



NAVAL POSTGRADUATE SCHOOL Monterey, California



THESIS

A STUDY OF THE FEASIBILITY OF A
MERGE BETWEEN THE RADIOMAN AND
DATA PROCESSING TECHNICIAN RATINGS

by

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March, 1991

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19 ABSTRACT (Continue on reverse if necessary and identify by block number) The merging of the telecommunications and automatic data processing disci- plines within the U.S. Navy to form Naval Computers and Telecommunications Command will result in many changes in the organization. One such change may be the merge between the enlisted ratings that perform the tasks of Radioman and Data Processing Technician. Background concerning the disci- pline merge and both ratings is presented, along with a discussion of or- ganizational change. Findings from interviews with subject matter experts and others from both ratings were analyzed together with the results of two independent studies of a merge feasibility. The authors' recommenda- tion concerning the decision to merge Radiomen and Data Processing Tech- nicians is presented along with the possible strategies to accomplish the merge, should the final official decision favor such a change.			
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A Study of the Feasibility of a Merge Between
the Radioman and Data Processing Technician Ratings

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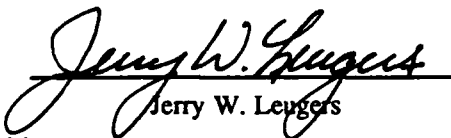
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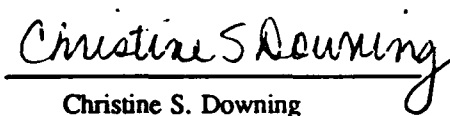
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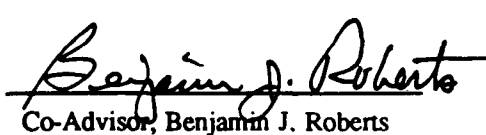
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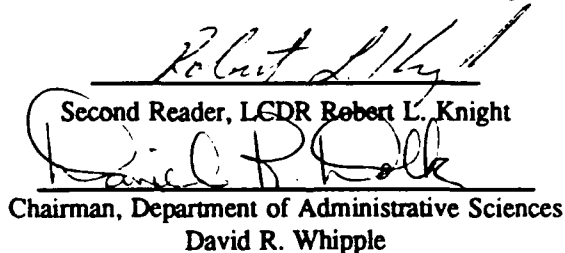
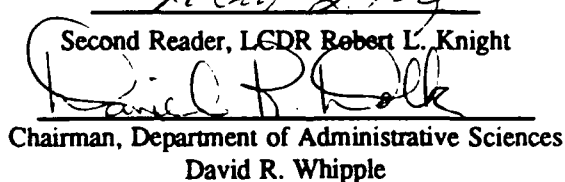

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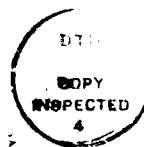

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ABSTRACT

The merging of the telecommunications and automatic data processing disciplines within the U. S. Navy to form Naval Computers and Telecommunications Command will result in many changes in the organization. One such change may be the merge between the enlisted ratings that perform the tasks of Radioman and Data Processing Technician. Background concerning the discipline merger and both ratings is presented, along with a discussion of organizational change. Findings from interviews with subject matter experts and others from both ratings were analyzed together with the results of two independent studies of merger feasibility. The authors' recommendation concerning the decision to merge Radiomen and Data Processing Technicians is presented along with possible strategies to accomplish the merger, should the final official decision favor such a change.



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I. INTRODUCTION

A. INTRODUCTION

The inexorable march toward automation in all things we do has far-reaching effects for our society today. Since the military organization is but a part of this society, it too, is undergoing change. Message handling within the U. S. Navy has traditionally been a time- and labor-intensive process; with the aid of computers and automatic data processing, this is no longer the case.

The lines between single processor computers, multiprocessor computers, local networks, and long-haul networks have blurred. The result is a growing overlap of computer and communications industries...and development of integrated systems that transmit and process all types of data and information. [Ref. 1:p. 1]

Predictably, this converging evolution of communications with automatic data processing has been recognized and encouraged within the Navy structure. In 1989, Vice Admiral J. O. Tuttle, Director, Space, Command and Control (OP-094), addressed such an integration and suggested a rationale and timelines for accomplishment [Ref. 2]. In mid 1990, a merger of the echelon 2 commands (Naval Data Automation Command and Naval Telecommunications Command) was completed which resulted in Naval Computers and Telecommunications Command (OP-094), also known as NCTC.

As with any major change project, particularly one concerned with an organizational structure change, the merging of the two disciplines is like dropping a

pebble in a pond--change radiates outward in all directions. Many issues and many organizational levels will be affected by the central change issue, other issues and aspects will be touched by a ripple effect which the central issue begets. One such central issue is the resulting effects on the personnel manning these disciplines.

Changes in tasks and technology usually require alterations in the structure of the organization...These technological and structural changes can, in turn, necessitate changes on the part of members--the basic components of the organization. [Ref. 3:p. 157]

At the outset, studies were conducted to determine the optimal use of officers having subspecialties in the telecommunications (TELCOM) and automatic data processing (ADP) disciplines. Subspecialty identifying notation, or P-codes, were reviewed with a goal of combining the two affected codes and plans were drawn up to re-designate billets from each discipline to create a cadre of officers with broad "TELCOM/ADP" experience. However, these and other issues affecting officers constitute a study in themselves and will not be addressed further within this project.

Whereas unrestricted line officers tend to be generalists possessing widely varied backgrounds and experiences, enlisted personnel are confined within the much more narrowly defined boundaries of their rating structure. Within ratings, skill requirements and subspecialty codes, called NECs, change often to reflect changing technology, instances of either establishment or disestablishment of whole ratings are not as common. However, given the efforts underway to create a new information management discipline in the Navy, and the attention given to similar changes in the officer community, it is inevitable that there will be a review of the enlisted ratings which perform the functions of TELCOM and ADP, Radioman (RM) and Data Processing

Technician (DP) respectively, to determine the feasibility of combining them into one rating.

B. PURPOSE

Initial review performed by Naval Occupational Development and Analysis Center (NODAC) indicated that although there was a growing number of functions performed which were similar or identical between RMs and DPs, there were still too many separate and unique functions to consider a wholesale combination of the two ratings as feasible or even desirable [Ref. 4]. In June 1990, a meeting was held among representatives of organizations responsible for the development and deployment of Radiomen and Data Processing Technicians. Although a memorandum summarizing the results of the meeting indicated a complete merger of the two ratings was not feasible, to date a point paper with specific insights is still in draft. [Ref. 5]

Change within an organization is a complex issue. Change can be planned or unplanned; planned change can be viewed as either a problem to be solved or an opportunity to be explored. This thesis therefore, explores the opportunity available to combine two enlisted ratings within the Navy: Radiomen and Data Processing Technicians. Since no formal organizational decision has been made concerning this topic, this study will serve to assemble information and opinion on the topic, as well as to present results of a job task analysis, which together can serve as a source of data to be considered as input to a final decision. Additionally, possible methods of implementing such an integration of the two rates will be offered.

This study will address the question: Can or should the Navy combine the RM and DP communities, satisfying the future needs of the information systems environment, as well as the tasks and functions currently defined for and unique to these two ratings?

Additional questions are:

- Can the tasks and functions of the future information systems environment at merged TELCOM/ADP centers be defined?
- What would be the best method or strategy to accomplish an RM/DP merger once such a decision is made?
- What would be the advantages and disadvantages of an RM/DP merger for both the ratings and the organization?
- How would such an RM/DP merger impact the current rating structure and community management?
- What are the likely sources of resistance to change and barriers to an RM/DP merger?
- How will echelon 3 commands be impacted by the Telecommunications/Automatic Data Processing merger insofar as how their missions will be carried out by the RMs, DPs or a new rating?

C. ORGANIZATION OF THE THESIS

Chapter II provides background information on the underlying source of change--the TELCOM/ADP merger. This serves to explain the context in which the research questions are addressed. A section concerning change in organizations and the companion issue of resistance to change is provided as a means of understanding the psychological environment which surrounds the central issue of organizational restructuring. The TELCOM/ADP merger is a very large change project; the affiliated concept of a ratings merger cannot be fully addressed without understanding the dynamics of change and its

effects. Chapter III presents the methodology used in terms of scope, methods, and limitations. Chapter IV addresses the RM and DP ratings and the focus becomes more narrow here as topics which are the basis for commonalities and uniqueness are explored. These topics include the history, training and requirements of the ratings, the organizations which provide TELCOM and ADP services and subsequently employ RMs and DPs, as well as the duties and responsibilities of each rating. By providing insight into these aspects of each community, similarities, contrasts and barriers to a merger are brought to light. The results of the research concerning the interviews and job task analysis are presented in Chapter V. Finally, Chapter VI offers the authors' analysis and recommendations concerning the overall feasibility of an RM/DP merger, and possible implementation strategies should the final decision favor combining the RM and DP ratings.

II. BACKGROUND AND LITERATURE REVIEW

A. TELECOMMUNICATIONS/ADP MERGER

The basis of this thesis study is the view of telecommunications and ADP organizations as open systems. In the open systems model, organizations interact with their environment. Such an interaction is a foundation for the mission for these organizations since they provide services to a wide range of customers across the system boundary. This critical element of the mission has not changed in the merging of the disciplines. In addition, planned change cannot be effectively implemented without proper planning and preparation. Thus, a study of the organization itself, as well as the worker and his tasks provides the groundwork for a determination of the feasibility of a merger of the two ratings.

Change is very nearly a constant in all things and change with respect to the evolution of technology is no exception. As computers and automated systems introduce change into the discipline of telecommunications, it begins to evolve closer and closer to the discipline of automatic data processing. Many communications links are now established via microwave and satellite technology, thereby involving telecommunications personnel with the attendant computer systems. Indeed, throughout much of the Navy, micro- and mini-computers are replacing older teletype machines as the primary means for drafting naval messages for insertion into the Navy communications system, and beginning to replace other manual systems such as receiver tuning. No longer can

telecommunications personnel avoid the rapidly growing link with the automated data processing field.

One person to recognize this converging evolution in the U. S. Navy was Vice Admiral (VADM) J. O. Tuttle, who in August 1989, sent a memorandum to the Vice Chief of Naval Operations (OP-09) outlining the rationale for integrating the telecommunications and automated data processing disciplines [Ref. 2]. A short three months later in November, in a newsletter from VADM Tuttle's office, an announcement was made concerning the Vice Chief's approval of the integration along with a planned date of May 1990 for the echelon 2 merger [Ref. 6]. Also indicated were long range plans to merge echelon 3 and 4 activities as appropriate.

In May, 1990, the Navy Data Automation Command (NAVDAC) joined their Washington D. C. headquarters with that of Naval Telecommunications Command (NAVTELCOM) to create Naval Computers and Telecommunications Command (NAVCOMTELCOM, or NCTC). Most of the physical joining involved moving NAVDAC personnel into the building previously housing only NAVTELCOM offices, and many common support function jobs were combined. When certain positions were duplicated but vacant in one entity or the other prior to the merger, the vacant position was eliminated and the incumbent assumed the position for the new organization. [Ref. 7]

Although effort had been expended to facilitate a smooth transition period, the six months between announcement and implementation contained elements of confusion and uncertainty. Even when planning is good, it is impossible to cover every detail, a fact

which naturally leads to more confusion. Each change process occurs at its own optimal pace, and sometimes the transition period must be extended or cut short. Levy and Merry [Ref. 8:p. 296] suggest that such transformational change may take between two and ten years to accomplish completely. Bennis [Ref. 9:p. 129] cites two cases which took 2 and 5 years for a change strategy to unfold. Thus, organizational change is traumatic for those involved and the bigger the change, the higher the confusion factor can rise. Additionally, in order for any change to be successful, there must be a clear vision of the end state [Ref. 10:p. 45].

The skill of corporate leaders, the ultimate change masters, lies in their ability to envision a new reality and aid in its translation into concrete terms. [Ref. 12:p. 278]

In this case the vision may not have been widely promulgated, and in fact, during the present research the authors encountered many people across the spectrum of the organization who had never even heard of the changes, completed or underway, in the TELCOM/ADP organization.

After the headquarters merger, the next level to be affected was echelon 3 commands which included the larger operational commands such as regional data automation centers (NARDACs) and communications stations (COMSTAs). Two geographical locations which contained both a NARDAC and a COMSTA chosen as test sites were Jacksonville, Florida and San Diego, California. Both sites were given relatively short timeframes between the directive to merge and the implementation dates of 1 October and 1 November 1990 respectively [Ref. 11]. Although these two sites are representative of such commands within the respective disciplines, a factor which

certainly contributed to their selection as test sites, every location affected by the merger will present a unique challenge when varying factors are addressed. These include physical distance separating the two commands to merge, facilities of each, unique customer requirements, and other logistical considerations. In the case of San Diego, the merger is being accomplished in a two step approach. First, on 1 November 1990 all common support functions such as administration, training, and supply were moved to the NARDAC site. The computer equipment and functions remained there and became the Operations Department of the new Naval Computers and Telecommunications Station (NCTS). The existing message center equipment and functions remained downtown in a federal building on Harbor Drive and also became a department of the "new" command. Thus, although the two former commands are now "merged", the new command remains divided physically between two distinct locations. The logistical requirements present a huge challenge when one considers relocating either a message center or a computer center, each with its specialized equipment and wiring needs. Currently, such a relocation of either one with the goal of the entire command housed in one building is a subject of review for implementation at a later date [Ref. 13].

In the future, this process will continue, merging commands from the two former disciplines until all have been affected. In some instances, geographical considerations may become a significant factor prohibiting the physical joining of facilities. In such cases, most changes could be largely administrative in nature, such as a change in the command name and chain of command, but no physical alterations would be implemented. Physical changes aboard ships would also be unlikely since configurations

aboard most platforms are not easily changed. In most instances, physical changes would be unnecessary since DPs would work with equipment already onboard. For those ships which currently do not have a data processing division, once DP billets were incorporated into the ship's manning authorization, the DPs could be assigned to the Communications Division [Ref. 14].

This entire process will obviously take time to complete, and those responsible for implementing change will encounter other difficulties and resistance. One such difficulty will arise when considering funding problems. If the budget process continues to cut dollars from the Defense Department, money will not be available to carry out the costly process of relocating either computer or communications centers unless considerable cost savings were substantiated and used to support the decision. Undoubtedly, budget constraints will preclude making a large number of physical changes in the near future.

It would be a logical progression in the context of the TELCOM/ADP merger to examine the two enlisted ratings from each discipline to determine the feasibility of combining them. Common sense would suggest that at the very least, training should be reviewed to add elements of each rating to the other to reflect the evolution of the two disciplines. Each rating will likely be resistant to change, unwilling to "give up" traditional roles, as well as wary of taking on newer, non-traditional duties and responsibilities.

...to the degree that those pursuing a line of work manage to maintain control over a scarce set of abilities or to develop an expanded knowledge base which only they can apply, occupational identities are likely to be sustained over time, if not enhanced.
[Ref. 15:p. 24]

B. CHANGE

Introduce the subject of change into a conversation and you will not fail to elicit a strong response. Although you will easily find opinions supporting and opposing change, rarely will you encounter someone who, in general, is neutral about change. The definition of change is not hard to come by, yet the concept is a diverse and somewhat elusive thing to pin down. Change can be planned or unplanned, slow or rapid, beneficial or detrimental, individual or organizational--the list of opposing adverbs goes on and on. Planned organizational change can be defined as:

...a set of activities and processes designed to change individuals, groups and organizational structure and processes...The term 'organizational development' is often used instead of planned organizational change. Planned organizational change emphasizes managerial choice. [Ref. 16:p. 4]

Change has been with us since the beginning of time and people have been scrutinizing the concept and process for almost as long. Many have put forth their ideas and suggested processes, formulas and methods which they feel will best facilitate change. Within the last few decades, the field of organizational development (OD) and the idea of managing planned change has come to prominence in the business world.

1. Methods of Change

Two macro methods for dealing with change can be identified as individual or group approaches. Attempts to change organizations by changing individuals does not generally work well. Some of these approaches include increasing the information flow, counseling, behavior modification, or training. Group approaches to organizational change can take many forms and attempt to increase learning and heighten commitment

to things learned via surveys and T-groups or sensitivity training. [Ref. 17:pp. 658-679]

One of the earliest students of change was Kurt Lewin, whose model of change examined the dynamics between those forces which favor the status quo and those forces which favor change. Lewin viewed the change process as consisting of three phases: 1) unfreezing, or reducing the forces which maintain the status quo, 2) moving, or developing new behaviors and attitudes, and 3) freezing, or reinforcing the forces which will maintain the new state. [Ref. 18:p. 72] Katz and Kahn [Ref. 17:p. 655] also refer to the need for dealing with three questions: what is the present state, what is the preferred state, and by what means is it proposed to move from one to the other. More recently Beckhard and Harris [Ref. 10:pp. vii-ix] have identified managing complex change as a central executive management agenda item. Their approach to the change process involves identifying the future state, assessing the present situation, and mapping out a strategy for transition from one to the other.

2. Forces of Change

The forces driving change can be further subdivided into permitting, enabling, and precipitating conditions, and triggering events. Internal permitting conditions which allow change to occur, include the presence of transformational leadership (one that defines the desired vision and secures commitment to its realization) or a gathering of resources such as time, energy or money necessary to manage change. External enabling conditions include survival threats to the organization, degree of tolerance for change or degree of radicalness of the change itself. Pressure for change stems from precipitating conditions such as tendency to grow or decline, real or perceived

crisis, and changes in shared beliefs. Given the right conditions, the occurrence of triggering events initiates change. [Ref. 19:pp. 68-70]

So formidable is the collection of forces which underpin behaviour in organizations that it is surprising that any changes ever manage to be promulgated let alone implemented. The dice would appear to be loaded against innovation and all departures from the 'natural order of events' would seem, at first glance, unlikely to prevail over the odds against them. [Ref. 20:p. 122]

One of the biggest traps for large system change efforts is the failure of organizational leaders to resist the temptation to rush through the planning process to get to the "action" stage. Often, the need to see immediate results which superficially appear to correct a problem, overrides the necessity for adequate planning and gathering of vital information. This is often the case when a manager does not clearly understand the complexity and nature of change and change efforts [Ref. 10:p. 116] Lippett, Watson, and Westley [Ref. 21:p. 75] also echo the need to avoid premature solutions which arise when the change process is completed too rapidly. One must avoid the twin perils of moving so quickly that chaos and unnecessary turmoil are created, and that of moving too slowly which fails to capitalize on the support from those in agreement with the change. The timing of the change process is also important:

Managing organizational change is a psychological as well as technical process. The timing of each change and the way it is introduced are as critical to its acceptance by staff and its ultimate success as the substance of the change itself. [Ref. 22:p. 229]

3. Resistance to Change

One of the biggest issues within the concept of change is overcoming resistance to the change. Resistance to change is a fairly natural human reaction that can

be attributed to a variety of sources or origins, and can result in a variety of manifestations--each requiring a different approach. The concept of stakeholders and their importance is recognized: "The costs and benefits of a change are not equally distributed and often fall unevenly on different stakeholders." [Ref. 22:p. 239] Once stakeholders have been identified, their position relative to the change with respect to attitude and power can be mapped out. This then forms the basis for a strategy to overcome resistance. Mangham [Ref. 20:p. 136] believes success in change endeavors depends, in part, on "...your ability to neutralize or destabilize your opponents." This is accomplished via an equalization of power and effective negotiation which is facilitated by strong interpersonal skills. One well-known theory expresses six approaches to managing resistance: education and communication, participation and involvement, facilitation and support, negotiation and agreement, manipulation and co-optation, and explicit and implicit coercion [Ref. 23:pp. 106-114]. Some also believe resistance to be very necessary:

Every organization must have some resistance in its circuits; an organization that changed in response to every input for change would be no organization at all, for it would lack the day-to-day consistency of patterned behavior that is a defining characteristic of organization. [Ref. 24:p. 416]

Our language when speaking of change depends on our position relative to the change. For instance, the same act could be described as either an obstacle or commitment depending on whether we are for or against change.

Overcoming resistance is somewhat of a misnomer in that resistance is very difficult to eliminate and perhaps better approached from the viewpoint of resistance

management: "...change managers need to analyze the type of resistance in order to work with it, reduce it and secure the needed commitment from the resistant party." [Ref. 10:p. 98] Schemerhorn [Ref. 25:p. 638] adds, "Consider, though, the viewpoint that resistance to change is really feedback which can be used constructively." He also believes resistance may not be a reaction to the change itself, but rather the strategy.

The presence of resistance typically suggests that something can be done to achieve a better 'fit' among the change, the situation and the people the change will affect. [Ref. 25:p. 640]

Resistance to change will play a central role in the TELCOM/ADP merger. For instance, there tends to be a strong loyalty among enlisted members within a particular rating, as each person takes great pride in group membership.

...a focus on occupations preserves some of the existential, everyday reality of the firsthand experience of work.... Social worlds coalesce around the objects produced and services rendered by people at work...occupational identities are typically presented to others with some pride and are not identities easily discarded for they are central to an individual's self-image. [Ref. 15:pp. 4-5, 18-19]

One reason Navy personnel are so resistant to change is the fact that change is ever present for them. From the top of the chain of command with the President, Secretary of the Navy and Chief of Naval Operations, to the newest Seaman Recruit, personnel turnover is a constant. And each new incumbent strives to do things his way and leave his mark. In the face of such continuous pressure to change, Navy personnel develop a resistance to change, and many implement only those changes they

feel are necessary or worthwhile, or those they are ordered to do. One analyst describes resistance to change in a government agency:

...there is so much change in process all of the time that typical Washington managers are cynical about its validity and permanence. 'Wait a while and it will all be changed back again' is their attitude.... Perhaps the most serious mistake I made was in trying to inject the programs as a top-down reform, using tough Theory X [people are lazy and incompetent, cannot be trusted and must be closely supervised] methods.... Because change is slow and painful, it must be well planned, well coordinated and well communicated. Above all, the people affected must be involved. [Ref. 26:pp. 112,145]

The U. S. Navy is a very old and tradition-rich organization. Builder, [Ref. 27] summarizes this concept well:

The Navy worships at the altar of tradition. Now tradition has always been an important part of military life; but the Navy, much more than any of the other services, has cherished and clung to tradition--and not just in pomp or display, but in the Navy's approach to almost every action from eating to fighting. In tradition, the Navy finds a secure anchor for the institution against the dangers it must face. If in doubt, or if confronted with a changing environment, the Navy will look for safety in its traditions. [Ref. 27:p. 14]

Thus, the very foundation of the naval organization is inherently resistant to change. Additionally, it is impossible to think of the Navy in terms other than that of a large bureaucratic entity. As such, it typically employs a non-participative, authoritarian, top-down style of management. This also creates resistance to change. Often, those affected by change are more accepting when they feel a sense of ownership in formulating a strategy to effect change. [Ref. 26:pp. 143-144] Change will not occur unless commitment is obtained on the part of those individuals which make a critical difference.

This commitment is gained when information is shared, and everyone involved has a clear vision of the desired end state and transition process. [Ref. 10:pp. 91-92] This is particularly difficult in the naval organization since independence is a prized personal trait. This becomes particularly apparent when compared to the highly interdependent, teamwork-oriented culture of the U. S. Army. [Ref. 28:p. 2]

The military services began parallel efforts to the civilian Organizational Development (OD) programs which were aimed at overcoming resistance and facilitating change. Beginning in the 1970's, with Organizational Effectiveness (OE), also called Human Resources Management (HRM), the Navy's program was an "...internal consultant organization...used as an instrument for engineering change." [Ref. 29:p. 207] Even though OE formally existed in to the mid 1980's, efforts within this program were not universally supported, and consequently, results were poor. Again, resistance within the Navy, a large bureaucratic organization, was widespread and many saw OE as "...a present threat to their accustomed practices and protected power bases." [Ref. 30:p. 11]

Thus resistance to change within the Navy can be shown as a significant barrier to change. Overcoming this resistance to obtain success in implementing change may very well be the largest and most significant barrier likely to be encountered.

C. JOB TASK ANALYSIS

In order to address a possible combination of two enlisted ratings, a job task analysis is essential. "The key link between workers and the organization is none other than the job...." [Ref. 31:p. 10]. In any comparison, one must ensure the things being compared are described in like terms. Failure to do this results in the familiar adage:

"You can't compare apples and oranges." Job task analysis can be used to break differing jobs into components which can be compared more easily and equally. This concept becomes important when jobs under comparison appear very different on the surface. For instance, Radiomen and their communications seem very far removed from Data Processing Technicians and their data base management. But through job task analysis, the two can be viewed on an equal basis to determine actual similarities and dissimilarities instead of possibly misleading superficialities. Thus,

Job analysis is a systematic procedure for gathering, documenting, and analyzing information about three basic aspects of a job: job content, job requirements and the context in which the job is performed. [Ref. 32:p. 1]

The content of a job identifies and describes its activities, and the requirements are factors such as education, experience skills, abilities, etc. Context refers to the purpose, degree of accountability and consequences of errors.

One systematic way of describing a job defines elements, activities, and tasks. Elements are the smallest definable unit of work, having a beginning, middle, and end. Elements are grouped into activities which serve to accomplish a requirement. Activities are collected together into tasks which satisfy job objectives. [Ref. 31:p. 3] Thus RMs and DPs might seem to have very different jobs, but in a task analysis, one might find similarities; for instance, both rates are required to run equipment diagnostics/performance checks.

The data collected from job task analyses can be used for many purposes such as determining acceptable levels of expected output, designing new jobs, determining worker

mobility and a whole host of aspects within human resources planning, development and utilization. An analysis of the tasks performed by each rating, undertaken at the job activity level determines whether or not such activities are similar enough to justify a combination.

A point of clarification made in one study concerns terminology and these meanings will be used throughout this thesis as well. "Rating" and "job" are not synonymous, i.e., ratings consist of groups of highly similar jobs [Ref. 33:p. 1]. For instance, within the Radioman rating, one might perform the job of Traffic Checker, Watch Supervisor, or Antenna Maintenance Petty Officer. Within the Data Processing Technician rating, one's assigned job could be a Programmer, Systems Analyst, Magnetic Media Librarian or Data Base Manager. Thus, the terms "job requirement" or "job tasks"

...are used to represent skills, abilities, knowledge or experiences needed to perform successfully in most of the jobs that comprise a particular rating. [Ref. 33:p. 1]

In contrast, another study did use the terms "job" and "rating" interchangeably: "...the Navy consists of 95 different enlisted jobs or ratings..." [Ref. 34:p. 1]. However, for the purposes of this study, the concept and terminology of jobs within ratings will be used. This is consistent with the breakdown of jobs consisting of tasks, activities and elements [Ref. 31:p 3].

Broadening the vantage point to look beyond the central unit of a job, one can group jobs into families. Pearlman [Ref. 30:p. 4] defines a job family as "...simply a group or cluster of jobs that are in some manner interrelated." Figure 1 illustrates the hierarchy. Defining and comparing the tasks of two different jobs then forms the basis

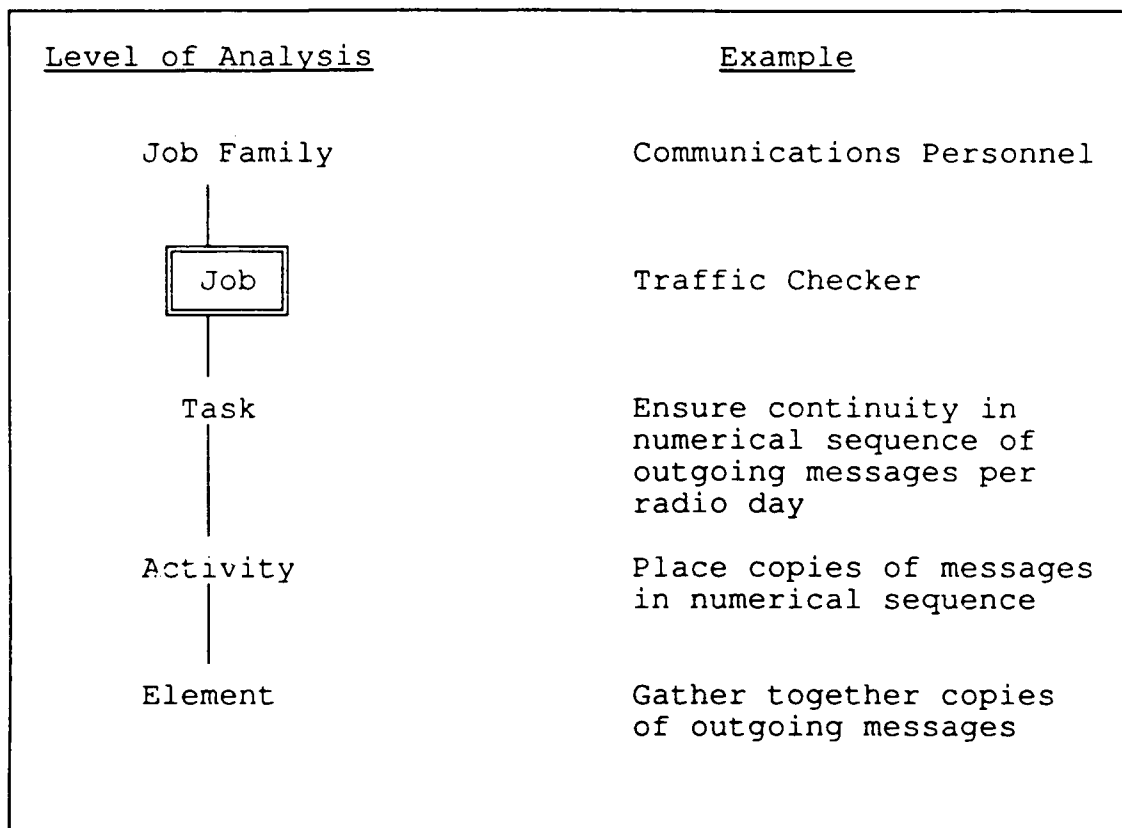


Figure 1 Job Level Hierarchy

upon which jobs can be grouped together into job families. The traditional viewpoint in the Navy defines a job family on the basis of jobs within a specific rating, i.e., one job family is Radiomen, another Data Processing Technicians. The changing nature of the tasks within these jobs introduces questions concerning the possibility of redrawing the line around both RM and DP job families, and making them one.

D. INSTRUCTIONAL SYSTEMS DEVELOPMENT

The results of job task analysis as discussed in section C above, can become the focal point for another analysis which closely links the task to be performed and the instruction or training necessary for that task. The purpose of Instructional Systems

Development, or ISD, is to "...provide a conceptual framework into which compatible procedures can be integrated to produce effective and efficient instruction." [Ref. 36:p. 402]

Rather than beginning with expert knowledge and building an instructional program designed to impart that knowledge to the student, the focus of ISD is directly on the student or user. The focus of this system is to identify the user and organizational needs and "...design a system to deliver knowledge in a form that fills those needs." [Ref. 36:p. 399] The concept of ISD is broken down into 5 phases: analyze, design, develop, implement, and control. The analysis phase begins with job task analysis and identifying which tasks are to be learned. In this manner, ISD represents a different approach to instruction, by focusing on needs and designing a system to fill the need, rather than focusing on the dissemination of knowledge for its own sake. Two strong attributes of the ISD procedure are that it is results-oriented and has built in feedback mechanisms. [Ref. 36]

The Navy recognized the positive contributions ISD could make to its myriad training programs and published NAVEDTRA 110A "Procedures for Instructional Systems Development." [Ref. 37] This manual is intended to provide guidance for the analysis, design, development, implementation, and control of instructional programs under the cognizance of Chief of Naval Education and Training (CNET), or in other words, apply ISD to Navy instructional development. Although ISD can be a detailed and involved process, it can produce very effective instructional programs and is currently used in the development of Navy Class "A" school curricula [Ref. 38].

Chapter V of this study will address a job task analysis completed for the RM and DP ratings. The results of this study may provide information which could require the revision of "A" school curricula to reflect the changing tasks of RMs and DPs. In this manner, the role of ISD is seen clearly--focus on the skills required for the job and match the training to them.

III. SCOPE AND METHODOLOGY

A. SCOPE

The approach used was twofold: 1) to analyze the broad scope of the organizational structure and mission, and 2) to analyze the narrow scope of a job activity comparison. A broad analysis of all members of the RM and DP ratings was not feasible to undertake for this project, nor was it possible to study all commands or sites designated for TELCOM/ADP merger activities. Therefore, the scope was limited to those sites and personnel in the San Diego, California area. Since San Diego was closer to the authors, it was selected over other suitable locations because of ease and cost of travel. Peripheral subject areas which would be highly impacted by a TELCOM/ADP integration will be addressed since these areas have subsequent effects on the enlisted ratings. Such factors having a direct impact on a decision to combine RMs and DPs include command structure and organization, initial training at service "A" schools, assignments of Navy Enlisted Classification (NEC) codes, and community management. Not included in the scope of this study are impacts on recruiting or other manpower assignment issues.

B. METHODS

Data were collected by two general methods, personal interviews and a job task analysis. The research questions: "Can the tasks and functions of the future information systems environment at merged TELCOM/ADP centers be defined?", "What would be the

best method or strategy to accomplish an RM/DP merger once such a decision is made?", and "What would be the advantages and disadvantages of an RM/DP merger for both the ratings and the organization?" were addressed during personal interviews with enlisted personnel of both ratings assigned aboard ship and at shore stations. Data gathered from interviews concerning tasks performed were used to supplement a formal job task analysis. Data concerning the research question: "How would such an RM/DP merger impact the current rating structure and community management?" were collected during an interview with the RM/DP community manager in Washington D.C., as well as from other subject matter experts in both ratings and a document review. For the research question: "What are the likely sources of resistance to change and barriers to an RM/DP merger?", data were collected from many sources during the entire data collection period. The last research question: "How will echelon 3 commands be impacted by the TELCOM/ADP merger and how will their missions be carried out by the RMs, DPs or a new rating?" was addressed during interviews with personnel involved with managing the merger between NARDAC and NAVCOMMSTA San Diego.

1. Selection of Organizations

Naval Communications Station San Diego and Navy Regional Data Automation Command San Diego were chosen as representative shore units which utilize the Radioman and Data Processing Technician ratings, respectively. In addition, these two commands were working toward a 1 November 1990 target date for merging the two commands into one. This presented an opportunity to study the transformation process and gain insight into the organizational viewpoint of a potential RM/DP merger. The two

afloat units chosen, USS Cape Cod and USS Halsey, were seagoing commands which utilize DPs and RMs respectively.¹ The service "A" schools for RMs and DPs afforded the opportunity to interview senior personnel of the ratings assigned as well as to collect data concerning school curricula. Additionally, since these schools are responsible for providing the initial training for new recruits in the skills of the rating, instructors could provide unique insight into each rating and its task requirements.

2. Selection of Interviewees

The authors asked the point of contact at each site to select enlisted members using the criteria of availability during the interview period, performance and experience, and the ability to provide germane comments on the topic at hand. These subject matter experts possessed detailed rating knowledge and varying degrees of management experience. Although most interviewees had worked extensively within their own rating, some members had completed assignments in which they had worked with members of the other rating. In one case, for example, a First Class Data Processing Technician had converted to that rate after having been a Radioman for eight years. In another example, one officer was a former enlisted radioman, who had gained extensive experience, and is completing a master's degree in, ADP. See Appendix A for a description of all interviewees.

Both researchers participated in conducting interviews and taking notes. Each session was conducted in a semi-structured group format in which the researchers

¹USS Cape Cod utilizes Radiomen in addition to DPs, however, the USS Halsey does not have billet authorizations for DPs.

asked questions and worked as discussion facilitators, allowing individuals to answer as they desired and participate freely. In all cases, the researchers stated the purpose of the visit, providing a brief background note on the TELCOM/ADP merger and the nature of the thesis. Interviewees were asked if permission would be granted for tape recording the session as an aid to recall for the researchers at a later date. Care was taken to reassure interviewees that direct quotes would not be published without their knowledge and approval. In all cases, verbal permission to record was granted.

Site visits and interviews occurred during 24-25 September 1990 in Washington, D. C. and during 17-19 October 1990 in San Diego. In most cases copies of the questions and discussion topics were sent in advance to facilitate discussion and generate interest.

3. Interview Questions

The following questions were posed to all interviewees. Baseline questions were designed to assess the knowledge of the interviewees and stimulate conversation centered around the research questions.

- What is your background with respect to communications and Radiomen (or ADP and Data Processors)?
- Would additional training and/or experience in these areas have helped your performance and advancement?
- How closely have you worked with RMs (DPs) in the past? In the present?
- How much do you know about the Telecommunications and ADP disciplines merging?
- How much have you (and your job) been affected by the merger?

- In light of the current rating structure and job tasks, with the disciplines merging, do you see a necessity for the ratings to merge (in whole or in part)?
- Can you foresee a rating of the future, such as Information Specialist, which combines the RM and DP ratings?
- How would you describe it?
- What traditional RM (DP) occupational standards do you think could be performed by a DP (RM)?
- Do you see a need to incorporate more data processing instruction in RM "A" school (more telecommunications in DP "A" school)?
- What would you see as the advantages and/or benefits of such an integration?
- How can the Navy best capitalize on these?
- What would you see as the disadvantages and/or problems of such an integration?
- How could these be overcome?
- If such an idea were to be implemented, what barriers would the Navy need to overcome?

4. Job Task Analysis

The Navy Occupational Standards Handbook (OCCSTDs) for each rating were used as the basis for defining the current requirements of each rating. As of this writing, both were under review. Also used was a study done by the Naval Military Personnel Command Detachment of the Navy Occupational Development and Analysis Center (NODAC) which compared the occupational standards and task statements for both ratings. Information from the interviews with enlisted members concerning actual tasks performed was used to supplement documentation as appropriate.

5. Limitations

Not in recent history has the Navy undertaken the merging of two major disciplines such as RMs and DPs and, as a result, historical data are difficult to obtain. Combining ratings, or portions thereof has been accomplished, but careful documentation has not always been kept and information is therefore incomplete and not readily accessible. Therefore, much of the information gathered and analyzed in this study will be in the form of observations and perceptions of subject matter experts.

It is assumed NARDAC San Diego and COMSTA San Diego are commands representative of the ADP and TELCOM communities respectively. As the merging of the two disciplines is carried down the chain of command, there will be many sites ashore for which the currently existing communications facility and the automatic data processing facility will be combined. Yet in each instance the exact nature of a merger will be somewhat unique depending upon location, services provided, and other logistical matters. Therefore, while the San Diego case study can provide insights and general observations, the information must be applied to other sites with caution.

The enlisted personnel interviewed are assumed to be representative of their rating, and that their backgrounds and experience are typical. However, selection of personnel for interviews was determined by persons other than the researchers, such as the organizational point of contact. This could result in a case where selection of the interviewee was based on his or her availability and not his or her ability to provide insightful comments, as the researchers had requested.

Although participation in the interview was voluntary and care was taken to reassure interviewees that their comments would not be used against them, it is possible some personnel did not express their true feelings or opinions. In any research effort based on self-reported data, the possibility of respondents withholding their true feelings or offering what they felt the researchers wanted to hear must be considered.

Interview questions were designed by the authors based on their respective backgrounds, as well as their assumptions concerning the research topic. It is possible they omitted a topic vital to a decision to merge. If the interviewees did not broach the topic during interviews, information would be lacking in this area and the final recommendation concerning an RM/DP merger would be skewed.

Statements and assumptions concerning the future of the new TELCOM/ADP discipline, its facilities, and personnel are based largely on the personal opinions of the authors, interviewees, and subject matter experts. Such a merger is analogous to sailing uncharted waters, and as such, the future is difficult to predict. All assumptions made concerning the future are plausible, but not definitive predictions.

IV. THE RADIOMAN AND DATA PROCESSING TECHNICIAN RATINGS

A. RADIOMAN

To fully appreciate the Radioman rating it is necessary to look at its history and how a junior Radioman gains experience and training. Additionally, it is important to look briefly at the types of commands employing these individuals as well as what makes the community unique.

1. History

One of the earliest rates established within the U.S. Navy was the electrician, and it was two specifically selected Chief Electricians, who, with a Lieutenant witnessed tests and studied early radio equipment for the Navy in 1901². This led to a Department of the Navy purchase in 1903 of 20 wireless radio sets for use in Atlantic Fleet exercises in August of that year. A need was created for operators; initially Electricians and Signalmen were trained, but requirements were set to enlist Electricians (Wireless Telegrapher). Interested young men did not need specialized telegraph experience, but did need to be able to spell and write legibly. General Order 198 issued in 1912 established permanent duty assignments as Electrician Radio (Operator), with the intent of creating a cadre of radio operators able to receive a minimum of 20 words per minute in Morse code through ordinary interference. By 1918, Electrician (Radio) had been

²The authors are indebted to CWO4 Lester B. Tucker, USN (Ret.) for his invaluable assistance in preparing this section.

subdivided into three categories: Radio Repair, Radio Operator, and Radio Land Wire Operator. Additionally, a separate training pipeline and designator was set aside for those Electricians assigned to aviation as airborne radio operators. A Bureau of Navigation Standards Circular issued in 1921 officially established the Radioman rating. The rating abbreviation became RM and the identification insignia was four sparks as illustrated in Figure 2, which symbolized radio waves. This insignia gave rise to nicknames now so synonymous with communicators, such as "Sparks" or "Sparky." [Ref. 39]

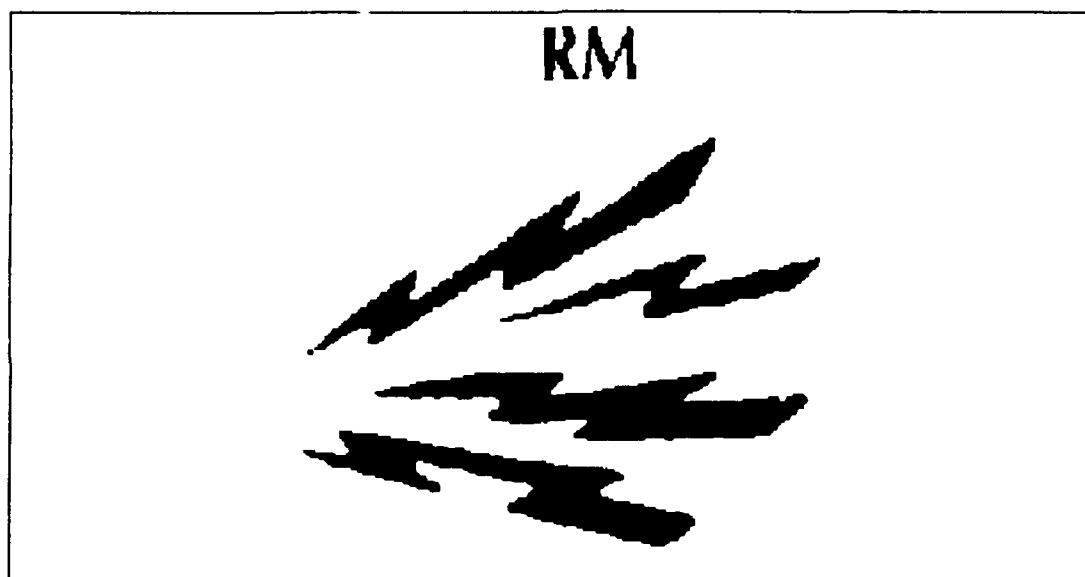


Figure 2 Radioman Rating Insignia

During the period 1921 to 1942, RMs operated and maintained communications equipment, direction finders, submarine detection equipment and for a short period radar, aboard ships, submarines and aircraft, as well as at shore sites. A Radio Material School was established at the Naval Operating Base in Virginia in 1922. Its ten week class was open to Chief and First Class Radiomen specifically recommended by their Commanding Officer. [Ref. 39]

Several changes were realized in the 1942-1943 time frame as a result of an overall expansion of the ratings. Several subspecialty skills within the RM rating were split out to become a separate rating. Aviation Radiomen (ARM) were those men specifically trained and qualified in aviation. Soundman, shortly thereafter renamed Sonarman (SOM), was established, as well as Radarman (R). Since radar itself was a highly classified project at the time, Radiomen Third Class singled out to attend the Canadian Navy Radio School in Ontario, Canada, were identified by the rating abbreviation of "R," generally defined as "Repair" for security purposes. Graduates of the Radio Material School were rated as Radio Technicians (RT) which became Electronics Technician Mates (ETM) in 1945. A division of the Specialist ratings was added for communications security and designated Sp(Q). Women first entered the rating in 1943 when WAVES (Women Accepted for Voluntary Emergency Service) could be assigned as teletype machine operators, called Telegraphers, and later, Teleman, in communications offices. They were not to be confused with other personnel operating teletypewriters in other types of offices. [Ref. 39]

The Post World War II Rating Revision Program was implemented on 2 April 1948 and divided the rating structure into three classifications. General Service Ratings were for USN or Volunteer Service personnel on active duty in peacetime as ship or station keepers. Emergency Service Ratings consisted of personnel in the Organized Volunteer Reserve, Fleet Reserve, and Retired USN and USNR. Exclusive Emergency Service Ratings were to be activated only in case of emergency and included Volunteer Reserve, Fleet Reserve, and Retired USN and USNR. The 1948 Rating Revision as it

applies to the Radioman and related ratings can be found in Appendix B, the Post World War II Rating Structure. [Ref. 39:pp. 12-13]

Changes in the structure since then have not been as profound, nor as frequent. The Teleman rating was gradually phased out over a period of time ending in 1962. Most of these personnel converted to either the Yeoman (YN) or Radioman ratings. In 1964, the Emergency Service Rating of Communications Yeoman (CYN) was established at the Third Class level. Personnel in this rating had to choose a career path in either administration or telecommunications and were promoted to either a Yeoman Second Class or Radioman Second Class, respectively. In 1972, all CYNs not yet advanced were automatically converted to Radioman Third Class and the CYN rating was abolished. [Ref. 39]

The evolution of the present-day Radioman rating began with events in 1901 and has continued until the present. Many subdivisions and related ratings have been established and disestablished to reflect changing needs and advances in technology. But through it all, the basic need to communicate, and thus the need for communicators, has remained a constant. Even with the recent advances in telecommunications technology, the need for "Sparky" will continue well into the future.

2. Training and Requirements

In the earliest days of the Radioman rating, training of the men stemmed from one of two sources--either they learned the necessary skills on the job, or they came into the Navy with radio or communications experience from the civilian sector. As the field of electronic communications grew, so did the body of knowledge, and by 1930, two

schools were established to provide rating education opportunities for the enlisted men. These were the Class "A" school or Radio Operator School, for the most junior personnel, and Class "B" school, or Radio Material School for petty officers only. During the next ten years, the training was reorganized and by 1940 Class "A" school provided basic training, Class "B" school was for Radio Operator Training and Class "C" school provide more advanced training in Radio Material School. [Ref. 40]

Currently, the Radioman Class "A" school is located in San Diego, California and runs three shifts of classes a day with an annual throughput of over 3000 students. However, in April, 1991 the schedule will drop to only one shift a day and annual throughput will fall to approximately 2500 students. [Ref. 41] This reduction is a result of several factors, one of which directly reflects the reduction in the total number of young people being recruited. Another contributing factor to the decline in schoolhouse numbers is the communications consolidation program. Initiated by NCTC in an effort to save money, this program seeks to identify those geographic locations containing multiple communications facilities, combining them where possible to eliminate redundancy. This is leading to a gradual reduction in the number of Radioman billets. [Ref. 42] A third factor causing the reduction of numbers at RM "A" school is an initiative to replace military RM billets with positions for civilians at many shore communications facilities. [Ref. 41]

Radioman Class "A" school is like many other Navy apprenticeship training programs which attempt to familiarize students with fundamental concepts, procedures and terminology. Students take the skills they have learned in the eleven-week course and

report to their first duty station, usually a ship, prepared to learn their actual duties and responsibilities through on-the-job training from more senior RMs. Topics addressed in RM "A" school include message preparation and processing, communications theory, circuit operations and communications security.

Young men and women joining the Navy and wishing to become Radioman must obligate for four years of service, be a U.S. citizen and eligible for a security clearance (Background Investigation required), as well as have normal color perception, speech, and hearing.

3. Commands and Assignments

Radioman carry out their assigned duties both onboard ships and at shore facilities. Figure 3 illustrates the "typical" career path for Radiomen [Ref. 43]. Most ships employ radiomen, and their numbers range in size from a handful aboard smaller ships to considerably more on the largest combatants. Shore stations range in size, and therefore in number of RMs assigned, from small transmitter or receiver sites to the largest stations called Communications Area Master Stations (NAVCAMS or CAMS). There are four such NAVCAMS worldwide, located in Naples, Italy, Norfolk, Virginia, Honolulu, Hawaii and Agana, Guam. In addition, NAVCOMMSTA Stockton, California is called the swing CAMS and can function as a full CAMS, taking over all functions

YEARS	RATE	TYPE OF TOUR		TYPICAL ASSIGNMENT
24	RMCM	36 Month Sea Tour		CMC at a large shore command/billet at MOTU
22		36 Month Sea Tour	36 Month Shore Tour	Assignments as Division Officer or Command Master Chief (CMC) at a major shore station
20	RMCS	36 Month Shore Tour		LCPO assignment to a staff or NATO command
18				
16	RMC	36 Month Sea Tour		Tour aboard any afloat unit as Leading Chief Petty Officer (LCPO) or CMS Custodian
14				
12	RM1	36 Month Shore Tour "Journeyman" Tour		Out-of-rate assignment (i.e. recruiter, instructor duty, etc.)
10		48 Month Sea Tour "Journeyman" Tour		Any ship or overseas communications facility
8	RM2	Schooling (2-14 wks)		NEC producing "C" School
6		24 Month Shore Tour "Apprentice" Tour		Assignment to a NTCC or NAVCOMMSTA
4		48 Month Sea Tour		Assignment to any afloat unit or to an overseas communications facility
2	RMSN RMSA RMSR	"Apprentice" tour RM "A" School		 11 weeks

Figure 3 Radioman Career Path

when necessary for any CAMS except Naples. These large facilities are responsible for all communications within their respective geographical location, as well as assigned subordinate commands which carry out communications functions. The command hierarchy within the telecommunications discipline ashore begins with these largest units and continues down through Naval Communications Stations (NAVCOMMSTA) and Communications Units (NAVCOMU) to the smallest individual units which are often remote antenna, transmitter or receiver sites. While these types of facilities constitute the majority of shore sites utilizing Radiomen, there are other options for their shore duty such as instructor duty, recruiting duty and serving as company commanders at Recruit Training Commands.

Radiomen are responsible for electronic communications from the ship or station to other units. This is in contrast to the Internal Communications (IC) rating which handles communications within a ship, or Signalmen (SM) which is responsible for external communications but does so via another medium, primarily signal flags or flashing lights. The Advancement Handbook for Petty Officers (RM version) defines the scope of the RM rating:

Transmit, receive and process all forms of telecommunications through various transmission media...operate, monitor and control telecommunications transmission, receipt, terminal and processing equipment...apply diagnostic and restoral techniques...and perform...maintenance on telecommunications equipment and system. [Ref. 44:p. C-ii]

4. Community Uniqueness

Aside from the intrinsic differences between ships and shore stations, Radiomen face constant change in equipment and procedures as they transfer from one

duty station to another. Between ship types communications suites, or "comm shacks" as they are commonly referred to, can vary greatly. While it is true that basic communications equipment and procedures are standardized within the Navy, each class of ship or type of shore station will alter the basics to fit their specialized needs. Thus a piece of gear used frequently in one instance, may only be used as a backup in another, or what is performed manually at one station may be almost entirely automated at another. Additionally, there are great differences in procedures between the Atlantic and the Pacific Ocean fleets. A sailor transferring from a ship homeported in Mayport, Florida will encounter many dissimilarities aboard the new ship homeported in San Diego, California. While standardization is a worthy goal, the realities are that Radiomen experience continual change and must update their skills frequently.

Since the Radioman rating does have a rich history with change limited largely to rating nomenclature during its lifetime, many RMs with considerable years of service are quite resistant to change. In many instances they are quite skeptical and wary of the changes that the trend toward automation is bringing. They often feel they have "paid their dues" during repetitive tours aboard ships with long deployments. This causes them to distrust some of the younger sailors who have had primarily shore based assignments. The more seasoned veterans refer to these RMs as "Commsta Crawlers" with disdain in their voices. This creates an unnatural division within the community, and is particularly troublesome for the female RMs. Currently, females comprise approximately 20% of the more than 20,000 active duty RMs. The constitutional restrictions which prohibit women from serving aboard combatant vessels means a large majority of the female RMs serve

entire careers assigned within the shore establishment. This creates an interrelated problem in that male RMs need to rotate to shore duty, but cannot be replaced at sea by the females. Since many male RMs see no use for women in their rate, measuring professional worth in terms of accumulated sea time, this creates a further source of disharmony within the community.

Recruits entering the RM rating are generally from mental groups³ three and four. While these young people are certainly not mentally handicapped, their somewhat lesser potential can create problems for instructors and managers when confronting shorter attention spans, difficulty in thinking abstractly, and longer learning times required.

Those from mental groups one and two are more likely to desire the more challenging and technically oriented ratings such as Electronic Technician (ET), Ocean Systems Technician (OT) or Cryptological Technician (CT). In what seems to be a paradox, the AFQT (Armed Forces Qualification Test) requirement to be a Mess Management Specialist (basically, a cook) is higher than that required for a Radioman. Compounding this problem for the community is the fact that many young people designated to receive RM training don't have a personal desire to perform that kind of work. One example cited was that in a typical class of 50 "A" school students, six were young men who did not receive initial training of any sort, but were sent directly to a ship and returned for training of their choosing. These individuals tend to be very motivated and enthusiastic toward the RM rating. However, that leaves a balance of 44 "A" school

³Mental group categories are derived from results from entry tests (ASVAB) given to potential recruits and are one criteria used for determining the aptitude and capability of the new accessions' potential for successful completion of an "A" school.

students, the majority of which were either ambivalent or negative about becoming an RM and thus have less than the optimally desired positive attitude concerning the value of training they are about to receive. [Ref. 41]

Unlike the tasks of many other ratings, there is a requirement for communications functions 24 hours a day. Therefore RMs are among the few navy ratings which face continual 3 shift operations for a 24 hour period. Over time this represents a significant detractor to the rating, since RMs constantly face biorhythmic clock interruptions and the difficulties of being on a different schedule than other "day-working" personnel.

B. DATA PROCESSING TECHNICIANS

The Data Processing Technician (DP) rating has a relatively short history due to the recent emergence of automated data processing within the U.S. Navy. This section shall detail that history, present the rating as it exists today, provide a description of the commands utilizing DPs, and briefly look at what makes DPs unique.

1. History

The U.S. Navy entered the computer age in the early to mid 1940's with the Mark I computer and the ENIAC (Electronic Numerical Integrator and Calculator) at the Bureau of Ships, the predecessor of Commander, Naval Sea Systems Command. With the introduction of computers came the need for personnel to operate and manipulate these new machines, and thus the beginnings of the Data Processing Technician rating. [Ref. 45:p. 9]

Initially, the Data Processing Technician (DP) rating came into existence as the Specialist (I) rating during the early World War II period. With the continuing evolution of the computer, the rating matured and was fully incorporated into the Navy's structure in 1948 when it was designated the Machine Accountant (MA) rating. The MA rating grew along with the various generations of computers from early vacuum tube technology, through transistors and into the third generation of computers involving miniaturized circuits to provide increased reliability and speed. [Ref. 45:p. 9]

The tasks of the MA during this timeframe were primarily involved with these manual-entry computerized systems utilizing punched cards. The MA's tasks included sorting, interpreting, collating, and tabulating these cards and then preparing them for entry in Electronic Accounting Machines (EAM) where they would be processed via a predescribed procedure and eventually presented in printed format. [Ref. 45:p. 9]

The transition from these work-intensive "data processing"⁴ procedures to more advanced automated data processing techniques utilizing the greatly expanding technology of computers also caused the MA rating to evolve. More emphasis would be placed on the mental capacities of the personnel and less on rote, mechanistic input of data via punched cards. More and more the MA was responsible for the understanding of how the system operated and had to develop the ability to communicate with the new systems. [Ref 44:p. 10]

⁴The definitions of Data Processing are varied and many. For the purposes of our study, data processing shall be defined as the systematic manipulation via machine (i.e., computer) analysis of information or facts to be used as a basis for some predefined result.

With the greater incorporation and integration of computers in the day-to-day operations of the U.S. Navy and an increased emphasis on data manipulation, on 1 July 1967 the name of the rating was changed to the Data Processing Technician, thus more adequately reflecting the expanded duties and responsibilities of the rating. The rating insignia illustrated in Figure 4, for Data Processing Technicians also reflects the evolution of data processing within the military. The "gear and quill" represents the merging of manual, manpower intensive tasks with the increased automation brought about by harnessing the power of the computer.

From the late 1960's, DPs have continued to mature and progress with their highly evolutionary field. They have become involved in electronic data processing utilizing state-of-the-art mainframe computers, more so than their predecessors whose jobs were more manual in nature involving electric accounting machines. [Ref. 45:p. 9] With the steady evolution of computer technology utilizing large, stationary mainframe computers and the continuing adjustments within the DP community to keep pace, the knowledge and expertise demanded of the DP began to reflect more of what today's DP is responsible for. But one major innovation within the computer technology field was yet to be introduced.

The introduction of mini- and micro-computers, complementing the workhorse of the profession, the mainframe, has caused the DP's responsibilities and duties to blossom. The DP now must be familiar with a plethora of technology and techniques beyond simple data entry and evaluation. From a computer equipment and peripheral operator, the DP has evolved into a manipulator of data and information; making both the

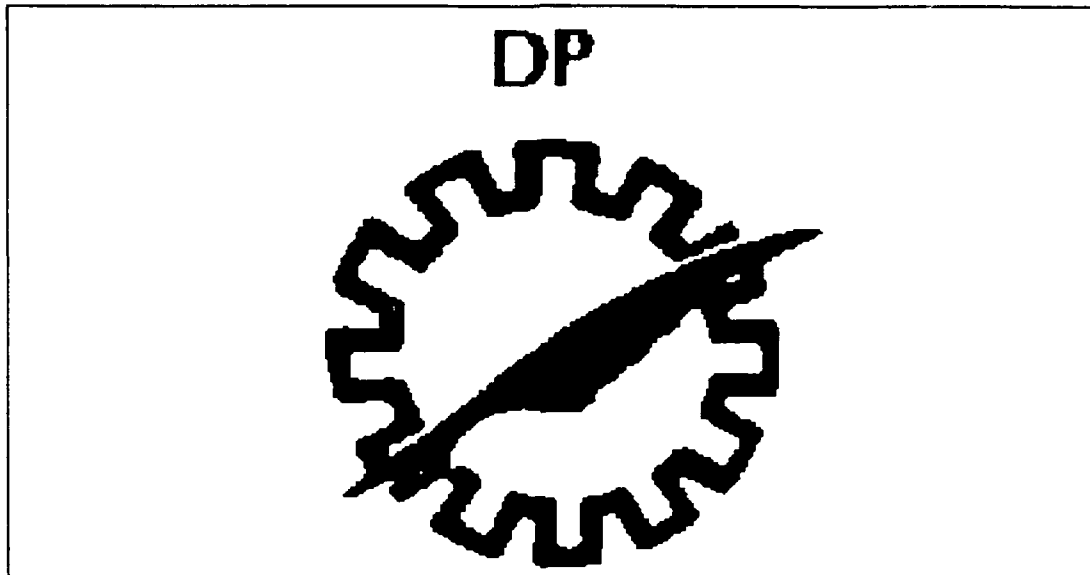


Figure 4 Data Processing Technician Insignia

computer and the data accomplish the objectives specified by the requirement of the job or task statement. DPs spend time acting in the capacity as librarians for data and information stored on various computer media. In addition, they function in the capacity of scheduling and controlling the various aspects of Automated Data Processing (ADP) production⁵. As experience is gained, DPs accede to systems analyst or programmer positions where they no longer simply manipulate data and information via prescribed procedures, but determine how data and information will be manipulated by written programs and systems that they or others develop and/or design. Beyond this level, the experienced DP begins to supervise and manage groups of Data Processing Technicians and ADP civilians who are themselves controlling and manipulating data and information

⁵It is important to note that the DP rating is responsible for only non-tactical automated data processing. Numerous other ratings exist within the U.S. Navy to design, test, deploy and operate tactical systems.

as well as producing, designing, and analyzing computer systems to meet the needs of an evolving community. [Ref. 45:p. 13]

2. Training and Requirements

DP training is basically gained via two sources, formal schoolhouse training or on-the-job training from senior, more experienced DPs. Initial formal training is obtained at the DP "A" school located in San Diego, California.

The five week DP "A" school course introduces the fledgling Data Processing Technician to the rating and the various computer systems which may be encountered during initial and subsequent duty assignments. As with many "A" schools, the instruction is not intended to be all inclusive but rather provide a basis from which the new DP may grow, expanding his or her knowledge about the data processing field. Currently, the DP "A" school enrolls and graduates approximately 500 students annually, enjoying highly enthusiastic students and a low attrition rate. [Ref. 14]

Following graduation from "A" school, the individual reports to his or her first command where he or she will serve in primarily administrative computer applications such as a data entry, media handling and basic computer system operations.

Advanced training for DPs is obtained during subsequent assignments to other facilities in the form of OJT, factory/contract training, completion of a variety of different Personnel Qualification Standards (PQS), and successful completion of various U.S. Air Force courses taught at Keesler Air Force Base, Biloxi, Mississippi. [Ref. 46:pp. 86-89]

The DP community as a whole stands at approximately 4000 personnel consisting of more than 2600 men and 1300 women [Ref. 47]. The mix of males and

females is not a critical issue within the DP rating due to the paucity of afloat billets and those few billets are mostly open to both sexes. Primarily, the billets available to DPs are located within the United States, with a few overseas and afloat.

The numbers of DPs are decreasing with time due to several factors. Aside from the obvious total force reductions felt throughout the military, the DP community size is becoming smaller because of advances in technology which make ADP less manpower intensive. Additionally, the relatively high expense of maintaining data processors in uniform (like most other ratings) makes it more cost effective to hire civilians who can execute the same duties but at a lower cost to the military. Civilian data processors also bring the advantage of being more current within the ADP field. [Ref. 14]

The young recruits enlisting in the Navy who are destined for the DP rating must obligate for an additional year beyond initial enlistment for a five year obligated service period. They must be a U. S. citizen and eligible for a security clearance but are not required, to have normal color perception, speech, or hearing.

3. Commands and Assignments

The DP rating is a small community which serves in commands located primarily in the United States. Most commands are found ashore, but with the increased automation being developed for afloat commands, female as well as male DPs are finding increased opportunity aboard ships at sea, primarily in auxiliaries, amphibious units, and some larger combatants.

The variety of shore facilities is determined largely by the location and personnel utilizing the services of the station. Two primary types of sites are the Navy Regional Data Automation Centers (NARDAC) and the Worldwide Military Command and Control System (WWMCCS) operations centers.

The NARDAC is an echelon three shore command reporting to NCTC and responsible for providing a full range of information management and ADP support services to the Navy, Department of Defense, and other government agencies within that NARDAC's particular area of responsibility on a cost reimbursable basis. The NARDAC's goal is to provide these products and services in an efficient and cost effective manner. [Ref. 48]

As of October, 1990 there existed nine NARDACs located in areas of high concentration of Navy and DoD activities. With the merger of NCTC assets, NARDACs as a separate entity are disappearing and being absorbed into new commands, Naval Computers and Telecommunications Stations. San Diego, California and Jacksonville, Florida were two of the first NARDACs to undergo such a change in late 1990. Their mission and method of executing services, however, did not change with the merger.

Worldwide Military Command and Control System (WWMCCS) operations centers are located throughout the world and provide the ability for remote military forces and commands to communicate with their commanders up to and including the National Command Authorities (NCA) [Ref. 49]. The WWMCCS relies heavily on computer networks to effectively execute its mission and thus requires the expertise of the Data Processing Technician to maintain and operate the systems.

A side benefit to a DP's assignment to a WWMCCS facility is their close association with telecommunications. Over the course of their assignment they are exposed to and may become proficient in the various communications networks which makeup the WWMCCS Intercomputer Network (WIN) whereby users may communicate with a multitude of other subscribers around the globe. DPs assigned to WWMCCS facilities are responsible for data collection and processing which ultimately involves establishing and maintaining communications links of various forms. [Ref. 50:pp. 116-120]

These two facilities represent the primary users of DPs, however, additional opportunities exist afloat and at other shore facilities in the capacity of computer analysts and programmers, instructors, recruiters and Recruit Training Command company commanders. Figure 5 illustrates the career path which a DP enlisting in the U.S. Navy might expect [Ref. 43].

With the incorporation and integration of non-tactical computer technology aboard many naval combatants, the need for personnel to operate and control these devices has become apparent and prompted the Navy to assign DPs to naval combatants. Accordingly, these personnel have undergone the same assimilation into the ship's complement as have all other ratings assigned. As such, they have been expected to become proficient in the shipboard routine required of their sea-going counterparts. The DP's expertise over time has expanded beyond those basic duties expected of any sailor at sea, to include assignment to damage control training teams (DCTT) and qualification as Enlisted Surface Warfare Specialists (ESWS).

Afloat commands currently possessing DP billets in primarily computer maintenance and operator roles are:

- Aircraft Carriers
- Destroyer Tenders
- Submarine Tenders
- Larger amphibious ships

The potential exists for this list to expand as the automation of ship systems becomes more prevalent. With the Navy's incorporation of new and advanced communications systems and procedures (Local Area Network (LAN), Wide Area Network (WAN), Gateguard, etc.), the requirements for DPs afloat may increase.

Data Processing Technicians assigned afloat are primarily responsible for maintaining the variety of non-tactical computer systems found onboard (Zenith Z-248, standard Navy Desktop Computers, SNAP I/II, etc.). This is in contrast to the Fire Control Technician (FC) rating which is responsible for maintenance and operation of tactical fire control systems, and Data Systems Technicians (DS) which maintain the various tactically oriented systems associated with the Navy Tactical Data System (NTDS) and other similar systems. The Advancement Handbook for Petty Officers (DP version) defines the scope of the DP rating:

YEARS	RATE	TYPE OF TOUR	TYPICAL ASSIGNMENT
24	DPCM	36 Month Sea Tour	CMC onboard AD/AS, etc.
22		72 Month Shore Tour	Assignment as Systems Analyst or DPS supervisor, staff duty or ADP billets in Norfolk or Washington, DC
20			
18	DPCS		
16	DPC	36 Month Sea Tour	ADP Operations Supervisor onboard AD/AS/LPH/LCC, etc.
14		48 Month Shore Tour	ADP Operations Supervisor at WMMCCS, NARDAC, etc.
12	DP1	Schooling (2-6 wks)	Programming School
10			
8	DP2	36 Month Sea Tour	ADP Supervisor aboard AD/AS/LPH/LCC, etc.
6		Schooling (4-10 wks)	NEC producing "C" School
4	DP3	36 Month Shore Tour	ADP Operator at SIMA, EPMAC, etc.
2		36 Month Sea Tour	SNAP I operator aboard AD/AS/LPH/LCC, etc.
	DPSN DPSA DPSR	DP "A" School	10 weeks

Figure 5 Data Processing Technician Career Path

...operate data processing equipment to record source data; set up and operate data processing equipment including digital electronic data processing machines, for accounting and statistical purposes; process incoming information and make routine and special reports as required; operate general purpose digital computers; and in the higher paygrades participate in programming, systems analysis, and designing electronic data processing systems. [Ref. 51:p. C-ii]

4. Community Uniqueness

The Data Processing Technician rating has undergone considerable change in its relatively short history causing the personnel in the rating to be less resistant to change than those in more static, traditional ratings. This was evidenced in the interviews conducted as many DPs voiced an anticipation and eagerness to embrace new technologies and looked favorably upon the suggestion of incorporating more communications within their rating requirements (interviews will be described in Chapter V). It is not feasible to compare the DP rating to all other ratings, however, the presumption here is that the foundation for this enthusiasm stems from the exciting, cutting-edge technology of computers and the high quality of personnel in the rating.

In support of this assumption, the "A" school instructors interviewed indicated that the newly arrived recruits they encounter are highly motivated, intelligent individuals who are there by choice, not because nothing else was offered or available to them. In the opinion of the instructors, these individuals are likely to be more receptive to the learning experience and fare better than individuals who were limited in his or her selection of a desired rating. [Ref. 52]

The ability of the DP community to select recruits from mental groups one and two also helps ensure the continued influx of only quality personnel. These personnel

assimilate knowledge faster and easier than those in lower mental groups and are more adept at verbal and mathematical skills facilitating their success in "A" school and subsequent academic endeavors.

All DPs interviewed were observed by the authors to be highly motivated and articulate career personnel. When they spoke, there was a definite air of confidence and pride conveyed in what they do and their abilities. This, coupled with the type of tasks performed by the rating, gives rise to the authors' perception that the DP rating is a rather sophisticated and aloof rating bordering on arrogance in belief in their abilities. This is not a criticism of the rating or an indication of perceived haughtiness, rather it is an acknowledgement of their abilities and capacity to assume greater responsibilities.

The working environment encountered by DPs is marked by equipment more reflective of state-of-the-art technology than that experienced by other ratings burdened by decades old systems and antiquated procedures. NARDAC San Diego, for example, has an impressive collection of data processing equipment housed in an aesthetically pleasing building located in southern California which equates to a highly desirable duty assignment. The director of DP "A" school expressed it best when he said that DPs have some of the best shore duty assignments available [Ref. 52].

C. COMMUNITY COMPARISON

In order to study the feasibility of a merger between the RM and DP communities, it is necessary to examine those community characteristics which are shared, and would serve to enhance a merger, as well as those dissimilarities which might prove detrimental

to merger efforts. This section will compare and contrast the communities concerning various topics with the exception of job task analysis which, along with the occupational standards of each community shall be addressed in Chapter V. This comparison section coupled with the information presented in Chapter V, shall form the basis for merger recommendations and strategies to be outlined in Chapter VI.

1. Working Conditions

Working conditions encountered by both ratings is one characteristic which can be both nearly identical and wildly divergent between the two ratings. When RMs are assigned to a ship, their conditions can vary quite a bit: from the clean, office-like environment used for message processing to the hazardous environment encountered while working aloft on the superstructure for antenna maintenance. In contrast, aside from custodial duties as a compartment cleaner responsible for space maintenance as is required of all ratings, the DP can look forward to working in very clean and comfortable spaces.

When assigned ashore, RMs generally enjoy cleaner, more spacious working spaces and less hazardous duties. The same may be said for shore billets filled by DPs. Their land-based environs are generally larger and afford less restrictive confines than encountered afloat. At some locations, RMs and DPs are already sharing the same or adjoining workspaces, such as the WWMCCS sites described above. Conditions of these locations are generally similar to the clean computer room environment that DPs are most familiar with.

One characteristic of working conditions which provides little similarity is the arrangement of working hours. Some of the largest ADP facilities have customer service

volumes requiring second and sometimes third-shift operations, however, DPs generally complete their tasks during normal daytime working hours. As discussed above, RMs face virtually an entire career of constantly rotating through a 24-hour watch routine, even at shore communications facilities. It is only when an RM is assigned outside of an operational communications billet that this routine is interrupted. "Dayworking" jobs do exist within each communications suite, but these are normally filled by more senior, experienced RMs or assigned on a rotating basis as a reward for good performance.

2. Sea-Shore Rotation

Radioman is considered a very sea-intensive rating while, in contrast, DPs serve mainly in the shore establishment with a favorable sea-shore rotation as is illustrated in Table I [Ref. 47]. Within the RM community,

Table I RM AND DP SEA/SHORE ROTATION

	Radioman Data Processing Technician	
E-4 and below	48/24	36/24
E-5/6	45/36	36/48
E-7/8/9	39/36	36/72
NOTE: Numbers are in months; sea time listed first followed by time ashore.		

there are approximately 21% females with a small percentage of them filling sea billets aboard tenders and other non-combatants. Similarly, the DP rating has approximately 1300 women, comprising almost 33% of the entire community, with a small percentage

serving afloat [Ref. 47]. Sea service is considered necessary for advancement within the RM rating, although more so for males than females. This is especially true at more senior levels such as E-7/8/9, where a lack of shipboard experience can literally stall advancement. As more sea billets open up for DPs, this will become true for that community as well. Until then, sea time for DPs will be either beneficial or neutral in its impact on a career, while a lack of sea-going experience will not be viewed as detrimental.

3. Personnel Issues

As previously mentioned, RMs are generally mental group three (upper and lower) and four while DPs are taken from mental group one and two recruits. This disparity directly results in the difference in the two ratings with the RM rating being more manual, rote-memorization oriented and the DP community requiring a more intelligent individual capable of more abstract thinking. ASVAB (Armed Services Vocational Aptitude Battery) scores of the members of each rating specifically illustrate this disparity. On the average, those personnel entering the RM rating score lower than their DP counterparts on the test.

The ASVAB is a "series of tests designed...to measure potential for training in general military occupational fields." [Ref. 53:p. 9-2] The ten test scores comprising the ASVAB are used to determine a potential recruit's enlistment eligibility, AFQT Mental Group Category, and rating eligibility, among other determinations. Verbal (VE) skills form an important part of all determinations and is derived by adding the raw scores from the Word Knowledge (WK) and Paragraph Comprehension (PC) tests. The AFQT

Mental Group Category is determined by adding the VE score to Arithmetic Reasoning (AR) and one half of the Numerical Operations (NO) test scores. The resulting raw score is then converted to an AFQT percentile for use in determining the recruit's mental group category. [Ref. 53:pp. 9-5,12]

For the Radioman and Data Processing Technician ratings, there are additional determinants in the selection of recruits and new accessions for formal school training in either rating. These are displayed in Table II. The test score criteria contained in this

Table II ASVAB TEST SCORE QUALIFICATIONS

ASVAB 5 thru 7		ASVAB 8 thru 14	
RM:	WK + NO + AD = 144	VE + NO + CS = 144	
DP:	WK + AR = 108	VE + AR = 108	

table are established to assist personnel (i.e., enlisted classifiers) tasked with vocationally guiding recruits in their selection of "A" school. The established threshold score for the ratings is intended to provide a basis from which enlisted classifiers may discern the new accession's ability to succeed in "A" school. Based on the different test scores used for each rating, a direct comparison of the two is not meaningful. Accessions headed for DP "A" school have a required score among the highest of any recruits for those ratings which share the same ASVAB test formula requirements with the DP rating, (the Journalist rate is the only one higher at 110 for both requirements). The converse is true

for Radioman; of the four ratings which have the same ASVAB test formulae, all but the RM rating requires a score of 160. [Ref. 54] In this light, the mental group category of each rating is the only common requirement which may be used for comparison of new accessions into the RM and DP rating. ASVAB requirements for all ratings are currently under review and may change from those established more than five years ago.

4. Capabilities and Personnel Requirements

Although any job can contain tasks which are repetitive, boring and mundane, some jobs and ratings require personnel with the ability to think more abstractly and comprehend more complex situations. The DP rating contains many jobs and tasks such as computer programming and systems analysis which require personnel with somewhat intellectual capabilities. Young recruits who have test scores corresponding to the higher mental groups one and two are encouraged to seek careers in the more challenging rates such as DP. While many jobs and tasks within the RM rating require vigilance and awareness of the command's mission and organization, most tasks, such as message preparation, routing, and filing do not require the same level of mental ability as the DP rating. For this reason, recruits from mental groups three and four are encouraged to consider ratings such as Radioman. • [Ref. 47]

5. Retention and Advancement

Retention and advancement statistics for both ratings do not show a significant trend which would indicate the retention and advancement of either community is more favorable than the other. Both compare well with Navy-wide retention statistics at the first, second and third term retention points. In the retention figures for 1990, the only

significant difference is found at the third term point where senior DPs are more likely to be retained than their Radioman counterparts by approximately five percent (70.7% for RMs and 76.0% for DPs). This third term figure for DPs was well above Navy-wide rating averages which were closer to the 70% retention figure for third term Radioman. This may be due, in part, to the highly favorable Sea/Shore rotation for DP E-7/8/9 illustrated in Table I. [Ref. 47]

6. Administration

The security clearance requirements for the two ratings is different in that a higher clearance is more routinely required for RMs due to the security requirements for record communications. Radioman must undergo a lengthy (and costly) special background investigation (SBI/SCI) to facilitate their being granted a Top Secret clearance. By virtue of working in a space which may contain Top Secret material, all Radiomen in that space must have the commensurate clearance/access.

Only 30 percent of all DPs require Top Secret security clearances whereas for Radioman the number is closer to 100 percent [Ref. 47] Primarily, DPs are granted Secret clearances resulting from routine background checks with access to classified material on a need-to-know basis, only. Those DPs assigned to facilities such as WWMCCS sites, where they will work with the communications suite, require higher security clearances. This is the exception rather than the rule, however.

7. Career Progression

Both the RM and DP ratings are considered "striker-type" ratings. As such, the communities receive new personnel from one of two primary sources: new recruits

who attend "A" school at a Recruit Training Command or those who "strike" for the rating from a non-rated status. The latter process involves the individual learning the skills of the new rating through OJT and then demonstrating that knowledge through the prescribed procedure to become rated as a Radioman or Data Processing Technician.

As both DPs and RMs become more senior within their ratings, their responsibilities continually change and increase. As with most Navy ratings, personnel in paygrades E-1 through E-4 are considered primarily technicians or operators. Upon advancing to second class petty officer (E-5), he or she begins to acquire management and leadership skills. At the E-6/7 level, supervisory skills are considered essential and commands begin to expect these senior personnel to spend less time with their "hands-on" the equipment and more time managing personnel, resources, and assets. Both RM and DP E-8s and E-9s are placed in positions at afloat and shore commands where their availability to execute rating-specific duties is reduced by the managerial requirements of the commands, such as serving in positions as the Command Senior or Master Chief. These highly influential positions rely heavily on a general knowledge of the Navy and all ratings, and less on the chief's source rating knowledge. In this respect, the RM and DP ratings are quite similar, as are most ratings.

8. Technology

Technology is a factor which influences both communities in different ways. DPs warmly embrace changes and advancements, welcoming the expansion to their field of knowledge--realizing that most changes enhance their capabilities and often decrease (or ease) their work load. This view was expressed by the majority of DPs interviewed.

[Ref. 52, 55, 56] Conversely, changes in telecommunications technology often represents additional work for operators, as many RMs find recent advances and the introduction of new equipment difficult to understand and hence operate properly. This causes a great deal of frustration and, in turn, generates a resistance to change. Evidence of this was heard aboard one of the ships where RMs were interviewed. They felt that if it took too long to learn or if great savings in time and effort weren't realized directly then the computer would become just an expensive toy placed out of the way and left to collect dust [Ref. 57]. It has been the experience of the authors, that for a variety of reasons, changes are made more readily at shore based ADP facilities, but are much slower to be incorporated aboard ships. This creates yet another resistance to change because RMs are less accustomed to accommodating new equipment and procedures than DPs.

Another side effect of advances in technology is the impact which it has on the training at the "A" schools. DP "A" school is revising the curriculum content to expand the subjects taught and allow for more indepth instruction [Ref. 14]. RM "A" school is facing the opposite condition: they are eliminating certain topics and decreasing the length of their school [Ref. 41].

9. Comparison Summary

Section C is not intended to be an all-inclusive listing of the various similarities and dissimilarities of the two communities. Rather, its purpose was to highlight some of the more meaningful and significant problems faced by both communities and identify the potential ramifications for a merger. To further expand on the two communities, a detailed discussion of the Radioman and Data Processing

Technician occupational standards, tasks statements and equipment will be presented in the following chapter.

V. INTERVIEW RESULTS AND JOB TASK COMPARISON STUDIES

A. INTRODUCTION

Aside from subject matter expert opinion and other, less rigorous criteria for determining the potential for an RM/DP rating merger, an objective, fact-oriented analysis must be applied. The most commonly used method for assessing similarities in a job comparison is Job Task Analysis. By analyzing the requirements of a job, it can be broken down into units which are more easily used for comparison; generally, this analysis is conducted on the job task level. All the armed services have similar methods to review job tasks, the Navy's being the Navy Occupational Task Analysis Program (NOTAP). This program develops task inventories based, in part, on Occupational Standards (OCCSTDs), schoolhouse curricula, observational data, and interviews with both fleet personnel and community experts. Questionnaires are distributed periodically to a cross section of personnel within the specific ratings to revise and update the task inventories; the data base of information is then used for a variety of research purposes.

Two studies were conducted which yield information germane to the central research question of this study. One was conducted on Navy-wide data and the other performed specifically for DPs and RMs. Each is discussed below.

B. NAVAL BIODYNAMICS LABORATORY STUDY

The Naval Biodynamics Laboratory Study was funded by the Naval Medical Research and Development Command, and the findings which were published in 1982 provided information to U. S. Navy personnel managers and researchers concerning questions such as:

...what jobs are most similar and dissimilar?...What human abilities and temperament attributes are characteristic of effective job performance? How are those abilities and attributes distributed across jobs in the navy? [Ref. 34:p. ii]

The report is a "condensation and reanalysis" of job information collected in the early 1970's concerning over 458 jobs within 48 navy enlisted ratings and nine nonrated categories (Airman, Seaman, and Fireman) [Ref. 34:p. 2]. In part, the findings present information about clusters or groupings of similar jobs and the relationships among jobs within the clusters, as well as performance characteristics of the jobs [Ref. 34:pp. 4].

1. Methods

To determine internal consistency of the data obtained from respondents in the same job, two measurements were computed. These are "R", which reflects the relationship or correlation between results from respondent pairs, and "R-composite", which reflects the reliability of mean results across the total number of respondents. [Ref. 34:pp. 5-6]

A listing of 32 job dimensions or factors was developed via factor analysis in which "...those elements correlating high with each other (i.e., rated in the same manner

as each other by [respondents]) but correlating low with other elements were combined into a common factor." [Ref. 34:p. 7]

Lastly, ratings were compared for similarities using Coefficients of Similarity and Mean Squares. The Coefficient of Similarity ranges from 1.0 (perfect match) to 0 (no match) to -1.0 (complete mismatch) based on evaluation of jobs along the 32 dimensions mentioned above [Ref. 34:p. 7]. To eliminate variability of responses, the Mean Square (MS) Error term was used.

The ratio, MS Jobs/MS Error, is a statistic that can be used to estimate the probability (P) that jobs [ratings] in a group (or cluster) of jobs are identical. As can be seen from this ratio, the lower the response variability (i.e., MS Error term) the higher will be the resulting P value. If P is high, the jobs in the cluster are highly similar in terms of the 32 dimensions.... [Ref. 34:p. 8]

2. Results

Carter and Beirsner [Ref. 34] provide a graphic representation of the clustering of Navy ratings based on the Coefficient of Similarity, and it is reproduced here as Figure 5. Ratings with coefficient values near 1 are positively correlated and have a low cluster number. For instance, cluster number 3 (ADJ 3 & 2 - AE 3 & 2) had a coefficient of 0.95. An AD is an Aviation Machinist Mate, the J represents a variant thereof, which has responsibility for maintenance of turbojet aircraft engines. The AE is an Aviation Electrician Mate and is responsible for the maintenance of aircraft electrical systems such as power generating systems. These two rates do contain many similarities in the tasks performed and do fall within the same occupational field of Aviation/Maintenance Weapons. Conversely, unrelated ratings, which have coefficient values near

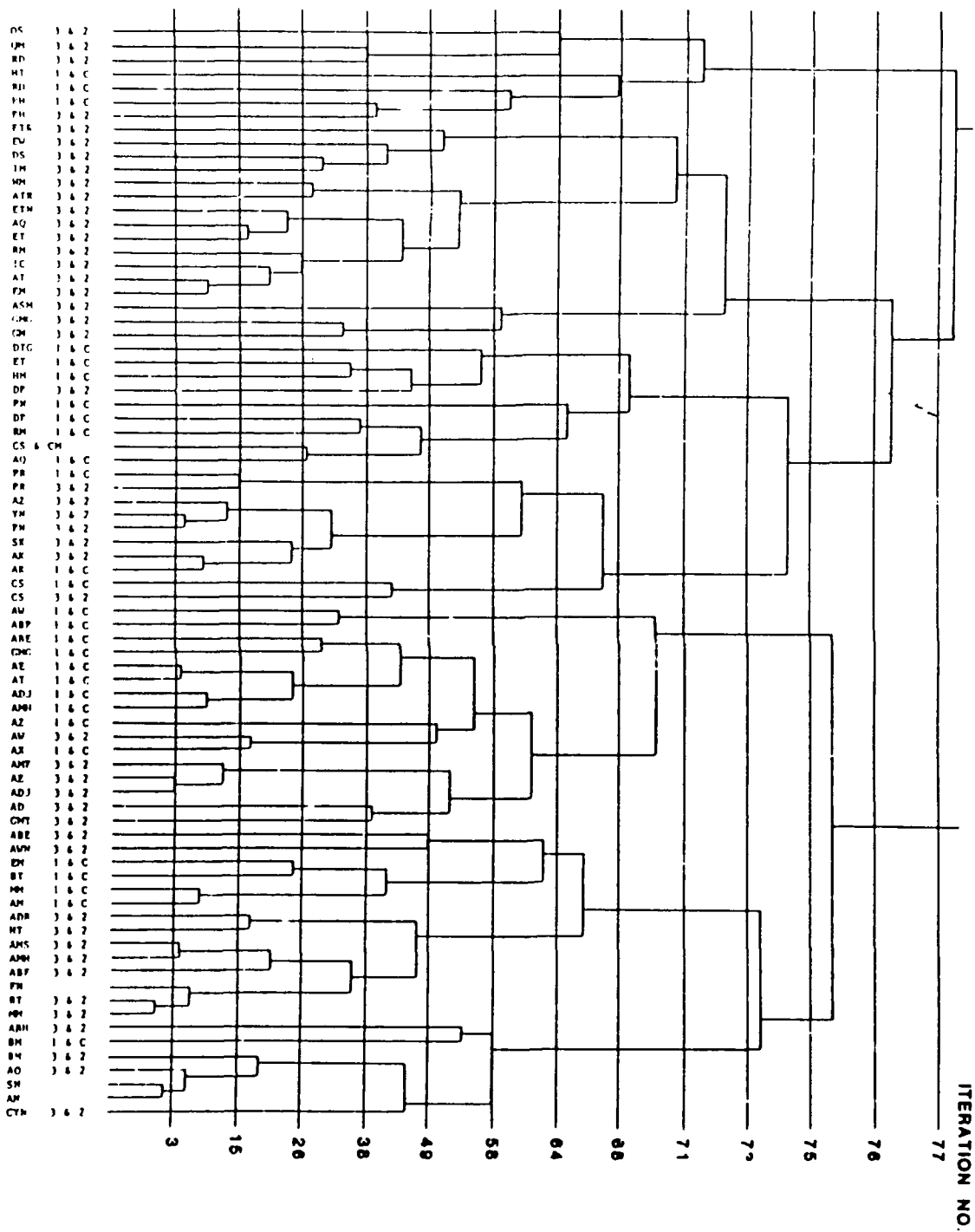


Figure 6 Navy Job Family Tree

zero, have higher cluster numbers and their lines intersect higher on the tree in Figure 5. For instance, cluster number 29 (DS 3 & 2 - IM 3 & 2) have a coefficient value of 0.73. In this example, DSs are Data Systems Technicians--electronic technicians specializing in the maintenance of computer systems--and the IM, or Instrumentman rating which repairs, adjusts and reconditions meters, gauges, office machines and other small equipment. In this study, successive comparison iterations were performed until all ratings were "related" at cluster number 78, with a corresponding coefficient value of 0.31. Although these data can provide a basis for determining rating similarity, a complete comparison must include values of MS Jobs, ME Error and P. Data from the study pertaining exclusively to the RM and DP ratings are summarized in Table III. [Ref. 34]

TABLE III CLUSTER NUMBERS AND STATISTICAL VALUES FOR RM_s AND DP_s

Cluster Number	Job Categories	Similarity			
		Coefficient	MS Jobs	MS Error	P
26	#20/RM 3&2	.90	.92	.54	.000
36	DP 1&C/RM 1&C	.68	.55	.62	.640
46	#34/DP 3&2	.59	.69	.49	.015

It should be noted that Carter and Beirsner subdivided each rating into two categories to simplify their analysis: 1) junior personnel of Petty Officers Second and Third Class (3

& 2), and 2) midgrade personnel of Petty Officer First Class and Chief Petty Officer (1 & C). Senior paygrades of Senior and Master Chief Petty Officers (CS & CM) were combined into a single grouping because of low numbers of respondents. These researchers suggest that coefficient values of 0.8 or greater and P values of 0.5 or greater indicate greatest homogeneity, and such groups could be

...treated the same for purposes such as personnel selection and placement, common training, transfers from one rate to another, and administrative organization. [Ref. 34:p. 10]

Accordingly, weak similarity can be found between RM 1 & C and DP 1 & C, which have a coefficient value of 0.68 and a P value of 0.640. Correlation between the junior ratings must be traced all the way to cluster number 76 (out of a total of 78 clusters), with values for coefficient and P of 0.37 and 0.000 respectively. These data would indicate that while those tasks performed by more junior RMs and DPs are highly dissimilar, tasks performed by midgrade RMs and DPs become more, but not highly, similar. Similar data would be encountered for many ratings, not just RMs and DPs: as one becomes more senior, emphasis is shifted away from the mechanical, rating-oriented tasks to the managerial, people-oriented tasks.

C. NODAC STUDY

A more recent study, confined to a comparison of just the RM and DP ratings, was completed by the Navy Occupational Development and Analysis Center (NODAC). A meeting was held at NMPC in Washington DC on 28 June 1990, and attended by RM/DP

subject matter experts, to specifically discuss the feasibility of an RM/DP merger [Ref. 5]. The results of the NODAC study were presented at this meeting.

1. Methods

This analysis was a computer-aided comparison of the task statements from the OccStds and the equipment listings from the Task Inventory Booklets of both ratings. All lists were input to the database and a program was run to determine similarities between the tasks of the RMs and DPs, as well as similarities in types or kinds of equipment used by both rates. [Ref. 58]

2. Results

As many as 195 different types of equipment are used by Radiomen ranging from antenna patch panels and shorting probes to date time stamps and electronic relay systems. Laptop computers, tape cleaners, bursters and microfiche readers are among the 41 types of equipment listed for Data Processing Technicians. The NODAC analysis identified 13 common items:

- card punchers
- card readers
- encryption/decryption devices
- key entry machines
- laptop computers
- personal computers
- microfiche readers

- multiplexers
- optical readers
- paper shredders
- paper tape punches
- printers
- terminals

From RM3 to RCM, there are 85 occupational standards with over 225 corresponding job tasks. From DP3 to DPCM there are 83 occupational standards with over 400 corresponding job tasks. When task statements were compared, approximately five percent were similar between RMs and DPs [Ref. 5]. Table IV is a representative listing of common tasks identified in the NODAC study [Ref. 58].

TABLE IV PARTIAL LISTING OF TASKS COMMON TO RMs AND DPs

RMs	DPs
load tapes	load/unload tapes
clean fixed disk drives	clean floppy disk drives
verify equipment status	run equipment diagnostic tests/ run equipment maintenance tests
isolate faulty equipment	isolate problems on production runs
evaluate computer program errors	determine program errors
review software changes for systems software	analyze end user requirements

The full listing of common tasks includes roughly 36 items. In proportion to the number of tasks for each rating, this figure represents roughly 16 percent of the RM task statements and nine percent of the DP task statements. However, percentage figures alone cannot provide a true analysis; these figures must be weighed against the relative importance of the task under consideration with respect to all tasks performed within the job. Upon examination, it would appear that these tasks represent a small portion of the tasks and duties of each rating. For instance, clearing paper jams is a common task, but constitutes a very small and relatively unimportant part of the tasks for both RMs and DPs.

Some of the tasks are fairly simple and of a general nature; they might appear as a task statement for a large number of different ratings. Such tasks include load tapes, inventory/destroy classified material, clean floppy/disk drives, format disks, perform quality assurance checks, and align printers. Other task statements which appear superficially similar, could be quite dissimilar when put in the context of how, when, and why they are actually performed. For these reasons, caution must be applied when considering a job task analysis as a basis for forming job families.

...jobs judged to be different when grouped on the basis of one type of descriptor may be judged similar when another type of descriptor is used....It is important to recognize the substantive rather than statistical nature of this problem. For example, a statistical test among jobs or groups of jobs...does not address the issue of whether such differences are meaningful....It is thus apparent that jobs considered different for some purposes may be appropriately considered similar for other purposes. [Ref. 35:pp. 16-17]

D. RESULTS OF THE INTERVIEWS

As previously discussed, the authors conducted interviews in the San Diego area during 18-19 October 1990 to provide information and opinions from subject matter experts within each community. Appendix A provides a more detailed description of the interviewees whose views and opinions were the basis for this section. Results of the interviews could not be presented in a quantitative fashion, therefore, the general comments, ideas, perceptions, and concerns most prevalent in the conversations at each site visited will be synopsized in the following sections.

1. USS Halsey (CG-23)

The enlisted personnel interviewed aboard the USS Halsey collectively possessed a wide range of experiences within the Radioman rating. The RMCS's career had spanned 25 years and included several tours of duty aboard combatants, shore duty at NAVCAMS Guam and RM "A" school, as well as, specialized duty in Kodiak, Alaska and with a Beachmasters unit. Both petty officers had served in various communications billets ashore and afloat. The Communications Officer was a surface warfare officer with no experience in ADP and only five months in his present position. These individuals had never heard of the TELCOM/ADP merger, and were not immediately affected by it since their chain of command was operational and not directly within the NCTC claimancy. [Ref. 57]

They felt very strongly that the duties and requirements of the Radiomen aboard ships presented enough uniqueness and diversity that there could never be a satisfactory RM/DP merger in the afloat community. They were confident that they, as

RMs, would have no difficulty in assimilating any DP-like skills and would therefore have no need for a DP in their present structure. After having admitted a lack of exposure to DPs and their tasks, they indicated their perception was that DPs worked in a "sterile world" and not only could not, but would not incorporate the more manual and hazardous aspects of the RM jobs. They pointed out that currently a large portion of their tasks involved mechanical, manual approaches and DPs might not possess the general abilities or aptitude for this kind of work. In other words, they perceived an inherent difference between the two rates with RMs being a "technical" rate and DPs being a "clerical" rate. A concern was expressed in terms of rating exams and advancement, and how these might be affected by a merger. Implicitly assuming the DP rating would be absorbed by the RM rating, they recognized the difference in intellectual levels, and felt DPs would dominate the rate, eventually doing better on rating exams and advancing more quickly. A second concern was that an infusion of shore-intensive DPs into the RM rating would upset the sea/shore rotation, making it worse and causing longer sea tours. Related to this, they voiced a concern about incorporating the DP rating within the RM rating with regard to the percentage of women in the DP community. They felt this would be another factor detrimental to their sea/shore rotation. [Ref. 57]

They perceived a natural division in the types of tasks performed within both ratings: 1) DP billets and the shore billets for RMs which most closely approximated those DP billets, and 2) RM afloat billets and those RM billets ashore which were most like their afloat counterparts. They suggested a possible reorganization of the two ratings along these lines; the strategy would be to split off the shore-oriented RM tasks and

billets to combine with the DP rating into one community, leaving the sea going RMs as a separate community. [Ref. 57]

Ultimately they felt the TELCOM/ADP merger would have little impact on them, pointing out that changes aboard ships would take many years to fully integrate due to the slow introduction of advanced technology in the form of new equipment. They agreed that more basic computer literacy was necessary within the RM rate and that this should be added to the "A" school curriculum. Their only other suggestion for the future of the RMs was that emphasis on typing skills should be increased--it is perceived as vital to the rating with or without the merger issue. [Ref. 57]

2. USS Cape Cod (AD-43)

The USS Cape Cod is a destroyer tender homeported in San Diego, California. Both Radiomen and Data Processing Technicians are employed aboard the tender. Interviewed were a DPCS with 18 years data processing experience, a DP1 with 10 years experience within the rating, and two RM1s. One of the two Radiomen had considerable exposure to the data systems world since she had been in the Data Systems Technician (DS) rating for almost ten years. Other than this exposure, all had limited experience with members of the other rating. [Ref. 54]

While both groups felt the inevitability of the telecommunications and ADP disciplines merger they were somewhat reserved about advocating the merger of the two ratings. The DPs interviewed voiced their opinions that if the ratings were to merge, the advantages would be obtained via the opening of additional sea billets for the shore-intensive DPs, and providing savings in the costs associated with maintaining two separate

ratings. The change to broaden their exposure to communications was also seen as an advantage but they believed that this could be accomplished without a merger. While they thought that some RM tasks were similar to traditional DP tasks, at least in theory, they felt that there wasn't enough commonality between the two ratings to warrant such a merger. They admitted that their knowledge was lacking about the Radioman rating but felt that in a merger of this sort, regardless of the ratings involved, confusion, resentment, and discontent could result. [Ref. 54]

The Radiomen interviewed shared some of the same reservations but felt that it would be possible for DPs to learn the RM rating without much difficulty. The first RM1 interviewed opined that the RM rating had changed over the years and it would be hard to compare the more traditional tasks performed in years past by more senior RMs to those performed today in a more automated, technologically advanced communications facility. In this light, she felt a merger at the lower levels, involving junior personnel might not be met with as much resistance. As part of their recommendations to implement such a merger, they felt that cross assignments and training would be necessary. This would involve consolidating the "A" schools into one and assigning former DPs to traditional RM billets and vice versa. They were skeptical of this approach and said it would be a long, drawn out process. [Ref. 54]

The general consensus of those interviewed aboard Cape Cod is that, even though the technology of ADP and telecommunications are eventually merging, the two communities of Radioman and Data Processing Technicians need not merge with it. In

fact, one of the Radiomen suggested simply to leaving the communities alone to develop independently with the advancing technologies. [Ref. 54]

3. DP "A" School

Two instructors, a staff administrator, and the director, from DP "A" school were interviewed. These four had amassed impressive credentials in the way of career assignments and exposure to data processing and telecommunications. The director of the school, a DPCS, had considerable exposure to RMs both in afloat positions and ashore. Others had either worked for or with RMs at various sites around the world. They all felt that this exposure to communications had been beneficial to their careers and were very certain that they could assimilate any RM task. As technology continues forward, the consensus was that renewed emphasis should be placed on incorporating increased telecommunications training for DPs. [Ref. 52]

While enthused about the idea of the technologies merging, they did harbor reservations as to the ratings merging. They felt that RMs might have difficulty in the comprehension of some aspects of the DP rating but that Radiomen should have a working knowledge of what goes on behind the keyboard and video display terminal of a computer used in telecommunications. Asking them to become computer literate to the point of what a DP knows, however was viewed as asking a lot of a rating that already tasks its personnel heavily. [Ref. 52]

The major impediment to affecting a merger of the two ratings was thought to be the fact that other ratings rely on services provided by DPs. RMs were seen only as one of many users of the DPs services and if merged, the services provided to other

users would suffer. Basic philosophical differences were presented as barriers as well. Radiomen, they felt, are primarily operators involved with the transfer of information and data between sites. DPs on the other hand are more concerned with the manipulation and management of the data or information involved. [Ref. 52]

In general, the DPs interviewed strongly felt that they were capable of learning and taking on the responsibilities and tasks of the Radioman rating and felt it important to continually incorporate more telecommunications within their rating. As for merging the rating they were somewhat skeptical. In their experience, Radiomen lacked the necessary background to take on some of the aspects of the DP rating and therefore would face a difficult time in coming up to speed in a merged rating. [Ref. 52]

4. RM "A" School

The director of the "A" school, as well as an instructor were interviewed: the director was a senior chief with over 20 years service, and the instructor was a chief who had been selected for commissioning in the officer ranks. They presented differing views in that the RMCS was skeptical that a change could be made and the RMC was certain that a change was inevitable. The RMC went on to add that he felt any student entering RM "A" school was capable of learning any of the DP tasks, should a merger of the two ratings take place. The biggest challenge facing the school was a drawdown in the total numbers of students attending, thus requiring the downsizing of the entire operation. The RMCS was most concerned that the "A" school curriculum was under review with pressure to shorten the length of the school and remove portions of the curriculum currently being taught. He agreed that some of the subjects concerned older technology,

but felt strongly that the length of "A" school should remain the same, simply updating the course contents as appropriate. The RMCS felt that many ratings were currently incorporating automated systems and as such, were learning to manage their own databases. Consequently, he advocated leaving the RM rating alone and perhaps subsuming the DP rating among various ratings. He was particularly concerned that a combination of the Navy's initiative to replace many RM billets ashore with civilians, and an infusion of shore-intensive DPs would result in making the RM rating more sea-intensive. The RMC believed that as a result of the concurrent evolution the two ratings were undergoing, a merger of some sort was a reality that needed to be dealt with. However, he cautioned that large scale changes of this nature would have to be managed carefully and completely to be effective and minimize resistance to change. [Ref. 41]

5. NARDAC San Diego

Interviewed at NARDAC, San Diego was a LCDR responsible for the merger of the NARDAC with NAVCOMSTA, San Diego and a DPCM. The LCDR was well-versed in the DP rating and had a basic familiarization with the Radioman community. The DPCM had much the same experience with Radiomen as those individuals at DP "A" school. [Ref. 53]

They echoed much of the sentiment of others; that data processing and telecommunications were merging and that automation was the wave of the future. The LCDR did not see the two communities coming together because she saw RMs as more equipment and hands-on oriented and felt that the only successful way of effecting such

a merger would be to commence creation of a whole new community beginning with new recruits.

The DPCM saw the merger of the two ratings as a natural progression and that the only real opposition to a merger would be born out of the fear of the unknown. [Ref. 53] He provided numerous examples of where DPs are already filling roles close to those traditional communications tasks filled by RMs. Fleet High Level Terminal (FHLT) sites, remote WWMCCS locations, and the White House Communications Unit were all offered as examples of commands where the line drawn between RM and DP tasks was blurring. At these sites, and many others like them, DPs are already executing much the same telecommunications-related duties normally performed by Radiomen. Patching radio circuits, tuning transmitters and receivers, troubleshooting, and even "butterflying" paper tape were all becoming a part of the DP's required duties at such commands. [Ref. 53]

The DPCM pointed out that as the Navy moves toward a paperless organization, there isn't anything done by either rating which couldn't be taught to the other. Even the more manual, manpower intensive requirements of the Radioman rating, i.e., antenna maintenance, was not seen to be a problem. Any DP who serves afloat already must perform routine maintenance outside his specialty and as such could handle the added maintenance requirements of the RM rating previously mentioned. [Ref.53]

6. NAVCOMSTA San Diego

Two of the individuals interviewed at this site had unique insight into the issue of a potential RM/DP merger in that they each had experience in both the telecommunications and data processing disciplines. As mentioned previously, the DP1

had been an RM for eight years. The Lieutenant had previously been an enlisted Radioman and was pursuing a master's degree in the computer science field. [Ref. 59]

When considering a merger, they felt that there were too many tasks unique to each rating to consider a complete merger at this time. However, they recognized a convergent evolution and felt that eventually the two rates would become similar enough to consider a merger. They had confidence in the ability of each rate to learn the tasks of the other. While they felt the only real difference in individuals of both ratings was the training they received, they did acknowledge that the Navy's selection standards for RMs would need to be raised. It was pointed out that in the very near future the Navy would require smarter RMs regardless of an RM/DP merger decision. Additionally, one change they felt must occur was the incorporation of more computer basics into RM "A" school. They felt one significant handicap in the TELCOM/ADP discipline was a rapidly growing technology and the Navy's slow response in the corresponding training of personnel. And despite new systems requiring new skills, there would still be a requirement for many manual systems thus effectively increasing the pool of skills necessary instead of decreasing them. [Ref. 59]

Their concerns regarding the merger, considering it was not a question of if, but when, it occurred, were twofold. First, they felt resistance to change would be a large barrier, particularly among the more senior personnel of both ratings. It was their opinion that many people did not see the broad picture and were unaware of the changes which would eventually be required. Secondly, they felt another obstacle was the administrative coordination of a merger. Recognizing the complexity of such a change, they feared that

the continuing needs of those already in each rate would be overlooked in the surge of enthusiasm surrounding a decision to merge RMs and DPs. [Ref. 59]

A strategy was suggested which would create a new rating, for at least the near future, in which the current ratings become branches within the new rating. This scheme is analogous to the current configuration of Cryptological Technician in which there are separate subdivisions of the rating for Administration, Operator, Interpreter, and others. In an "Information Management Specialist" rating there would be a Communications branch and an ADP branch. By partially combining the "A" schools to teach common topics, yet still retaining some uniqueness, a spirit of acceptance would be generated and resistance lessened. Over time, as technology and attitudes changed, the division could be de-emphasized and a complete merger phased in. [Ref. 59]

VI. CONCLUSIONS AND RECOMMENDATIONS

A. INTRODUCTION

Most discussions of change have an underlying theme: you must know where you are, envision where you want to be, and determine a strategy to accomplish the transition [Ref. 10:pp. vii-ix, Ref. 17:p. 655, Ref. 18:p. 72]. In previous chapters, information was presented which forms a foundation essential to fully appreciate the scope and far-reaching ramifications of a decision to merge RMs and DPs, and defines where the ratings are today. This final chapter will begin with a look at the future of telecommunications/data processing and the U. S. Navy TELCOM/ADP enlisted ratings as they are currently structured. By attempting to define the environment and the changes yet to come for the ratings, the stage is set for addressing the question of the merger. The section succeeding that will define various merger strategies brought to light during the research for this study, as well as representative advantages and disadvantages of each. Presented next will be a section which contains the authors' recommendations concerning a merger decision and a potential strategy. The concluding section will summarize the study and offer suggestions for future research.

B. LOOKING TO THE FUTURE

It is important to recognize that any consideration of the merger of the RM and DP ratings will occur in the future, and in this regard, task statements generated and

appropriate in the past will not necessarily be applicable to the ratings as they evolve with technology in the coming decades. Certainly the trend toward increasing utilization of computers and automated systems will continue. Accordingly, the telecommunications discipline will see the continued incorporation of computers and automation into procedures which were originally all manual. RMs of the future will have to be more familiar with micro- and mini-computers; indeed, such equipment is already becoming an integral part of many existing communications suites. Similarly, DPs of the future will find themselves more and more involved with the transmission of data. They will have to become more familiar with the intricacies of communications methods.

It is conceivable that message processing may be delegated to the ADP division of the future, while Radiomen concentrate on establishing the circuits, links, and paths along which communications will occur. Many communications systems, or portions thereof, will become automated in the sense that they are operated via a terminal or elaborate keyboard layout, but will not fall within the realm of automatic data processing. It is also possible to imagine an information management division of the future responsible for all phases of data generation, transmission and management. In such a scenario, it is not hard to imagine RMs and DPs working side by side in interchangeable roles, possibly as part of a new, merged rating.

Predictions of the future can only project so far before becoming purely speculative. In the foreseeable future, the gap between telecommunications, or data transmission, and data processing will close. This will certainly create a pool of tasks which are common to both the RM and DP rates. At the same time there will exist a need for those skills

unique to each rating. The definitive standard in formulating a recommended course of action is the needs of the organization. RADM R. G. Jones, then OP-13 and the chairman of the NEOCS (Navy Enlisted Occupational Classification System) board probably put it best when he said:

...the ultimate criteria of efficient manpower, personnel and training (is) the right person in the right place at the right time with the proper motivation to accomplish the mission at the least cost. [Ref. 60]

1. TELCOM/ADP

Two of the driving forces of change are the presence of transformational leadership and the gathering of resources necessary to effect change [Ref. 19:pp. 68-70]. Clearly, VADM J. O. Tuttle embodies such a leadership force. The consolidation of Telecommunications and Data Processing disciplines created the force of resources to carry out the changes he envisions. However, the external enabling conditions will work against the implementation of some of the changes since there is not a high degree of tolerance for change, and an RM/DP merger would be considered highly radical by many of the RMs and DPs affected. Pressure for change could be felt through precipitating conditions such as the tendency to decline--a result of decreasing budgets, and changes in shared beliefs--if the idea of an RM/DP merger becomes popular and gains "grass roots" momentum. One must keep in mind that in an authoritarian organization such as the U. S. Navy, change can be implemented in the face of opposition merely by issuing an order to do so.

Nevertheless, the merging of the telecommunications and automatic data processing disciplines in the U. S. Navy heralds a new age for those enlisted personnel charged with carrying out their duties and tasks within the new environment. It is expected that the trend already set in motion to consolidate Navy telecommunications and automatic data processing facilities ashore will continue insofar as budget constraints allow. The partial consolidations, similar to the configuration of separate facilities remaining after the NARDAC/COMSTA San Diego merger will hinder an RM/DP merger. This continued separation will leave confusion and doubts in the minds of DPs and RMs and will foster continued segregation, inhibiting an exchange of experiences and information between personnel of the two ratings. In addition, it will be some time before substantial changes can be made aboard ships. Although new equipment can be installed easily, overall space configurations cannot be readily altered. The authors believe it will be possible in the near future to begin assimilating DPs into comm shacks of combatants afloat, but due to the nature of communications in the sea-going environment, it will be several years before DPs can become fully integrated.

Technology is also expected to bring the fields closer together. Recently, an announcement was made of a DoD contract awarded to develop an automated message handling system to help manage the information contained within a large volume of messages. [Ref. 61] Such a system will be a significant milestone in creating an overlap of the RMs' message management tasks with the data base management tasks of a DP.

2. Radioman Rating

The Radioman rating stands today with a rich history behind it and an exciting future before it. Growing from humble beginnings in the witnessing of tests with experimental radios, RMs have become a cadre of professional communicators who ensure the essential contact between the widespread and remote units of the U. S. Navy takes place. Thousands of RMs currently serve in a wide variety of billets performing hundreds of tasks aboard all ship types and at many shore commands, both in the United States and overseas.

Technology provided rapid evolution within the rating during the early years of telecommunications development. Although breakthroughs have not been as spectacular since then, technology has not stagnated. The growth of communications systems and methods continues to bring changes in the form of new equipment and procedures. RMs can now effect point-to-point communications with previously unheard of speed, reliability, and security. Additionally, RMs will benefit from advances in the data processing field which will enable them to automate large portions of the tedious procedures of message processing, storage, and retrieval. The complexity of modern telecommunications reaffirms the need for those professionals who ensure the lifelines of communications are not broken.

3. Data Processing Technician Rating

Data processing is a relatively new occupational field, tracing its beginnings back to the early days of the computer age in the early 1960's. The DP rate, a small group of professional data managers, have enjoyed ever expanding horizons following the

rapid technological evolution of the field. In today's society, and in the U. S. Navy as well, there are many people adept at data processing--a result of their own interests and the increasing role of stand alone computers in many daily tasks. All specialists serve an important role by amassing knowledge and skill in a specific application; DPs will continue to provide a necessary role as those professionals dedicated to data management.

As more computers and automated systems are incorporated aboard all naval combatants afloat, the need for someone with expertise in programming and database management will grow as well, creating an increasing role for DPs in the Navy of the future. It is an oft-lamented phenomenon that time saving devices such as word processors and computers create a block of time that is quickly filled by other demands of the job. Thus it will be even more imperative that an expert such as a Data Processing Technician be available to lend assistance with the management of the administrative offices of the future.

C. COMMUNITY MANAGEMENT

It is clear that change will continue to affect both the RM and DP communities and technology will play a significant role in defining many of the changes. Many changes will occur within the communities regardless of whether the ultimate decision is favorable to a merger of the two ratings or not. Throughout this study, many such issues became apparent which should be considered by those responsible for the community management of RMs and DPs in the coming months and years. Some of these concerns and issues are presented in the following sections.

1. Training

Training is a critical component of any occupation. The quality of early training is especially vital in providing a solid foundation for those new to the occupation. The Instructional Systems Development (ISD) discussed in Chapter II stresses the need for an educational training program to be based on an assessment of the job tasks to be performed. It will be imperative in the future of the RM and DP ratings to hold frequent NOTAP reviews and use the data gathered to assess the appropriateness of the "A" schools' curricula. This will be difficult in an environment of shrinking budgets and shifting priorities, but the long term dividends realized in the skill level of RMs and DPs will be well worth fighting for the necessary dollars. The "A" school curricula for both ratings could benefit immediately from a recognition of the growing overlap of the tasks of the two ratings and a corresponding adjustment to current curricula. DPs need a basic understanding of telecommunications and RMs need to understand data processing. The "A" schools could join forces to present joint lectures or training on the very topic of similarities and overlapping duties. By introducing young recruits to the notion of evolutionary change, resistance to that change will be greatly reduced or eliminated entirely. Such a venture would also serve to reduce the "us against them" syndrome so apparent during the course of research for this study.

2. Typing Skills

Currently, students in RM "A" school are required to type at 800 functions in five minutes (approximately 30 WPM) to graduate while DP students are not required to attain the any specified skill level to graduate. But trends indicate a general lowering of

the RM standards which is alarming to several sources consulted during research for this study. Additionally, incorporation of a DP typing requirement is not in the foreseeable future [Refs. 4, 14, 41, 53 and 57]. Typing is an essential skill, although it is often considered not glamorous or even "sissy" by young men. Regardless of the prevailing attitude, typing skills will continue to be necessary in both ratings. As standard teletype machines with manual keyboards are replaced by new computerized versions with enhanced keyboards, the need for a person to enter a message using typing skills will not change. A slow and inaccurate typist will waste too many valuable manhours in entry, proofreading, and correction. Battle commanders and operational tacticians can ill afford a message which contains typographical errors and thereby possibly conveying inaccuracies. Operational units need "A" school graduates who can become fully functional in the communications suite, not one who must be shunted aside to acquire typing proficiency not mastered previously. Just as inappropriate is the time wasted by a programmer who takes twice as long to produce a program because of a lack of efficient typing skills. Typing is a skill which is easily mastered with appropriate training and practice, and attention must be turned to ensuring both "A" schools are graduating students with the requisite typing skills.

3. Cross Training

It was not surprising to the authors that many of the interviewees were not aware of the TELCOM/ADP merger and had never considered the potential for an RM/DP merger. Pressures are great and commitments are many in every command and it is very easy to lose a sense of the "big picture" as one strives to meet all the demands

of any one division or job. But it is essential as more information becomes available to keep individuals throughout the ranks of both ratings aware of changes and developments as they are planned and occur. All personnel will benefit by the dissemination of information such as the superordinate goals envisioned for the telecommunications/data processing discipline. This could be accomplished by an all-hands newsletter or similar publication originated by NCTC. A feature which would be beneficial in generating the sense of ownership so vital to successfully implementing change, would be to include a "Letters to the Editor" or "Suggestion Corner" section. In this manner, the technique of participation and involvement can be used to help manage resistance [Ref. 23:p. 106-114]. People are naturally wary of changes they don't understand; a newsletter or small scale trade journal could serve as a point of reference for changes within the discipline and NCTC claimancy. To be most effective the newsletter must be widely available and easily understandable when explaining technical material. NCTC has published a quarterly newsletter in the past, but during the echelon II merger, publication was temporarily suspended.

4. Rating Requirements

As technology grows and the population of 18-21 year-olds shrinks, recruiting qualified individuals will become a difficult task. Many rates will remain essentially unchanged for many years to come; their task inventories will continue to consist of largely manual labor. There will always be a need for those persons who aren't as mentally gifted but who have strong bodies and an appreciation for a job done well. Standards will have to be adjusted for many ratings, however, to reflect a genuine need

for those more capable of greater abstract thinking. In the past, the Radioman rating could afford to have a mix of individuals with differing ASVAB scores and mental group categories. This may not be the case in years to come. As more and more changes are made in communications methods and equipment, there will be a need to have more Radiomen capable of comprehending the increasing complexity they will be faced with. To what degree these standards must be raised can be debated. Perhaps no changes are necessary in the immediate future, but the issue remains germane and must be monitored to ensure RMs have the capability to respond in every situation they are faced with.

5. Career Path Enhancement

Every effort must be made to continue the trend of providing billets aboard combatant ships for DPs. As new equipment is installed, it will be imperative to add the services of a professional data manager. If a program were established to exchange one DP billet ashore for one RM billet aboard every ship, both rates would benefit. DPs would expand their horizons by gaining the seagoing experience and learning real-time telecommunications, and RMs would gain shore billets and learn more of the data processing discipline. As each member serves a tour in the "other" rating's environment, experiences will be shared and serve to reduce the current level of unfamiliarity each rating has for the other. Additionally, such a program could serve as an on-going reinforcement of overlapping skills and foster growth through learning new skills. The benefits of such a program can be attested to by those DPs interviewed who have served in communications-intensive billets at WWMCCS and FHLT sites [Ref. 53 and 59]. These individuals displayed a much greater appreciation for the converging roles of data

processing and telecommunications than any of the interviewees who did not have such experiences in their backgrounds.

6. Civilian Substitution

There has been a program within the Navy for some time which seeks to identify those ratings and tasks which could be more cost effectively replaced by civilian workers. At many facilities, the ratio of civilians to enlisted personnel has risen. Data processing facilities and communications sites have both been affected by this program. For instance, at NARDAC San Diego, there are 247 government service employees and 36 military personnel [Ref. 62]. The reasons for this gradual replacement are many, the most significant of which is cost considerations. Often a civilian worker is less expensive in terms of wages, fringe benefits, PCS costs, and training than a military member. This occurs at shore facilities for obvious reasons and serves to tip the sea/shore rotation unfavorably for the enlisted members of a rating. Eventually, numbers of the rating decline, reflecting the decreased need for total rating end strength. This program will continue to affect both the RM and DP ratings in the future. Community managers must remain aware of the detrimental effects on each community and seek to offset those problems as they occur.

D. TO MERGE OR NOT TO MERGE

The advantages and disadvantages of merging the Radioman and Data Processing Technician ratings are varied and many. The common problems and benefits to a merger, regardless of how that merger might be implemented, are enumerated here.

1. Technology

The technologies of the two communities are slowly but inevitably coming together. In recognition of this, the U. S. Navy has placed the commands responsible for communications and ADP under one central figure. The officer community involved in both disciplines is undergoing a merger as evidenced by the telecommunications and computer curricula at the Naval Postgraduate School becoming one. Individuals graduating from this new curriculum shall be assignable to both telecommunications and ADP billets. It would make sense for the enlisted community in each discipline to follow suit and merge.

Unfortunately, however, the situation for the enlisted community is not that clear cut. The updates to equipment and procedures employed by these personnel are not keeping pace with those changes being felt in the management of the two communities. This fact necessitates caution in implementing a merger of the enlisted communities.

2. Quality of Recruit

Members of both communities consider the other unable to assimilate the skills and knowledge necessary to function within the other's discipline. [Ref. 41, 50-54] A DP would not execute the more manual functions of a Radioman while an RM could not acquire the requisite knowledge to execute the more cerebral functions of a Data Processing Technician. These are overly simplified and parochial statements, and there is no evidence to suggest that DPs would not perform well at manual tasks traditionally executed by RMs. Likewise, Radioman may comprehend and absorb DP skills quicker and easier than some would give them credit. Given the proper instruction and adequate

forethought in developing the curriculum to bring both communities in line with the other, a happy median might be achieved. In any event, there will be a period of adjustment to allow those in both ratings to acquire an adequate degree of functional literacy and familiarity.

3. Cost Savings

Streamlining the two communities by merging them should be advantageous to a shrinking Navy. While not creating a generalist, the merger would provide a more multifaceted individual capable of executing more tasks than his predecessors. A corresponding cost savings would be realized through a total reduction in the number of personnel in uniform and the increased versatility of those in the merged rating. The continued move toward replacing military members with less expensive civilians, coupled with eliminating redundant billets previously filled by an RM and a DP at some merging commands will further serve to provide savings.

There will be considerable costs incurred however. Costs associated with implementing a merger would include:

- Updating rating exams and rate training manuals
- Revising Occupational Standards
- Increasing training for exposing the ratings to each other
- Restructuring NECs for both ratings
- Revising non rate-related documents which include general information about the ratings (e.g., NEC Manual)
- Incurring additional PCS and TAD costs

This list is not intended to be inclusive. These costs are difficult to quantify but the assumption may be made that the long term savings in efficiency will outweigh the up front costs.

4. Distribution Considerations

Females comprise a large percentage of the DP rating and the RM rating currently has more females than the stated allowance. A merger could result in an adverse impact on the current sea/shore rotation for the males in both ratings. The repercussions of the sudden availability of women due to the influx of DP females to fill sea and shore billets alike may be mitigated through continued efforts to open more sea billets to women. The other side of this situation however would result in greater sea service opportunities for those individuals, both male and female, currently in the DP rating.

A rating merger would provide the community detailers with a much more versatile individual, capable of being sent to fill a wider range of billets and assignments. Although the detailers would have a greater body of personnel to draw from, detailing would presumably continue to be affected by NEC, previous commands, and experiences. The commands at which these individuals serve also benefit from the increased versatility provided by personnel in the new rating.

A related issue is the advancement potential of the personnel within the merged ratings. Both ratings currently promote at or near the norms for the U.S. Navy as a whole. [Ref. 47] One would expect that with an increase in the quality and versatility of the individual, his or her advancement opportunity could only rise.

5. Impact on the Naval Reserve

The general effects on the Reserve side of the house would be generally the same as those impacting the active side. However, drilling reservists tend to be faced with equipment even more outdated than the active sailors must contend with. Reservists would tend to keep the traditional roles much longer. They also don't have the money for the training we are advocating to ease the transition. Additionally, they lack the managerial expertise in the units and no community manager to "mother hen" the changes. On the other hand, you can't divorce the two halves of the one Navy concept. Like everything else it would be difficult and painful, but would happen with a cheery "aye-aye."

6. Resistance to change

The nature of such a merger could cause many people to conclude that it shouldn't be attempted because the magnitude of the change is too great. The time, effort, and costs involved will be considerable but if one believes that ADP and telecommunications are merging, then it follows that the two ratings will eventually merge as well. Therefore, the merger process, as painful as it appears, will be encountered eventually.

There would undoubtedly be considerable resistance and resentment toward implementing such a merger. Traditionalism and fear of the unknown will play a role for those currently in either rating when resisting the move toward a merger. This is an inappropriate reason for opposing such a merger. It is a disadvantage that requires serious

consideration but if the merger is addressed properly, some or all opposition may be overcome. Strategies and methods for overcoming resistance are presented in section E.

7. Precedent

Precedent does exist which establishes the pattern for merging two or more similar ratings into one. The advantage this lends is that merging the RM and DP ratings would not be a first case. The experiences, failures, and successes of other mergers may be drawn upon to assist in the success of planning and completing an RM/DP merger.

Recently, the aviation personnel planners within the U. S. Navy considered a merger involving three enlisted ratings. The three communities of aviation electronics technicians (ATs), aviation fire control technicians (AQs), and aviation antisubmarine warfare technicians (AXs) were initially considered for consolidation into two ratings. The original proposal was later adjusted to have the three merge in one based on the reconsideration of factors such as a decrease in the Navy's size and inequities in the original idea. [Ref. 63:p. 42]

This merger has been greeted with both enthusiasm and skepticism. There are those fearful that the new merged rating personnel will be more of a generalists and of less worth to their assigned command. On the other hand, many sight the increased options open to those within the ratings and an increased versatility and competitiveness for advancement. [Ref. 63:p. 42]

A different kind of merger was effected by the Fire Control Technician rating during the early to mid 1980's. At that time, Fire Control Technicians (FTG and FTM) were classified by the primary system for which they were responsible. For example, an

FTG was responsible for the fire control system associated with guns while FTMs operated and maintained the various systems connected with a ship's missile fire control. For purposes of efficiency the two were combined into one rating, the FC rating. Individuals who in the past only worked with guns were still detailed to work those systems and were identified by acquired NECs. Individuals throughout the FC rating however have a fundamental understanding of the underlying basic principles and tenants of the ballistics of projectiles, computers controlling these weapons, radar systems and other matters common to the rating.

These two cases are meant to be illustrative of the potential for merging personnel within similar (FTGs and FTMs) or relatively more diverse ratings (ATs, AQs and AXs). The precedent exists and, while it does not necessarily support a RM/DP merger it does show that such a merger is within the realm of possibilities.

E. MERGER STRATEGIES

There exist numerous ways to effectively implement a merger of two enlisted communities. This section shall list some of the various methods available and offer the pros and cons of each. Figure 7 provides a brief listing and description of all methods which will be explained in this section.

1. Merge at E-7/8/9 Level

This option would involve waiting until the personnel in the ratings achieve chief petty officer (E-7) before merging the two into one. Both ratings would continue

<u>Merge Strategies</u>	<u>Description</u>
1. Merge at E-7/8/9 level.	As DP and RM personnel are advanced to Chief Petty Officer they will be placed in the new merged rating.
2. Merge at recruit level and split out at E-5 point.	As new personnel join the Navy destined for the RM or DP rating they will be placed in a common rating until they are preparing for advancement to E-5. Then they will split out from the common rating to the RM/DP rating.
3. Merge at recruit level with no split out at any point.	New accessions will be assigned to the new rating where they will remain for their enlistment.
4. Merge ashore but not afloat.	The RM and DP ratings serving afloat would not be affected by a merge of any sort. Those personnel ashore (both RM and DP) would be merged into a common rating.
5. Merge all personnel at the same time.	This option will establish a date for all personnel in both ratings (at all levels) to merge into one rating.
6. Merge all personnel when requisite knowledge of the new rating is acquired.	Unlike strategy five, this will permit the gradual phase-in of the new rating and avoid the shock which lack of training and exposure would cause.

Figure 7 Merge Strategies

as at present but at advancement to the E-7 level, would be redesignated in a new rating and become responsible for the duties and responsibilities associated with both ratings.

The primary disadvantage to this option is that it does not ensure that personnel in one rating are adequately prepared for taking on the supervision of personnel in both ratings. Chief petty officers in the merged rating would find themselves supervising a group of personnel in the opposite rating from which they have spent their careers. In this case, he or she is ill-prepared to deal with the technical questions which will undoubtedly arise on a day to day basis. The degree to which these personnel feel equipped to handle their new responsibilities will largely determine the intensity of their resistance to a merger implemented in this fashion. Additionally, chief petty officers have made the Navy a career and as such are more traditional and may be resistant to change. Considerable effort would be required to determine these pockets of resistance and work to overcome their hesitancy.

The requirements demanded of a chief petty officer however, are such that he or she must not only be a manager, supervisor and leader but a pre-eminent technician. If all else fails, the chief petty officer will know the solution to the problem or be aware of the proper steps to take. This is a time-honored reliance that junior personnel attribute to those in each rating clad in khaki.

On the other hand, the chief petty officer in charge of a combined telecommunications and ADP division will have little difficulty in dealing with the personal and problems of a general nature arising from those personnel within the division. He or she will have spent a career familiarizing themselves with the basic and

fundamental aspects of routine operations within the U. S. Navy. This advantage is inherent in the management and supervisory skills attained by personnel with many years of experience.

A secondary advantage may be found, in this option being the first step in a multi-step process to merge all in the rating at a future date. Merging at the top levels first and then, when the disciplines converge with time, more junior personnel may be merged into a common rating. The ultimate goal then would be to enlist the aid of the more senior personnel in easing the two communities together over an extended period of time.

2. Merge at Recruit Level with E-5 Split

With this option, all personnel responsible for ADP and telecommunications would receive common training via a common "A" school as future members of one rating. Prior to advancement to petty officer second class (E-5), the individuals in the common rating would be permitted to express their desires as to which discipline, telecommunications or ADP, they would like to remain with. Coupled with the needs of the U. S. Navy, they would be assigned from the common rating to either the Radioman or Data Processing Rating. Under this proposal, those individuals which have already attained the rank of E-5 or above will be unaffected.

This scheme precludes the need for specialized and indepth training for individuals destined for both ratings. It facilitates the growth of a petty officer who is more of a generalist experienced in both telecommunications and data processing and not a specialist in one to the exclusion of the other. However, the primary drawback is that

at the E-5 point, supervisory skills are becoming more expected and a "generalist" may have a difficult time adjusting to this new role and the narrowing of the focus of his or her rating. This reservation is similar to the potential problem experienced by the chief petty officer placed in charge of a division which deals in areas he or she is unfamiliar with. An additional disadvantage is the difficulty of exposing the individuals to enough of the basics of the disciplines to ensure a proper selection is made. There will also be disgruntled individuals who don't get what they want; they must be dealt with.

Departing the role of "generalist" at the E-5 level may not be such a bad idea. It is important for those individuals in their first enlistment (first four or five years of service) to become familiar and proficient with the requirements of both telecommunications and ADP which may serve to place them in a stronger position to assume supervisory responsibilities. As such, once exposed to and experienced in the prerequisites of both disciplines, they will be ready to assume the responsibility for supervising younger personnel. Additionally, they will be prepared to dedicate their efforts to the refinement of knowledge in one particular area such as communications, data base management, programming, etc.

The primary advantage of such an approach is that the best candidate from among more than 20,000 is available for both ADP and telecommunications. This provides the best qualified and most motivated individual for the position. Additionally, all individuals will be more adept at discerning how communications and data processing fit together. The common background will certainly serve as beneficial in an information management environment.

3. Merge at Recruit Level with no Split

At a specified implementation date, all new recruits destined to become Radioman or Data Processing Technicians will attend the same "A" school and will be members of the same rating from enlistment forward. Personnel already in the two separate ratings would be unaffected.

A disadvantage would emerge as new recruits arrive at their first command, and are unavoidably singled out as something different even within their own division. Resentment and indignation toward these new personnel from the older sailors may run high. Unless accepted and encouraged to flourish, the new personnel may stagnate and become disenchanted with the promises they heard about the new automated, progressive Navy in "A" school.

This option would require many years to complete and does not address adequately those individuals which may be capable of joining the ranks of the new rating. There are many in both ratings who have had considerable exposure to ADP and telecommunications and could very well thrive in the new rating.

The advantage of such a cautious move would be that no personnel would be placed in a position requiring knowledge or skills which they have not acquired. Current RMs and DPs would only be detailed to billets appropriate to their rating. Personnel trained in the new rating would be eligible for billets in either discipline.

Gradually increasing the percentage of the new personnel would also provide the U.S. Navy adequate time to update manuals, examinations and other similar time consuming projects. A total restructuring of the two rates would also be avoided.

4. Merge Ashore Only

Due to the sea-intensity of the RM rating, a merger of the two ratings could be affected for personnel responsible for telecommunications and data processing ashore while communications afloat would be designated for an afloat Radioman sub-rating.

This option stems from the slow incorporation of automated telecommunications systems afloat and the paucity of duty assignments for DPs onboard naval ships. It is recognized that automation is increasing and additional afloat billets are being sought for members of the Data Processing Technician rating. The confusion caused by a merger of the two communities all at once would be considerable and potentially debilitating. In real life, such a move could very well fall into the "too hard" category.

The obvious problem with such a proposal is that those afloat radiomen will have no billets ashore to which they may be assigned. Additionally, those members of the new merged rating would become more shore-intensive and lose out on the advantages derived from exposure to both sea and shore environments. This alternative instills an unnatural barrier between those ashore and afloat by acknowledging that the individuals left to serve afloat will eventually be replaced as well as soon as their obsolete and antiquated equipment is replaced with the newer systems already in place ashore. The undercurrent here is that those individuals currently serving in positions ashore will inherit the positions both ashore and afloat in the future. The resentment and disharmony caused would be untenable.

Taken as only one step of a larger process to one day merge all members of both ratings, this option does exhibit merit. It recognizes the shortcomings of communications afloat and makes allowances for the lack of automation. At the same time it prepares the U. S. Navy for the day when the afloat commands will have the automation in telecommunications which will require an individual well versed in both communications and data processing.

5. Merge All at Once

Merging the two communities all at once incorporates the tenants of option three with the requirement for all current members of both ratings to instantly become members of the new merged rating. This option has the Radioman and Data Processing Technician ratings ceasing to exist at the precise moment the new rating comes into being.

The ability to implement the merger all at once will provide the advantage of getting the program started without hesitation and provide those responsible for the implementation and those affected less time to resist. This may sound somewhat radical but resistance to an appropriate change may be overcome by executing the reorganization quickly and then working to smooth out the details and problems as they arise. If the individuals affected by the change are provided the proper incentives, they may get onboard with the restructuring early and may even provide invaluable assistance in making it work.

The administrative difficulties associated with a partial or phased merger may also be avoided. Putting the various predetermined mechanisms in motion to affect the

transformation all at once would prevent the requirement to track individuals at various stages of a merger. The military personnel system should be able to absorb the change easier i.e., no new procedures and programs would have to be instituted.

The required restructuring of those supporting elements of both ratings would necessitate considerable time, effort, and money to achieve. All vehicles currently in place to train, organize, categorize, and track individuals in both ratings would have to be revamped virtually overnight. Sorting out the diverse levels of experience and exposure to telecommunications and ADP would require a dedicated screening process to determine the ability to assign personnel from both ratings to positions requiring expertise in varying proportions.

As personnel are reassigned, the commands receiving these new personnel would undoubtedly be uncertain of their experience levels and may have to invest considerable effort in bringing these personnel up to speed to become productive members. In this light, this option does not adequately address those individuals already serving as RMs and DPs. The re-training and education required for these individuals would be enormous, difficult, and conceivably cost prohibitive.

The resistance to such a move would probably be considerable. Traditionalism, uncertainty, and allegiance to one's former rating would cause many to resist such a frontal assault. The major impediment would be the realization by members of both ratings how woefully inadequate they are in the other discipline. The reality of potential assignment to a billet that they are not prepared for would cause many to view this as an unacceptable option. For this to be a viable option, considerable upfront

training and detailer sensitivity would need to be executed. This would be the next major obstacle to be overcome. Training and detailer flexibility translates into dollars, something which will not become more abundant in the future. Therefore, a solution to merging all at once must be found while remaining within funding constraints.

The foremost advantage to merging all at once would be the first major step toward dissolution of the parochialism of the two communities. While many will remain loyal to their roots, the inevitability of the merger will soon sink in and they will acquiesce and assimilate into the new rating. The administrative burden could conceivably be reduced quicker than if another option was selected.

6. Gradual Phase In

Gradually converting current members of both ratings to the new rating while training new recruits to the requirements of the merged rating would incorporate some aspects of the previous five options. This option would restructure "A" school to instruct new recruits in the requirements of the new rating while those currently in both ratings would merge into the new rating after they had received the requisite training or had served in billets providing them the necessary skills to adequately perform in telecommunications and ADP.

This option would undoubtedly be an administrative nightmare. Maintaining track of almost 25,000 individuals at various stages of consolidation would require close scrutiny. At a minimum, the current structure of advancement examinations, schools and NEC assignments would need to be totally revamped. This is not a quick and inexpensive process. It would require considerable manpower, money, and time to

execute such a process. In the opinion of the authors, an approach such as this would also not be received well as it does not appear to be a conventional approach to merging a rating. To ensure the U. S. Navy has the best qualified person filling a particular position and preparing for the Navy of tomorrow today, this option has the least impact on individuals in both ratings.

F. RECOMMENDATIONS

Several assumptions must be made concerning the overall topic of an RM/DP merger to precede recommendations. Primary among these is the assumption that technology will continue to put telecommunications and data processing on a path of convergent evolution. Under this assumption, an RM/DP merger becomes an eventuality, not a question. Since the future is somewhat uncertain and the rate of technological advancement nearly impossible to predict, there is likely to be variation on this scenario. In this instance, periods of convergence would be punctuated by periods of plateaus wherein each rating continues to develop internally, but the two come no closer together. We believe this latter scenario is the more likely of the two. Additionally, many physical changes (i.e., the acquisition and installation of new equipment) will occur in fits and starts at the mercy of long term instability in defense budgets.

One must also predict the degree of growth for the DP rating. Communications will remain vital to the Navy, and data processing will play an increasingly important role. However, we foresee that many of the users of ADP services will begin to incorporate those skills and tasks within their own rating. It is not likely that the future will see an

ADP central office or division, manned by DPs, being incorporated in commands afloat as well as ashore. Rather each rating with ADP responsibilities will have their own experts, possibly responsible to one central chief petty officer whose collateral duty is ADP coordinator. This concept would be akin to the current structure of a command's Maintenance and Material Management (3-M) program where a central 3-M coordinator oversees and supervises personnel in all divisions and departments in 3-M matters.

Therefore, we believe that the answer to the question of "Can or should the Navy combine the RM and DP communities, satisfying the future needs of the information systems environment, as well as the tasks and functions currently defined for and unique to these two ratings?" is yes. At the same time, we qualify the affirmative by indicating this is based on the assumption of convergent evolution in the disciplines. There will inevitably be an area of overlap in the tasks of RMs and DPs which will continue to grow and in this regard, we believe there will be a merger. Whether the trend will continue far enough into the future to justify a total melding of the two ratings is not possible to extrapolate.

This, then, begs the question of how to adapt to the changes already here, as well as those yet to come. In this regard, we recommend a phased approach which will be flexible enough to capitalize on changes as they occur and yet avoid premature implementation when change is not warranted. A factor to be considered here is the magnitude of the change and the timelines proposed. Some authors [Ref. 8:p. 296, Ref. 9:p. 129, and Ref. 22:p. 229] cite the need for several years to complete a large scale change. Slowing the pace of change also allows time for information gathering and

adequate planning [Ref. 10:p. 116 and Ref. 21:p.75]. It is with this in mind that we recommend the phased approach to be implemented over a lengthy period.

The first phase should address changes of immediate concern: those which have already occurred, and those which are known will occur within approximately the next five years. While there are already common tasks in each rating inventory, many of these are of a general nature as pointed out in Chapter V. Nevertheless, there is clearly a growing overlap of telecommunications and data processing in general terms which will continue to affect the ratings and their tasks.

During this early period of the change process, it is important to consider those personnel affected directly by the change. After recognizing the RMs and DPs as the obvious primary stakeholders, it will be necessary to identify their perceptions of costs and benefits and work to address those topics specifically. For instance, personnel interviewed in both ratings conveyed a deep sense of pride for their rating and a keen sense of occupational identity [Refs. 41, 52-54, 57 and 59]. This illustrates Van Maanen and Barley's assertion that such occupational identities are central to self esteem and reinforces the idea that this type of resistance is strong and difficult to overcome [Ref. 15:pp. 18-19].

People resist changes they do not understand, therefore concurrent with commencement of the first phase, an awareness campaign using techniques of education and communication must be in place [Ref. 23:pp. 106-114]. This campaign should consist of joint "A" school lectures, an NCTC newsletter, joint RM/DP conferences, and perhaps a mobile NCTC team, composed of leading RMs and DPs, which presents

seminars and lectures fostering awareness of the convergence of the disciplines. As a result of this campaign, inaccurate or false rumors concerning the fate of the ratings and advancement potential would be lessened and the NCTC team could begin to generate the critical sense of ownership necessary to obtain commitment to change [Ref. 26:pp. 143-144 and Ref. 10:pp. 91-92].

Phase One could also be used to establish an NEC for data processing within the RM rating and one for telecommunications within the DP rating. Such a program would establish the basis for cross-assignments of personnel in the two ratings. Personnel would retain their primary rating specialty knowledge, but they would take advantage of the growing overlap of tasks through on-the-job-training, correspondence courses, and/or advanced "C" school training. Personnel awarded these NECs would become available for cross assignment; more RMs could be assigned ashore and more DPs could fill billets at sea--a situation advantageous to both ratings. Prior to the implementation of cross assignment, all billets in both communities must be reviewed. Such a review has already been conducted for the TELCOM/ADP officer community which identified those billets remaining unique to the telecommunications or data processing community, and therefore not altered, and those billets which could be filled by an officer from either sub-specialty. These latter category billets were subsequently recoded to reflect a dual code [Ref. 64]. The review of enlisted RM and DP billets would identify those billets in both communities which could be filled by a member of either rating provided he or she had the required NEC.

Also during this first phase, task inventories must be reviewed annually to monitor the growth of overlap and any resultant changes. Personnel Advancement Requirements, bibliographies, and rating advancement examinations would need to be updated to reflect the most basic overlapping topics. This phase could last a variable amount of time, dependent on changes within the discipline. It is the opinion of the authors that Phase One would encompass the next five to ten years.

Phase Two would commence when task inventories showed a 25 percent or more overlap and the number of cross-assignable personnel approaches 50 percent. This phase would encompass the continuation of Phase One activities along with some additional steps, and is predicated on sustained convergence between the two disciplines.

At this stage of the change process, a merger between the RM and DP communities would appear to be inevitable. Through efforts in Phase One, most objections would be overcome and resistance minimized. Phase Two would intensify these efforts and introduce the creation of a new rating. This new rating may appear very much like the current RM rating, after absorbing the DP rating, or may take on characteristics of both ratings and emerge as a totally new entity. The authors consider it unlikely, given the information and evidence available at present, that the DP community would absorb the RMs.

Once the "new" rating was identified, the process of converting personnel to that rating must begin. The details and specifics of such an evolution are beyond the scope of this study. A decision from higher authority would have to be made declaring a date by which all personnel would convert to the new rating. Approximately one to two years

prior to this date, RM and DP "A" schools should be joined into one. At the same time, the detailing offices would be combined and cross-assignments would become nearly universal for all personnel in both ratings. Phase Two could span two to five years.

Phase Three would begin on the date of mandatory conversion and would be a period of maintenance for the new rating structure. The old ratings would be completely phased out and all personnel of the new rating would continue to grow and advance within the world of information management.

G. SUMMARY

The idea for this study came from an awareness of the U. S. Navy's merger of the telecommunications and data processing disciplines and an interest in how consequences would affect the people of those disciplines and the environments in which they work. Early in 1990, studies were underway to examine the officer community, but the authors were aware of no similar study for the enlisted personnel involved--the Radioman and the Data Processing Technician. It was clear to the authors, considering the creation of Naval Computers and Telecommunications Command, that the disciplines would continue to grow closer within the Navy environment eventually impacting the enlisted personnel. Thus, the central research question was identified and the study commenced in April 1990. At approximately the same time, the topic was brought to light at NCTC and the NODAC study was undertaken. At a meeting in June 1990, subject matter experts determined that the commonality of tasks based on the NODAC study results did not warrant an immediate, full-scale merger of the RM and DP communities. The authors

believe the RM/DP merger question will surface again as the two disciplines continue to grow closer; this study has attempted to provide additional information and insight into the topic which may prove useful during future considerations of the feasibility of an RM/DP merger.

The authors concur with the findings of the June 1990 NCTC meeting that a full RM/DP merger is not justified at the present time. Commonalities do exist in task inventories, but they are of a sufficiently general nature and do not justify a merger. As technology brings advances to the discipline of information management, the pool of tasks common to RMs and DPs will grow. This will create a real need to ensure both ratings are educated to, trained for, and proficient with the changes as they affect each community. A period of gradual adjustment such as this may last for several years, even through the turn of the century. Events beyond that time are difficult to predict, but the authors believe there may come a time which will require the complete blending of the RM and DP ratings. When this change becomes necessary, it must be approached carefully and planned in advance to minimize problems and mistakes.

H. ADDITIONAL STUDY

During the course of this study, topics were identified which could become the focus of additional research. These topics are listed briefly below.

- Should a decision be made to merge the two ratings, a specific study to delineate specific actions of such a change which would be necessary. In this regard, a study of the details and specific actions required to effect the merger will be needed.

- The Data Processing Rating will undergo many changes in the years to come. Some of these may suggest an eventual disestablishment of the rating. A study could be conducted to predict the future of the rating and the opportunities for DPs afloat.
- The merger of telecommunications and data processing is slated to continue down through the echelons of the NCTC claimancy. A specific study could encompass a cost/benefit analysis to determine where consolidations should be made, and where it might be more economical to leave configurations as they are now. In a related study, one could examine how the TELCOM/ADP merger will affect those NCTSs which do not currently fall within the NCTC claimancy.
- Two other enlisted ratings are identified with the TELCOM/ADP discipline: Data Systems Technicians (DSs) and Electronics Technicians (ETs). A study parallel to this one could examine the feasibility of a merger between these two ratings.
- This study could be repeated in approximately five years to assess changes and re-examine the feasibility of an RM/DP merger. This would be particularly indicated if the current decision is not to merge, and no other action is taken on the topic in the interim period.
- The future of information management is difficult to predict, especially in detail, but a study devoted directly to an examination of the future of technology and its application in the Navy, without ties to specific personnel issues, would aid decision makers in the future.

APPENDIX A

IDENTIFICATION OF INTERVIEWEES

<u>Location</u>	<u>Interviewee</u>	<u>Position</u>
NARDAC	LCDR (GURL)	Special Assistant for San Diego merge
	DPCM	Command Master Chief
USS HALSEY	LT(jg) (URL)	Communications Officer
	RMCS	Communications LCPO
	RM1 (2)	Communications LPO and Communications Supervisor
	RM2	Antenna Maintenance PO
USS CAPE COD	DPCS	ADP LCPO
	DP1	ADP LPO
	RM1 (2)	Communications Supervisors
COMSTA	LT (LDO)	Communication Operations and Plans Officer
	RMCS	Communications LCPO
	DP1	Data Base Manager
DP "A" School	DPCS	Director "A"/"C" Schools
	DPC (2)	"A" School Instructors
	DP1	Staff Administration
RM "A" School	RMCS	Director RM "A" School
	RMC (ENS sel)	"A" School Instructor

APPENDIX B

POST WORLD WAR II RATING STRUCTURE

General Service Ratings

USN, Volunteer Reserve on active duty in peace time as ship or station keepers.

Radioman - RM

Teleman - TE

Radarman - RD

Communications Technician - CT

Electronics Technician - ET

Machine Accountant - MA

Sonarman - SO

Aviation Electronicsman - AL

Aviation Electronics Technician - AT

Seaman Apprentice - SA

Airman Apprentice - AA

Seaman Recruit - SR

Emergency Service Ratings

Organized Reserve Volunteer Reserve, Fleet Reserve, Retired USN, and USNR.

Radioman N (Radioman) - RMN
Radioman T (Telegrapher) - RMT

Teleman M (Mailman) - TEM
Teleman L (Communications Clerk) - TEL
Teleman P (Registered Publications Clerk) - TEP
Teleman Q (Cryptographer) - TEQ
Teleman T (Teletypist) - TEL

Radarman - RD

Communications Technician Y (Clerk) - CTY
Communications Technician I (Intercept Radioman) - CTI
Communications Technician S (Special Devices Operator and Technician) - CTS

Electronics Technician - ET

Machine Accountant - MA

Sonarman (General) - SOG
Sonarman H (Harbor Defense Man) - SOH

Aviation Electronicsman - AL

Aviation Electronics Technician - AT

Seaman Apprentice - SA

Seaman Apprentice - AA

Seaman Recruit - SR

NOTE: Exclusive Emergency Service Ratings not applicable to ratings listed.

APPENDIX C

LIST OF ACRONYMS

AD	Destroyer Tender
ADJ	Aviation Machinist's Mate - Jets
ADP	Automated Data Processing
AE	Aviation Electrician's Mate
AFQT	Armed Forces Qualification Test
AQ	Aviation Fire Control Technician
ARM	Aviation Radioman
ASVAB	Armed Services Vocational Aptitude Battery
AT	Aviation Electronics Technician
AZ	Aviation Maintenance Administrationman
Bi	Background Investigation
CAMS	Communications Area Master Station
CG	Guided Missile Cruiser
CMC	Command Master Chief
CMS	Classified Material System
CNET	Chief of Naval Education and Training
COMSTA	Naval Communications Station
CT	Cryptologic Technician
CYN	Communications Yeoman
DCTT	Damage Control Training Team
DoD	Department of Defense
DP	Data Processing Technician
DP1	Data Processing Technician First Class Petty Officer
DP2	Data Processing Technician Second Class Petty Officer
DP3	Data Processing Technician Third Class Petty Officer
DPC	Data Processing Technician Chief Petty Officer
DPCM	Data Processing Technician Master Chief Petty Officer
DPCS	Data Processing Technician Senior Chief Petty Officer
DPS	Data Processing Supervisor
DPSA	Data Processing Technician Seaman Apprentice
DPSN	Data Processing Technician Seaman
DPSR	Data Processing Technician Seaman Recruit
DS	Data Systems Technician

EAM	Electronic Accounting Machine
ENIAC	Electronic Numerical Integrator and Calculator
ENS(sel)	Ensign Select
ESWS	Enlisted Surface Warfare Specialist
ET	Electronics Technician
ETM	Electronics Technician's Mate
FC	Fire Control Technician
FHLT	Force High Level Terminal
GURL	General Unrestricted Line Officer
HRM	Human Resources Management
IC	Interior Communications Electrician
IM	Instrumentman
ISD	Instructional Systems Development
LAN	Local Area Network
LCC	Amphibious Command Ship
LCDR	Lieutenant Commander
LCPO	Leading Chief Petty Officer
LDO	Limited Duty Officer
LPH	Amphibious Assault Ship
LPO	Leading Petty Officer
LT(jg)	Lieutenant (junior grade)
MA	Machine Accountant
MOTU	Mobile Technical Unit
NARDAC	Naval Regional Data Automation Command
NAVAMS	Naval Communications Area Master Station
NAVCOMMSTA	Naval Communications Station
NAVCOMMU	Naval Communications Unit
NAVCOMTELCOM	Naval Computers and Telecommunications Command
NAVDAC	Naval Data Automation Command
NAVEDTRA	Naval Education and Training
NAVTELCOM	Naval Telecommunications Command
NCA	National Command Authority
NCTC	Naval Computers and Telecommunications Command
NCTS	Naval Computers and Telecommunications Station
NEC	Navy Enlisted Classifications
NEOCS	Navy Enlisted Occupational Classification System

NMPC	Navy Military Personnel Command
NODAC	Navy Occupational Development and Analysis Center
NOTAP	Navy Occupational Task Analysis Program
NTCC	Naval Telecommunication Center
NTDS	Naval Tactical Data System
OCCSTDs	Occupational Standards
OD	Organizational Development
OE	Organizational Effectiveness
OJT	On-the-Job Training
OT	Ocean Systems Technician
PCS	Permanent Change of Station
PQS	Personnel Qualification Standard
RADM	Rear Admiral
RM	Radioman
RMC	Radioman Chief Petty Officer
RM1	Radioman First Class Petty Officer
RM2	Radioman Second Class Petty Officer
RM3	Radioman Third Class Petty Officer
RMC	Radioman Chief Petty Officer
RMCM	Radioman Master Chief Petty Officer
RMCS	Radioman Senior Chief Petty Officer
RMSA	Radioman Seaman Apprentice
RMSN	Radioman Seaman
RMSR	Radioman Seaman Recruit
SBI	Special Background Investigation
SCI	Sensitive Compartmented Information
SM	Signalman
SNAP	Shipboard Non-tactical ADP Program
SOM	Sonarman
TELCOM	Telecommunications
URL	Unrestricted Line Officer
USN	United States Navy
USNR	United States Naval Reserve
VADM	Vice Admiral

WAN	Wide Area Network
WAVES	Women Accepted for Voluntary Emergency Service
WIN	WWMCCS Intercomputer Network
WPM	Words Per Minute
WWMCCS	World Wide Military Command and Control System
YN	Yeoman

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