical situation, or, when it is begun by an order from command, a sonar or radar contact, or other precipitating

departure. In air control, for example, this phase would begin when the air controller receives word he is to assume control of a CAP at such and such a time.

PHASE II: Initiation-Approach. This phase begins when the "external events" of the tactical situation begin, either at a previously specified time or as precipitated by a sonar or radar contact, or order from command. It ends when control stations actually begin employing weapons. (In air control this phase would begin when the air controller assumes control of a CAP.)

PHASE III: Action. This phase begins when control stations begin employing weapons and ends when firing, etc., ceases. (In air control this phase begins when the CAP makes contact with the raid.)

PHASE IV: Readjustment. This phase starts when the active employment of weapons ceases and/or the mission of the control stations is accomplished. In CIC it would involve those steps necessary to bring the operational level of CIC back to the condition which prevailed before Phase I of the tactical situation began. (In air control, this phase IV begins when the CAP reports mission accomplished or failed.)

Obviously, there will be some situations to which this phasic analysis cannot be applied easily. In ASW, for example, we recognize that there may be several cycles of search-attack activity on the part of a destroyer before the submarine either escapes or is (theoretically) destroyed. Generally, these cycles can be included under one action phase (III). The same would apply to air defense exercises in which there is successive involvement with a number of targets.

A similar problem exists if the outline is to be applied to radar navigation near coast lines and in channels. The action phase would comprise the entire time the vessel is being navigated by radar while near land.

Finally, phases I and II may overlap. In the case of an unexpected sonar contact, for example, it is possible that the CIC officer (or Watch Officer) will have to initiate whatever preparation in CIC is necessary while the ship is in the initiation-approach phase.

We would appreciate it if you would supply the information which is requested on the following pages. The forms have been designed for your convenience.

YOU, AND THE OTHER EXPERIENCED CIC OFFICERS LIKE YOU, REPRESENT THE ONLY SOURCE OF THIS INFORMATION. WE BELIEVE IT WILL BE BOTH INFORMATIVE AND USEFUL TO THOSE MANAGEMENT ECHELONS IN THE NAVY WHICH ARE CONCERNED WITH HUMAN FACTORS. THEREFORE, YOUR COOPERATION WILL BE MOST GRATEFULLY APPRECIATED.

In filling out the outline, please be as brief as is consistent with clarity, by listing in a sentence or two each item of information you are supplying.

A. Identifying Information

1. Name _____ 2. Rank _____

3. Present CIC Duty _____

4. CIC Experience:

a. CIC Schools Attended

	Months
_____	_____
_____	_____
_____	_____
_____	_____

b. Ship Types:

	(Months in Each Position) CIC Officer	Assistant CICO	CIC Watch Officer
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

c. Other CIC Duty

	Months
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

B. We are interested in obtaining information about the CIC Officer's job in the following tactical situations. Check the ones for which you are supplying this information.

Air Control

LVI intercepts. . . . . ( )

HVI intercepts. . . . . ( )

Searches and patrols. . . . . ( )

Gunnery

Shore Bombardment: callfire. . . . . ( )

Shore Bombardment: prearranged . . . . . ( )

AA Gunnery and Co-ord . . . . . ( )

Surface Action. . . . . ( )

ASW

A/S Searches. . . . . ( )

A/S Attacks . . . . . ( )

H/K: Air Searches . . . . . ( )

Surface Action Units . . . . . ( )

Screening Operations. . . . . ( )

Amphibious Landing Operations

(Taoron activities during) . . . . . ( )

(CIC Officer on AGC during). . . . . ( )

Radar Navigation (coastlines and channels). . . . . ( )

Replenishment in Task Force . . . . . ( )

ECM: active. . . . . ( )

passive . . . . . ( )

Search and Rescue . . . . . ( )

Torpedo Attacks by Own Ship . . . . . ( )

C. While the orientation of this outline primarily is in terms of the CIC Officer of an individual ship, we also are interested in the job of the group CIC Officer. Indicate which of these two jobs you are going to describe when filling out the outline.

____ Individual Ship CIC Officer: Type of Ship _____

____ Group CIC Officer: Size of Unit _____

D. The headings of the outline are given below, with spaces provided for lists of necessary steps, complicating factors, etc. Spaces also are provided for your own judgments as to when time phases begin and end in a specific situation. A complete set of forms for the necessary steps part of the outline are provided for each of the four time phases. For the complete analysis of a tactical situation, this section of the outline should be done for each time phase.

Tactical Situation _____

			(Check One)
TIME PHASE:	I.	Preparation	( )
	II.	Initiation-Approach	( )
	III.	Action	( )
	IV.	Readjustment	( )

Time Phase Begins: _____

_____

_____

Time Phase Ends: _____

_____

_____

Note: This and the following forms were supplied in the consultant's booklet for each of the four phases of a tactical situation.

1. Data aspect of the CIC officer's job in the tactical situation.
   A. Necessary Steps
      1. Information which the CIC Officer must have in this phase:
         a. _____
         b. _____
         c. _____
         d. _____
         e. _____
         f. _____
         g. _____
         h. _____
         i. _____
         j. _____
         k. _____
         l. _____
         m. _____
         n. _____
         o. _____
         p. _____
         q. _____
         r. _____
         s. _____
         t. _____
         u. _____
         v. _____
         w. _____
         x. _____
         y. _____
         z. _____

2. Decisions which the CIC Officer must make in this phase:

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

i. _____

j. _____

k. _____

l. _____

m. _____

n. _____

o. _____

p. _____

q. _____

r. _____

s. _____

t. _____

u. _____

v. _____

w. _____

x. _____

y. _____

z. _____

3. Activities which the GIC officer must perform in this phase (Include supervisory activities)

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

i. _____

j. _____

k. _____

l. _____

m. _____

n. _____

o. _____

p. _____

q. _____

r. _____

s. _____

t. _____

u. _____

v. _____

w. _____

x. _____

y. _____

z. _____

D. Common Complicating Factors and Remedial Steps:

1. Common Complicating Factors which may Handicap CIC Performance:

Short Range:

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

i. _____

j. _____

Long Range:

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

i. _____

j. _____

2. Records, Steps

Short Range:

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

i. _____

j. _____

Long Range:

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

i. _____

j. _____