TASK ANALYSIS OF U. S. NAVY ENLISTED RADIOMEN WITH EMPHASIS ON TECHNICAL CONTROLLERS AT THE U. S. NAVAL COMMUNICATIONS STATION, SAN FRANCISCO, CALIFORNIA

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THESIS

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Task Analysis of U. S. Navy Enlisted Radiomen With Emphasis on Technical Controllers at the U. S. Naval Communications Station, San Francisco, California

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ABSTRACT

This report summarizes occupational analysis conducted in the United States, placing particular emphasis on the efforts of the military services. It presents an explanation of current task analysis procedure and computer programs used by the U. S. Navy in its occupational research. And, it describes how such methodology was used to conduct a task analysis of U. S. Navy enlisted radiomen. The results of that study are presented. It is concluded that further task analysis of U. S. Navy enlisted radiomen is desirable to improve organizational efficiency and the effectiveness of training.

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TASK ANALYSIS OF U.S.NAVY ENLISTED RADIOMEN AT THE U.S.NAVY COMMUNICATIONS STATION SAN FRANCISCO, CALIFORNIA (WITH EMPHASIS ON TECHNICAL CONTROLLERS)

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I. HISTORY AND BACKGROUND OF AMERICAN JOB ANALYSIS

A. EARLY JOB ANALYSIS IN THE UNITED STATES

Modern concepts of industrial management first made their appearance late during the nineteenth century in the writings of Henri Fayol, a Frenchman, and Frederick W. Taylor, an American. Both men were self-educated engineers whose early professional lives were spent pursuing their technical disciplines. However, as each man gained industrial experience, he advanced from the performance of narrowly defined engineering tasks to broader and less distinct managerial functions. As time passed, Fayol and Taylor independently arrived at the conclusion that managers and supervisors at every level of governmental and industrial activity could utilize certain principles to guide them in the marshalling of human and material resources for more effective and efficient production of goods and services. They reasoned that managers could develop theory upon which to found the basis for their procedures just as engineers, mathematicians and scientists had in preceding centuries.

An important element of emerging management theory for both Fayol and Taylor was occupational analysis, that is, defining what, how and why people did their jobs. Fayol concentrated on the attributes and functions of the manager while Taylor examined the industrial assembly-line worker.

In his writings, Fayol listed both the principal functions, as he viewed them, of every manager and the different aptitudes necessary to

successfully perform such tasks. Among the activities he listed as being conducted by managers were the following: technical, commercial, financial, security, accounting and managerial. Then he constructed a two dimensional array containing as one set of determinants the six managerial functions listed above and, as the other, seven different levels of employment within an industrial organization from workman through general manager. The array was completed by assigning percentage values to each element of the matrix which represented the proportion of an individual's total work consumed by a specific managerial function. This simple device represented one of the very earliest attempts to define job content.

Taylor approached the subject of occupational analysis by a wholly different route. First as a gang boss in the employ of the Midvale Steel Company and later as a plant superintendent in the steel industry he became convinced that individual worker productivity could and should be vastly improved. So, over a period of years he conducted extensive time and motion studies of workers performing their routine tasks. He used the results of his work to modify the work methods of employers under his supervision.

Finally in 1903 after more than 20 years of conceptual thinking, analysis, observation and evaluation of production line tasks, Taylor presented a paper before the American Society of Mechanical Engineers (ASME) entitled "Shop Management". In it, he outlined his findings as they had been practiced at industrial activities under his supervision

and his experience as a management consultant. He emphasized that work could be evaluated and its content carefully defined by time and motion studies. Their objective was the restructuring of tasks to permit greater productivity per man hour with a more economical use of materials and human effort. The traditional thesis that higher output could be achieved by forcing men to work harder was rejected. Also cited, was the premise that tasks could be simplified after their content was known by subdividing them into elements which were less comprehensive. Training requirements would thus be reduced and the investment necessary in terms of time spent before workers were able to contribute fully to plant operations would be lessened. Mental demands on relatively unsophisticated employees would also be diminished. An important shortcoming of this presentation, though, was that Taylor had neglected to assay the impact that his views would have upon the workers psychologically both in terms of their job satisfaction and employment security.

Because papers laid before the ASME were restricted in length, Taylor later withdrew "Shop Management" from presentation and expanded it to form another paper entitled "Principles of Scientific Management" which he had published at his own expense and distributed to the membership of the ASME in 1911.

Industrial executives, the target of Taylor's philosophy, had in the meantime begun implementing his ideas. And, it was their usage by the United States Army in arsenal production that attracted the opposition of organized labor which resulted in an investigation by a committee

of the House of Representatives in 1912. Testimony given by Taylor before this committee attempted to refute labor's criticism that scientific management, as it was called at the time, would culminate in massive unemployment amongst factory laborers, but political pressure on Congress arising from union unrest prevailed and Taylor's beliefs were censured.

The work of Taylor survived, though, and went on to become one of the foundations of that branch of management today known as industrial engineering and continues to be used in those aspects of job analysis geared expressly towards increasing worker productivity per unit time.

American participation in the First World War re-enforced the position of occupational analysis as a management tool. Personnel specialists in the U. S. Army applied the techniques of Taylor and other pioneers, using them to analyze jobs into their components. Following the analysis stage, job specifications were written which defined what a worker in a military occupation was expected to do and to be. And on the basis of such specifications, men were selected to fill positions in the military organization then being constructed.[1]

After the end of the war, job analysis appeared once more in civilian life. In education, it was termed vocational analysis and was used as an instrument to assist young people in the choice of vocations. A pioneer study by Frederick J. Allen entitled "The Machinist" had appeared

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[1] Encyclopedia Britannica, vol. 13, p. 78, University of Chicago, 1950.

as early as 1910 on this subject. Significantly, the same methods were being used to analyze careers as had been presented by the efficiency engineers of the Taylor school.[2]

In addition to guidance or vocational counseling, educators were employing vocational analysis as the standard around which to design formal job training courses whose purpose was the training of students for jobs available in the local community. Richmond, Virginia, in 1914 took the lead in performing the first citywide study to catalogue and define the content of the occupations found in its metropolitan area and the labor needs that arose from such employment opportunities.[3] Many other communities followed in Richmond's footsteps with Cleveland, Ohio, conducting one of the most thorough surveys.

Research was continuing in the field and had expanded to encompass how people learned the tasks comprising their jobs and the rate at which they were able to assimilate new information or skills. Particularly important with respect to learning rates were Bryan and Harter's investigations on the performance of telegraph operators during various stages of their training.

B. JOB ANALYSIS IN THE U. S. DEPARTMENT OF LABOR

With the Great Depression of the 1930's as a catalyst, Congress in June 1933 passed the Wagner-Peyser Act establishing the United States

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[2] Ibid., p. 78.

[3] Ibid., p. 78.

[4] Ibid., p. 78.

Employment Service.[5] This piece of legislation provided for the development of a national public employment agency whose mission would be the registration of individuals in the working population according to their occupational characteristics. In scale, this effort was unprecedented in the history of the country and probably the world.

Broadly speaking, the objectives of the Employment Service were to facilitate the placement of unemployed persons in gainful jobs; provision of vocational guidance to individuals seeking an occupation; assistance to employers in establishment of effective recruiting programs; and reduction of time lost through trial and error recruiting procedures which often selected people for jobs they were unsuited to hold.

Administration of such an ambitious undertaking necessitated a comprehensive body of information distilled from occupational data that could be used for reference purposes. To fulfill this need, an occupational research program was initiated operating under the advice of a special board of individuals having wide technical experience in personnel management and research for educational governmental and industrial organizations. Members of this board felt two principles should serve as the foundation for the Employment Service's research. In the first instance, research should provide for an extensive gathering and processing of data to obtain a panoramic view of the occupations

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[5] Lewis, Leon, Job Analysis In The United States Training and Employment Service, p. 33, paper presented at the 77th Annual Convention of The American Psychological Association, Washington, D. C. September 1969.

currently existing within the American economy. A standardized concept of each occupation should emerge from this process. Secondly, all data should be gathered at the source, that is, from direct observation of the worker to ensure that an objective impression was obtained of the work as it was being performed; not as it was supposed to be done. At all costs, it was essential that an idealized, academic statement of the occupational structure be avoided.

Techniques developed during the 1930's for analyzing work reflected the tenor of the times. The job market suffered a surfeit of qualified workers and a shortage of unoccupied jobs. Consequently, data collection instruments were designed which stressed the content of tasks performed and placed little emphasis on characteristics required by the worker if he was to be optimally matched to the job. Only three types of background information or variables were solicited from job incumbents: experience, training and performance requirements (responsibilities; job knowledge; mental application; dexterity and accuracy.)[6]

Economic recovery in the late 1930's and the deteriorating international situation in the Far East and Europe raised industrial production in the United States from the doldrums of the Depression. Full employment economic conditions soon followed with the outbreak of war in Europe and America's move towards military preparedness and aid to potential allies. This created a situation where many base entry level

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[6] Ibid., p. 34

workers were entering jobs for which they had had no previous experience. Accordingly, it was essential that the nation devise methods to manage its manpower resources effectively.

Job survey techniques were modified to obtain more background data on job incumbents to facilitate obtaining information permitting accurate placement of people in jobs for which their abilities fitted them. Personnel turbulence and training time would thus be reduced.

Research instruments were modified to meet the changed objectives of job analysis and incorporated forms for recording the physical demands of jobs and worker traits required.[7] The data collected from surveys made during this period was used to compile the Dictionary of Occupational Titles. This document was used for counseling and placement of base entry workers.[8] After the war, this line of approach was continued. The emphasis changed from personnel management in a full employment economy to serving the needs of a rapidly advancing technology. The postwar economy was creating entirely new types of employment which had not previously existed. Later, in the 1950's, the emphasis started to shift again. This time the objective was the placement of disadvantaged persons into productive jobs.

C. JOB ANALYSIS IN THE U. S. AIR FORCE

Postwar U. S. occupational research was led by the United States Air Force. During the decade of the 1950's, mission oriented officers

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[7] Ibid., p. 34.

[8] Ibid., p. 34.

at Air Force Headquarters strongly emphasized the need for tools that would permit more effective usage of personnel resources throughout the Air Force organization. Specific objectives in mind from the very first were elimination of redundant training and the reformation of curricula in Air Force technical schools so as to reduce, where possible, the amount of time personnel spent in training before transfer to operational commands.

At first, leading members of the Air Force's behavioral research group resisted entering the field of occupational research, maintaining that they did not possess the necessary tools or backgrounds to handle the job. This position was not held long and by 1958 full scale work was underway to determine what methods of occupational analysis would best serve Air Force operational requirements.[9]

Preliminary research by Rupe in 1950 had disclosed five different methods of gathering the type of occupational data felt to be needed if job analysis was to yield meaningful results. The methods he investigated included:

(a) the individual interview where job incumbents are questioned at a location other than their work activity;

(b) the observation interview during which the worker is interviewed and observed while he performs his work thus giving the analyst an opportunity to ask questions about work functions as he sees them being performed;

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[9] Christal, Raymond E., Collecting Analyzing and Reporting Information Describing Jobs and Occupations, p. 77, paper presented at the 77th Annual Convention of The American Psychological Association, Washington, D. C., September 1969.

(c) the group interview where job incumbents are assembled together and administered a questionnaire under supervision of a task analyst;

(d) the technical conference in which a group of job experts, usually senior personnel in the occupational specialty, are questioned collectively by a job analyst; and

(e) the mail survey questionnaire to which job incumbents respond individually.[10]

Additional research by Rupe (1956) led him to the conclusion that whatever form of data collection the Air Force ultimately adopted it would have to be quantifiable. Data in verbal form were just too difficult and time consuming to process. Verbal data also suffered from a noticeable lack of objectivity, since each job analyst evaluated worker responses to questionnaires and interview participation in a different manner.

Large scale data collection with its attendant mass surveys suggested to Rupe that the only practical means of attack lay in the checklist method or as it has since become known, the task inventory.[11] Advantages of the checklist as refined by the Air Force were that it was economical to issue, produced quantifiable data and could be adapted for computer processing. Additionally, usage of a checklist assisted the personnel to whom it was given by avoiding the utilization of verbal

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[10] Marsh, Joseph E., Collecting, Analyzing and Reporting Information Describing Jobs In the United States Air Force, p. 43, paper presented at the 77th Annual Convention of The American Psychological Association, Washington, D. C., September 1969.

[11] Ibid., p. 43

skills and relying only on recognition.[12] These characteristics are important since one of the chief objections to questionnaires had been the fact that without suggestion many job incumbents simply could not remember what they did. It was also true that many individuals had been found unable to express themselves in writing sufficiently well enough to produce intelligible and relevant responses.[13]

The approach eventually adopted, and in current use by the Air Force, contained elements of both the checklist and questionnaire methods of data collection for job analysis.

An Air Force occupational survey customarily begins with the request from an operational command for information pertaining to an enlisted or officer occupational specialty of interest to the user. Such occupational specialties within the Air Force are termed career ladders and are composed of a group of vertically arranged job specialties involving basically similar knowledge and skills. Job specialties themselves consist of positions which require common qualifications. Statements in the task inventory, therefore, are applicable to all personnel regardless of paygrade serving in the specialty.

Commonly, a task inventory consists of from 200 to 400 task statements. These statements are derived by conducting a thorough review of

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[12] Personnel Research Division, Air Force Human Resources Laboratory Report WADD-TR-61-113, Job Analysis in the United States Air Force, by Joseph E. Marsh, Joseph M. Madden, Major, USAF, and Raymond E. Christal, p. 7, February 1961.

[13] Ibid., 1. 6

the literature describing the field. They are structured so as to begin with action verbs and kept as brief as possible while avoiding ambiguity and generalities. They are as specific as the description of a particular task will permit and arranged alphabetically beneath the duty to which they belong.[14] Duties by Air Force definition compose a large segment of the work done by an individual and thus form a major portion of each job.[15] Tasks, as detailed by the task statements contained in an inventory, are those units of work activity forming a constant and significant part of a duty. Thus, tasks are those things that an individual, regardless of his geographic or organizational location, could be expected to perform as part of his work if he were held responsible for execution of a designated duty.[16] The position occupied by an individual within an organization is a grouping of the duties for which one person is responsible.[17]

After completion of a preliminary task inventory, it is submitted to a field review by senior position incumbents at selected installations in dispersed geographic locations. Reviewers are charged with the addition or deletion of task statements from the inventory in order that the data collection instrument reflect the most up-to-date picture of the

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[14] Joseph E. Marsh, op. cit., p. 44.

[15] Joseph E. Marsh, Joseph M. Madden, Major, USAF., Raymond E. Christal, op. cit., p. 3.

[16] Ibid., p. 3.

[17] Ibid., p. 3.

occupational specialty available. When returned to the job analysts, the inventory reviews are collated with the preliminary document to yield the final version.

Operational administration of the task inventories is conducted by mailing a complete packet containing inventories and directions to as many installations as necessary to provide a sample of adequate size. Ordinarily, samples contain at least 200 cases. Where an occupational specialty is smaller than this number a 100 percent census is used.[18]

Task inventories are organized with the directions and background information preceding the task lists. Tasks are arranged alphabetically beneath their respective duties. Response areas are provided for in columns at the right-hand edge of each page. The first column is checked by the respondent if he performs the task to which it corresponds. Next, if there are any tasks which the individual performs but which were not listed, he adds them in the space provided at the bottom of the page or at the end of the booklet. Classified tasks are not included in the inventory. In this manner, the respondent works through all of the duties. When finished, the review is repeated and tasks are time rated according to a relative weighting scale arranged in ascending order of time spent performing the task from one to seven. Finally, if there is a third column at the right it is completed as directed in the instructions.

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[18] Personnel Research Division, Air Force Human Resources Laboratory Report PRL-TR-67-11, Procedural Guide for Conducting Occupational Surveys in the United States Air Force, by Joseph E. Marsh and Wayne B. Archer, p. 21, September 1967.

Where inventories are issued to enlisted personnel, they are proctored by a command training officer specially indoctrinated for this purpose. Officer inventories are self-administered.[19]

Relatively few inventories from full scale field sampling contain write-in tasks. And, the more complete the inventory, the greater is the tendency for this to be the case.

Validity of information obtained from task inventories has been challenged but Air Force research seems to indicate that the quality and objectivity of data produced by their method is very good. Direct observation of worker task performance has not been used as a criteria for judging information quality because the presence of an outside observer was felt to influence the job incumbent to behave in a manner different from his usual norm. It was also considered unlikely that the analyst would be present long enough to observe every type of task which the worker performed. Indirect forms of analysis were, therefore, used to ascertain task inventory reliability and validity. Research results and methods utilized may be summarized as follows:

(1) Lie detector questions of several types were inserted into task inventories. Task statements worded differently but pertaining to the same task were found to elicit similar responses. Tasks known not to be part of the occupational specialty but intentionally included in the inventory were usually skipped by respondents.

(2) The same inventory issued to job incumbents on several different occasions generally produced similar responses particularly in terms of such task rating factors as time spent or difficulty.

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[19] Ibid., p. 45.

(3) Job information gathered from daily work records corresponded with that obtained from task inventories even though the response method and sample size were much different.

(4) Supervisors issued the same task inventories as their subordinates tended to exhibit a high level of agreement in terms of tasks performed but differed somewhat with respect to the time spent ratings.

The last of the above mentioned research results was adjudged to result from the fact that supervisors were not in sufficiently close contact with subordinates to rate time consumed in task performance as accurately as is commonly supposed.[20]

The heart of the Air Force system of job analysis as seen by the directors of the effort is the application of the electronic computer to assist both the construction of task inventories and analysis of data obtained from surveys.[21]

Computer capability is applied during the inventory construction phase when alphabetic task lists are constructed as the machine searches through all applicable tasks using a selection of pertinent key words. Administration of completed inventories is facilitated by having the computer select the sample population from Air Force personnel records using the last several digits of the members' service numbers. And, finally, the computer prints the mailing labels which will address each inventory packet to its proper destination.[22]

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[20] Joseph E. Marsh, op. cit., p. 45.

[21] Ibid., p. 45

[22] Joseph E. Marsh and Wayne B. Archer, op. cit., p. 21.

Electronic data processing makes its most significant impact in the area of data analysis using a complicated program containing over 50,000 instructions to cluster tasks into composite job descriptions. Such descriptions may be computed for any group of individuals where cases can be defined in terms of background variables. As many as nine different variables can be used in this process.[23]

The format of the group job description printout lists all tasks that are included in the job description. The printout's columns, progressing towards the righthand edge of each page, show the following: the percentages of all members within the group who perform the task, the average percent of each incumbent's total work time consumed performing the task, the average percent of time spent by all group members on the enumerated task including those not performing it, and the cumulative average time spent by all group members in the performance of all the tasks contained in the list up to and including the item of interest. This last column is additive with each succeeding task contributing to the total whose summation is equal to 100 percent of the working time of the group. Cumulative time spent forms the essence of the job description.

Job descriptions are also available that are built around duties. The format of presentation is similar to job descriptions constructed from task clustering except that the process employs duties rather than tasks.

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[23] Personnel Research Division, Air Force Human Resources Laboratory Report PRL-TR-66-19, Impact of the Computer on Job Analysis in the United States Air Force, by Joseph E. Marsh and Raymond E. Christal, p. 2, October 1966.

Job type descriptions are still another variation of the clustering process. In this instance, various groups of individual job descriptions based upon tasks are brought together and compared using the amount of overlap or similarity between different groups. Those jobs having the most similarity are joined together at each successive stage of the clustering process thus reducing the total number of independent groups with each iteration. This process is continued until only one composite group remains. A record is made at each iteration indicating the amount of homogenity in the group to that point and the number of members in the group. The general rule for establishment of a job type is that the best overlap between any two groups being combined at a "stage" or iteration in the clustering process must be at least 35 percent. And, the average overlap between all members of the new group must be at least 50 percent.[24] Overlap, as used in this sense, describes the degree of homogenity existing among individuals in a group or between merging groups in the clustering process. It is defined for two merging groups or individuals as being the "smaller of the two 'percent time spent' values on the task and the total overlap between the two individuals is the sum of their task overlap values."[25] Computation of total overlap between groups is performed in the same manner as that for individuals.

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[24] Personnel Research Division, Air Force Human Resources Laboratory Report PRL-TR-66-12, Computation of Group Job Descriptions from Occupational Survey Data, by Wayne B. Archer, p. 24, December 1966.

[25] Ibid., p. 10.

Many other presentations are available from Air Force data including: difference and similarity analysis, statistics on background variables in the form of means, standard deviations, and the distribution of responses within a group, and analyses of task rating factors such as difficulty, criticality, frequency of task performance and training required.

D. JOB ANALYSIS IN THE U. S. MARINE CORPS

Post World War II job analysis in the U. S. Marine Corps began under the impetus of a memo from the Joint Chiefs of Staff to the Secretary of Defense in August of 1949. This document stated:

> "Initiate a study to determine the most appropriate methodology and techniques of military job analysis and job evaluation; determine the extent to which the unilateral analyses accomplished to date are valid with relation to methodology; provide for such further job analysis as may be required and initiate a study to relate all Army, Navy, and Air Force jobs to a common occupational structure."[26]

Following the recommendations concerning job analysis given to him by the Joint Chiefs of Staff, the Secretary of Defense directed a paper on the subject to the Chairman of the Personnel Policy Board. In part, this paper stated:

> "Present mobilization plans are based on the promise that during an emergency, the manpower resources of the nation will be allocated between the Department of Defense and the civilian economy on the basis of need. It is expected that 'rationing' will be confined to a limited number of 'critical' occupations. Implicit in this concept, however, is the idea that each group must present proof of its needs for such manpower. Such proof can best be presented by the Department of Defense only after analysis of military jobs..."[27]

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[26] Van Cleve, R. R., Collecting, Analyzing, And Reporting Information Describing Jobs and Occupations, p. 65, paper presented at the 77th Annual Convention of The American Psychological Association, Washington, D. C., September 1969.

[27] Ibid., p. 65.

Marine Corps job analysis commenced at this point. Officers and enlisted personnel were assigned world-wide to the project. They were directed to gather data about Marine Corps tasks, correlate it to the then existing job structure, and develop recommendations for revising the occupational structure. Budget ceilings and the Korean War intervened to bring the job analysis program to a halt, but not before the old specification serial numbers were superseded by the more informative Military Occupational Specialty Coding Systems (MOS's) as a means of designating the job specialties of personnel.[28]

Job analysis lapsed until the late 1950's. In 1958 a three phase program was started whose objective was to establish a system capable of analyzing all Marine Corps billets at five year intervals. During the period in between the Corps wide efforts, provision was made for the accomplishment of special job analyses requested by user commands.

Phase I of the project required the analysis of sixty benchmark billits using specially trained enlisted personnel as analysts. Their task was to go out to the field and issue a job questionnaire to one billet occupant, review the completed questionnaire and interview the billet incumbent about his job. They also interviewed the incumbent's immediate supervisor and directly observed the individual at work. The purpose of such additional information gatherers was to supplement the questionnaire. At no time were responses to the questionnaire deleted.

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[28] Ibid., p. 65.

After data collection was completed, the job analyst presented the results of his analysis on a special form. It evaluated the billet in terms of its compensable factors. Each billet was analyzed in this fashion five times by different analysts using the same billet incumbent as the subject.

In the next phase of the project the coverage was expanded to one hundred billets, including forty of the first group surveyed. Data collection instruments and job analysts were unchanged. Procedure differed only in that each billet was surveyed three times.

The final phase of the project encompassed all 1200 types of enlisted billets in the Marine Corps. Additional analysts were trained but procedure and data collection instruments remained the same as in phase II.[29]

Evaluation of the 1958 studies by Marine Corps Headquarters indicated that the method then used for job analysis was not cost effective. It was concluded that the project lay beyond the state of the art. By the late 1960's, however, the situation had begun to change. Application of computer techniques to job analysis by the U. S. Air Force and the data collection methods of the Canadian Armed Forces promised to provide the Marines with a method by which job analysis could be effectively conducted.[30]

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[29] Naval Personnel Research And Development Laboratory Report WRM 67-9, Job Analysis: An Assessment of Applicability of Analysis Systems of Other Services to Navy Enlisted Billets, by Mark E. Johnson, pp. 14-16, November 1966.

[30] R. R. Van Cleve, op. cit., pp. 65-66.

Using imported theory and technique, the Marines began assembling their first job analysis task group at Quantico, Virginia in 1969. Organizationally, it was located within the Headquarters, Marine Corps Staff and reported directly to the Assistant Chief of Staff. Personnel selected for job analysis were senior enlisteds having paygrades of E-7 or above. Criteria for selection were primarily the individuals' professional performance and motivation as a Marine. Care was taken not to have personnel assigned to an analysis group who had had previous experience in the occupational field to be surveyed. This was done to limit the amount of personal bias analysts would carry into their work.

The first group of job analysts was trained in the Washington area. Their instruction included: research methodology, task inventory and statement construction, data collection, and survey administration procedures.

After completing the training phase, the analysis team started to work on the first Marine Corps occupational field. (An occupational field is defined by the Marines as a grouping of related job specialties.) Preliminary research included determining the total number of billets in the field and their location, the number of Marines by paygrade in the field, the existing training structure, training documents and instruction manuals, tools and equipment used, and the technical language of job incumbents.

Armed with their knowledge from unbiased background research, the job analysts took to the field singly or in small groups to interview job

incumbents. This phase covered all paygrades and Military Occupational Specialties in every level of Marine Corps organization. Generally, it was restricted to the U. S. East Coast in order to conserve travel funds. Each job analyst attempted to interview at least one job incumbent in every MOS to obtain the widest possible perspective on the entire occupational field.

Next, unit commanders whose units were to be included in the project were given slide show briefings by job analysts to acquaint them with the nature of the Marine Corps occupational analysis program. Key staff officers were also included in these briefings. Then the job analysts proceeded with their interview of job incumbents focusing their questions on the how and why of the way each incumbent performed his job. The data derived from such interviews were used to construct rough task statements. These statements were recorded on magnetic tape which was mailed to Marine Corps Headquarters. There, the tape was placed on a Magnetic Tape Selectric Typewriter which automatically typed task statements in the rough.

When the job analysts returned from their field interviews they collectively collated all of the rough task statements into task lists and formulated questions on background information and hardware used in task performance. The completed task inventory was then routed to all divisions of Headquarters Marine Corps Staff for review and comment. No questions or task statements could be deleted during this review or in the subsequent inspection made by the technical manager for the

occupational field. Finally, the task inventory was submitted to various technical specialists in the Washington area to ensure that it was phrased in the vernacular used by the job incumbents.

Administration of the task inventory during the field survey is done by the same team which constructed it. At least fifty percent of all billet incumbents in the occupational field throughout the Marine Corps must be included in the survey for its results to be held valid. The field survey is conducted on a worldwide scale wherever Marines are located.

Response booklets containing survey data are read by an optical reading device, the Farrington 3030 scanner. Output from the 3030 is in the form of magnetic tape and is acceptable for computer processing. The first one hundred cases or response packets are reproduced on paper in the format the computer will receive to ensure that the input data read into the computer are in the required form.

Computer processing is performed on an IBM 360/65 machine. The programs used are a special adaptation of the U. S. Air Force Computerized Occupational Data Analysis Programs (CODAP) System.

Computer output forms the basis from which the job analysis group writes the final report for the occupational field. This document is routed to all staff divisions at Headquarters for comment. Disagreements are resolved at this level, then the report is rerouted back to all staff chiefs for final approval and then submitted to the Chief of Staff via the Assistant Chief of Staff.

From its inception in 1969, the Marine Corps occupational analysis effort has been a truly operational activity. Each occupational survey has yielded final reports that made specific recommendations concerning the field of interest. Training programs have been changed on this basis, while occupational fields combined with others, MOS's created or eliminated, and some Marine billets recommended for civilianization in consonance with Department of Defense policy.[31] Tangible benefits of task analysis are most obvious though with respect to cost avoidance. A study made of Occupational Field 62, Avionics, presented potential cost savings of $2,520,318 for training alone and offered to save 282.0 man/years in the training line.[32]

E. HISTORY OF JOB ANALYSIS IN THE U. S. NAVY

During the closing days of World War II the Navy completed the development of a comprehensive billet analysis system for both officers and enlisteds. It was operational before the war ended but funding limitations after the close of hostilities forced the abandonment of the project.

The objective of the Navy's wartime billet analysis was to collect and systematize occupational data on all types of Navy jobs, both afloat and ashore. The job descriptions derived from the collected data were used to write billet requirements for officers and enlisteds, revise

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[31] Telephone conversation with Major Lawrence Bowler, USMC, 11 January 1973.

[32] Assistant Chief of Staff Memorandum of 28 June 1972, "Task Analysis of Occupational Field 62, Avionics", p. 1.

training, establish personnel classification systems, and develop career patterns.

After the curtailment of the wartime billet analysis project, the Navy had no organized effort to collect data on jobs. Updates of the Qualifications for Advancement in Rating and studies specially related to individual weapons systems continued to provide a limited amount of information on occupations within the Navy.[33]

In the early 1960's the Navy reevaluated its lack of an occupational data gathering system. The Secretary of the Navy's Policy Board and Task Force, organized to investigate the problems of personnel retention in the Navy and Marine Corps, recommended the establishment of an occupational analysis research program. The objectives of this project were to determine what sort of occupational data gathering system the Navy needed. Then having identified the type of system suitable for the Navy, the research project was to undertake its development.[34]

In addition to retention, the Navy was motivated to develop an occupational data gathering system in order to support billet evaluation. Research on this subject begain in 1965 at the request of the Chief of Naval Personnel and was directed at improving the Navy's ability to

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[33] Naval Personnel Research And Development Laboratory Report WRM 69-22, Occupational Analysis: Design of A System For Navy Use, by M. E. Johnson and R. B. Wethy, p. 1, May 1969.

[34] Naval Personnel Research And Development Laboratory Report WRM 69-27, Enlisted Billet Evaluation: Selection And Pilot Test of Factors For Navy Use, by Alexander J. Rose and Roy B. Wethy, p. 1, May 1969.

justify its enlisted grade structure before the Department of Defense review. The course of this research disclosed that effective billet evaluation could not be conducted without a knowledgeable review of the jobs that were being performed by enlisted personnel.[35]

Later, in 1966, the Bureau of Naval Personnel formalized its desire for occupational data still further. The Management Information System Task Force (MISTAF) in its report, published in July 1967, enumerated 75 goals that should be pursued to provide the Bureau of Naval Personnel with more comprehensive information on the Navy's uniformed men and women.

Two of the information objectives were of particular importance to the Navy's occupational analysis research project. In brief, they stated that a data bank should be developed containing qualitative and quantitative occupational information. The required data were to be "derived from job analysis, billet evaluation, occupational re-engineering, and skill/experience/educational attainment." These data were to be stored in an updated and accessible form.

The Personnel Research Division of the Bureau of Naval Personnel (Pers-A3) was given overall responsibility for monitoring the design and development of the Navy's occupational data bank.[36]

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[35] Ibid., p. 2.

[36] M. E. Johnson and R. B. Wethy, op. cit., p. 3.

A series of research reports published between 1966 and 1969 by the Naval Personnel Research and Development Laboratory in Washington, D. C., investigated the occupational analysis systems in use by other agencies of the U. S. Government and the Canadian Armed Forces. It was determined during the course of this research that none of the existing systems then in use in the United States was completely adequate to meet the Navy's requirements. The primary reason for this finding was the extremely large number of different billets in the Navy's organization. Other important factors in the construction of an adequate occupational analysis system for Navy use were the differences which occurred from duty station to station in Navy billets and the all encompassing nature of Navy work. Thus, a man assigned to a particular billet performed many more tasks outside the confines of his occupational specialty than was common in other government organizations or in industry.

However, research indicated that development of radically new or different concepts and methodology was unnecessarily time consuming and expensive. Many features of the ongoing and operational occupational analysis systems used by the U. S. Air Force and the Canadian Armed Services were suitable for Navy needs. Accordingly, it was decided to marry the best of these two programs together and alter them to suit the peculiar requirements of a maritime defense organization.

This process began in 1969 with the adaptation of the computer programs developed by the Air Force under the direction of Dr. Raymond E. Christal for Navy use. The original software consultants who had

participated in the Air Force project, Oats-Hills, Inc. of Houston, Texas, were retained by the Navy to assist in this work.

The military officer assigned to direct the development of the U. S. Navy occupational data bank was Commander Bruce Cormack, Canadian Armed Forces. It was his task to oversee the evolution of a data collection system based upon methods pioneered in Canada that would be compatible with the computer programs of Oats-Hills. This work was fully completed by the summer of 1972 when a formal report was published describing the data collection methods used in a Navy-wide test of the project on the Group IX ratings. Additional reports have since been published incorporating further refinements to the process. It is expected that the occupational task analysis project will transition from the research and development phase to operational status on 1 July 1973. At that time, it will begin collecting occupational data on a rating by rating basis throughout the Navy. These data will be stored on magnetic tape easily accessible for periodic updating and analysis serving the needs of Naval personnel management.

F. CURRENT METHODOLOGY IN U. S. NAVY JOB ANALYSIS

Task inventories are the tool used to field survey large groups of personnel. Their format is such that the person being surveyed is asked only to recognize tasks he performs among those in the task list given him. Through research this method has been found superior to asking an individual to recall what it is that he does in his work.

Personnel being surveyed are required to tick or mark those tasks which they perform in a specially prepared response booklet. This booklet is designed so that it may be automatically read by optical scanning devices. Additional data may be gathered in this fashion concerning: background information, task involvement, watchkeeping duties, worker characteristics, tools and equipment utilized, ship or aircraft type and miscellaneous data. The format of the response booklet can be varied as necessary to alter the type of information obtained in addition to task performance, as desired. Reprogramming of the computer software package is required each time this is done, however.

The objective of this type of data collection is to ask the worker what he actually does as he sees it. This reduces the subjectivity involved in job analysis when an analyst attempts to describe what he thinks the worker is or ought to be doing. This, however, places full responsibility on the job analyst to construct a collection document or task inventory that is relatively accurate and written in the language of the job incumbents.[37] But, as noted before, the task inventory provides a vehicle which facilitates the amount of data the job incumbent can provide. Additionally, this method gives the job analyst complete control over the type of language used in the survey. This enables the analyst to approach the personnel being surveyed in as direct and concise a manner as possible.

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[37] Mark E. Johnson, op. cit., p. 19.

Construction of the task inventory is done using senior enlisted personnel assigned to the task analysis project working in task analysis teams. To preclude bias from entering their work, team members assigned to survey a particular rate are chosen from outside that rate. Their work begins at headquarters by conducting a thorough research of all available literature concerning the rate to be surveyed. This includes, but is not limited to: Qualifications for Advancement in Rate, NEC qualifications, formal schools' syllabi, and training manuals. At the completion of the literature review, all team members have a working familiarity with the context of the enlisted rate of interest from paygrades E-1 through E-9, inclusive.

Next, the team splits up and enters the field to begin a firsthand observation of personnel working in their rate. During this phase, job incumbents are observed and interviewed individually. This precludes group or social pressure from biasing the information obtained. The end prupose of this relatively expensive and time consuming work is to gather the most unbiased and accurate raw material from which to compose task statements.

Following the observation-interview phase, the task analysis team reassembles at headquarters to begin the composition of duty and task statements. The statements are written so that each describes a single, complete task. Care is taken to prevent them from becoming too specific. That is, they must not subdivide the tasks into their elements. And

finally, each task statement is begun with an action verb to emphasize what is being done by the worker.

The preparation of statements for inclusion in the field issue task inventory is a group process, with all team members participating as if attending a seminar. Each team member contributes to the writing process using the task lists that he obtained during the observation-interview phase.

Administration of the task inventories in the field for a full survey is done by the task analysis team which compiled them. The task analysts serve as proctors to the groups of personnel to whom inventories are given, explaining directions and format of the response booklets. Care is taken by the analysts to assure job incumbents that the inventories will not be used to evaluate the personnel participating in the survey. Also, they assure respondents that all data given are treated confidentially by the Bureau of Naval Personnel and not reported to the commands participating in the survey.

This attention to anonymity of responses is important because it encourages job incumbents to be less inhibited in their answers to background questions and task statements. The result is that data collected reflect more what the job incumbent thinks about his work and less what he perceives his superiors would want him to answer. A reaction of this kind is in keeping with one of the basic objectives of job analysis, that is, to increase the objectivity of collected data.

To be considered successful, a field survey should scan at least 80 percent of all the personnel serving in a rating. In this way, it is fairly well assured that most of the completed response booklets will be usable by the computer. The Navy feels that for the data to be statistically significant with regard to the characteristics of a rating, the number of valid response booklets must be equal to 45 or 50 percent of the population in the rating.

Computer processing of response booklets is begun by carefully handchecking each booklet to insure that there are no missing pages or extraneous marks that would cause it to be invalidated. Then the booklets are separated page by page and arranged according to page and case identification number. The collected groups of pages are then optically read onto magnetic tape. Processing of the data is then possible using the CODAP software package as adapted for use on the Defense Supply Agency's IBM 370/70 computer located at Cameron Station, Virginia. The printouts obtained from this processing are then used by job analysts and interested commands to analyze the nature of work actually performed by enlisted personnel.

Research is continuing into the uses to which occupational data may be put. However, based upon a pilot study, training costs for air controllers in the Navy have been reduced by approximately $500,000 per year on a continuing basis. Similar results have been obtained from at least one other pilot study. This represents only one application of the usefulness of occupational data.

In conclusion, it should be mentioned that the Navy is currently conducting its first investigation of an officer subgroup using computer assisted task analysis. It is hoped that the study of Combat Information Center officers on representative ship types will yield the same caliber of information about their task performance as the previous surveys have for enlisted ratings.

II. METHODOLOGY

With only limited time and resources at the researcher's disposal, it was not feasible to construct a task inventory using the procedures employed by the U. S. Navy's Occupational Task Analysis Project. Instead, it was decided to collate existing task inventories that had been prepared for investigating communications workers in the Canadian Armed Forces, the U. S. Air Force and U. S. Navy.

The tasks selected for inclusion in this project were grouped according to the major duties to which they pertained. In total, there were 573 task statements and 11 duty titles.

The task inventories prepared for field issue at the U. S. Naval Communications Station, San Francisco, California, were prefaced with instructions for completing the background information section and task response sheets of the response booklets. Arrangement of the tasks within the inventories followed in numerical sequence from one through 574, with one task number omitted through error. Duty titles were not included so as to reduce the possibility of bias entering the responses.

Response booklets used in the survey were the latest version prepared by the Naval Occupational Task Analysis Project (NOTAP.) They are designed for optical scanning of data onto magnetic tape. Each booklet contains 20 pages and is divided into seven response sections. Only the first two of these sections were used in this project.

Job incumbents were requested to complete section A giving background information and section B which pertained to task involvement and time spent performing the task. Other sections of the booklet were not used due to the large number of tasks contained in the inventory. (Specimen pages from sections A and B of the response booklet are contained in Appendix II.)

Administration of the task inventory was conducted at the U. S. Naval Communications Station, San Francisco, under the supervision of the Communications Officer, Lieutenant Commander Kenneth Ditmore, U. S. Navy. Conventional team proctoring as conducted by the task analysis teams of the NOTAP was not feasible due to the heavy operating commitments of the communications station. Instead, each watch section was briefed by the command's education and training chief petty officer as to the function of the project and procedure for completing the response booklets. Watch standers then completed the inventories during their spare time while on watch. Similar procedure was used for day workers.

Only radiomen were included in this survey. All enlisted paygrades without regard to sex participated and a 100 percent sample of the radiomen assigned to the communications station was obtained. Completion of the survey required approximately one month due to the method of administration and holiday periods. Unfortunately it is not possible to estimate the length of time spent by each job incumbent in responding to the task inventories. The target time required of each respondent was

envisioned as not to exceed two hours total. This limit was imposed in an effort to avoid interference with the on going work at the communications station and to reduce the effect of fatigue on responses.

After all inventories and response booklets were completed, they were returned to the writer who handchecked each booklet for extraneous marks that would invalidate them during the optical scanning phase. This process was repeated at NOTAP to doubly ensure that the number of response booklets invalidated would be held to an absolute minimum.

Computer processing services and assistance in the selection and interpretation of output were provided by NOTAP. Data processing personnel assigned to that command conducted the optical scanning of response booklets and prepared the computer programming in accordance with the specifications of the Navy's CODAP/370 software package.

III. DISCUSSION OF COMPUTER OUTPUT

A. PRINT VARIABLE[38]

This printout provides a concise summary of all the background information gathered by section A of the response booklet. It is interpreted using the codes heading the top of each column across the print variable page. Some of the different types of information contained in the print variable are: hierarchical case number, training received, on the job training required, reenlistment intent, GCT-ARI test scores, naval enlisted classification codes held, etc. (A specimen print variable page is contained in Appendix III.)

Principally, the print variable is used to identify individual cases, or job incumbents, who cluster together on the hierarchical diagram. It also is used in its own right to generalize about the characteristics of job incumbents.

B. HIERARCHICAL DIAGRAM OF TIME SPENT SIMILARITY MATRIX

The hierarchical diagram is one of the most important print outs available from CODAP. It is a pictorial representation of the time spent matrix and is based upon the computation of overlap in the amount of time job incumbents spend performing identical tasks. The overlap computation is made by comparing the percent of total work time each of two individuals consumes performing the same task. The smaller of the two

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[38] The term print variable is used to identify the CODAP/370 computer program summarizing background information pertaining to job incumbents.

values obtained from this comparison is defined as the time spent overlap between two group members. It is also, for the first iteration in the cluster process, the overlap for that group of two individuals.

Clusters are formed by progressively adding job incumbents, one at a time, to the results of the initial comparison between two individuals. At each iteration, a new group overlap figure emerges. The process is continued until there are no job incumbents remaining in the sample population who closely resemble the group thus formed.

Clusters are merged by comparing their group overlaps. This is done akin to the method used to form individual clusters. Each iteration in this process results in a collapse of the matrix and yields progressively larger groups having less and less homogenity.

Each cluster point or "stage" is represented by a set of six numbers arranged in the following pattern:[39]

Stage Number	Number of Cases Included
XX	XX

Consecutive Cases in Stage

XX-XX

Average Similarity Between Merging Groups	Average Similarity Within New Groups
XX.X	XX.X

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39. Naval Personnel Research and Development Laboratory Report WTR 73-*, Occupational Analysis: Report of Analysis of Data From Field Test Of Air Controlmen Rating, by M. D. Cullison, p. I-1, February 1973.

In the upper left corner, the stage number indicated a particular point in the clustering process. A job description can be obtained at this "stage" which lists the duties and tasks that are performed by the persons forming the group.

In the top row of the printout are shown those clusters having the greatest amount of homogenity. Top row clusters are begun using a set of limiting criteria specifying a minimum number of group members, a minimum homogenity between merging groups, and a minimum value for the average homogenity within the group. Dotted lines connect the top row clusters to others beneath them. At each point where a dotted line or lines intersect with a new cluster, a collapse of the matrix is represented. This process continues until all members of the sampled population have been joined into one cluster.

Examination of the tree structure, job descriptions, and background information from the print variable enables the job analyst to determine functional work areas and to define where significant work areas begin and end. Additionally, the reasons for the program's differentiation among apparently similar groups become discernible. (A specimen printout is contained in Appendix III.)

C. JOB DESCRIPTIONS

This is a group of printouts which define the nature of work performed by a specified group of job incumbents. Group formation is determined

by paygrade, cluster point in the time spent overlap matrix, possession of a NEC code, or other background data type listed in the print variable.

Special Jobdec is the name for a job description whose group membership is determined by the job incumbents' possession of a specified data type contained in the print variable.

Job descriptions may be organized with tasks listed in descending order of percentage of members performing, the average time spent by members performing the task, the percentage of time spent by all members in the group, or by listing the tasks according to their alphanumeric designations.

D. TITLE LIST

This printout is a list of the alpha-numeric titles assigned to all duties and tasks. It is used to provide the key for interpreting duty/task titles contained in specialized printouts such as Analysis of Secondary Factors (ASFACT) and the Group Summary. (A specimen printout is contained in Appendix III.)

E. ANALYSIS OF SECONDARY FACTORS

Contained in this printout is a listing of data organized by paygrade and by class of involvement in each task. The listing gives the total number of job incumbents responding by paygrade for each type involvement. Then for each paygrade, the mean task involvement is cited and the standard deviation around the mean. This presentation is used to decide what training should be given at different paygrades. It may also

imply when a person should become an instructor. (A specimen printout is contained in Appendix III.)

F. GROUP SUMMARY

This report provides a comparison of groups by individual task. Listed vertically along the left edge are the duty/task titles and on the top border the group identifications. Then in the rows and columns of the report, a summary of the amount of time spent performing each task is displayed. This figure is in terms of percent. It is possible to list 13 columns of such information. Each column of percents under a group identification represents the summary of the job description for that group. (A specimen printout is contained in Appendix III.)

IV. ANALYSIS OF DATA

A. OBJECTIVES

When this project was begun, it was intended to collect and evaluate data from all radiomen serving at the San Francisco Communications Station. After receipt of the computer generated job descriptions and background data, it became obvious that within the time allotted a comprehensive analysis was impossible. Accordingly, the scope of the project was narrowed to encompass only technical controllers. These personnel are specially differentiated by possession of the 2318 NEC.

Usable computer output from the analysis of the 2318 NEC holders comprised the print variable, a 2318 NEC job description, and the cluster diagram. Printouts for the analysis of secondary factors, job descriptions by paygrade and the group summary were done so as to include all radiomen surveyed. Due to the nature of their format and the fact that they included data gathered from all radiomen, these additional printouts proved of limited utility in the analysis of the 2318 NEC holders. If time and computer resources had permitted, these printouts could have been reordered providing powerful tools with which to augment the analysis of technical controllers.

Within the limits of the now restricted boundaries of an occupational analysis for technical controllers, it was intended to examine the background characteristics possessed by radiomen in this special group.

An examination of the tasks contained in the 2318 NEC special job description was also performed. The purpose of this was to identify the most important components of the technical controllers' work. The results of this examination were compared with the existing job description contained in the "Manual of Navy Enlisted Classifications."

Finally, the 2318 NEC special job description was compared with the instruction curricula presently used at the class 'C' school where technical controllers are trained.

B. EVALUATION OF BACKGROUND DATA DISPLAYED IN THE PRINT VARIABLE

1. Comparison of the Perceived Value of NEC Training With Its Utilization

The ordinate in the first graph shown in Appendix IV represents the percentage of technical controllers in the sample while the abscissa is marked according to paygrade. The trends shown in this graph indicate that technical controllers feel that they utilize their NEC training to a very high degree but with increases in paygrade the utility of such training decreases. The training utilization curve peaks at E-6, is slightly slower for E-5 and markedly reduced for E-7. The perceived utility of the NEC training curve shows a continuous and gentle decline from E-5 to E-7.

Examination of the computer printout giving job descriptions by paygrade for all radiomen confirms what the print variable discloses for technical controllers. That is, as job incumbents become more senior

they are less involved with purely technical tasks and more occupied with management functions. Skills which serve to support management tasks are not part of the technical controller 'C' school curriculum. Therefore, it is to be expected that as technical controllers advance in rate their NEC training applies to a smaller portion of their jobs. There exists an anomaly to this so far as E-6 technical controllers are concerned. They exhibit a higher level of perceived utilization of NEC training than do E-5's. This conflicts, however, with their feelings about the utility of technical training.

2. Comparison of the Percent of Total Work Time Spent on Managerial Functions With the Total Number of Tasks

The second graph in Appendix IV has an ordinate measured in terms of the percent of work time spent in task performance and total number of tasks performed. The abscissa is subdivided by paygrade. This graph reenforces the conclusions drawn from the first graph and is compiled on the basis of data contained in the job descriptions for different paygrades for all radiomen at the communications station. The curves for each of the three different managerial duties displayed in this graph show a steadily rising slope with each increase in paygrade. The total number of tasks performed rises slightly from E-5 to E-6 but falls sharply from E-6 to E-7.

In combination, the trends shown in graph number two imply a lessening of the perceived utility of technical training with increases in paygrade and an increasing requirement for the judgment used in management.

The increase in total tasks performed by E-6's as compared to E-5's may in part explain why E-6 technical controllers feel they utilize their training more than E-5's do. That is, it is possible for E-6 technical controllers to utilize their NEC training more than E-5's but find it less effective. This is explained by the fact that they have more tasks upon which to use their training than do the E-5's but their involvement in the performance of these tasks has become more supervisory in nature.

3. Comparision of Education Actually Held as Opposed to Education Perceived Necessary

The third graph in Appendix IV shows that the number of technical controllers possessing a 12th grade education drops from E-5 to E-6 and then rises about halfway back to the E-5 level for E-7's. Conversely, the amount of education thought to be necessary for job performance is highest at the E-6 level and lower for both E-5's and E-7's. Average GCT/ARI test scores drawn from the basic battery of entry level classification examinations rise sharply from the E-5 to E-6 level and continue upward at a reduced rate for E-7's.

Despite the limited size of the sample involved, the trends indicated in this graph appear to show that a competitive process is at work in selecting chief petty officers. Both education and academic aptitude are strong determinants in this process. The drop in the level of education thought necessary for job performance from E-6 to E-7 is disturbing. Perhaps it indicates that secondary schools do not offer the

type of material which is meaningful to managerial type tasks. Or, it may mean that E-7's feel their work only requires the basic skills which can be taught in less than 12 years. An examination of the job description by paygrade for all radiomen would seem to favor the latter conclusion. Paygrades E-5 and E-6 become progressively more technical in terms of the time spent on complicated technical tasks. There is also a shift towards managerial responsibility as one advances from E-5 to E-6. Possibly, the E-6 begins to resemble the shop supervisor in industrial parlance. With the E-7, however, a significant change occurs. Training of subordinates and relatively longrange planning become primary responsibilities in terms of time spent. There is less time devoted to purely technical tasks. On balance, this general breakdown of task performance in terms of those tasks performed by each paygrade supports the concept that chief petty officers are more concerned with the usage of verbal skills to compile training plans, initiate correspondence and draft directives. It is also possible that the E-7 has just become more familiar with the nature of his work and thus more confident of his ability to perform it. His own confidence then may lessen the level of education he feels is necessary to do his job.

4. Comparison of On The Job and Formal Schools Training

The fourth graph in Appendix IV has an ordinate marked off in months and weeks for on the job training and formal schools attendance, respectively. The abscissa is labelled according to respondents' paygrades. All data points are averages.

Both on the job and formal school training requirements, as viewed by the job incumbents, increase markedly from E-5 to E-6. Formal school training perceived necessary declines from E-6 to E-7 slightly more than it rose from E-5 to E-6. On the job training requirements decline less significantly from E-6 to E-7.

As in the previous section, examination of the full range of tasks performed by all radiomen at the communications station discloses that the job of an E-6 is more demanding technically than that of an E-5. Chief radiomen, by contrast, appear less involved with technical work and more concerned with tasks requiring the use of verbal skills and judgment. Verbal skills are not taught in the technical controllers' 'C' school and it is doubtful if that course of instruction has "judgment" as one of its objectives. Thus, E-7's may attach less importance to on the job and formal schools training because they view their job as being assisted most by the full realm of their past experience.

5. Comparison of Reenlistment Intent With Various Factors

The ordinate of the fifth graph in Appendix IV is set off both in terms of percentiles from zero through 100 and in years from seven to 19. As in the other graphs, the abscissa is subdivided by paygrades from E-5 to E-7.

Reenlistment intent rose by more than 15 percent from the E-5 level of 40 percent to the E-6 level. Then, it declined by a similar amount to the E-7 paygrade. Considering that the average length of service for E-5's was 7.32 years, their reenlistment intent of 40 percent

is unacceptably low. This is emphasized by the fact that most of the men involved are already in their second enlistment. Similar circumstances exist with respect to E-6's whose average length of service is 11.02 years. Even though the intent to reenlist has risen to 57 percent this still seems low considering the fact that most men in this category are entering their fourth enlistment. And, at the completion of that enlistment they would have only four years remaining before they would be eligible for the half-pay retirement annuity.

Somewhat predictably, reenlistment intent declines among the E-7's. This is probably because they have an average length of service of 18.43 years and will be eligible for retirement within several years, if not already so.

E-5's show the strongest conviction that they will be able to use their NEC training in civilian life. This conviction is markedly lower for E-6's and E-7's. It may be a factor in dampening the reenlistment intent of both E-5's and E-6's. But, it is probably of less relative importance when considering E-7's. This is because they are presumably influenced far more by the halfpay retirement plan for which all military personnel become eligible at the completion of 20 years active service.

V. TASK ANALYSIS OF RADIOMEN

A. IMPLICATIONS OF THE HIERARCHICAL DIAGRAM

When columns one through three of the hierarchical diagram (see Appendix III) are arranged side-by-side to form a tree structure an interesting pattern emerges. The first column on the left contains the main trunk of the tree and a group of clusters or branches composed largely of lower rated personnel (E-3 to E-5.) The next page or second column holds three major branches whose members fall predominantly in paygrades E-5 to E-8. Nearly all of the chief petty officers and technical controllers are found here. The third and remaining column contains only two branches. One of these is a subsidiary of a larger branch in column two. It contains several chief petty officers and four technical controllers out of a total group membership of six radiomen. The other branch joins directly to the main trunk in column one and contains personnel of assorted rates. Also, its members possess a relatively low level of homogenity at an early stage in the clustering process.

Without examining the job descriptions computed according to the time similarity matrix, it is apparent that columns one and two are differentiated largely by paygrade. Also, the incidence of NEC's is much higher in column two than in column one. Inevitably, it must be concluded that the time similarity matrix has clustered job incumbents in a fashion that recognizes the fact that different paygrades do, for the most part, perform different jobs. This characteristic can be used to support

research into the paygrade structure existing within the Navy in general and the radioman rate in particular. In addition, the hierarchical diagram offers a pictorial guide to assist in the interpretation of background data and job descriptions computed by the time similarity matrix.

The diagram appears to be less helpful when used in analyzing other results, such as those from the analysis of secondary factors and job descriptions by paygrade.

The presence of most technical controllers in column two may indicate a tendency of the hierarchical diagram to cluster groups of job incumbents by physical work location. Certainly, the fact that nearly all technical controllers are assigned to the same work group within the San Francisco communications station organization tends to bear this out. Further evidence for such a conclusion is offered by the fact that in column one most of the personnel are lower rated and appear to perform tasks most closely identified with message processing functions. Thus, within limits, it is felt that a hierarchical diagram of the type presented in this study can be useful in analyzing the general structure of a communications station, or other, organization.

One perplexing difficulty emerges in the detailed interpretation of a hierarchical diagram. This is the tendency of job incumbents to group in what appears to be a somewhat arbitrary manner during the early stages of clustering. It may be that this condition occurs as a result of the task statements in the task inventory possessing a lack of specificity. On the other hand, it may indicate that the clustering of job incumbents

by similarity of time spent performing the same tasks does not always produce intuitively appealing differentiations among jobs.

Finally, it is possible that clusters in the time spent overlap matrix having a very high degree of homogenity may represent work that is more general in terms of tasks performed than is commonly supposed.

B. THE TECHNICAL CONTROLLER'S JOB DESCRIPTION

Highly specialized though this group of radiomen is, the job incumbents who responded to the task inventories expressed themselves as performing many more tasks than the writer had expected. This result can only be explained by presuming that the nature of a technical controller's work is far more varied than was supposed before this study was made.

It is possible, however, that the task inventory may have unfairly biased the data collected in the survey. The fact that this may have occurred is suggested by the premise under which the study was begun. That is, it was originally intended to examine the jobs of all radiomen at the communications station. In spite of this, however, the fact remains that job incumbents possessing the 2318 NEC and assigned to 2318 coded billets responded to 271 tasks out of a total of 573 in the task inventory. This means emphatically that the technical controllers perform nearly half the tasks performed by radiomen of whatever description.

If the specificity of technical tasks pertaining to holders of the 2318 NEC had been increased when the task inventory was written it would have

provided a more valuable instrument with which to gauge the effectiveness of technical controller training. As it is, however, one can generalize and say that instruction which applies directly to the maintenance of circuit quality is valuable to the work that technical controllers are called upon to perform. This instruction would include those tasks which are performed by at least 20 percent of all job incumbents according to Navy training policy. Examples of some of the technical functions that meet this criteria are: allocation of communications channels to meet user requirements, use of frequency prediction charts, equipment checks for operating efficiency, location in circuits of the cause of circuit outages, selection of antennae, operation of on-line cryptographic equipment, frequency measurement and analysis, and selection of alternate communications links.

The job description for technical controllers disclosed the possibility that women may be more than equally competitive with men in this specialty. None of the four women who responded in this study possessed a 2318 NEC. However, their average score in the clerical section of the basic test battery given to all enlistees is significantly higher than that for men who are currently technical controllers. Average test scores were 52.8 and 64 for men and women respectively. This factor may be important since 26 out of the 90 tasks which consume 80 percent of the average technical controller's time are clerical in nature.

The performance of women, limited though the sample is, on the mechanical aptitude section of the basic test battery is also superior to

that of men possessing 2318 NEC's at the San Francisco communications station. Average test scores were 50.6 and 59 for men and women, respectively.

It would appear in the Navy's interest to investigate whether test scores for the mechanical aptitude section of the basic test battery are typically higher for women than for men, as is the case with clerical aptitude scores. If such a situation does exist then recruitment of women to fill job specialties such as that of the technical controller would appear particularly desirable.

When referencing a job description for technical controllers, one finds that general radioman functions are performed by relatively few individuals. And they tend to consume a small proportion of the job incumbents' time. This reenforces the impression that clustering of tasks by the time similarity matrix provides realistic descriptions of the work which is performed by Navy job incumbents. This is because one would hope that if personnel are assigned to a work center using a primary NEC as the selection criteria they would perform work closely related to that NEC.

Another characteristic noted among technical controllers was that, as a group, a relatively large proportion of their time is spent communicating with subscribers via radioteletype and radiotelephone. These modes of communication are called orderwires. Usage of the radioteletype occupies 65.52 percent of all technical controllers for 4.49 and 4.30 percent of their time when receiving and transmitting, respectively.

Radiotelephony consumes much less time by comparison, but still occupies a large percentage of the technical controllers for a significant amount of time. For all technical controllers, the usage of orderwires requires an average of 7.00 percent of their total work time.

This information suggests that either there are many subscriber requests for service improvement or that the ability of technical controllers and subscribers to articulate the description of communications problems and their solutions is poor. If the former situation exists, then the overall quality of point to point, longrange naval communications requires significant upgrading. If, on the other hand, it is the ability of radiomen to communicate with one another effectively that is deficient, the Navy needs to alter its training programs and personnel selection practices.

In reality, the truth in this situation probably lies somewhere between the two extremes stated above. Research has shown in the past, however, that the communications ability of people suffers greatly when they are forced to exchange ideas via methods that preclude face to face contact. Voice communication even when persons cannot see one another is significantly more effective than voice contact when the participants cannot see one another. These observations have been measured both in terms of the mean time that it takes to solve a complex problem using various modes of communication and the mean number of messages that must be transmitted during such a process.[40]

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[40] Chapanis, Alphonse, "Prelude to 2001: Explorations In Human Communication," American Psychologist, vol. 26, pp. 959-960, November 1971.

The general conclusion that must be drawn from the foregoing discussion is that naval training must seek to improve the verbal skills of enlisted personnel. It appears that the traditional public school process is not doing well enough in this regard to satisfy the demands made upon job incumbents as technical controllers.

VI. CONCLUSIONS

The worth of task analysis lies, at least in part, in its usefulness as a tool to infer the functional organization of job incumbents in a work situation. When combined with sophisticated computer programs such as contained in CODAP/370, the organizational implications of job incumbents' work can be expressed in pictorial, numerical and verbal terms. This provides a tool that can exert great leverage in developing organizational changes that improve the effectiveness of workers, reduce redundant effort, and enhance organizational performance.

Task analysis is effective in identifying elements or units of work which are critical to mission accomplishment in naval organizations. The identified critical work elements then are used to form the framework around which training courses can be built or modified.

Knowledge of tasks gained from task analysis provides a set of criteria which are the keystones of the personnel selection and placement process. If the nature of work is well defined, then it is possible to identify the human characteristics needed for effective job performance.

Collection and display of comprehensive background data, as is done by the CODAP/370 package, provides a data base from which to determine important personal characteristics of any given workforce. Such data collection, for example, forms the basis from which comparisons may be made between job incumbents' intent to reenlist, acquire additional training and education, or use their naval experience in the

civilian job market. Collection of background information also produces a tool with which to make forecasts concerning future personnel trends.

Optically scanned data collection documents and computer processing of data provide a relatively economical means with which to survey large numbers of job incumbents. Computer processing also enables personnel and organization managers to store, retrieve and manipulate much larger quantities of data than is possible using hand methods.

APPENDIX A - TASK INVENTORY

1. Advise division officer of effectiveness of new developments and procedures
2. Advise CO on readiness prior to getting underway
3. Advise supervisory personnel of work progress on equipment
4. Allocate channels and circuits to meet user requirements
5. Assign communication tasks or details to personnel
6. Assign duties and tasks to billets
7. Assign instructors for on-the-job training (OJT) programs
8. Assign maintenance tasks to RM's
9. Assign personnel to billets
10. Assign personnel to daily tasks
11. Assign personnel to receive on-the-job training (OJT)
12. Assign personnel to receive school/classroom training
13. Assign personnel to watches
14. Assign publications to be maintained by RM's
15. Assist in formulation of communication plans
16. Assist in preparation of communication annexes to operations plans
17. Assist in preparation of communication financial budgets
18. Assist in preparing competitive exercises, trials, and inspections
19. Coordinate communications guard arrangements with shore station activity
20. Coordinate communications maintenance programs with ships maintenance programs
21. Coordinate communications maintenance programs with ship's OPSKED
22. Coordinate repair and maintenance operations with supply and operations personnel
23. Coordinate training programs with ship's operating schedule (OPSKED)
24. Designate backup frequencies and equipment for emergency operations

25. develop procedures for casualty analysis

26. Develop procedures for determining work priorities

27. Establish personnel performance standards and tests

28. Estimate requirements for time, materials, and labor

29. Maintain department/division organization and regulation manual

30. Maintain status board

31. Maintain Watch, Quarter, and Station Bill

32. Organize and plan work of personnel

33. Organize communications division, branch, or section

34. Organize drills for training

35. Organize duties to be performed aboard ship

36. Organize duties to be performed at shore station

37. Plan and organize security training program

38. Plan and organize shipboard maintenance and preservation programs (not 3-M)

39. Plan and organize Standard Navy 3-M System

40. Plan communications activities in compliance with official orders

41. Plan for tender/yard overhaul of communications equipment

42. Plan installation, transfer or replacement of communications equipment

43. Plan physical layout for communications division, branch, or section

44. Plan safety education programs

45. Plan training programs (informal, formal and OJT)

46. Plan training conferences, meetings, or seminars

47. Prepare and maintain Departmental Bills and Directives

48. Prepare and submit requests for training and educational accreditation

49. Prepare daily work schedules

50. Prepare draft of security regulations

51. Prepare monthly preventive maintenance schedules

52. Prepare operating instructions on communication functions

53. Prepare quarterly planned maintenance schedules

54. Prepare tender/yard overhaul requests for equipment

55. Prepare up-to-date personnel access list to communications areas

56. Prepare weekly planned maintenance schedules

57. Requisition training and educational manuals and materials

58. Rotate radiomen in communications billets

59. Prepare classified material destruction bills

60. Schedule training (formal, informal, and OJT)

61. Submit departmental work request list

62. Update quarterly planned maintenance schedule

63. Update weekly planned maintenance schedule

64. Participate in staff meetings

65. Prepare briefings

66. Plan leave schedule

67. Coordinate communications procedures with Net Control Stations

68. Maintain emergency recall bill

69. Assist in maintaining cycle schedule

70. Check administrative reports

71. Check Coordinated Shipboard Allowance List (COSAL) for parts

72. Conduct casualty drills

73. Conduct drill circuits (CW, TTY, RATT...)

74. Control selection of transmitting, receiving and terminal equipment

75. Coordinate casualty repairs

76. Determine rates to be charged for class E messages

77. Determine repairs or adjustments for equipment

78. Direct control and operations of long-haul communications media and local circuits.

79. Direct correction of deficiencies noted by inspecting officers

80. Direct elimination of safety hazards

81. Direct patching of communications

82. Direct preparation of correspondence

83. Direct records disposal

84. Enforce shipboard electrical safety precautions

85. Implement safety training programs

86. Implement shipborad maintenance and preservation program (other than 3-M)

87. Indoctrinate newly assigned personnel

88. Initiate MDCS Documentation

89. Instruct personnel in reporting casualties correctly

90. Insure availability of spare parts

91. Insure completion of tender/yard overhaul of equipment

92. Insure monthly weighing of CO 2 extinguishers

93. Insure proper posting of emergency, distress, scene of action and SAR frequencies

94. Insure proper stowage of spare emergency antennas

95. Insure proper use of control links and landlines

96. Insure standby stations have necessary communication publications

97. Interpret electrical schematics for subordinates

98. Interpret policy, directives, and regulations for subordinates

99. Inventory communications equipment

100. Inventory controlled equipage

101. Inventory expendible supplies

102. Inventory tools and parts at regular intervals

103. Issue corrections to publications

104. Issue supplies

105. Issue tools

106. Maintain reliable communications through proper use of equipment

107. Perform continuous system analysis

108. Perform necessary corrective routing action

109. Prepare supply requisitions for officer's signature

110. Regulate expenditure of departmental funds

111. Requisition equipment

112. Requisition parts

113. Requisition supplies

114. Restrict routing of class E messages

115. Review equipment training schedule

116. Review long-range shipboard maintenance program

117. Review procedures for controlling blast and thermal radiation damage

118. Review Standard Navy 3-M System aboard ship

119. Revise operating techniques to improve work efficiency

120. Revise repair procedures

121. Revise work schedules to accommodate high priority jobs

122. Stow and secure supplies

123. Stow tools

124. Supervise casualty analysis of equipment

125. Supervise clerical support staff

126. Supervise communications security training program

127. Supervise communications training programs (formal, informal, and OJT)

128. Supervise handling of official and classified publications

129. Supervise implementation of operation orders

130. Supervise installation, transfer, or replacement of communications

131. Supervise instructors

132. Supervise inventory teams

133. Supervise long-range planned maintenance program

134. Supervise modifications to existing equipment

135. Supervise observation of safety precautions

136. Supervise operation of communication division, branch, or section

137. Supervise personnel in communication operation

138. Supervise personnel in communication procedure

139. Supervise personnel performing correctivemmaintenance

140. Supervise personnel performing preventive maintenance

141. Supervise personnel in use of Maintenance Requirement Cards

142. Supervise Planned Maintenance System (PMS)

143. Supervise preparation and maintenance of files, logs, records, and reports

144. Supervise preparation of equipment failure reports

145. Supervise preparation of shipyard/tender overhaul work requests

146. Supervise proper operations of cryptocenter

147. Supervise radiomen at cruising watches

148. Supervise radiomen at general quarters stations

149. Supervise RM watches in port

150. Supervise safety training programs

151. Supervise security of communication spaces

152. Supervise Standard Navy 3-M System

153. Tabulate and display information on current conditions of system components

154. Update maintenance schedules

155. Give career counselling

156. Counsle personnel on personal affairs

157. Muster personnel for morning quarters

158. Perform messcook duties

159. Participate in colors detail

160. Check equipment for circuit outage

161. Check personnel on knowledge of emergency destruction bill

162. Conduct administrative inspections

163. Conduct casualty analysis of electronic equipment

164. Conduct casualty control inspections

165, Conduct circuit and systems performance tests

166. Conduct inspection of men at quarters

167. Conduct inspections and resistance tests on antennas

168. Conduct operational readiness inspections.

169. Conduct system operational performance tests

170. Evaluate accuracy of reports and work scheduling

171. Evaluate adequacy of maintenance inspections

172. Evaluate casualty damage

173. Evaluate causes of operational failures

174. Evaluate defective and worn equipment

175. Evaluate individual training progress

176. Evaluate inspection findings

177. Evaluate inspection procedures

178. Evaluate operational efficiency

179. Evaluate performance tests (Quals) for personnel

180. Evaluate personnel on knowledge of Watch, Quarter, and Station Bill

181. Evaluate practical factors performance of subordinates

182. Evaluate proposals and suggestions

183. Evaluate repair orders

184. Evaluate safety programs

185. Evaluate safety training programs

186. Evaluate survey reports

187. Evaluate test results

188. Evaluate training programs (informal, formal, and OJT)

189. Evaluate work area conditions

190. Evaluate work request forms (OpNav 4700-2C)

191. Examine battle lanterns weekly

192. Inspect assigned firefighting equipment

193. Inspect communications areas for potential safety hazards

194. Inspect communications equipment

195. Inspect first aid kits

196. Inspect logs and records pertinent to control center

197. Inspect replacement parts of radio equipment

198. Inspect shipyard and tender overhaul work progress

199. Measure frequency of electronic circuits and compare with established values

200. Perform periodic tests on electronic equipment

201. Perform periodic visual inspection of teletype equipment

202. Perform resistance checks on electronic equipment

203. Perform system diagnostic tests on digital subscriber terminal equipment

204. Perform voltage checks on electronic equipment

205. Review performance evaluation reports

206. Summarize inspection findings

207. Test and evaluate newly installed communication equipment

208. Test cryptographic security devices

209. Test circuits for continuity, short-circuits, and grounds

210. Test portable communications equipment

211. Test TSEC/KY-2 equipment

212. Test other communications equipment

213. Ensure serviceability of emergency power

214. Inspect meteorological facsimile equipment

215. Inspect telephone exchange equipment

216. Inspect landlines

217. Inspect patch panels

218. Perform power output checks on communications equipment

219. Perform waveform checks

220. Inspect ground/bonding straps

221. Inspect power cables

222. Inspect electrical insulation for discontinuities

223. Administer performance tests (Orals)

224. Administer tests

225. Administer trainin pprograms

226. Advise supervisors of training progress of subordinates

227. Arrange for classroom space for training programs

228. Assist in preparation of servicewide examinations for advancement in rating

229. Assist in preparing Navy Training Cources

230. Assist in preparing off-ship school training

231. Assist ration section instructor in administering training

232. Attend training conferences, meetings or seminars

233. Conduct battle problems

234. Conduct general military training

235. Conduct group formal training sessions

236. Conduct group informal training sessions

237. Conduct leadership training sessions

238. Conduct on-the-job training

239. Conduct ship's operational requirements training

240. Conduct specialized shipboard training course for radiomen

241. Conduct training conferences, meetings or seminars

242. Construct tests

243. Coordinate training between watch sections

244. Counsel individuals on their training progress

245. Develop training course material

246. Establish cross training program

247. Instruct personnel in classified publications procedures

248. Instruct personnel in communication operation

249. Instruct personnel in communication procedure

250. Instruct personnel in electrical safety precautions and safeguards

251. Instruct personnel in equipment handling procedures

252. Instruct personnel in preparation and maintenance of safety records, reports, files, and logs

253. Instruct personnel in rescue and treatment of electrical accident victims

254. Instruct personnel in use of manuals, publications, etc.

255. Instruct personnel in watchstanding duties

256. Issue training and educational manuals and materials

257. Maintain department or division training records

258. Maintain individual training records

259. Maintain training and educational manuals and materials

260. Plan training program for communication division

261. Prepare course outlines

262. Prepare lesson plans

263. Prepare training aids

264. Prepare training reports

265. Prepare training schedules

266. Present training films

267. Procure training aids, textbooks, manuals and equipment

268. Review progress of personnel undergoing training

269. Revise training materials

270. Revise training programs

271. Score tests

272. Train and drill personnel at cruising watches

273. Train and drill personnel at general quarters stations

274. Assist in preparation of communications movement reports

275. Assist in publication of ship's or shore station's newspaper

276. Assist Supply Officer in maintaining Coordinated Shipboard Allowance list (COSAL)

277. Collect technical information, data, and publications

278. Complete and file alternation record card (NavShips 530)

279. Complete electronic equipment history card (NavShips 536)

280. Complete Maintenance Requirement Cards (MRC)

281. Complete PMS feedback report (OpNav 4700-7)

282. Complete repari record card (NavShips 529)

283. Complete record of field changes for electronic equipment form (NavShips 527)

284. Dispose of obsolete correspondence and messages

285. Dispose of obsolete files and records

286. Dispose of obsolete stock lists and catalogs

287. Disseminate technical information, data, and publications

288. Examine logs and records during watch

289. File correspondence and messages

290. File official publications and directives

291. File or refile class A or class B messages with commercial communication company

292. File technical manuals, stock lists, and catalogs

293. Insert corrections in official publications and directives

294. Keep Equipment Identification Code (EIC) Manual up-to-date

295. Keep maintenance records for digital subscriber terminal equipment

296. Keep Planned Maintenance System (PMS) Manual up-to-date

297. Maintain accurate communication center file

298. Maintain accurate cryptocenter

299. Maintain instructions and materials concerning commercial traffic handling

300. Maintain broadcast file

301. Maintain classified message logs and file

302. Maintain communications publications

303. Maintain complete file of commercial messages

304. Maintain equipment histories and records

305. Maintain file of training publications, regulations, and directives

306. Maintain general message file

307. Maintain group record of practical factors

308. Maintain individual drill record

309. Maintain individual qualification record at watch stations

310. Maintain library of publications or technical manuals

311. Maintain outage logs and reports

312. Maintain publication custory logs

313. Maintain radiotelegraph log

314. Maintain radiotelephone log

315. Maintain radioteletype log

316. Maintain records receipt and expenditure for local purchases

317. Maintain required inventories of publications and directives

318. Maintain safety publications, regulations, and directives

319. Maintain security publications, records, and regulations

320. Maintain supervisor's log

321. Maintain radio station file

322. Order official publications and directives.

323. Prepare cycle schedule (OpNav 4700-4)

324. Prepare (draft) correspondence and reports

325. Prepare (draft) instructions or notices

326. Prepare enlisted leave authorization requests (NavPers 697)

327. Prepare equipment histories and records

328. Prepare inspection reports

329. Prepare job orders and work requests

330. Prepare Maintenance Data Collection System (MDCS) forms (OpNav 4700-2 Series)

331. Prepare message report forms

332. Prepare Naval Message blanks for incoming messages

333. Prepare outage logs and reports

334. Prepare Performance Evaluation Reports on subordinates

335. Prepare quarterly schedule of preventive maintenance (OpNav 4700-S)

336. Prepare requests for survey of tools and equipment

337. Prepare required safety reports

338. Prepare reports on newly installed communications equipment

339. Prepare research and interpretive reports on communication material

340. Prepare technical reports dealing with assigned electronics equipment

341. Prepare weekly schedule of preventive maintenance (OpNav 4700-6)

342. Report minor changes in ship electronic installation on NavShips 4263

343. Route correspondence

344. Submit corrected NavShips 4110

345. Submit NavSup 1250 to supply department

346. Type correspondence and reports

347. Type instructions and notices

348. Prepare work progress reports

349. Prepare leave schedule

350. Draft recommended changes to official publications

351. Prepare traffic summaries

352. Adjust antenna length to suit given frequency

353. Adjust frequency to suit given antenna length

354. Check teletype range and adjust to optimum setting

355. Compare frequency standard against National Bureau of Standards Radio Station (WWV) and log results

356. Coordinate complete processing of communication signals

357. Determine point of signal deterioration and correct problem

358. Follow standard mode (teletype, etc) procedur es

359. Handle radio transmission by broadcast method

360. Handle radio transmission by intercept method

361. Handle radio transmission by receipt method

362. Keep transmitters and receivers exactly on frequency

363. Maintain circuit quality

364. Maintain signal quality

365. Operate Automatic Digital Network (AUTODIN)

367. Participate in CW drill circuits

368. Participate in radiotelephone drill circuits

369. Participate in radioteletypewriter drill circuits

370. Perform specialized communication duties like weather reporting

371. Prepare circuit quality

372. Receive by telegraphy

373. Receive by teletypewriter

374. Receive facsimile broadcast

375. Receive on radiotelephone circuits

376. Receive using AUTODIN mode

377. Select antennas for transmitting or receiving

378. Select proper antenna matching equipment for receiving

379. Select radio frequency for maximum circuit efficiency

380. Send and receive on CW circuit

381. Send facsimile broadcast

382. Set up radio receivers

383. Set up radio transmitters

384. Stow crystals (from VHF/UHF transmitters) when not in use

385. Supervise setting up of transmitters and receivers

386. Trace messages

387. Trace signals in audioamplifiers

388. Trace signals in communication receivers

389. Transmit and receive through electronic jamming and other interference

390. Transmit by telegraphy

391. Transmit by teletypewriter

392. Transmit facsimile broadcast

393. Transmit on CW circuit

394. Transmit on radiotelephone circuits

395. Transmit using AUTODIN mode

396. Tune amplifiers

397. Tune and adjust Tropo-scatter equipment

398. Tune radiofrequency oscillators

399. Tune radio receivers

400. Tune radio transmitters

401. Tune other communications equipment

402. Monitor distress frequencies/channels

403. Operate a telephone exchange

404. Operate sound powered telephones

405. Use frequency prediction chart

406. Splice message tapes

407. Change paper rolls on teletype equipment

408. Switch communications equipment between microwave and landline

409. Adjust pulsewidth of microwave channels

410. Synchronize microwave channels

411. Start up emergency power units

412. Monitor equipment during changeover between emergency and regular power.

413. Synchronize clocks

414. Operate a duplicating machine

415. Set up radio patch panels

416. Make voice radio checks

417. Select means of message transmission (AUTODIN, Fleet Broadcast, HICOM)

418. Verify all daily traffic which has been transmitted/received

419. Initiate channel checks

420. Maintain circuit status boards

421. Operate microwave equipment

422. Operate tape reperforators

423. Assign serial number (SRS numbers) to commercial traffic

424. Check references on messages to insure security and accuracy

425. Construct service messages (SVC)

426. Insure international radio procedures are observed

427. Insure standard procedures for precedence in traffic handling are observed.

428. Perform duties of CPL(COMM TAC Publications Librarian)

429. Perform duties of fleet locator

430. Perform duties of service clerk

431. Perform duties of traffic checker for communication station

432. Perform routine clerical duties of communication office

433. Pick up basegrams while in port

434. Prepare domestic telegraph messages in commercial form

435. Prepare international telegraph messages in commercial form

436. Prepare messages in Naval form for transmission

437. Process incoming messages (CW, RATT, FAX etc)

438. Process outgoing messages

439. Process service messages (SVC)

440. Review classification and precedence assigned to outgoing messages

441. Route traffic from and within own ship or station

442. Supervise handling of message traffic

443. Identify callers using call list

444. Maintain service message log

445. Process limited distribution messages

446. File message tapes

447. Destroy overage message tapes

448. Verify routing indicators

449. Perform message tracer action

450. Maintain voice radio traffic log

451. Distribute message traffic

452. File message traffic

453. Log message traffic

454. Determine charges for commercial message traffic

455. Verify long distance commercial telephone charges

456. Assist RPS (Registered Publication Section) custodian

457. Authenticate on radiotelegraph circuits

458. Authenticate on radiotelephone circuits

459. Authenticate on radioteletypewriter circuits

460. Change safe combinations or locks

461. Demonstrate antijamming procedures

462. Destroy and dispose of classified material and equipment (Other than RPS)

463. Encryot and decrypt call-signs

464. Instruct personnel in operation of call-sign cipher device

465. Instruct personnel in safeguarding classified matter

466. Insure enforcement of communication security requirements

467. Maintain log of personnel visiting security areas of communication activity

468. Maintain security of classfied material

469. Maintain personnel access list to communication areas

470. Report electronic jamming on radio receiving equipment

471. Report security violations

472. Serve as enlisted member of Crypto Board

473. Serve as member of Registered Publications Correction Board

474. Stow and safeguard classified materials

475. Account for delivery of classified material using classified material control log

476. Check identification of personnel picking up classified message traffic

477. Assign routing for off-line encrypted messages

478. Operate on-line crypto equipment

479. Prepare messages for encryption

480. Process incoming encrypted messages for local delivery

481. Use off-line crypto devices to encrypt or decrypt messages

482. Prepare and package material for courier transfer

483. Prepare classified material destruction reports

484. Escort visitors through classified communications spaces

485. Compute length of antenna at given frequency

486. Demonstrate measures to restore damaged communications facilities

487. Drill personnel in emergency antenna rigging

488. Drill personnel on detecting and correcting casualties to equipment

489. Install communications equipment

490. Instruct personnel in basic radio, electronic and electrical theory

491. Instruct personnel in emergency tuning, patching, and operating of transmitters and receivers

492. Interpret and work from wiring and circuit diagrams

493. Patch transmitters and receivers into remost units

494. Read and interpret circuit diagrams (schematic, overall block, and service block)

495. Remove communications equipment

496. Rig emergency radio receiving and transmitting antennas

497. Rig transmission lines

498. Set up antenna patch panel

499. Set up complex communication system involving multiplex terminal equipment and secure mode of transmission

500. Adjust capicitor

501. Calibrate cryptographic security devices

502. Calibrate TSEC/HY-2 equipment

503. Calibrate other communication equipment

504. Change tape in perforator or reperforator (teletypewriters)

505. Change teletypewriter ribbons, paper and tape

506. Change typewriter ribbons

507. Clean and maintain handtools

508. Clean taletypewriters

509. Clean typewriters

510. Clean other communications equipment

511. Coordinate operational changes on teletype or telephone orderwire with distant satellite operators

512. Coordinate operational changes on circuits with prescribers

513. Lubricate teletypewriter equipment

514. Lubricate typewriters

515. Perform preventive maintenance on air filters

516. Perform preventive maintenance on antennas

517. Perform preventive maintenance on classified material destruction devices

518. Perform preventive maintenance on cryptographic security devices

519. Perform preventive maintenance on digital subscriber terminal equipment

520. Perform preventive maintenance on duplicating equipment

521. Perform preventive maintenance on electrical assemblies of teletype machines

522. Perform preventive maintenance on electronic semiautomatic off-line teletypewriter equipment

523. Perform preventive maintenance on emergency radio equipment

524. Perform preventive maintenance on mechanical assemblies of teletype machines

525. Perform preventive maintenance on microphones

526. Perform preventive maintenance on motors and generators

527. Perform preventive maintenance on NBST communication equipment

528. Perform preventive maintenance on off-line cryptographic devices

529. Perform preventive maintenance on on-line cryptographic devices

530. Perform preventive maintenance on portable radio equipment

531. Perform preventive maintenance on radio receivers

532. Perform preventive maintenance of radio transmitters

533. Perform preventive maintenance on Satellite communication terminals

534. Perform preventive maintenance on teletype equipment

535. Perform preventive maintenance on Tropo-scatter equipment

536. Perform preventive maintenance on TSEC/HY-2 equipment

537. Perform preventive maintenance on other communication equipment

538. Prepare Maintenance Requirement Cards (MRC)

539. Remove and replace fuses

540. Install replacement parts of radio equipment

541. Solder semiconductors

542. Tag switches during repair or overhaul of electronic equipment

543. Train personnel to perform preventive maintenance

544. Repair typewriters

545. Correct circuit outages

546. Locate electrical and electronic failures in radio equipment

547. Patch circuits

548. Perform casualty analysis of cryptographic devices

549. Perform casualty analysis of teletypewriter equipment

550. Perform casualty analysis of TSEC/HY-2

551. Perform casualty analysis of other communication equipment

552. Perform corrective maintenance on air filters

553. Perform corrective maintenance on antennas

554. Perform corrective maintenance on classified material destruction devices

555. Perform corrective maintenance on digital subscriber terminal equipment

556. Perform corrective maintenance on duplicating equipment

557. Perform corrective maintenance on electrical assemblies of teletype machines

558. Perform corrective maintenance on electronic semiautomatic off-line teletypewriter equipment

559. Perform corrective maintenance on emergency radio equipment

560. Perform corrective maintenance on mechanical assemblies of teletype machines

561. Perform corrective maintenance on microphones

562. Perform corrective maintenance on motors and generators

563. Perform corrective maintenance on NBST communication equipment

564. Perform corrective maintenance on off-line cryptographic devices

565. Perform corrective maintenance on on-line cryptographic devices

566. Perform corrective maintenance on portable radio equipment

567. Perform corrective maintenance on radio receivers

568. Perform corrective maintenance on radio transmitters

569. Perform corrective maintenance on Satellite communication terminals

570. Perform corrective maintenance on teletype equipment

571. Perform corrective maintenance on Tropo-scatter equipment

572. Perform corrective maintenance on TSEC/HY-2 equipment

573. Perform corrective maintenance on other communication equipment

574. Repair printed circuits

575. Repair radio headsets

576. Train personnel to perform corrective maintenance

577. Train personnel to perform minor repair of communication equipment

578. Train personnel to troubleshoot electronic communication equipment

579. Troubleshoot electronic communication equipment

NAVAL OCCUPATIONAL TASK ANALYSIS PROGRAM

BACKGROUND INFORMATION SHEET

MY NAME _____

A - BACKGROUND INFORMATION

1. SHIP or STATION ACTIVITY CODE

2. BILLET PRIMARY / **3. NECs SECONDARY**

4. BILLET PAYGRADE

E-1, E-2, E-3, E-4, E-5, E-6, E-7, E-8, E-9

5. RATING

INSTRUCTIONS

1. Use No. 2 pencil only.
2. Do not use a pen or other pencil.
3. Indicate your response with a solid black mark in the space provided.
4. Erase completely all changes.
5. Do not detach forms from the packet.

TEST SCORES

6. GCT / **7. ARI** / **8. MECH** / **9. CLER** / **10. SHOP PRACTICE**

11. SOCIAL SECURITY ACCOUNT NUMBER

12. MY PAYGRADE

E-1, E-2, E-3, E-4, E-5, E-6, E-7, E-8, E-9

AMOUNT OF TIME SERVED IN

13. U.S. NAVY (YEARS / MONTHS)

14. MY PRESENT RATING (YEARS / MONTHS)

15. MY PRESENT ACTIVITY (YEARS / MONTHS)

16. MY PRESENT PAYGRADE (YEARS / MONTHS)

17. FORMAL EDUCATION (Highest Level)

Yrs. Completed	DEGREES or DIPLOMAS AWARDED
0	None
1	High School
2	Associate
3	Bachelors
4	Masters
5	Doctorate

18. SEX

Male

Female

19. NAVAL CATEGORY

USN

USNR

USNR (INACTIVE)

SURTAR

AIRTAR

DO NOT MARK IN THIS SPACE

NAVAL OCCUPATIONAL TASK ANALYSIS PROGRAM

BACKGROUND INFORMATION SHEET

INSTRUCTIONS

1. Use No. 2 pencil only.
2. Do not use a pen or other pencil.
3. Indicate your response with a solid block mark in the space provided.
4. Erase completely all changes.
5. Do not detach form from the pocket.

20. MY PRIMARY NEC

21. MY SECONDARY NEC

22. I ACQUIRED MY NEC THROUGH

SOURCE	Prim	Sec
Class "B" Sch		
Class "C" Sch		
Factory Tng.		
OJT		
Other		
Not Applicable		

23. I ACQUIRED MY RATING THROUGH

SOURCE
Class "A" Sch
Class "B" Sch
Class "C" Sch
OJT
Other

24. TRAINING MOST USEFUL IN MY JOB

Class "A" Sch
Class "B" Sch
Class "C" Sch
Factory Tng.
Fleet Schools
Not Applicable

25. AMOUNT OF WORK EXPERIENCE REQUIRED IN MY JOB

YEARS: 0 1 2 3

MONTHS: 0 1 2 3 4 5 6 7 8 9

26. AMOUNT OF OJT REQUIRED IN MY JOB

MONTHS: 0 1 2

0 1 2 3 4 5 6 7 8 9

27. AMOUNT OF FORMAL SCHOOL TNG REQUIRED IN MY JOB

WEEKS: 0 1 2 3 4 5

0 1 2 3 4 5 6 7 8 9

28. NO. OF MOS I HAVE WORKED OUT OF MY RATING WHILE IN THIS COMMAND

MONTHS: 0 1 2 3 4 5 6 7 8 9

0 1 2 3 4 5 6 7 8 9

29. NUMBER OF HRS I WORK EACH WEEK

0 1 2 3 4 5 6 7 8 9

0 1 2 3 4 5 6 7 8 9

30. NUMBER OF PEOPLE I SUPERVISE

None
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-35
Over 35

31. AMOUNT OF SUPERVISION I RECEIVE

None
Very Little
Little
Much
Very Much

32. DO YOU PLAN TO REENLIST?

Yes
No
Uncertain

33. MY JOB TITLE

0 1 2 3 4 5 6 7 8 9

0 1 2 3 4 5 6 7 8 9

34. DOES YOUR JOB UTILIZE YOUR NEC TRAINING?

Yes
No
N A

35. DO YOU NOW DRAW HAZARDOUS DUTY PAY?

Yes
No
N/A

36. DO YOU PLAN TO CONTINUE YOUR FORMAL EDUCATION WHILE IN THE SERVICE?

Yes
No
Uncertain

37. DID YOU HAVE ANY OCCUPATIONAL TRAINING BEFORE ENTERING THE NAVY THAT YOU NOW USE IN YOUR JOB?

Yes
No
N A

38. HAVE YOU EVER RECEIVED A VRB PAYMENT?

Yes
No

39. DO YOU NOW RECEIVE "PRO" PAY?

Yes
No

40. DO YOU PLAN TO USE YOUR NAVY TRAINING IN A CIVILIAN JOB AFTER RELEASE FROM SERVICE?

Yes
No
Uncertain

41. ARE YOU ENROLLED IN A CIVILIAN OFF DUTY COURSE (INCL. USAFI) THAT IS RELATED TO YOUR PRESENT JOB?

Yes
No
N A

42. IS YOUR OFF DUTY JOB RELATED TO YOUR RATING OR NEC?

Yes
No
N A

43. WHAT IS THE MINIMUM EDUCATIONAL GRADE LEVEL YOU THINK IS REQUIRED FOR YOUR JOB?

8
10
12
Above H S

0 1 2 3 4 5 6 7 8 9

0 1 2 3 4 5 6 7 8 9

DO NOT MARK IN THIS SPACE

0 1 2 3 4 5 6 7 8 9

0 1 2 3 4 5 6 7 8 9

0 1 2 3 4 5 6 7 8 9

0 1 2 3 4 5 6 7 8 9

0 1 2 3 4 5 6 7 8 9

NAVAL OCCUPATIONAL TASK ANALYSIS PROGRAM

TASK RESPONSE SHEET

TASK NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
B - 1 MY INVOLVEMENT IN TASK																				
IN TRAINING STATUS																				
I ASSIST																				
I DO (PERFORM)																				
I DO & SUPERVISE																				
I ONLY SUPERVISE																				
I INSTRUCT																				
B - 2 HOW MUCH TIME IS SPENT ON TASK?																				
VERY LITTLE																				
BELOW AVERAGE																				
AVERAGE																				
ABOVE AVERAGE																				
VERY MUCH																				

TASK NUMBER	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
B - 1 MY INVOLVEMENT IN TASK																				
IN TRAINING STATUS																				
I ASSIST																				
I DO (PERFORM)																				
I DO & SUPERVISE																				
I ONLY SUPERVISE																				
I INSTRUCT																				
B - 2 HOW MUCH TIME IS SPENT ON TASK?																				
VERY LITTLE																				
BELOW AVERAGE																				
AVERAGE																				
ABOVE AVERAGE																				
VERY MUCH																				

INSTRUCTIONS

1. Use No. 2 pencil only.
2. Do not use a pen or other pencil.
3. Indicate your response with a solid black mark in the space provided.
4. Erase completely all changes.
5. Do not detach forms from the packet.

WORKER CHARACTERISTICS OF THE JOB

C. ITEM NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
BELOW AVERAGE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AVERAGE	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
ABOVE AVERAGE	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

GENERAL QUARTERS AND WATCH DUTIES

D. ITEM NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
CONDITION I																				
CONDITION III																				
CONDITION IV																				
IN PORT																				

DO NOT MARK IN THIS SPACE

DD 30-208

88

NAVAL OCCUPATIONAL TASK ANALYSIS PROGRAM

TASK RESPONSE SHEET

TASK NUMBER	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
B - 1 MY INVOLVEMENT IN TASK																				
IN TRAINING STATUS																				
I ASSIST																				
I DO (PERFORM)																				
I DO & SUPERVISE																				
I ONLY SUPERVISE																				
I INSTRUCT																				
B - 2 HOW MUCH TIME IS SPENT ON TASK?																				
VERY LITTLE																				
BELOW AVERAGE																				
AVERAGE																				
ABOVE AVERAGE																				
VERY MUCH																				

TASK NUMBER	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
B - 1 MY INVOLVEMENT IN TASK																				
IN TRAINING STATUS																				
I ASSIST																				
I DO (PERFORM)																				
I DO & SUPERVISE																				
I ONLY SUPERVISE																				
I INSTRUCT																				
B - 2 HOW MUCH TIME IS SPENT ON TASK?																				
VERY LITTLE																				
BELOW AVERAGE																				
AVERAGE																				
ABOVE AVERAGE																				
VERY MUCH																				

OC 20-288

WORKER CHARACTERISTICS OF THE JOB

C. ITEM NUMBER	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
BELOW AVERAGE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AVERAGE	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
ABOVE AVERAGE	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

GENERAL QUARTERS AND WATCH DUTIES

D. ITEM NUMBER	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
CONDITION I																				
CONDITION III																				
CONDITION IV																				
IN PORT																				

INSTRUCTIONS

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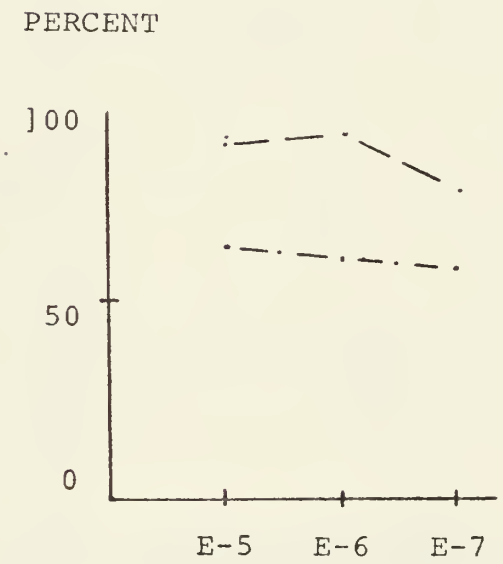
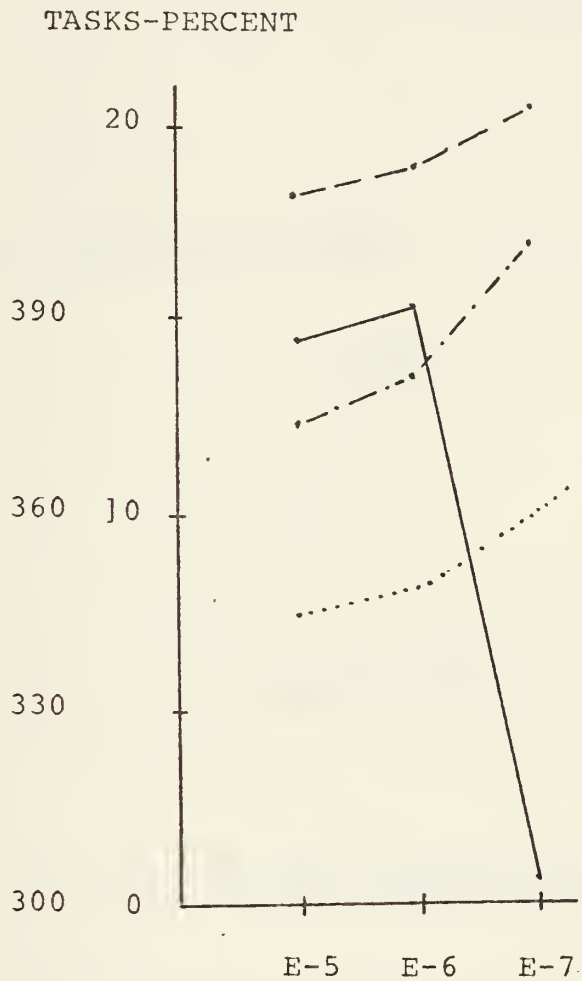
DO NOT MARK IN THIS SPACE

APPENDIX C - GRAPHS

COMPARISON OF THE PERCEIVED VALUE OF NEC TRAINING WITH ITS UTILIZATION



COMPARISON OF THE PERCENT OF TOTAL WORK TIME
SPENT ON MANAGERIAL FUNCTIONS WITH THE TOTAL NUMBER OF TASKS



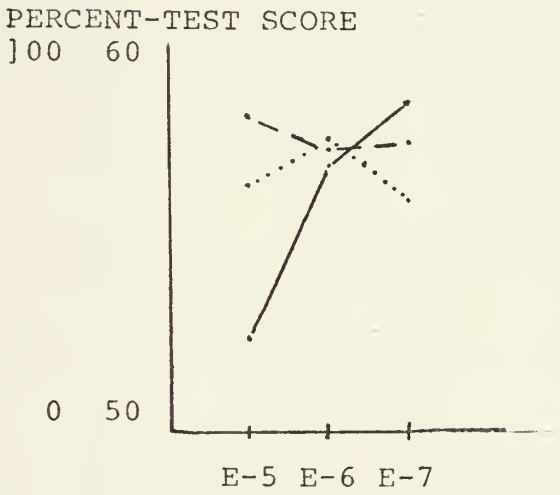
— — — —
DIRECTING AND IMPLEMENTING

— · — · — · —
PLANNING AND ORGANIZING

. . . . . .
EVALUATING AND INSPECTING

————————
TOTAL NUMBER OF TASKS PERFORMED

COMPARISON OF EDUCATION ACTUALLY HELD AS
OPPOSED TO EDUCATION PERCEIVED NECESSARY

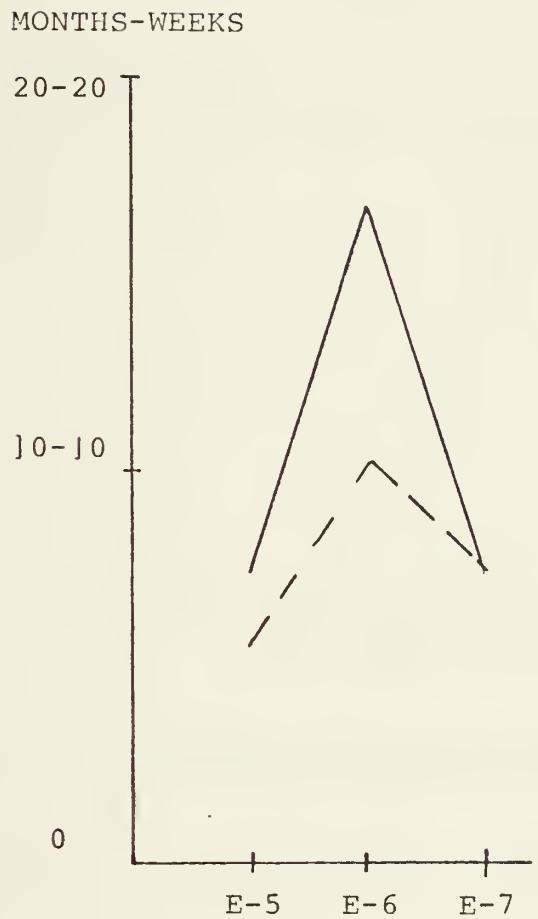


PERCENT HAVING]2th GRADE EDUCATION

PERCENT THINKING]2th GRADE EDUCATION
REQUIRED TO PERFORM THEIR JOBS

AVERAGE GCT/ARI TEST SCORE

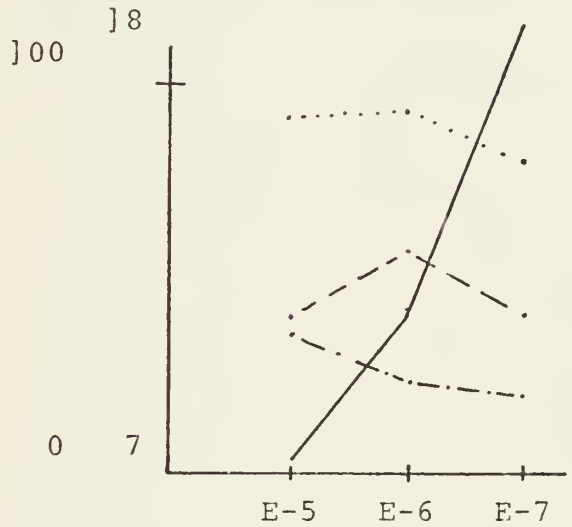
COMPARISON OF ON THE JOB AND
FORMAL SCHOOLS TRAINING



— — — — —
AVERAGE ON THE JOB TRAINING IN MONTHS

AVERAGE FORMAL SCHOOLS TRAINING IN WEEKS

COMPARISON OF REENLISTMENT INTENT
WITH VARIOUS FACTORS



PERCENT INTENDING TO REENLIST

AVERAGE NUMBER OF YEARS OF SERVICE

PERCENT INTENDING TO USE NEC TRAINING IN CIVILIAN LIFE

PERCENT WHO FEEL NEC TRAINING UTILIZED IN THEIR WORK

COMPUTER OUTPUT

PRINT VARIABLE

RM PRINT VARIABLES BY TIME — RADIOMAN ______ RMTYMGRP PAGE ____1____

PRINT VARIABLE IN TIME SEQUENCE GROUP

HIER CASE	CASE ID	ACTIVITY CODE	BILLBILL PNECSNEC	B P	RM	TEST SCORE GCARMECLSP	SSN	PY GR	NAVY YRMO	RATE YRMO	ACTY YRMO	PYGR YRMO	ED YR	S	V C	PNECSNEC	AD PS	RT	EXPJ SHKKKPA YRMOWKOTHPSS	RE UP	JB TL	PERSONAL DATA
1	20339	2473074000	00000000	3	RM	6444494639	550369240	3	0038	0002	0200	0812	11	1	0	00000004	51	1	000140040042	0	3	232223233
2	31639	2473179000	11000000	4	RM	6366465966	557802917	4	0106	0103	0000	0613	11	2	0	00000006	61	10	001070036022	0	03	222222121
3	[illegible]	[illegible]	00000000	5	RM	1557556055	[illegible]	4	0201	0100	0400	0512	11	1	0	[illegible]	51	50	202360036022	0	03	[illegible]223133
4	[illegible]	[illegible]	24112313	6	RM	6169616250	[illegible]	6	0011	0007	0201	0312	11	1	[illegible]	[illegible]	11	[illegible]	[illegible]	0	01	211112223
5	[illegible]	[illegible]	23112005	6	RM	[illegible]	[illegible]	6	0005	0706	[illegible]	1114	11	1	2	[illegible]	41	30	101011342[illegible]	0	01	[illegible]11223
6	31597	2470073000	03000000	4	RM	5948414334	[illegible]	4	0207	0101	0000	0112	11	2	0	[illegible]	51	50	[illegible]	0	03	222222221
7	31523	2470078000	23040000	4	RM	5969457753	511550734	3	0100	0006	0101	0014	11	1	2	30400002	61	30	[illegible]	0	01	212223230
8	31528	2473078000	23049000	5	RM	5862505650	555031109	5	0405	0402	0231	0413	11	1	2	30400004	61	10	103262048111	0	01	232221233
9	[illegible]	2473075000	23000000	5	RM	6155000000	[illegible]	5	0504	0407	0000	0112	12	1	2	30600004	51	60	104160048103	0	01	222121222
10	31527	2470073000	[illegible]	5	RM	[illegible]	[illegible]	5	0508	0507	1100	[illegible]	11	1	2	34700002	61	10	001000003111	0	02	212121223
11	[illegible]	2473074000	23040000	4	RM	[illegible]	[illegible]	4	0203	0202	1000	0613	11	1	0	00000006	61	50	103140432012	0	[illegible]	[illegible]
12	31578	[illegible]	23050000	5	RM	5362515342	[illegible]	4	0405	1100	0101	0412	11	1	2	39300004	61	30	106140024102	0	01	[illegible]
13	31555	[illegible]	00000000	6	RM	[illegible]	[illegible]	5	0207	0205	0200	[illegible]	11	2	0	00000005	51	10	201120043122	0	[illegible]	[illegible]
14	31471	[illegible]	22130000	5	RM	[illegible]	[illegible]	5	0510	0105	0401	0514	11	1	2	31000001	61	20	001000036121	0	[illegible]	212122223
15	31403	[illegible]	00000000	5	RM	6040453340	573703160	5	0705	0201	0302	0112	11	1	0	00000006	61	60	031000034121	0	[illegible]	[illegible]
16	[illegible]	2473070000	00000000	6	RM	5753462800	[illegible]	5	0901	0702	0204	0212	11	1	2	34200002	61	60	801000033121	0	02	222121223
17	[illegible]	[illegible]	00000000	5	RM	5653475546	[illegible]	5	0211	0205	0400	0412	11	1	0	00000006	61	10	102160048117	0	03	322222233
18	31523	[illegible]	12000000	4	RM	5062531950	[illegible]	4	0306	0002	0101	0012	11	1	0	[illegible]	61	10	[illegible]	0	01	232221224
19	31524	[illegible]	00000000	4	RM	0000000000	[illegible]	4	0205	0200	1100	0512	11	1	0	[illegible]	51	[illegible]	[illegible]	0	03	232223272
20	[illegible]	[illegible]	00000000	3	[illegible]	[illegible]	[illegible]	4	0211	0208	0600	1713	11	1	0	00000005	51	50	[illegible]	0	03	222222233
21	31527	[illegible]	00000000	3	RM	[illegible]	[illegible]	3	0100	0010	0000	0312	11	1	0	[illegible]	61	10	[illegible]	0	03	222222221
22	[illegible]	[illegible]	00000000	4	RM	[illegible]	[illegible]	3	0100	0005	0600	0316	21	2	0	[illegible]	61	10	[illegible]	0	03	212223123
23	31270	[illegible]	00000000	4	RM	5350544200	471505207	4	0206	0111	1000	0512	11	1	0	00000006	61	10	101142224012	0	03	322223233
24	[illegible]	[illegible]	00000000	4	RM	5955404754	[illegible]	4	0204	0102	0200	0612	11	1	0	[illegible]	61	10	104160435032	0	03	222222221
25	31597	[illegible]	00000000	3	RM	6264490073	[illegible]	3	0101	0006	0600	0313	11	2	0	00000005	61	10	[illegible]	0	02	222222232
26	31621	[illegible]	00000000	4	RM	5359449933	152421151	4	0202	0200	0300	0412	11	1	0	[illegible]	61	10	101141243012	0	03	[illegible]
27	[illegible]	[illegible]	23000600	3	RM	[illegible]	[illegible]	3	0202	[illegible]	0900	0712	11	2	0	00000005	61	10	[illegible]	0	03	221222223
28	31640	[illegible]	00000000	3	RM	[illegible]	351442355	3	0104	0000	0000	[illegible]	11	1	0	00000006	51	10	[illegible]	0	03	222222233
29	[illegible]	[illegible]	00000000	4	RM	[illegible]	[illegible]	4	0103	0010	1000	0012	11	2	0	[illegible]	61	10	[illegible]	0	03	[illegible]
30	[illegible]	[illegible]	00000000	5	RM	[illegible]	575140000	5	0502	0507	0300	0012	11	1	0	00000005	51	10	001120040033	0	03	212121233
31	31561	[illegible]	10950000	5	RM	[illegible]	511502427	4	0111	0100	0300	0014	11	1	0	[illegible]	51	10	[illegible]	0	03	[illegible]
32	31531	[illegible]	00000000	5	RM	[illegible]	[illegible]	4	0110	0110	0100	0112	11	1	0	00000006	51	10	101141236022	0	03	212222223
33	31612	[illegible]	00000000	3	RM	[illegible]	[illegible]	3	0205	0005	0600	[illegible]	11	2	0	00000004	61	10	003140234030	0	01	[illegible]
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35	[illegible]	[illegible]	00000000	4	RM	[illegible]	[illegible]	4	0201	0105	0600	0515	11	1	0	00000005	51	10	[illegible]	0	03	[illegible]
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39	[illegible]	[illegible]	00000000	4	RM	[illegible]	[illegible]	4	[illegible]	0100	0700	0613	11	1	0	00000005	61	10	[illegible]	0	03	[illegible]
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41	[illegible]	[illegible]	12000000	4	RM	[illegible]	[illegible]	4	[illegible]	0107	0600	0612	11	1	0	[illegible]	51	10	[illegible]	0	[illegible]	[illegible]
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44	[illegible]	2473070000	00000000	5	RM	7957566500	541553305	5	0201	0100	0600	0112	12	1	0	00000005	51	10	101140040127	0	03	232223223
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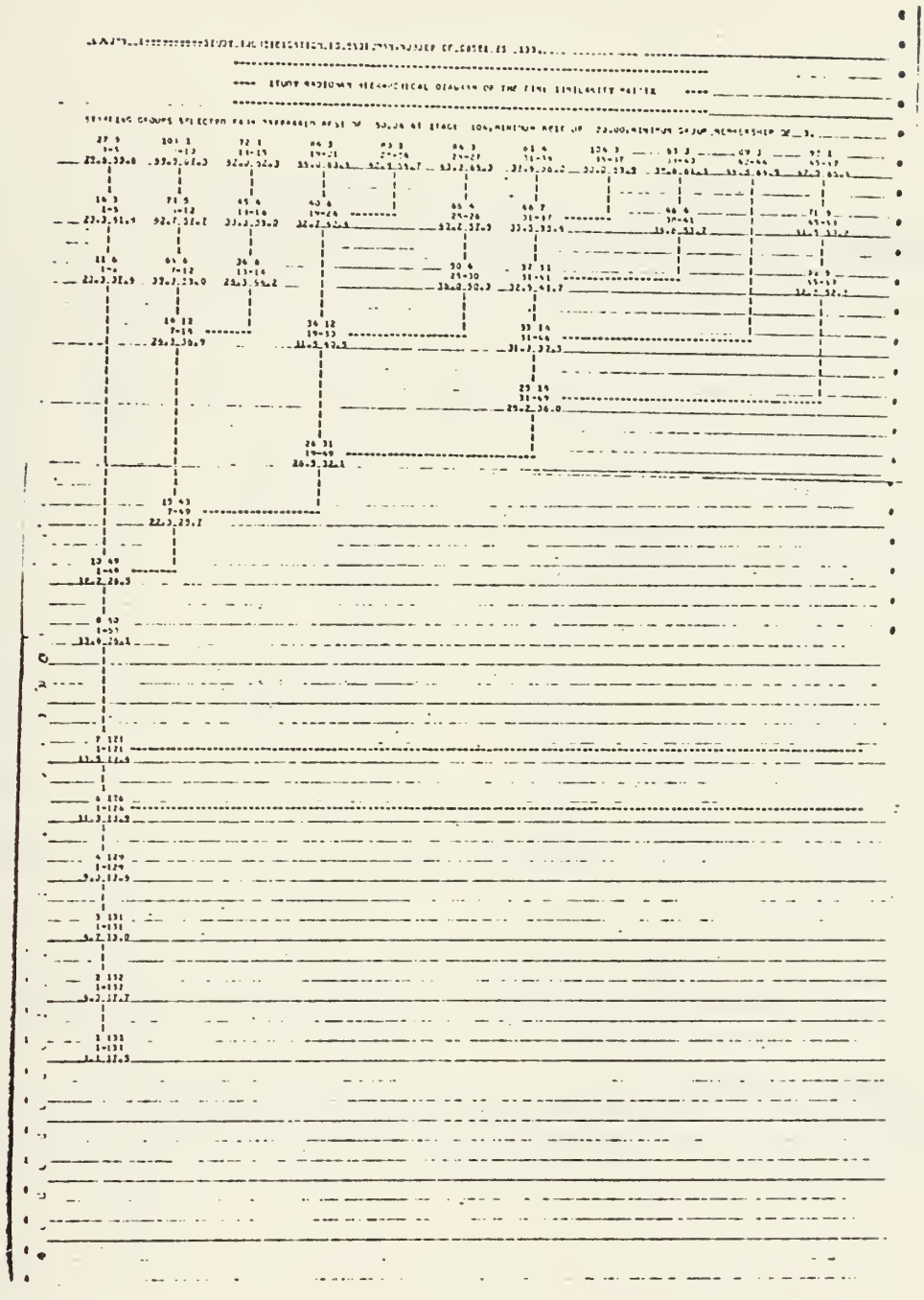
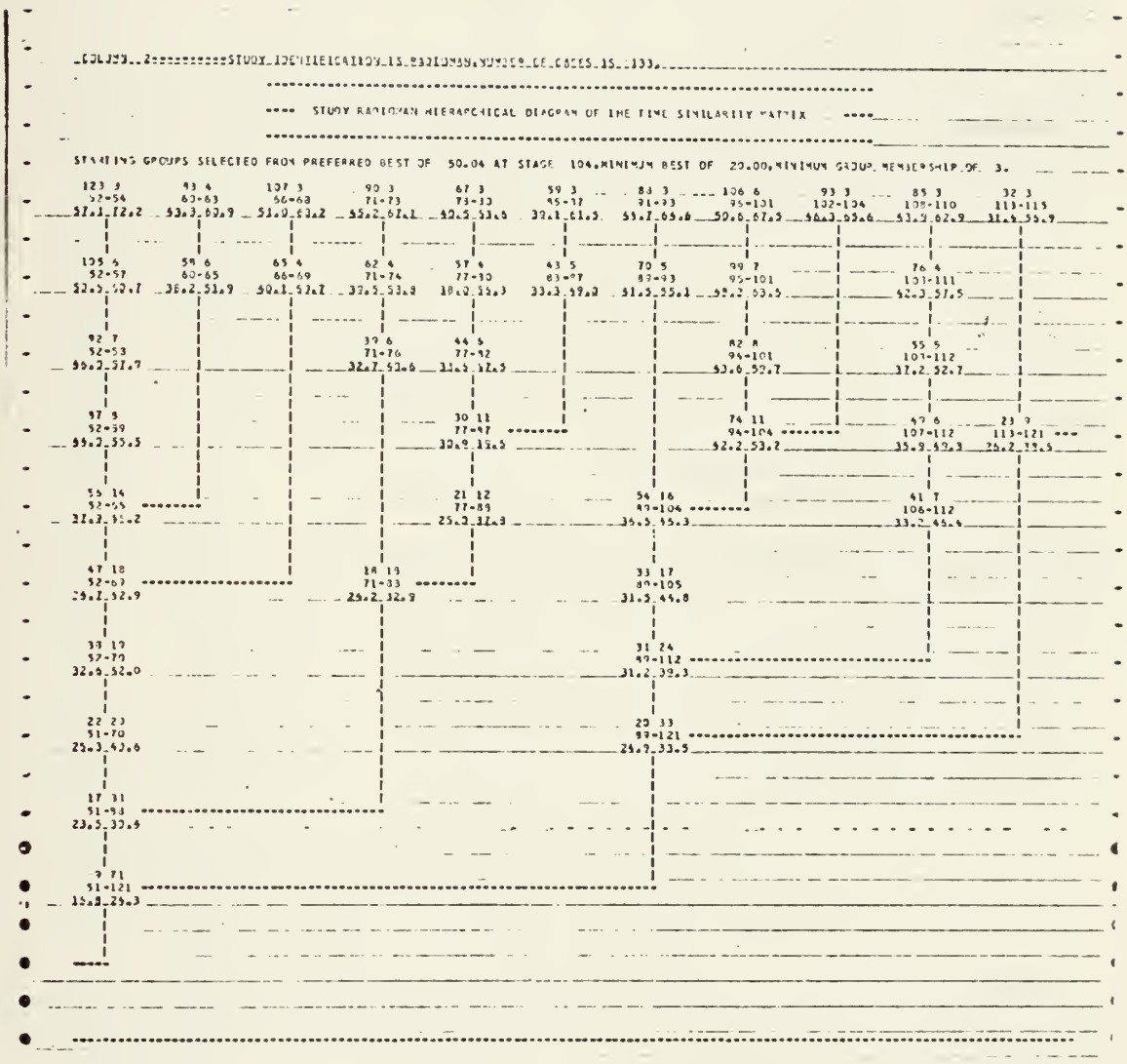
46	31567	2470078000	00000000	4	RM	6984635930	[illegible]	4	0205	0111	1000	0512	12	1	0	00000005	51	10	001141034022	0	01	222222221
47	31596	2473070000	00000000	5	RM	7069415957	[illegible]	4	0204	0103	0400	1113	11	1	0	00000005	51	10	002020048023	0	01	222222221
48	31654	2470078000	12000000	4	RM	6250494950	520600179	4	0104	0011	0900	1112	11	1	0	00000006	61	10	001140040022	0	03	212223231

HIERARCHICAL DIAGRAM

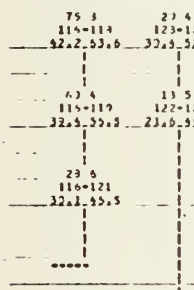



STUDY RAMONAN HIERARCHICAL DIAGRAM OF THE TIME SIMILARITY MATRIX
STARTING GROUPS SELECTED FROM PREFERRED BEST OF 50.04 AT STAGE 104,MINIMUM BEST OF 29.00,MINIMUM GROUP MEMBERSHIP OF 3.

COLUMN 3 STUDY IDENTIFICATION IS PREDICTION NUMBER OF CASES IS 133.

**** STUDY RADIMAN HIERARCHICAL DIAGRAM OF THE TIME SIMILARITY MATRIX ****

STARTING GROUPS SELECTED FROM PREFERRED BEST OF 50.04 AT STAGE 104, MINIMUM BEST OF 20.00, MINIMUM GROUP MEMBERSHIP OF 3.



RADIOMAN TITLES BY DUTY — RADIOMAN — RMTITLES PAGE 1

A---PLANNING AND ORGANIZING

A 1 ADVISE CO OF EFFECTIVENESS OF NEW DEV AND PROCEDURES
A 2 ADVISE OOD ON READINESS PRIOR TO GETTING UNDERWAY
A 3 ADVISE SUPR PERSONNEL OF WORK PROGRESS ON EQUIPMENT
A 4 ALLOCATE CHANNELS AND CIRCUITS TO MEET USER REQUIREMENTS
A 5 ASSIGN COMMUNICATION TASKS OR DETAILS TO PERSONNEL
A 6 ASSIGN DUTIES AND TASKS TO BILLETS
A 7 ASSIGN INSTRUCTORS FOR OJT PROGRAMS
A 8 ASSIGN MAINTENANCE TASKS TO RM'S
A 9 ASSIGN PERSONNEL TO BILLETS
A 10 ASSIGN PERSONNEL TO DAILY TASKS
A 11 ASSIGN PERSONNEL TO RECEIVE OJT
A 12 ASSIGN PERSONNEL TO RECEIVE SCHOOL/CLASSROOM TRNG
A 13 ASSIGN PERSONNEL TO WATCHES
A 14 ASSIGN PUBLICATIONS TO BE MAINTAINED BY RM'S
A 15 ASSIST IN FORMULATION OF COMMUNICATION PLANS
A 16 ASSIST IN PREP OF COMMUNICATION ANNEXES TO OPERATIONS PLANS
A 17 ASSIST IN PREP OF COMMUNICATION FINANCIAL BUDGETS
A 18 ASSIST IN PREPARING COMPETITIVE EXERCISES TRIALS AND INSP
A 19 COORDINATE COMMUNICATIONS GUARD ARRANGEMENTS WITH SHORE STA
A 20 COORDINATE COMMUNICATIONS MAINT PROGRAMS WITH SHIP MAINT
A 21 COORDINATE COMMUNICATIONS MAINT PROGRAMS WITH SHIP OPSKED
A 22 COORDINATE REPAIR AND MAINT OPER WITH SUPPLY AND OPER PERSL
A 23 COORDINATE TRAINING PROGRAMS WITH OPSKED
A 24 DESIGNATE BACKUP FREQUENCIES AND EQUIPMENT FOR EMERGENCY OP
A 25 DEVELOP PROCEDURES FOR CASUALTY ANALYSIS
A 26 DEVELOP PROCEDURES FOR DETERMINING WORK PRIORITIES
A 27 ESTABLISH PERSONNEL PERFORMANCE STDS AND TESTS
A 28 ESTIMATE REQUIREMENTS FOR TIME MATERIALS AND LABOR
A 29 MAINTAIN DEPT/DIV ORGANIZATION AND REGULATION MANUAL
A 30 MAINTAIN STATUS BOARD
A 31 MAINTAIN WATCH QUARTER AND STATION BILL
A 32 ORGANIZE AND PLAN WORK OF PERSONNEL
A 33 ORGANIZE COMMUNICATIONS DIVISION BRANCH OR SECTION
A 34 ORGANIZE DRILLS FOR TRAINING
A 35 ORGANIZE DUTIES TO BE PERFORMED ABOARD SHIP
A 36 ORGANIZE DUTIES TO BE PERFORMED AT SHORE STATION
A 37 PLAN AND ORGANIZE SECURITY TRAINING PROGRAMS
A 38 PLAN AND ORGANIZE SHIPBOARD MAINT AND PRESERVATION PROGRAMS
A 39 PLAN AND ORGANIZE STANDARD NAVY 3-M SYSTEM
A 40 PLAN COMMUNICATIONS ACTIVITIES IN COMPLIANCE WITH OFFICIAL
A 41 PLAN FOR TENDER/YARD OVERHAUL OF COMMUNICATIONS EQUIPMENT
A 42 PLAN INSTALLATION TRANSFER OR REPLACEMENT OF COMM EQUIP
A 43 PLAN PHYSICAL LAYOUT FOR COMM DIVISION BRANCH OR SECTION
A 44 PLAN SAFETY EDUCATION PROGRAMS
A 45 PLAN TRAINING PROGRAMS
A 46 PLAN TRAINING CONFERENCES MEETINGS OR SEMINARS
A 47 PREP AND MAINT DEPARTMENTAL BILLS AND DIRECTIVES
A 48 PREP AND SUBMIT REQUESTS FOR TRNG AND EDUC ACCREDITATION
A 49 PREPARE DAILY WORK SCHEDULES
A 50 PREPARE DRAFT OF SECURITY REGULATIONS
A 51 PREP MONTHLY PREVENTIVE MAINTENANCE SCHEDULES
A 52 PREPARE OPERATING INSTRUCTIONS ON COMM FUNCTIONS
A 53 PREP QUARTERLY PLANNED MAINTENANCE SCHEDULES
A 54 PREP TENDER/YARD OVERHAUL REQUESTS FOR EQUIPMENTS
A 55 PREP UP-TO-DATE PERSONNEL ACCESS LIST TO COMM AREAS
A 56 PREP WEEKLY PLANNED MAINTENANCE SCHEDULES
A 57 REQUISITION TRNG AND EDUC MANUALS AND MATERIALS
A 58 ROTATE RADIOMEN IN COMMUNICATION BILLETS
A 59 PREPARE CLASSIFIED MATERIAL DESTRUCTION BILLS
A 60 SCHEDULE TRAINING
A 61 SUBMIT DEPARTMENTAL WORK REQUEST LIST
A 62 UPDATE QUARTERLY PLANNED MAINTENANCE SCHEDULE
A 63 UPDATE WEEKLY PLANNED MAINTENANCE SCHEDULE
A 64 PARTICIPATE IN STAFF MEETINGS
A 65 PREPARE BRIEFINGS
A 66 PLAN LEAVE SCHEDULE
A 67 COORDINATE COMMUNICATIONS PROC WITH NET CONTROL STATIONS
A 68 MAINTAIN EMERGENCY RECALL BILL

B---DIRECTING AND IMPLEMENTING

B 1 ASSIST IN MAINTAINING CYCLE SCHEDULE
B 2 CHECK ADMINISTRATIVE REPORTS
B 3 CHECK COORDINATED COSAL FOR PARTS
B 4 CONDUCT CASUALTY DRILLS
B 5 CONDUCT DRILL CIRCUITS
B 6 CONTROL SELECTION OF TRANSMITTING RECEIVING & TERMINAL EQUP
B 7 COORDINATE CASUALTY REPAIRS
B 8 DETERMINE RATES TO BE CHARGED FOR CLASS E MESSAGES
B 9 DETERMINE REPAIRS OR ADJUSTMENTS FOR EQUIPMENT
B 10 DIRECT CONTROL & OPER OF LONG-HAUL COMM MEDIA & LOCAL CIRCT
B 11 DIRECT CORRECTION OF DEFICIENCIES NOTED BY INSPECTING OFFIC
B 12 DIRECT ELIMINATION OF SAFETY HAZARDS
B 13 DIRECT PATCHING OF COMMUNICATIONS
B 14 DIRECT PREPARATION OF CORRESPONDENCE
B 15 DIRECT RECORDS DISPOSAL
B 16 ENFORCE SHIPBOARD ELECTRICAL SAFETY PRECAUTIONS
B 17 IMPLEMENT SAFETY TRAINING PROGRAMS
B 18 IMPLEMENT SHIPBOARD MAINT AND PRESERVATION PROGRAM
B 19 INDOCTRINATE NEWLY ASSIGNED PERSONNEL
B 20 INITIATE MDCS DOCUMENTATION
B 21 INSTRUCT PERSONNEL IN REPORTING CASUALTIES CORRECTLY
B 22 INSURE AVAILABILITY OF SPAR PARTS
B 23 INSURE COMPLETION OF TENDER/YARD OVERAL OF EQUIPMENT
B 24 INSURE MONTHLY WEIGHIN OF CO2 EXTINGUISHERS
B 25 INSURE PROPER POSTING OF EMERGENCY DISTRESS SCENE & SAR FRQ
B 26 INSURE PROPER STORAGE OF SPARE EMERGENCY ANTENNAS

DUTY SUMMARY OF PERCENTAGE MEMBERS PERFORMING EACH TASK.
GRP SUMMARY BY PAYGRADE

THE FOLLOWING GROUPS ARE INCLUDED IN THIS REPORT:

RM---E3	PAYGRADE E3	,MEMBERS= 12.
RM---E4	PAYGRADE E4	,MEMBERS= 42.
RM---E5	PAYGRADE E5	,MEMBERS= 36.
RM---E6	PAYGRADE E6	,MEMBERS= 20.
RM---E7	PAYGRADE E7	,MEMBERS= 12.
RM---E8	PAYGRADE E8	,MEMBERS= 3.

DTY/
TASK

TASK	RM---E3	RM---E4	RM---E5	RM---E6	RM---E7	RM---E8
A	25.00	57.14	38.89	95.45	100.00	100.00
B	75.00	90.48	100.00	100.00	100.00	100.00
C	25.00	54.76	75.00	92.86	83.33	100.00
D	66.67	73.81	66.11	89.29	100.00	100.00
E	16.67	97.62	91.67	92.86	100.00	100.00
F	166.67	100.00	97.22	100.00	100.00	100.00
G	100.00	83.33	77.78	71.43	66.67	100.00
H	75.00	76.19	75.00	75.00	75.00	100.00
J	0.0	7.14	30.56	57.14	50.00	66.67
K	91.67	92.86	86.11	80.71	86.67	86.67
L	0.0	16.67	36.11	60.71	50.00	100.00

TASK SUMMARY OF PERCENT OF MEMBERS PERFORMING EACH TASK.
GRP SUMMARY BY PAYGRADE

THE FOLLOWING GROUPS ARE INCLUDED IN THIS REPORT:

RM---E3	PAYGRADE E3	,MEMBERS= 12.
RM---E4	PAYGRADE E4	,MEMBERS= 42.
RM---E5	PAYGRADE E5	,MEMBERS= 36.
RM---E6	PAYGRADE E6	,MEMBERS= 24.
RM---E7	PAYGRADE E7	,MEMBERS= 12.
RM---E8	PAYGRADE E8	,MEMBERS= 3.

QTY/ TASK	RM---E3	RM---E4	RM---E5	RM---E6	RM---E7	RM---E8
A 1	0.0	2.38	8.33	25.00	33.33	66.67
A 2	0.0	0.0	0.0	0.0	0.0	0.0
A 3	8.33	19.05	50.00	32.14	41.67	33.33
A 4	0.0	7.14	38.89	50.00	58.33	66.67
A 5	8.33	11.90	41.67	21.43	75.00	100.00
A 6	0.0	2.38	22.22	35.71	41.67	66.67
A 7	0.0	2.38	30.56	35.71	50.00	33.33
A 8	8.33	4.76	19.44	7.14	16.67	66.67
A 9	8.33	4.76	16.67	14.29	33.33	33.33
A 10	0.0	7.14	33.33	50.00	50.00	33.33
A 11	0.0	4.76	30.56	46.43	41.67	33.33
A 12	0.0	2.38	19.44	17.86	16.67	33.33
A 13	0.0	0.0	5.56	3.57	16.67	33.33
A 14	0.0	0.0	5.56	3.57	8.33	33.33
A 15	0.0	0.0	2.78	3.57	41.67	66.67
A 16	0.0	0.0	2.78	3.57	16.67	33.33
A 17	8.33	0.0	2.78	0.0	0.0	33.33
A 18	0.0	2.38	2.78	3.57	8.33	33.33
A 19	8.33	4.76	8.33	14.29	33.33	0.0
A 20	16.67	0.0	5.56	3.57	0.0	0.0
A 21	0.0	0.0	0.0	3.57	8.33	0.0
A 22	0.0	0.0	8.33	3.57	0.0	33.33
A 23	0.0	0.0	11.11	3.57	8.33	33.33
A 24	0.0	4.76	13.89	17.86	25.00	33.33
A 25	0.0	0.0	2.78	7.14	25.00	33.33
A 26	0.0	0.0	11.11	3.57	8.33	33.33
A 27	0.0	2.38	16.67	7.14	16.67	33.33
A 28	0.0	4.76	13.89	7.14	8.33	33.33
A 29	0.0	2.38	8.33	7.14	0.0	33.33
A 30	16.67	11.90	69.44	85.71	83.67	100.00
A 31	8.33	2.38	13.89	21.43	8.33	33.33
A 32	0.0	0.0	27.78	35.71	33.33	33.33
A 33	0.0	0.0	8.33	10.71	8.33	33.33
A 34	0.0	0.0	11.11	14.29	16.67	100.00
A 35	0.0	0.0	2.78	3.57	0.0	0.0

ANALYSIS OF SECONDARY FACTORS FOR RADIOMAN RADIOMAN RMASFACT PAGE 1

THIS IS AN ASFACT FOR RADIOMAN

RM---E3 ,PAYGRADE E3
RM---E4 ,PAYGRADE E4
RM---E5 ,PAYGRADE E5
RM---E6 ,PAYGRADE E6
RM---E7 ,PAYGRADE E7
RM---E8 ,PAYGRADE E8

GROUP IDENT.		RM---E3	RM---E4	RM---E5	RM---E6	RM---E7	RM---E8
GROUP MEMBERS		12	42	36	28	12	3
FACTOR SUBGROUP		12	42	36	28	12	3
LT-TX	VALUE						
A 1	1	0	1	0	0	0	0
	2	1	0	2	2	1	1
	3	0	0	0	2	5	2
	4	0	0	1	2	2	0
	5	0	0	0	0	0	0
	6	0	0	0	0	0	0
	OTHER	11	41	33	22	2	1
	N	1	1	3	6	10	2
	MEAN	2.000	1.000	2.667	3.000	2.900	3.000
	SD	0.0	0.0	0.943	0.816	0.700	0.0
A 2	1	0	0	0	0	0	0
	2	0	0	0	0	0	0
	3	0	0	0	0	0	0
	4	0	0	0	0	0	0
	5	0	0	0	0	0	1
	6	0	0	0	0	0	0
	OTHER	12	42	36	28	12	3
	N	0	0	0	0	0	0
	MEAN	0.0	0.0	0.0	0.0	0.0	0.0
	SD	0.0	0.0	0.0	0.0	0.0	0.0
A 3	1	0	0	0	0	0	0
	2	1	6	5	0	0	0
	3	0	1	9	4	4	0
	4	0	1	3	3	1	0
	5	0	0	1	1	0	1
	6	0	0	0	0	0	0
	OTHER	11	34	18	20	7	2
	N	1	8	18	8	5	1
	MEAN	2.000	2.375	3.000	3.625	3.200	5.000
	SD	0.0	0.996	0.918	0.870	0.980	0.0

JOB DESCRIPTION BASED ON TIME SPENT SIMILARITY MATRIX

GROUP NUMBER = 2, ORDERED FROM 1 TO 132 RADIOMAN GRP00021 PAGE 1

FOLLOWING GROUPS OF THE TIME HIERARCHY

DUTY JOB DESCRIPTION-----CASES= 133-----TASKS= 574-----DUTIES=11-----MEMBERS= 132
SELECTED FROM THE HIERARCHY POSITIONS 1 THROUGH 132----FORMED AT STAGE 2 OF GROUPING ON TIME SIMILARITY.

COUNT OF DUTIES OR TASKS LISTED.....
CUMULATIVE SUM OF AVERAGE PERCENT TIME SPENT BY ALL MEMBERS..
AVERAGE PERCENT TIME SPENT BY ALL MEMBERS.....
AVERAGE PERCENT TIME SPENT BY MEMBERS PERFORMING.
ORDERED BY..PERCENT OF MEMBERS PERFORMING.....

D-TSK	DUTY TITLE					
F	TRANSMITTING AND RECEIVING	99.24	23.17	22.99	22.99	
E	PREPARING AND MAINTAING GENERAL FILES,FORMS,LOGS,REPORTS,AND	95.45	16.52	15.77	38.75	
B	DIRECTING AND IMPLEMENTING	94.70	16.08	15.22	53.98	
D	TRAINING	93.33	9.45	7.88	61.86	
G	PREPARING AND PROCESSING MESSAGES	81.82	11.30	9.24	71.11	5
K	PREVENTIVE MAINTENANCE	81.82	7.40	6.06	77.16	
H	SECURITY	76.51	8.54	6.53	83.70	
A	PLANNING AND ORGANIZING	75.76	11.22	8.50	92.20	
C	EVALUATING AND INSPECTING	68.94	7.77	5.36	97.56	
L	CORRECTIVE MAINTENANCE	34.85	4.26	1.48	99.04	10
J	ELECTRICITY AND ELECTRONICS	31.06	2.69	0.84	99.88	

FOLLOWING GROUPS OF THE TIME HIERARCHY

TASK JOB DESCRIPTION-----CASES= 133-----TASKS= 57*-----DUTIES=11-----MEMBERS= 132
SELECTED FROM THE HIERARCHY POSITIONS 1 THROUGH 132----FORMED AT STAGE 2 OF GROUPING ON TIME SIMILARITY.

COUNT OF DUTIES OR TASKS LISTED.....
CUMULATIVE SUM OF AVERAGE PERCENT TIME SPENT BY ALL MEMBERS.....
AVERAGE PERCENT TIME SPENT BY ALL MEMBERS.....
AVERAGE PERCENT TIME SPENT BY MEMBERS PERFORMING.....
ORDERED BY..PERCENT OF MEMBERS PERFORMING.....

D=TSK	TASK TITLE	% ****	%	%	%	N
F 56	CHANGE PAPER ROLLS ON TELETYPE EQUIPMENT	71.97	3.09	2.22	2.22	
B 33	MAINTAIN RELIABLE COMM THR PROPER USE OF EQUIPMENT	65.15	3.35	2.18	4.40	
F 40	TRANSMIT BY TELETYPEWRITER	65.15	3.73	2.43	6.84	
F 22	RECEIVE BY TELETYPEWRITER	62.83	3.83	2.44	9.28	
B 5	CHG TAPE IN PERFORATOR OR REPERFORATOR	59.85	3.22	1.93	11.20	5
A 33	MAINTAIN STATUS BOARD	59.09	2.41	1.42	12.63	
K 7	CHG TYPEWRITER RIBBONS	58.33	2.92	1.54	14.17	
F 15	EXAMINE LOGS AND RECORDS DURING WATCH	52.27	2.60	1.36	15.53	
E 42	MAINTAIN RADIOTELETYPE LOG	49.24	3.27	1.61	17.14	
B 19	INDOCTRINATE NEWLY ASSIGNED PERSONNEL	43.43	1.74	0.77	17.90	10
D 16	CONDUCT OJT	47.72	2.00	0.96	18.94	
B 69	SUPR PERSONNEL IN COMMUNICATION OPERATION	46.97	2.00	0.94	19.88	
B 19	ATTEND TRAINING CONFERENCES MEETINGS OR SEMINARS	46.21	3.29	1.52	21.40	
H 73	SUPR PERSONNEL IN COMMUNICATION PROCEDURE	45.45	2.06	0.94	22.33	
F 71	OPR TAPE REPERFORATORS	45.45	2.00	1.27	23.60	15
A 5	ASSIGN COMMUNICATION TASKS OR DETAILS TO PERSONNEL	44.70	1.65	0.74	24.34	
F 33	MAINTAIN OUTAGE LOGS AND REPORTS	43.94	2.91	1.29	25.62	
G 26	LOG MESSAGE TRAFFIC	42.42	3.09	1.30	26.92	
D 27	INST PERSONNEL IN COMMUNICATION PROCEDURE	41.66	1.71	0.71	27.63	
E 12	DISPOSE OF CLASSIFIED FILES AND RECORDS	41.66	2.66	1.11	29.74	20
K 6	CHG TELETYPEWRITER RIBBONS PAPER AND TAPE	40.91	2.66	1.17	29.91	
F 12	MAINTAIN CIRCUIT QUALITY	40.15	2.87	1.15	31.06	
O 26	INST PERSONNEL IN COMMUNICATION OPERATION	38.64	1.56	0.60	31.66	
E 16	FILE CORRESPONDENCE AND MESSAGES	38.64	2.93	1.13	32.79	
G 25	FILE MESSAGE TRAFFIC	38.64	3.00	1.16	33.95	25
F 11	DISPOSE OF CLASSIFIED CORRESPONDENCE AND MESSAGES	37.12	2.42	0.90	34.85	
F 69	MAINTAIN CIRCUIT STATUS BOARDS	37.12	1.97	0.73	35.59	
H 29	ESCORT VISITORS THRU CLASSIFIED COMMUNICATIONS AREAS	37.12	1.15	0.43	36.01	
C 1	CHECK EQUIPMENT FOR CIRCUIT OUTAGE	36.36	1.89	0.63	36.69	
B 15	SUPR PREPARATION & MAINT OF FILES LOGS RECORDS & REPORTS	33.33	1.53	0.51	37.20	30
H 31	INVENTORY COMMUNICATIONS EQUIPMENT	32.57	1.98	0.64	37.84	
E 27	MAINTAIN BROADCAST FILE	32.57	3.07	1.00	38.84	
B 43	PERFORM NECESSARY CORRECTIVE ROUTING ACTION	31.82	2.11	0.67	39.51	
E 60	PREPARE OUTAGE LOGS AND REPORTS	31.82	1.81	0.58	40.09	
A 3	ADVISE SUPR PERSONNEL OF WORK PROGRESS ON EQUIPMENT	31.82	1.62	0.52	40.60	35
F 65	SPLICE MESSAGE TAPES	31.82	2.72	0.86	41.47	
B 10	DIRECT CONTROL & OPER OF LONG-HAUL COMM MEDIA & LOCAL CIRCT	30.30	2.27	0.69	42.16	
A 4	ALLOCATE CHANNELS AND CIRCUITS TO MEET USER REQUIREMENTS	30.30	1.99	0.60	42.76	
F 61	INITIATE CHANNEL CHECKS	29.54	2.46	0.73	43.49	
B 13	DIRECT PATCHING OF COMMUNICATIONS	28.79	2.62	0.75	44.24	40
A 10	ASSIGN PERSONNEL TO DAILY TASKS	28.78	1.20	0.37	44.61	

PAYGRADE E3 RADIOMAN RM---E31 PAGE 1

JOHOFCS BY PAYGRADE

DUIY JOB DESCRIPTION-----CASES= 133-----TASKS= 574-----DUTIES=11-----MEMBERS= 12
PAYGRADE E3
SELECTED FROM THE FOLLOWING COMPUTED/HISTORY VARIABLES:
V013/EQ/ 3/ :PAYGRADE

COUNT OF DUTIES OR TASKS LISTED....................................
CUMULATIVE SUM OF AVERAGE PERCENT TIME SPENT BY ALL MEMBERS..
AVERAGE PERCENT TIME SPENT BY ALL MEMBERS..............
AVERAGE PERCENT TIME SPENT BY MEMBERS PERFORMING.
ORDERED BY..PERCENT OF MEMBERS PERFORMING..............

D-TSK	DUTY TITLE	%	%	%	%	N
E	PREPARING AND MAINTAING GENERAL FILES,FORMS,LOGS,REPORTS,AND	100.00	25.22	25.22	25.22	
F	TRANSMITTING AND RECEIVING	100.00	19.64	19.64	44.86	
G	PREPARING AND PROCESSING MESSAGES	100.00	18.16	18.16	63.02	
K	PREVENTIVE MAINTENANCE	91.64	12.63	11.58	74.60	
B	DIRECTING AND IMPLEMENTING	75.00	10.87	8.16	82.76	5
H	SECURITY	75.00	13.12	9.84	92.59	
O	TRAINING	66.65	6.82	4.54	97.14	
A	PLANNING AND ORGANIZING	25.00	6.09	1.52	98.66	
C	EVALUATING AND INSPECTING	25.00	5.13	1.28	99.94	

JOBDECS BY PAYGRADE

TASK JOB DESCRIPTION-----CASES= 133-----TASKS= 576-----DUTIES=11-----MEMBERS= 12
PAYGRADE E3
SELECTED FROM THE FOLLOWING COMPUTED/HISTORY VARIABLES:
V013/E07 3/ #PAYGRADE

COUNT OF DUTIES OR TASKS LISTED.....
CUMULATIVE SUM OF AVERAGE PERCENT TIME SPENT BY ALL MEMBERS..
AVERAGE PERCENT TIME SPENT BY ALL MEMBERS.....
AVERAGE PERCENT TIME SPENT BY MEMBERS PERFORMING.
ORDERED BY..PERCENT OF MEMBERS PERFORMING.....

D=TSK	TASK TITLE	% ****	%	%	%	N
G 26	LOG MESSAGE TRAFFIC	83.33	6.62	5.52	5.52	
F 12	DISPOSE OF OBSOLETE FILES AND RECORDS	75.00	4.86	3.64	9.16	
D 19	ATTEND TRAINING CONFERENCES MEETINGS OR SEMINARS	66.66	4.54	3.02	12.18	
E 11	DISPOSE OF OBSOLETE CORRESPONDENCE AND MESSAGES	66.66	4.54	3.02	15.21	
K 5	CHG TAPE IN PERFORATOR OR REPERFORATOR	66.66	5.95	3.95	19.17	5
F 22	RECEIVE BY TELETYPEWRITER	58.33	5.77	3.36	22.54	
F 40	TRANSMIT BY TELETYPEWRITER	58.33	5.98	3.48	26.02	
F 56	CHANGE PAPER ROLLS ON TELETYPE EQUIPMENT	58.33	5.10	2.98	29.00	
H 7	DESTROY & DISPOSE OF CLASSIFIED MATERIAL & EQUIP	58.33	3.32	1.94	30.93	
K 7	CHG TYPEWRITER RIBBONS	58.33	6.66	2.72	33.65	10
D 38	MAINTAIN RELIABLE COMM THR PROPER USE OF EQUIPMENT	50.00	4.06	2.03	35.68	
E 27	MAINTAIN BROADCAST FILE	50.00	5.32	2.66	38.33	
F 42	MAINTAIN RADIOTELETYPE LOG	50.00	5.18	2.59	40.92	
F 71	OPR TAPE REPERFORATORS	50.00	4.08	2.04	42.96	
G 25	FILE MESSAGE TRAFFIC	50.00	9.76	4.38	47.34	15
C 54	STOW AND SECURE SUPPLIES	41.66	2.24	0.93	48.27	
F 14	FILE CORRESPONDENCE AND MESSAGES	41.66	4.97	2.90	51.18	
H 12	MAINTAIN LOG OF PERSONNEL VISIT SECURITY AREAS OF COMM ACT	41.66	2.19	0.91	52.09	
K 6	CHG TELETYPEWRITER RIBBONS PAPER AND TAPE	41.66	4.65	1.94	54.02	
E 15	EXAMINE LOGS AND RECORDS DURING WATCH	33.33	2.97	0.99	55.01	20
E 24	MAINTAIN ACCURATE COMMUNICATION CENTER FILE	33.33	2.82	0.94	55.95	
G 20	DESTROY OVERAGE MESSAGE TAPES	33.33	2.16	0.72	56.67	
G 21	VERIFY ROUTING INDICATORS	33.33	2.77	0.92	57.59	
B 17	INDOCTRINATE NEWLY ASSIGNED PERSONNEL	25.00	2.23	0.56	58.15	
H 31	OPR ORDY COMMUNICATIONS EQUIPMENT	25.00	4.77	1.19	59.34	25
E 23	MAINTAIN CLASSIFIED MESSAGE LOGS AND FILE	25.00	3.44	0.86	60.20	
F 53	SPLICE MESSAGE TAPES	25.00	3.90	0.97	61.17	
F 67	VERIFY ALL DAILY TRAFFIC TRANSMITTED/RECEIVED	25.00	5.11	1.28	62.44	
F 69	INITIATE CHANGE CHECKS	25.00	6.41	1.60	64.04	
G 4	INSURE THAT PROPER PROCEDURES ARE OBSERVED	25.00	9.22	1.05	65.10	30
G 5	INSURE STD PROCEDURES FOR PRECEDENCE IN TRAFFIC HANDLING	25.00	4.22	1.05	66.15	
G 10	PROCESS INCOMING MESSAGES	25.00	3.74	0.93	67.08	
G 11	PROCESS OUTGOING MESSAGES	25.00	3.74	0.93	68.01	
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ABSTRACT

This report summarizes occupational analysis conducted in the United States, placing particular emphasis on the efforts of the military services. It presents an explanation of current task analysis procedure and computer programs used by the U. S. Navy in its occupational research. And, it describes how such methodology was used to conduct a task analysis of U. S. Navy enlisted radiomen. The results of that study are presented. It is concluded that further task analysis of U. S. Navy enlisted radiomen is desirable to improve organizational efficiency and the effectiveness of training.

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