EMPLOYEE COMMUNICATION AT THE NASA LANGLEY RESEARCH CENTER

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ABSTRACT

The purpose of this research effort is to study the vehicles of employee communication employed at the NASA Langley Research Center and to evaluate their effectiveness. The intent is to present and briefly discuss some of the communication vehicles unique to a government scientific research organization and, in addition, to provide NASA management with an understanding of some of the strong and weak aspects of employee communication at the Center.

The history, purpose, and structure of the organization as well as the employee educational background and salary status are discussed. Some of the approaches used by Langley Research Center management in communicating with their men are addressed and compared with recommendations of experts in employee communication. The results of personal interviews involving both employee and management assessment of management-employee communication are presented and evaluated.

Results show that few barriers exist for scientific or technical communication between employees and supervisors and that employees are informed to their satisfaction about normal day-to-day operation of the Center. In addition an effective supervisor-employee communication link exists when dealing with such matters as pay raises, performance, working environment, and other matters of personal concern to the employee.

However, employees need a great deal more recommunication from management providing rationale behind the cancellation of existing projects or the disapproval of proposed research projects. Also NASA management needs to establish a policy and guidelines for the rapid and simultaneous dissemination of all non-restricted information to employees during organizational activities having potential adverse effects on large numbers of personnel. Finally some improvements should be made in employee orientation procedures.

I. INTRODUCTION

Communication Defined

Communication has been defined as "the transmission of intelligence from one person to another...an hour by hour relationship entailing a complex of innuendoes, implications, inferences, and even propaganda."[1] It involves an interchange of opinions and thoughts. Communication may occur whenever two or more people meet, or when someone receives a written communication or telephone call, or when someone listens to the radio or watches television or views a painting or in any way that people make contact. In essence communication is involved in all facets of human relations and consequently good relations depend on adequate communication. From the viewpoint of management, communication is the means by which employees are given the information they need to carry out their assigned duties and the means by which management determines the pulse of the organization.[2]

Need for Good Communication

Good communication has been recognized as the one indispensable element in leadership and organization throughout history. Undoubtedly

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[1] Richard C. Anderson, Management Strategies (New York: McGraw-Hill Book Co., 1968), p. 65.

[2] Stephen Habbe, "Communicating with Employees," National Industrial Board, Studies in Personnel Policy, No. 129, p. 3.

both the chief engineer in charge of building the pyramids, who decided how big the blocks were to be, and the construction manager, in charge of placing them knew the importance of good communication.[3] The builders of the tower of Babel soon realized the effects of inadequate communication.[4]

Many authorities point out that communication is the basis for all organization and stress the need for good communication in modern industry. In our society organizations have increased in size and complexity and been decentralized and sub-divided to the point where the average employee is somewhat confused about where he stands. His social consciousness is becoming more acute. Furthermore, the ever-increasing strength of labor unions and increased government intervention has pushed the employee even farther from management and thus makes it even harder to communicate.[5]

Many modern executives believe that effective communication between employers and employees can greatly increase the workers interest and consequently performance in his job. A manager can weaken an organization by greatly restricting communication. An organization with inadequate internal manager-employee communication is filled with rumors, half-truths, and misinformation.[6] The "rumor mill" or "grapevine" is generally present in any organization and while in general most rumors

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[3]Anderson, p. 65.

[4]Professional Advancement for Engineers Through Communication Techniques (Los Angeles: The Ralph M. Parson, Co., 1968), p. 1.

[5]Habbe, p. 3.

[6]L. L. L. Golden, "Escape from the Grapevine," Saturday Review, Vol. XLVIII (December 11, 1965), p. 79.

are inaccurate, they can adversely affect the attitudes of the employees.[7] The employee must understand what the company is doing and why they are doing it. This can only be done with good communication at and between all levels. Good communication can allow firms to keep in touch with all employees. In this situation communication will flow freely in both directions, business can be carried out smoothly, and a proper operating "climate" will be present.[8]

Uniqueness of Scientific Research Organizations

Communication with employees have often been a source of bewilderment to supervisors in any type of organization be it government, military, or private business. Much has been written on how top managers effectively communicate the policies, objectives, and goals of the organization from level to level until finally reaching the lowest ranking employees. In most organizations the policies, goals and objectives of the organization are set at the top and through various communication links, all employees are, hopefully, informed as to how they are expected to contribute to the overall scheme. In many instances, this communications technique can be compared with how an all-knowing and benign king (manager) can most efficiently and effectively give understandable orders to his partially ignorant but receptive serfs (employees). No situation can be further from this than that which exists in a scientific research organization and particularly a government research laboratory where the usual predominance of corporate profit goals over scientific

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[7] Anderson, p. 68.

[8] Habbe, p. 3.

goals does not exist. In a scientific research organization which is unique in itself, a situation is present where a much closer spread of knowledge exists between manager and the research scientist or engineer. In fact, when considering scientific expertise, the major resource of a scientific organization, the research engineeer oftentimes surpasses or is at least equal with his boss. This not only demands an entirely different approach to the usual set of communication problems encountered in most highly structured organizations but also reverses in many respects the usual path of communication involving specific goals and objectives of the organization. In addition to and possibly because of the lack of a significant manager-employee knowledge gap, the attitude of the technical employee toward management is somewhat unique. Few employees address management with a "hat in hand" attitude and many feel that managers and their function are barely tolerable nuisances.

The uniqueness of the manager-employee relationship existing at a scientific research organization suggested the research topic presented in this paper. The purpose of the research effort was to briefly study and evaluate employee communication existing in such an organization, in this case a government scientific research center, the National Aeronautics and Space Administration's Langley Research Center. Langley employs about 3900 men and women. On the employee rolls are engineers, scientists, technicians, clerks, secretaries, model makers, administrators, and so forth. However, the scope of the research effort discussed in this paper is confined primarily to those personnel considered to be professional engineers or scientists, currently numbering about 1600 employees. These employees are responsible for the major "product" of the Center which can be simply defined as new scientific or technical

knowledge. Henceforth, the term employee means engineer, scientist, or research engineer. There is little, if any, distinction in the level of work performed by personnel who are labeled (or label themselves) by these terms so they are interchanged without implication throughout this paper.

Although attention is focused in this paper on the NASA Langley Research Center, it is postulated that, although differing in detail, employee communication at other government oriented research organizations would be generally the same. By studying only a government research organization the scope of this paper is not as limited as it would at first appear. Studies have shown that the federal government employs more technically oriented manpower than any other organization in the world. In addition, it is estimated that there are thousands of laboratories spread among 25 different federal agencies and departments.[9]

In addition to reviewing the employee communication vehicles functioning at Langley, this paper will focus on two interesting areas involving communication between managers and employees in scientifically oriented research groups. The first area involves techniques employed by various managers in dealing with common, although not simple, communication problems involving a not so common type of employee, a research scientist or engineer. These techniques are compared with approaches recommended in publications dealing with recent research in employee communication. The second area addresses the effectiveness of employee communication in general and focuses on communication during the stressed filled period preceding a required reduction in personnel at the Center.

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[9]Simon Marcson, "Technical Men in Government," Science and Technology, No. 73 (January 1968), p. 63.

In developing the subject matter of this paper, it was necessary to perform a moderately detailed analysis of the Langley Research Center (LRC) organizational structure, the formal and informal communication media at the center, and the communications methods utilized by various levels of management. Several sources were utilized to obtain the data from which this paper was written. These sources include: (1) interviews with LRC employees and management; (2) a survey of the formal communication vehicles used at LRC; (3) a review of some of the more recent research in employee communication; and (4) results of the author's personal experience and observations as a student employee, research engineer, and manager at the NASA Langley Research Center.

The following chapter (II) presents a breakdown of the organizational structure starting from NASA Headquarters in Washington down to the lowest level of formal organization. Also revealed in this chapter are the broad organizational purposes and histories of the NASA and LRC, and a discussion of the employee educational level and salary structure.

Chapter III focuses on the results of a survey into the various communication vehicles used at LRC. These vehicles are broken down into upward, downward, and lateral communication categories. The status of informal communication is also discussed. Emphasis is placed only on those areas deemed to be at least partially unique to a research organization or to the government.

In Chapter IV the subject matter switches to an in-depth look into communication techniques applied by various managers at LRC in dealing with problems common to all organizations. Such areas as administering employee criticism and discipline and communicating major organizational changes with the employees are considered. Results of

interviews with selected LRC managers are presented. In addition, where possible, these techniques are compared with some of the recent research on employee communication.

Chapter V presents the results of personal interviews with 20 scientists and engineers and six of their supervisors dealing with the effectiveness of management attempts to communicate with the employee. The interviewees were selected to, hopefully, give a good representative sample of the total LRC technical professional population. Considered are upward, downward, lateral, and personal communication and grapevine activity. Also included are employee attitudes toward the quality of communication, both subsequent to a major Center reorganization and during the implementation of a forced reduction in personnel.

Chapter VI evaluates the results of the surveys and interviews dealing with the effectiveness of employee communication at the NASA Langley Research Center. In addition, several recommendations are made.

II. LANGLEY RESEARCH CENTER -- THE ORGANIZATION

Understanding the Organization

In order to adequately approach the many faceted aspects of manager-employee communications in an organization, it is first necessary to consider the general background of that organization. The history, purpose for existence, immediate and future goals, resources for achieving these goals, as well as employee structure, all in some manner influence the attitude of the men and women within the organization. In turn, these attitudes delineate the basis from which the relationships between manager and employees commence.

History

The history of the Langley Research Center goes back to 1917, less than 14 years after the Wright brother's flights, when construction began on the first research laboratory for the National Advisory Committee for Aeronautics (NACA). At this time, the United States, although involved in World War I ranked a poor fifth on the list of world powers possessing functional military aircraft. NACA was created to change this position and the Langley Research Center was chartered to lead the way. The general task of the NACA was

> ...to supervise and direct the scientific study of the problems of flight, with a view to their practical solution, and to determine the problems which should be experimentally attacked, and to discuss their solution and their application to practical questions. In the event of a laboratory

> or laboratories, either in whole or in part, being placed under the direction of the committee, the committee may direct and conduct research and experiment in aeronautics in such laboratory or laboratories[1]

Langley Research Center was named for Samuel Pierpont Langley, the man credited with the first practical demonstration of unmanned flight. During its first 40 years contributions from LRC included: systematic development of airfoil shapes; full scale propeller research; precise definition of airplane handling qualities; engine cooling research; aircraft engine supercharger development; and extensive airfoil refinement.[2]

Until 1940 LRC functioned as the only national laboratory for aeronautical research. It naturally followed that with the intensifying of aeronautical research brought about by World War II, Langley would serve as a seed bed of research personnel and techniques and furnish these resources to other newly formed research centers. These newly formed centers included the Ames Research Center, Moffett Field, California; the Lewis Research Center, Cleveland, Ohio; the Flight Research Center, Edwards, California; and Wallops Station, Wallops Island, Virginia. This group would form the nucleus around which the National Aeronautics and Space Administration would later be formed.[3]

During the period from 1917-1957, LRC functioned as a well-respected research laboratory by being a leader in identifying and solving

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[1] Fifty Years of Aeronautical Research, U.S. Government Printing Office (1968, 0-285-493), Washington, D.C. (1968), pp. 1-2.

[2] "Langley Research Center" from NASA Facts, U.S. Government Printing Office (1968, 0-307-800), Washington, D.C. (1968), p. 2.

[3] Ibid.

numerous complicated aeronautical problems. Except for intermittent periods such as the two world wars, LRC had generally operated under ideal scientific research conditions characterized by a leisurely research pace, low pressure, little external competition, and adequate funding. In 1957, the launching of the first man-made satellite, Sputnik I, shattered the calm existence of the NACA, sprung the space-age on the world, and triggered the explosive growth of space related research projects in this country. The old NACA was neither big enough nor organized well enough to handle a vigorous space program that would enable the United States to regain lost prestige abroad by rapidly outstripping Russian achievements in space. At this time, the scientific merits of research programs were of little consideration to U.S. policy-makers. Congress declared that the general welfare and security of our country require that adequate provision be made for aeronautical and space activities.

Consequently, on July 29, 1958, the National Aeronautics and Space Administration was created through the signing of the National Aeronautics and Space Act (Public Law 85-568) by the president. Forming the nucleus of the NASA would be the Langley Research Center and the other research centers of the old NACA. Today, NASA encompasses 17 research centers and operational stations throughout the United States. LRC, with a staff of around 3500, of whom nearly a third are scientists and engineers and with facilities valued in excess of a third of a billion dollars, serves as one of the most important research centers performing aeronautical and space research.

Organizational Purpose

Studying employee communication within an organization requires visualization and understanding of what functions the organization is trying to perform and the mechanism for performing these functions. Why have a particular group of people been assembled and what purpose are they expected to serve? Is the organizational goal profit oriented with emphasis on market penetration and product expansion as is the case with many of today's dynamic corporations? Or instead, is the organization performing a charitable service with lofty humanitarian objectives and whose major threat is other charities competing for contributions from compassionate doners? Whatever the purpose for existence, all members of an organization should be made aware of and more than superficially understand how they fit into the overall scheme directed toward achieving the organization's goals. A firm understanding of this will enable the creation and maintenance of clear communication channels between employees and management. Each individual employee brings to his job his own mental attitudes, personal motivations, and emotions which are somewhat influenced by his understanding of his organization's purpose for existence.

Hence, to analyze employee communications at LRC, it is necessary to determine its purpose for existence. Officially, the law establishing the National Aeronautics and Space Administration broadly required that NASA "... provide for research into problems of flight within and outside the Earth's atmosphere and for other purposes." These other purposes can be related to first, gaining knowledge in a broad spectrum of scientific fields, second deriving practical benefits for the use and enjoyment of humanity, and third, preserving U.S. prestige

by maintaining the role of the United States as a leader in science and technology. Unofficially, the purposes of NASA projects have been reported as being somewhat reversed by not being chosen primarily for scientific and practical merit but instead have been labeled by a president's (Kennedy) science advisor as creatures of prestige first, military significance second, and science last.[4] An understanding of this by NASA research personnel would help explain some existing communications problems concerning the scientific merit (or lack of it) of current projects.

Broadly, the major areas of responsibility for NASA can be separated into the sometimes overlapping disciplines of aeronautical research and space research. Continuing goals set forth by the Government include: unmanned planetary, as well as lunar, exploration; both development and application of communications and weather satellites; development of launch vehicles and propulsion systems; extended aeronautical research in all speed regimes; expansion of knowledge relating to space and how man can adapt to it; and international cooperation in space research.

The mission of the Langley Research Center has been defined as follows:

> (1) "To expand human knowledge of the phenomena of atmosphere and space.
>
> (2) To improve the performance, safety, and utility of aeronautical and space vehicles.
>
> (3) To develop and operate manned and unmanned spacecraft.

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[4]William S. Beller, "Decision Making in Washington," Space/Aeronautics, Vol. XLVIII, No. 6 (December 1967), p. 89.

> (4) To generate new and advanced concepts for future NASA missions.
>
> (5) To advise and provide research assistance to other branches of the Government including assistance to the Department of Defense in the development of new weapon systems.[5]

Of course, these broad tasks can be further broken down into individual areas such as flutter, dynamic loads, structural response, life-support systems, sonic booms, parachute technology, etc.

Structure of the Organization

All dynamic organizations have periodic shifts in objectives and goals, and the NASA is no exception. Such shifts often result in the realinement of the organizational structure so that, while an organizational chart may be correct for a given instant of time, a week or month later, the chart may not be completely correct. However, with regard to the scope of this paper such changes are unimportant. Although the material presented in this paper is recent and relevant, no attempt has been made to include the most updated organizational charts.

Figure 1[6] shows a recent organizational chart for the entire NASA within which are represented the approximately 30,000 NASA employees. The first two levels of the chart indicate activities which are centered at NASA Headquarters in Washington, D.C. These are primarily staff functions which enable the administration to carry out the directives of the President and the Congress and at the same time interface with

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[5] Your New Job with NASA, publication of the NASA Langley Research Center, p. 3.

[6] "Aerospace Research and Development in U.S. Government," Space/Aeronautics, Vol. LII, No. 1 (July 1969), pp. 29-30.

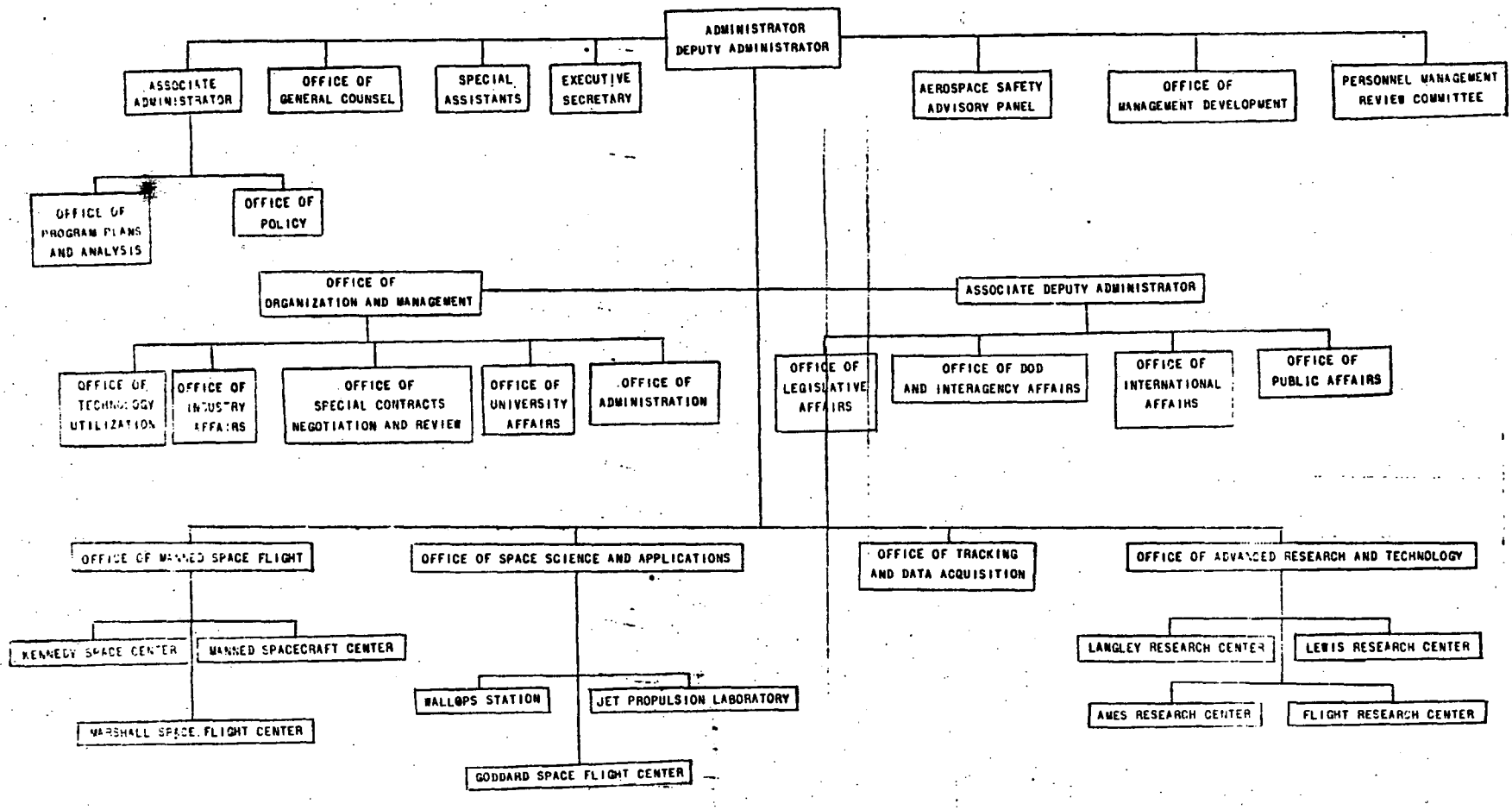

Figure 1.- National Aeronautics and Space Administration organizational chart.

industry, military, colleges and universities, foreign governments, other government agencies and the general public. This staff also acts as the machinery for communication with the real heart of the NASA, the field research centers shown under the Office of Manned Space Flight (OMSF), the Office of Space Science and Applications (OSSA), and the Office of Advanced Research and Technology (OART). It is at this level where the real communication crossroads of NASA is situated, where broad policies and budgetary restrictions are passed down and technological findings are passed back up. As the figure shows, the Langley Research Center is responsible to the Office of Advanced Research and Technology.

The organization of the Langley Research Center is shown in figure 2. At the time of this writing, the organizational chart has applied for only a few months and could change again as national goals are shifted and the emphasis on space and aeronautics changes. In essence, the chart shows that LRC is functionally organized with the various research and support divisions and project offices operating independently, but responsible to one of six assistant directors. These assistant directors are represented on the chart as Directors for Electronics, Structures, Aeronautics, Space, Systems Engineering and Operations, and Administration. The titles indicate areas of prime interest and responsibility for the various directorates but should not be considered as necessarily restrictive. The assistant directors are in turn responsible to the Office of the Director of the Center. The Director for Center Development, with the Office of Safety, Reliability and Quality Assurance, act as staff functions responsible to the Director. The Viking Project Office is unique in that it is comprised of a large number

NASA LANGLEY RESEARCH CENTER ORGANIZATION

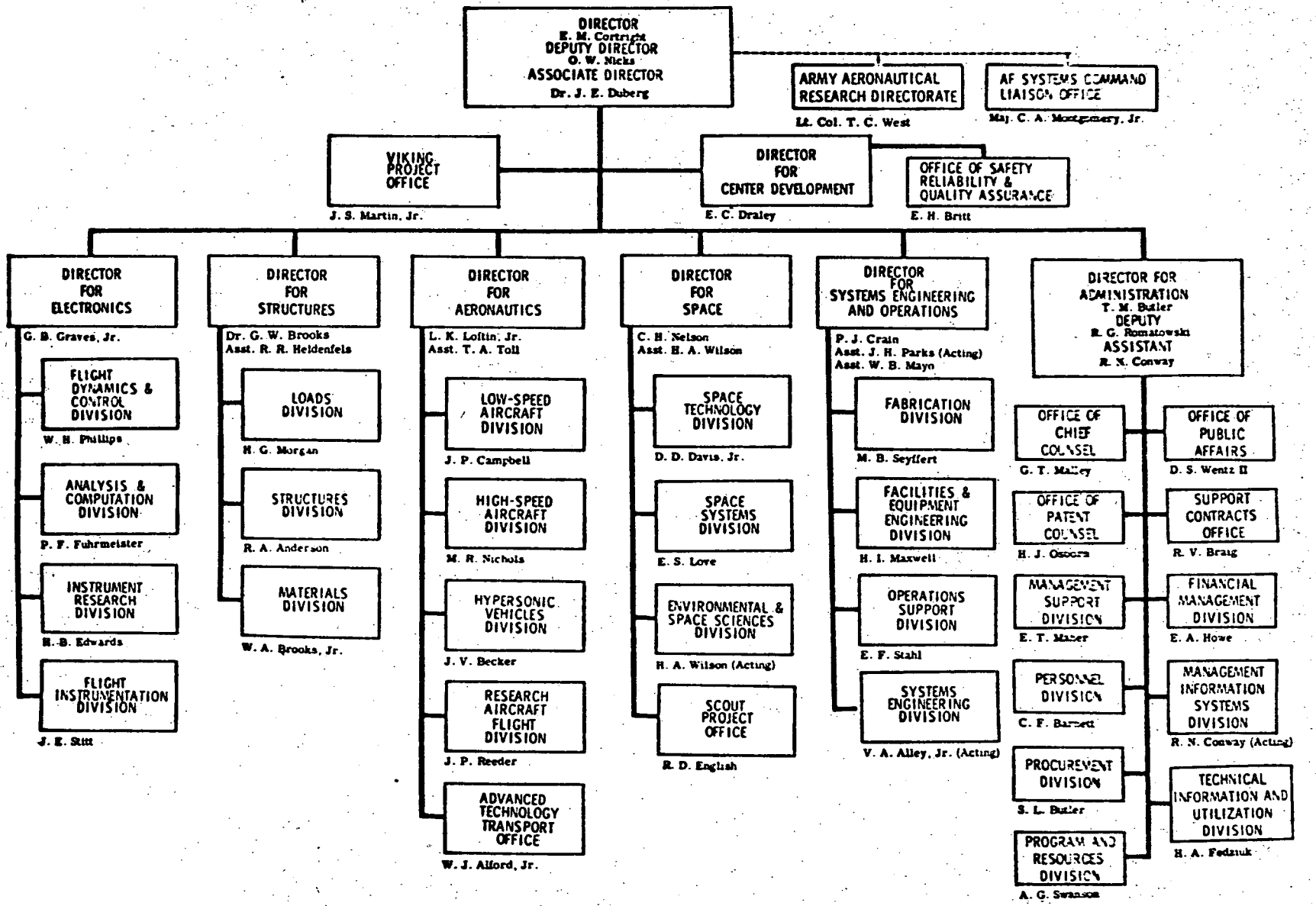

Figure 2.- Organizational structure of the Langley Research Center.

of employees collectively managing a major national space activity (unmanned landings on the planet Mars). The scope of this effort and the related high pressure atmosphere in which it operates, dictate that Viking communicate directly with the center Director rather than through an assistant director.

Approximately 130 people comprise the Space Technology Division (STD) which is one of the research divisions responsible to the Director for Space. The writer has been assigned to this division (and its predecessors) for nine years. The STD organizational chart is shown in figure 3, and indicates that the division is divided into five branches which in turn are subdivided into either sections, offices, or units. The general areas of responsibility for each group are indicated by the group title; however, many research problems and projects extend into several branches and sections. In addition, the educational background, experience and interest of many of the division's professional employees would allow them to perform adequately in more than one organizational group.

Employee Education and Salary

According to personnel files as of January 1971, the NASA Langley Research Center has 3889 total employees of which 3791 are classified as permanent. The permanent employees are segmented into broad job-descriptive groups such as scientists and engineers, professional administrators, clerical, technician, technical aids, and the various blue collar categories. However, this paper is concerned with the 1631 permanent scientists and engineers which constitute the scientific and technical expertise of the laboratory. All discussion concerning employee communication is confined to this group in general and

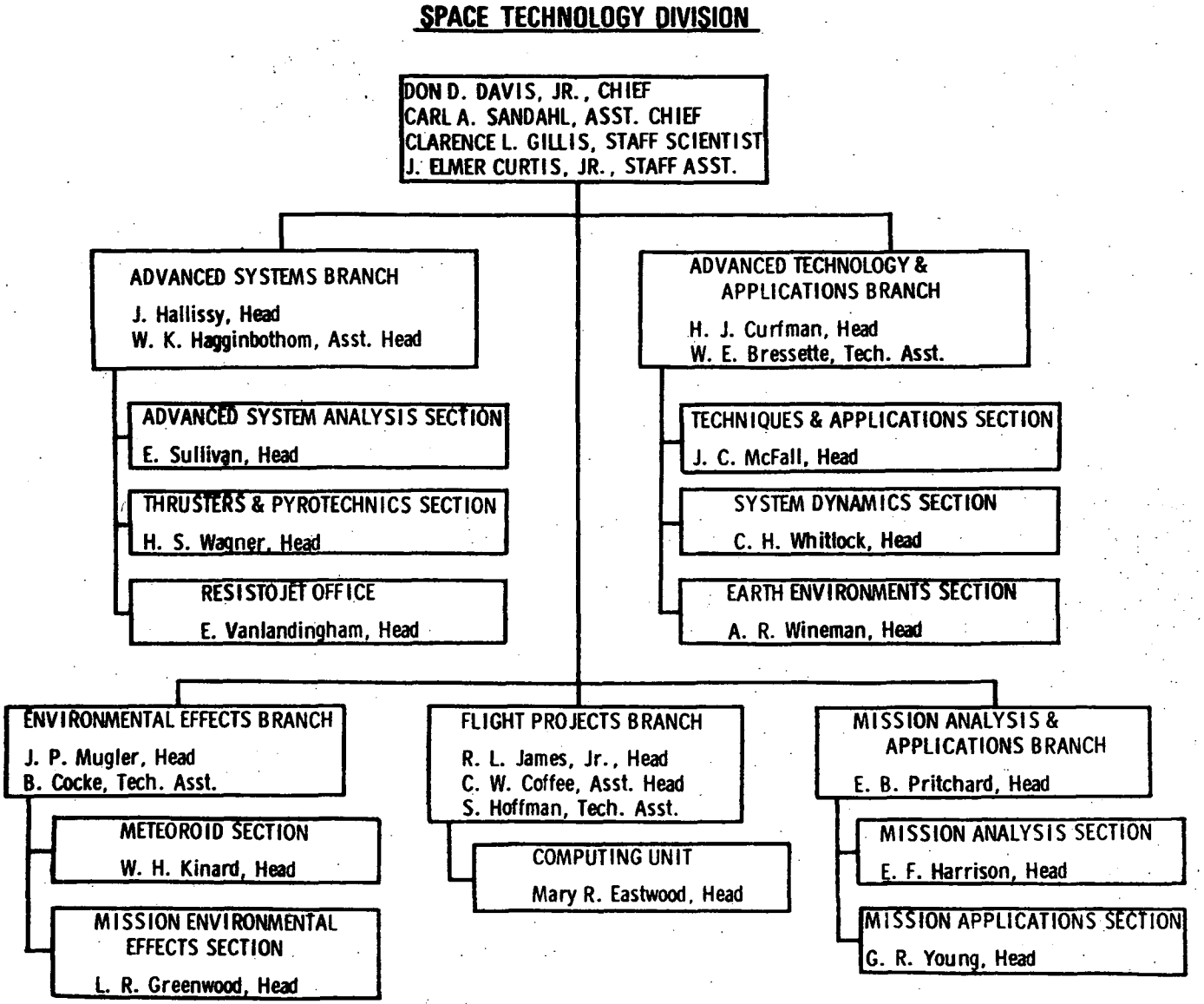

Figure 3.- Space Technology Division organizational chart.

particularly those scientists and engineers who are not classified as top or middle management. For the purposes of this paper middle management begins with the branch head level (see figure 3).

A wide variation in educational level exists among the permanent engineers and scientists on the LRC staff. Although one of the primary "products" of the laboratory is the achieving and dissemination of knowledge at and beyond the current "state-of-the-art" for a particular scientific or technological field, only 100 employees have earned bona-fide PHD degrees. This represents about 6% of the research staff. 412 employees or 25% have achieved masters degrees while 67 or 4% hold no degrees at all. Currently 176 employees are working towards masters degrees and 123 employees are PhD candidates.

Most government white collar workers are classified within General Schedule (G.S.) grades and steps for the purposes of remuneration. An employee's G.S. grade and step is determined by job classification, past performance, supervisory position, and time in grade as well as other factors. All scientists and engineers at LRC fall within the G.S. 7-16 range while some upper management and certain employees, whose technical competence is nationally recognized, are in the "NASA Excepted" (Ex) category with a minimum salary generally above the G.S. 16 minimum. Each grade has up to ten pay rate levels defined as "steps." The minimum annual salary for employees classified as scientists and engineers at LRC is $10,870, which corresponds to step 1 of the G.S. 7 grade shortage-category positions as of January 10, 1971. The minimum salary for those employees achieving excepted positions at LRC is $29,350. G.S. pay rates are based on surveys which determine salaries of equivalent positions in private industry. Figure 4 shows the educational level, G.S. grade,

G.S.	Bachelors	Masters	Doctors	None	Min. Salary
7	31	---	---	4	$10,870
9	58	5	---	3	12,215
11	109	42	---	2	13,878
12	187	103	17	10	15,040
13	315	134	29	29	17,761
14	181	74	26	13	20,815
15	138	36	21	6	24,251
16	16	9	4	---	28,129
Ex	17	9	3	---	29,350
Total	1052	412	100	67	

Figure 4.- LRC scientist/engineer grade, educational level, and salary structure as of January 1971.

and minimum salary level and the number of employees in each category as of January 1971.

III. VEHICLES OF EMPLOYEE COMMUNICATION

Communication: A Dynamic Art

Most of the information and background material for this thesis were actively gathered over a two-year period, while some of the concepts and conclusions discussed were formulated over the course of the author's twelve-years employment at LRC. During these periods, numerous changes in all aspects of formal communication have occurred. For example, titles of documents used to communicate scientific information have changed and the volume and slant of formal communication from director to engineer have been somewhat altered. Consequently, document titles and communication procedures discussed may not be current, however, the author feels that such variances as do exist do not compromise the research results presented.

The intent of this chapter is to discuss, in a broad manner, the various forms of formal communication vehicles utilized at LRC to convey both scientific and non-scientific information to and among the employees. Several communication vehicles are discussed in more detail in order to provide the reader some idea of the scope of communication activities within a Government scientific research organization.

The division of communication vehicles into upward, downward, and lateral categories is often hard to accomplish because of their generally multipurpose nature. However, some attempt is made in this

paper to divide the various forms into the category in which they have their most significant impact.

The usual path of formal communication requiring management approval can be represented by the flow chart shown in figure 5. The last two levels may be deleted if neither sizeable center resources nor possible broad implications are involved.

Upward Communication

The documents referred to as:

(1) Work Units,

(2) Research and Technology Objectives and Plans, and

(3) Job Order Requests

although not all-inclusive, are representative of the most important segments in the initial flow of scientific communication from the employees to top management at LRC, to NASA Headquarters in Washington, D.C., and eventually to the top scientific decision makers in the United States Government. Other documents such as memoranda, Project Description Documents, Purchase Requests, and Travel Requests and Authorization also contribute to this upward flow of communication. Some of the most recently accomplished or proposed technical advances at LRC are first obtained by management from these documents.

Work Units

The Work Unit (formerly "Task") is used both by NASA and the Department of Defense (DOD) as a standard subdivision of research and technology work areas. It is used to provide effective local technical control and supervision over work in specific areas which in general

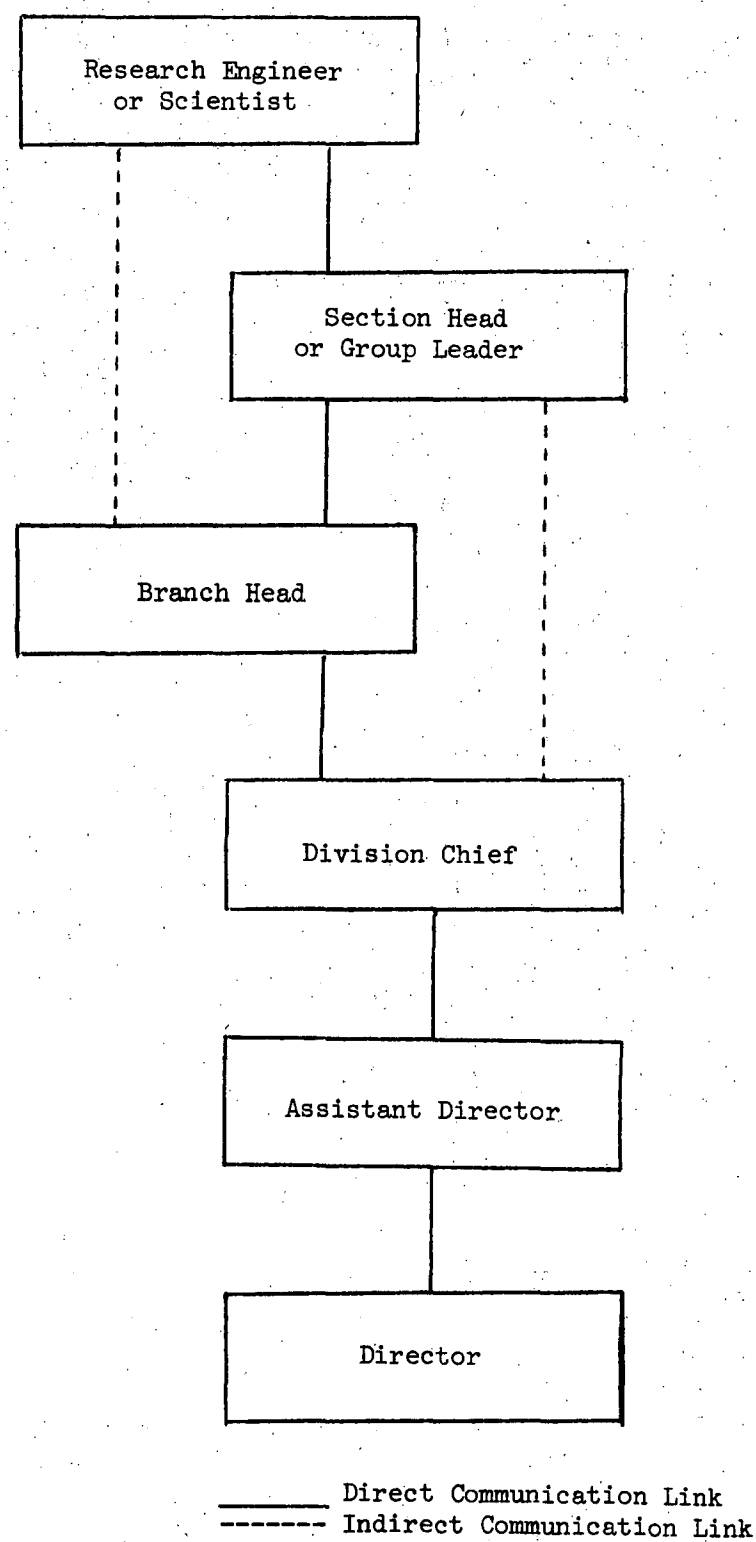

Figure 5.- Formal communication path from employee to top management

is part of previously defined and justified broad research areas.[1] These documents briefly summarize the scientific thoughts and ideas of each research group and are the source of the employee's scientific communication with his supervisors. They can cover a broad spectrum of scientific thought but are constrained by the goals and objectives of the broad research area under which they fall. Contained in the work unit is a brief description of the approach to the problem including specific tests, experiments, and theoretical work. Also summarized are anticipated resource requirements, manpower needs, and monetary expenditures associated with the proposed research task. An example of a Work Unit as reported on a Research and Technology Resume is shown in figure 6.

Work Units represent the first formal level of planning and the starting point of the budgetary cycle. All work performed at LRC and other NASA facilities is delineated in some Work Unit document. At any given time, several thousand of these documents are being pursued throughout the NASA.[2] In order to cut down on the amount of reading by management and to give an overall picture of an organization's contribution in a particular research area, all related Work Units and "Job Orders" (to be discussed) are often consolidated at the branch and division levels into a single document. This document is called a "Research and Technology Objective and Plan" which is prepared for top LRC management and is eventually submitted to the NASA Headquarters in Washington.

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[1] "Instructions for Completing Research and Technology Resume - Data Elements and Codes (Revised)," NASA document, January 20, 1966.

[2] P. M. Lovell, "Coordination of Research Activities," Langley Research Center Memorandum, December 14, 1964.

709-11-00-01-23

RESEARCH AND TECHNOLOGY RESUME

1.	2. GOVT. ACCESSION	3. AGENCY ACCESSION	

4. DATE OF RESUME	5. KIND OF RESUME	6. SECURITY	7. REGRADING	8. RELEASE LIMITATION	9. LEVEL OF RESUME
01-04-68	A. NEW	U PT U WRK	N/A		A. Work Unit

10a. CURRENT NUMBER/CODE	10b. PRIOR NUMBER/CODE
709-11-00-01-23	N/A

11. TITLE: Flight Project - Supersonic Planetary Entry Decelerator - Part II - (U) Full-Scale Decelerator Systems

12. SCIENTIFIC OR TECH. AREA	13. START DATE	14. CRIT. COMPL. DATE	15. FUNDING AGENCY
015900 Spacecraft; 016000 Spacecr. lnch. veh. & gr. support	01-68	N/A	N/A

16. PROCURE. METHOD	17. CONTRACT/GRANT			18. RESOURCES EST.	a. PROFESSIONAL MAN-YEARS	b. FUNDS (*In thousands*)
	b. NUMBER	c. TYPE	d. AMOUNT			
N/A		N/A		PRIOR FY— '68	---	124
				CURRENT FY— '69	25.0	549

19. GOVT. LAB/INSTALLATION/ACTIVITY	20. PERFORMING ORGANIZATION
NAME: Langley Research Center	NAME:
ADDRESS: Langley Station, Hampton, Va. 23365	ADDRESS: SAME AS 19
RESP. INDIV.: SANDAHL, C. H. - AMPD	INVESTIGATORS PRINCIPAL:
TEL: 703-722-7961, Ext. 3784	ASSOCIATE:
	TEL: TYPE:

21. TECHNOLOGY UTILIZATION	22. COORDINATION

23. KEYWORDS

Expandable spacecraft, planetary entry, full-scale decelerator systems

24. (U) The objectives of the project are (a) to provide a full-scale flight research system to test supersonic aerodynamic decelerator configurations, (b) to furnish full-scale data on parachute operation in the wake of a blunt body at Mach numbers above 2.0, (c) to furnish information on two parachute configurations for correlation with other test results, (d) to advance full-scale parachute technology in the Mach number range 2.0-3.0 for use in future space flight mission planning.

25. (U) An expandable 120° total angle cone spacecraft configuration will be boosted to about 300,000 feet while in the folded position. During descent when vehicle is at about 200,000 feet altitude, the spacecraft is expanded to its open condition. A guidance system insures that the angle of attack will be small during this period. The parachute or decelerator will be deployed during descent after the spacecraft is expanded.

26. (U)

27.	28. REQUESTING AGENCY	29. PROJECT CROSS CODE	30. SRT CROSS CODE

31. SPECIAL EQUIPMENT	32. FUNDS ($ K)	IN-HOUSE	CONTRACT
	PRIOR FY— '68	124	---
33. UNIQUE PROJECT: Small Space Vehicle Flight Projects	CURRENT FY— '69	549	---
34. SUB PROGRAM: Supersonic Planetary Entry Decelerator	NEXT FY— '70	---	---
35. TASK AREA: Undesignated			

NASA FORM 1122 (Rev. Nov. 65)
(Items 1 to 26 identical to DD Form 1498

907-720 U.S. GOVERNMENT PRINTING OFFICE : 1965—O-795-048

Figure 6.- Example of a NASA Research and Technology Resume

Research and Technology Objective and Plan

Top management at LRC use the Research and Technology Objective and Plan (RTOP) as a means of informing NASA Headquarters about the Center's annual projection of research and development programs and anticipated resource requirements.[3] Each RTOP includes all of the work of the Center in a particular research area and may contain tasks carried out under several work units. These documents are not confined to work within one organizational unit, but instead may encompass the work of several divisions. Usually the division doing the most work within a particular research program is assigned the job of collecting all research material related to the program and condensing it into an RTOP. Often the cognizant scientists and engineers are called on to play a large part in the preparation of these documents. Here the employee is able to directly communicate his technical expertise to top management.

The RTOP is intended not only to give a brief technical summary of the research program, but to describe and justify the limited goals, objectives, and resource requirements inherent within the program. The RTOP should accomplish this in such a manner that the reader does not have to be technically competent in every area of research in order to grasp the significance of what is being presented. However, the RTOP reader is assumed to have an understanding of the basic scientific terms generally used to discuss the particular program. The engineer or scientist aiding in the preparation of the RTOP is able to obtain valuable training in how to write about a scientific topic in non-technical terms.

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[3]Robert N. Conway, "Program and Resources Planning - FY 1970," Langley Research Center Memorandum, April 9, 1969.

Figure 7 shows an RTOP intended to describe the status of advanced plasma thruster research at LRC.

Job Orders

Job Orders along with Job Order Change Requests represent the first formal written form of upward scientific communication from the employee on an approved program. The Job Order Request briefly describes what the engineer wants to accomplish, justifies why the work is necessary, indicates which to what extent Center resources are required, and gives estimate of time and cost to complete the work in addition to the appropriate accounting and control information. The Job Order Request requires approval at various levels of management depending on the scope and cost estimate of the request. Obviously job order requests allow management to direct and control the magnitude and direction of research. However, these requests also enable management to separate the firm from the fleeting ideas heard during informal communication with the scientists and engineers. If a research engineer is willing to put his thoughts on paper and request financial backing in the form of a job order request, then management has an effective means of identifying what the engineer considers significant. Alternately by management's approval or rejection of a job order request, the research engineer is able to determine the official Center position on the value of his proposed work. An example of a job order requesting resources for a small research program is shown on figure 8.

The documents just described represent initial forms of written communication from employee to top management. Management is kept informed in more detail by many other means. For example, hundreds of memoranda are written by the LRC staff monthly, containing detailed

RESEARCH AND TECHNOLOGY OBJECTIVE AND PLAN

1. DATE PREPARED	2. AGENCY ACCESSION	3. RELEVANCE CODE	4. CURRENT NUMBER/CODE
19 05 69		21	120-26-14

5. TITLE
Advanced Plasma Thruster Research

6. RELATED SUBPROGRAMS *(if applicable)*

7. RELATED SUBCATEGORIES *(if applicable)*
23, 24

8. CONSOLIDATION OF RTOP NOS.

9. SCIENTIFIC & TECHNICAL AREAS *(COSATI)*
005400, 015900, 011100

10. RESPONSIBLE NASA ORGANIZATION

Langley Research Center
Langley Station
Hampton, Virginia 23365

RESP. INDIV.: BROOKS, G. W./ELLIS, M. C., Jr.
TELEPHONE: **703-827-**3285/2376

11. STATUS OF THIS RTOP

PLANNING PROPOSAL FOR FY_____

☐ NEW START ☐ EXTENSION ☐ CHANGE IN SCOPE OF EXISTING ACTIVITIES

FIRM PROPOSAL FOR FY 70

☒ NEW START ☐ EXTENSION ☐ CHANGE IN SCOPE OF EXISTING ACTIVITIES

PROPOSED CHANGE IN APPROVED PROGRAM PLAN-CURRENT FY_____

☐ CHANGE IN SCOPE ☐ TERMINATION OF ACTIVITIES

12. BRIEF TECHNICAL SUMMARY/ABSTRACT *(What is being done, how, why)*

The MPD arc stands out as the most promising electromagnetic type thruster with potential advantages over the ion engine. Although continuing research has led to a fair understanding of the device, research along several lines is needed in order to prove its potential and to increase its efficiency. Research on the MPD arc by several groups indicates that high efficiency may be attainable for continuous (steady) operation at high powers. It has also been indicated that the advantages of high power operation could be used for medium average power by repetitive pulsing of long (millisecs) pulses with high-power quasi-steady operation. Research will be carried out, both in-house and under contract, toward design and development of MPD arcs for continuous operation at high powers and repetitive, long (millisecs) pulsing for medium average powers.

In all experiments on the magnetoplasmadynamic arc, effects of the test environment on the plasma flow are present to varying degrees. Individual investigators deal with these effects in different ways, as each concentrates in one or a few areas of study. Contract and in-house research will continue concentrated effort to identify those test-environment sources of primary influence on the jet plume in the test tank and seek to eliminate as many as possible so as to approach space-like conditions.

The role of plasma instabilities and of ions and neutrals has been established for medium steady powers; for high powers, the nature of the instabilities and means for their control needs to be evaluated. Although all MPD-arc research will be concerned with instabilities, concentrated effort in this area will be made in-house.

13. KEYWORDS
Electric propulsion, plasma acceleration, MPD arc

APPROVALS

ASSISTANT DIRECTOR	DATE	DIRECTOR	DATE
G W Brooks	6/26/69	John E. Ortenz	6/29

Figure 7.- Example of a NASA Research and Technology Objective and Plan.

RESEARCH AND TECHNOLOGY OBJECTIVE AND PLAN (CONTINUATION)

1. DATE PREPARED	4. CURRENT NUMBER/CODE	Advanced Plasma Thruster Research	PAGE 2 OF 3
19 05 69	120-26-14		

14. Justification

Several years ago, there were several plasma accelerators candidate for electric propulsion application; today there are very few (the Air Force supports only colloidal system) and the MPD arc stands as the one most promising. It offers potential advantages over the ion engine of higher thrust per unit area, lower power-conditioning weight costs, and the possibility of variable specific impulse, fitting optimum required for specific mission, with small loss in efficiency. Intensive research on the complex plasma acceleration and flow processes has resulted in a fair understanding of the details of these processes, but considerable advanced research still needs to be done so that application of the MPD arc as the prime propulsion in space for future vehicle missions, for example, to the outer planets can be realized.

15. Technical Plan

A. Objectives and technical approach for FY'70.- Continuing research on the steady-flow MPD arc has led to a fair understanding of the various MPD phenomena that play a role in the plasma acceleration and confinement (magnetic nozzle) processes including, e.g., finding of criteria for onset of certain rotational plasma instabilities and the effects of consequent plasma motions. Whereas efficiencies for these devices appear limited for medium powers, increases are expected for higher power operation. High power, quasi-steady operation can be achieved by long (milliseconds) pulses, which if repetitive would (with appropriate off-times) give medium average power. Experiments to prove this concept will be carried out during the fiscal year through coordinated in-house tests at Langley and contract research at AVCO-Wilmington.

All laboratory experiments on the MPD arc must be made with finite background pressure and in finite test vessels; continuing questions exist on the effects of the test environment on the experiments. Under contract with PLASMADYNE, Div. of GEOTEL, Inc. systematic studies of environmental effects will be continued and expanded, utilizing the new electrically-insulating fiberglass vacuum tank acquired under prior research contracts.

Longer-range objectives.- The continuing long-range objective of research on the MPD arc is to bring its potential to fruition as the next generation electric-thruster after the ion engine. As the most promising of the very few plasma thrusters under consideration, this effect must be continued as an advanced research item. Research will be continued for development and design modifications of an MPD arc for continuous operation at high powers and repetitive, long (millisecs.) pulsing at medium average powers. For both systems, operation with single millisecond pulses at high powers will be evaluated. The nature of the instabilities and their control will be evaluated. The velocities and densities of ions and neutrals at high powers will be investigated with increasing mass flows and will be compared with specific impulse and efficiencies based on thrust and mass flow. For the systematic tests now seen as required for continued progress toward MPD-arc application to electric propulsion, increased reliance will be made on complementary contractual research.

16. Review and Reporting.- No special requirements.

17. Target Schedule.- Since this is advanced research no target dates appear feasible.

Figure 7.- Continued.

RESEARCH AND TECHNOLOGY OBJECTIVE AND PLAN (CONTINUATION)

1. DATE PREPARED	4. CURRENT NUMBER/CODE	Advanced Plasma Thruster Research	PAGE 3 OF 3
19 05 69	120-26-14		

18. Resources Requirements

A. Manpower

	Fiscal Year (Man Years)		
	70	71	72
Professional	5.0	4.5	4.0
Direct Support	6.9	6.0	5.0
Total	11.9	10.5	9.0

B. Facilities

C. R and D Funds

Contracts and In-House	Fiscal Year ($K)		
	70	71	72
Contracts	310	340	340
Equipment	60	60	60
Service Contracts			
In-House Support	55	55	55
Total	425	455	455

Contracts - General Dynamics, San Diego, Cal.
General Electric, King-of-Prussia, Pa.
Plasmadyne, Div. of Geotel., Inc., Santa Anna, Cal.
AVCO Aerophysics Lab., Wilmington, Mass.

Figure 7.- Concluded.

JOB ORDER

REQUESTED BY	DATE	JOB ORDER NO:
Richard J. Bendura	Sept. 10, 1968	RJI-558

DIVISION	BRANCH	SECTION	ORGANIZATION CODE	AGENCY CODE
AMPD	AMB	Reentry and Recovery Section		124-07-02-16-00

TITLE (40 Characters or less including spaces)
Determination of Subsonic Dynamic Stability Characteristics of Several 55° Half-Angle Conical Entry Bodies

NARRATIVE (For Division Chief)

Three 55° half-angle blunted conical configurations proposed as possible planetary entry bodies by Ames Research Center will be tested in the Langley spin tunnel. The purpose of the test will be to determine low subsonic dynamic stability characteristics of these bodies.

ESTIMATED RESOURCES		ESTIMATED DURATION	THIS J. O. IS FOR (CHECK ONE!)
DOLLARS (EXCLUDING LABOR)	IN-HOUSE MAN-HOURS		
R & D	RESEARCH 1100	LESS THAN 1 YEAR [X]	Maintenance, Repair or Alteration of Facilities [ ]
RPM	ENGINEERING 250	1-2 YEARS [ ]	Design and/or Construction of Facilities [ ]
CoFF	ADMINISTRATIVE	2 YEARS OR MORE [ ]	In-House Construction or Modification of Equipment [ ]
	TECHNICIAN 50		R & D ACTIVITY [ ]
			OTHER [X]

ROUTING

APPROVALS	INITIALS	DATE	REVIEWS	INITIALS	DATE	CODE
1. SECTION HEAD			4. P. R. & A. U. MS 122			
2. BRANCH HEAD			5. FMD, MS 135			
3. DIVISION CHIEF			6.			

COPIES TO (ORGANIZATION AND MAIL STOP)

1. PLANNING CONTROL UNIT, MS 191
2. ADP SYSTEMS UNIT, MS 181
3. PROGRAM REPORTS AND ANALYSIS UNIT, MS 122
4. AMPD, MS 213
5. AMPD-AMB, MS 214A
6. AMPD-AMB-RRS, MS 213A
7.
8.
9.
10.

NASA LANGLEY FORM 25 (REV. OCT. 1970) PREVIOUS EDITIONS ARE OBSOLETE PRESCRIBING DOCUMENT - LMI 9100.1

Figure 8.- Example of a NASA Job Order.

information about all LRC activities. The level to which these memoranda reach is dependent upon the desires of the originator or his supervisors. In addition, numerous program, project, and organizational reviews, as well as standing committee meetings, ad hoc committee meetings, department meetings, etc. are held periodically in which employees as well as various levels of management are involved. These meetings serve the dual purpose (as is the case for most communication vehicles) of the employee informing management as well as management directing the employee.

Of course, more rigorous scientific and technical discourse between the employee and his immediate supervisors occur daily during the course of normal work activities. Communication with higher management is accomplished by means of the numerous internal and external documents published by the LRC employees, as well as by formal paper presentations and informal talks at various technical gatherings. In these cases, management inputs are confined to rough drafts or presentations and informal talks at various technical gatherings. In these cases, management inputs are confined to rough drafts or presentation rehearsals and usually take the form of comments between technical peers.

Non-scientific upward communication procedures at LRC are usually no different than procedures of any other large organization. Employees have available the usual number of administrative forms requesting transfer, overtime, leave of absence, review of personnel action, office equipment and supplies, storage of technical data, etc., as well as suggestion forms to show how conditions or current practices may be improved, made safer, or changed to achieve cost reductions. For any request, suggestion, or situation not covered by a standard form the LRC memorandum is always

available. Since none of these communication vehicles are unique, they will not be discussed further.

Downward Communication

As mentioned earlier, it is difficult to distinctly categorize communications into unique directional classifications since most communication vehicles are multi-directional in nature. This is particularly true in a scientific research facility where technical communication is a prime "product" of the organization. Consequently, communication vehicles which are multi-directional and have been previously mentioned are omitted from further discussion.

Several communication forms are primarily intended to go only from management or administration to employee and usually do not invite employee comment. These include memorandums from management discussing national policy, defining NASA procedural changes, or relating the official position on possible controversial matters, in addition to broadly defining the research categories (such as space or aeronautics) to be concentrated upon by the laboratory. Also numerous handbooks, employee guidebooks, announcements and other documents dealing with the many areas which can be grouped under the broad category of personnel management are made available to the employee and are generally categorized as downward communication.

One very effective means of keeping employees up to date on items of current interest or importance is the "Langley Research Center Announcement." These documents are usually issued by the LRC Director or from the Office of the Director for Administration and are usually concerned with items which require rapid dissemination to the entire Center staff. Typical announcements cover a wide variety of topics

including; situations involving employee safety, notices of technical meetings or lecture series of interest to Center employees, changes in pay schedules, availability of positions in an organizational unit, holiday schedules, NASA-related television or radio programs, retirement options, and information involving a pending reduction in force (RIF) by NASA. The announcements are generally printed on green paper with the distinctive NASA symbol at the top and therefor are easily distinguished from other documents. Figure 9 shows an LRC announcement informing employees about restrictions at a certain research facility during lunar astronaut training.

A document entitled "NASA Activities" is available to those employees interested in the broader aspects of NASA related activities. This document is published monthly by the NASA Office of Public Affairs, is usually ten to twelve pages long, and contains much significant information of interest to NASA employees. Usually featured in the publication are copies of presentations to Congress, important speeches and talks, or letters to the employees by top NASA management often dealing with the broad policies and objectives of the nation as well as the organization. Also included are portions of speeches by top administrative spokesman or congressmen concerning the NASA or NASA-related activities as well as the status of congressional bills of concern to NASA employees. In addition, information concerning key personnel changes, new publications, key awards, radio and television activities, press releases, granting of patents, launch schedules, and a calendar of events involving the NASA or its employees are presented in the document.

The employee is also the recepient of several documents, required to be distributed by Government or organizational regulation, such as

LANGLEY RESEARCH CENTER ANNOUNCEMENT

No. 39-69

DATE June 24, 1969

SUBJECT: Restriction of Access to the Lunar Landing Facility Test Site

The Lunar Landing Facility at the Center is being employed for the training of astronauts in preparation for the actual lunar landings. Extensive effort has been given to simulate actual conditions in as much detail as possible. These research tests are conducted during the evening darkness in order to permit the generation of artificial light which simulates conditions anticipated on the lunar surface.

The presence of light sources, groups of people or automobiles severly reduce the value of these tests, and exposes observers to hazards which cannot be controlled. The possibility of objects falling from the gantry supporting the test vehicle or the discharge of hydrogen peroxide from the vehicle are readily identifiable as possible hazards.

Therefore, it is necessary that we limit access during these tests at the Lunar Landing Facility to those who are officially assigned duties associated with the tests.

The cooperation of the staff will be appreciated.

T. Melvin Butler
Assistant Director for
Administration

cc:
Each Employee

Figure 9.- Typical Langley Research Center Announcement.

vacancy announcements (Government Merit Promotion Plan) and changes in the "NASA Management Manual." Handbooks dealing with such matters as employee standards of conduct, travel suggestions and guidelines, and awards programs are periodically distributed to the employee. Lectures or presentations involving science, current social problems, and safety are periodically sponsored by the Center. In addition, the employee is involved in varying amounts of verbal communication with management concerning such matters as orientation, transfer, training, organizational changes, remuneration, performance, and other administrative matters.

Lateral Communication

Many of the previously discussed methods and vehicles of communication can also be classified as lateral or crosswise communication since they are intended to cross organizational lines in addition to moving vertically through an organizational unit. For example, many of the internal LRC memorandums, the most frequent form of written communication, are intended to be widely distributed across organizational lines. This includes non-technical, as well as the technical memorandums.

Since a prime product of a research center is the achieving and determination of technical information, it is no surprise that almost all scientific or technical communication is intended to be laterally distributed. Also many research areas and engineering projects exist with almost total disregard to formal organizational boundaries which dictates the need for good lateral communication. In addition since the technical background and academic history of employees in different organizational units is often similar in general, a natural curiosity exists about what "those other guys" are doing. Of course all formal

NASA technical publications such as the Technical Note (TN), Technical Report (TR), and Technical Memorandum (TM) as well as publications by NASA employees in the various scientific and technical journals are forms of lateral communication among employees as well as among the scientific community as a whole.

The principal conveyor of non-technical lateral communication is the center newspaper, the "Langley Researcher" which is published biweekly and distributed to each employee. It is usually four pages long and contains items considered to be of interest to the employee such as: employee engagement, wedding, birth and death announcements; club notices; the cafeteria menu; classified advertisements submitted by employees; notices of college or training courses being offered to the employees; comic photographs; and famous quotations. Articles and photographs concerning outside activities of the employees are also included. Frequently featured are articles publicizing the Langley Federal Credit Union, and an employee question and answer column.

The paper is also utilized by management to inform employees about official NASA policies and procedures, to publicize the public interest activities of top management, to inform employees about upcoming rocket launchings or other NASA projects, and to ask for ideas and suggestions toward solving particular technical problems of widespread interest or application currently perplexing other government agencies.

In addition to the printed forms of lateral communication, verbal presentations, group discussions, and various meetings are important forms of employee communication. A prime example is the monthly department meeting held the first Monday evening of each month by an LRC division or other major organizational unit. At these gatherings a

program dealing with the work areas currently being pursued within a particular organization is presented. Most LRC employees as well as management are given the opportunity to attend these programs. In addition to the department meetings, numerous formal and informal meetings and reviews are held daily concerning non-technical as well as technical subjects which involve employees from different organizational units.

Lateral communication is also implemented by newspaper and magazine articles, radio and television shows, displays at public places, and open house programs at LRC.

Informal Communication

A very active "grapevine" exists at LRC as is probably the case for most organizations. The nature of a scientific research organization, requiring discourse among employees, acts as a catalyst for the grapevine. Most employees have a telephone on their desk with little if any restrictions on its use within the Center. In addition the physical movement of personnel between offices, floors, or buildings is freely permitted and of course necessary. Employees often travel together on official business trips. Many of the LRC scientists or engineers regardless of position in the organization are in contact for other than official reasons. For example, many live in the same neighborhoods and form car pools while others belong to mutual social, professional, civic, or religious groups. Also a number of employees went to the same schools, are originally from the same region of the country, or share similar sports interests. Consequently, the opportunity for informal communication is great and events in aerospace move rapidly enough to provide sufficient nourishment for any grapevine.

The recent decline in aerospace activity nationally has caused a number of occurrences resulting in much informal communication activity among employees at LRC. Many space and aeronautics projects and research programs have been cancelled, severely restricted, or postponed during the last several years resulting in a loss of jobs or opportunities for aerospace employees with repercussions throughout the entire industry. Prime examples are the Supersonic Transport project which was cancelled, the Apollo program which has been restricted, and the Viking project (unmanned exploration of Mars) which has been postponed. The decline in aerospace interest nationally has resulted in a requirement for a reduction in force (RIF) at LRC during 1971. Since it is anticipated that the RIF will cause some employees to lose their jobs involuntarily, rumors and half-truths are rapidly passing through the organization. To the credit of Langley management, the employees are being officially informed seemingly as rapidly as possible about the whos, wheres, whens, and whys of the RIF. This of course tends to lessen the adverse effects usually associated with "grapevine" communication. Employee evaluation of how management has communicated RIF information will be discussed in subsequent chapters.

IV. MANAGEMENT APPROACHES TO COMMUNICATING SPECIFIC PROBLEMS

Management Interviews

Managers, like all people, are individuals, and as such react differently to given situations. No two managers will use exactly the same approach in dealing with their charges. Some are always direct and "take the bull by the horns" while others are often subtle and prefer to "beat around the bush." Still other managers use a direct approach at times and a subtle approach at other times, depending upon the nature of the situation or the mood of the supervisor. Another contrast is the rigidity of the approach, be it direct or subtle. Some supervisors may use a set format or follow rigid rules in all cases when communicating with employees, while others will treat each employee individually and use a different approach in each situation.

In an effort to determine the communication approaches utilized by some LRC management, six middle and lower level supervisors were interviewed and asked to discuss two potential communication problem areas: (1) employee criticism and discipline, and (2) organizational changes. Middle and lower level management were chosen for interviews because they have the most direct contact with the engineers and scientists at LRC. The managers interviewed were not randomly selected, but instead were well known by the writer. It was felt that by choosing supervisors in this manner, in lieu of a random selection possibly involving supervisors not personally known to the interviewer, a more open and in-depth

discussion would evolve resulting in a better appraisal of the management approaches. Also by carefully selecting the interviewees a good cross section of LRC managers could be interviewed without resorting to interviewing the prohibitively large number of supervisors required by random processes. The selection of the supervisors was made to encompass a wide range in age (early thirties to early fifties), supervisory experience (less than one year to more than twenty years) and men supervised (three to thirty-seven). In addition an attempt was made to choose supervisors who exhibited, in the opinion of the writer, different management philosophies in order, hopefully, to assure a variety of response.

Management Questionnaire

The interviews consisted of discussions in private where a prepared questionnaire was used by the interviewer to guide the discussions and to insure consistency among interviews. Questions utilized in the interviews were suggested by material contained in recent research publications dealing with management-employee communication. The intent of the questionnaire was to serve as a catalyst to stimulate open discussion concerning the handling of employee criticism, applying discipline, and the communicating of major organizational changes. The questions asked and responses given are as follows:

1. What approach do you ordinarily use in criticizing, admonishing, and disciplining your men when such action becomes necessary?

Response	Number
Immediate face to face confrontation	2
Delayed face to face confrontation	2
No direct confrontation, instead work problem through positive suggestions	1
Confrontation only during the required annual review	1

2. Do you use the same approach for all employees or do you vary the approach, depending upon the employee or situation?

Response	Number
Same approach	1
Varied approach	5

3. Does NASA provide you with set procedures or "road maps" to use when applying discipline? Do you follow them?

Response (first part)	Number
Yes	6
No	0

Response (second part)	Number
Yes	4
Have never been required to apply discipline	2

4. What role does higher level management, or the personnel office, play in aiding you in applying discipline?

Response	Number
Consultants only	2
Involved only in severe cases	2
Never had need for either	2

5. We've had a recent reorganization and we're in the midst of a reduction in force at Langley Research Center. How do you communicate such important changes to your men?

Response	Number
Immediately relate only official information office by office or individually	3
Relate only official information to the entire group at the same time	1
Relate both official information and rumors to men as soon as possible	2

6. Are you given sufficient latitude or choice in how much information concerning such organizational changes you can relate to your employees?

Response	Number
Yes	4
No	2

As intended the discussions diverged from the narrow confines of the stated questions. Consequently both a broader and more indepth analysis of the interviews was performed than if only the direct answers to the questions were available. Following, the results of the interview are discussed and, where possible, the techniques employed by the managers interviewed are compared to approaches recommended in recent publications concerning employee communication.

Handling Employee Criticism and Applying Discipline

According to Robert Morton[1] communicating simple, concrete information is hard enough but for a supervisor faced with the task of criticizing an employee, the difficulties are greatly increased. In such a situation, the feelings and personal values of all parties concerned can be affected. The supervisor's initial approach is important and his ability to speak openly with the employee is vital. The employee should not be humiliated or any results of the confrontation will be negative. Instead it is the responsibility of the boss to help the employee understand what is unsatisfactory about his work.[2]

The Government provides its supervisors with a wealth of documented advice on how to constructively criticize the employee, according to the managers interviewed. Many booklets, instructions, lectures, seminars and classes address this topic and of course consultation from higher management and the personnel office are available. Also, regulations require that each employee must be evaluated on his overall

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[1]Robert B. Morton, "When an Employee Needs Criticism," Supervisory Management, Vol. XII, (March 1967), p. 11.

[2]Ibid.

performance and personally informed of the results of this evaluation yearly. This is an ideal time for the manager to criticize any aspect of the employee's performance. However, only one of the managers interviewed relied solely on the annual review. Two of the interviewers said they usually, but not always, employed face to face confrontation with an employee immediately after an act requiring criticism or discipline. Two others allowed a cooling off period before any confrontation to prevent emotions from ruling judgment. One favored no direct confrontation at all but instead felt that problems could be worked out by providing positive suggestions to the offending employee. All insisted on honesty and ruled out any humiliation of the employee. Only one manager used the same approach for all employees or situations. Others pointed out that rarely did the same set of circumstances prevail such that a patterned approach could be developed. Some managers also pointed out that they had to tailor the approach used in criticizing the employee to the employee's temperament and personal environment.

Several of the interviewees implied embarrassment and a general uneasiness when they were administering criticism to an employee. Others indicated that they either tended to avoid criticism and utilize the "carrot" approach entirely or at least to delay criticizing the employee as long as possible. Morton[3] indicates that when criticism is required, either approach rarely works. He recommends getting right to the specific point when confronting the employee and to confront him as soon as possible after the act is committed.

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[2] Ibid.

[3] Ibid.

One manager interviewed evidently had either given the subject of employee criticism a lot of serious thought or at least had done research into this area. He indicated that when confronted with the situation he tried to (1) ignore his personal relationship with the engineer and instead concentrate only on his behavior; (2) would only discuss the facts and would ignore hearsay and opinions; (3) tried to specifically spell out offenses and situations and avoided generalities and (4) openly encouraged discussion with the employee on alternative courses of action open to both. Most of these actions are suggested by Morton as points to be considered by a manager when applying criticism.[4]

Criticism conveyed from supervisors to employee is usually considered a distasteful situation for all parties concerned. But is displeasure always communicated to a worker when he receives a reprimand from his boss? Not so, according to Harold Mayfield[5] and one of the LRC managers interviewed. Both generalized that no person likes criticism and that most people tend to squirm when a better, easier, or more efficient course of action is pointed out. A supervisor's opinion is important to the employee and when he communicates some form of displeasure it is upsetting, even if he is entirely wrong. However, maybe this criticism should be looked at in a different light. Criticism from the boss is a form of communication which points out rather convincingly that at least the employee is worth attention.[6]

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[4] Ibid, p. 12.

[5] Harold Mayfield, "Happiness is When Your Boss Bawls You Out?" Supervisory Management, Vol. XII (April 1967), p. 8.

[6] Ibid.

Mayfield concludes that possibly most criticisms in reality go unsaid because the manager feels he would be wasting his time, a point echoed by several of the LRC managers. An effective manager will only criticize those people who he feels will profit from correction. In turn, he ignores those from whom he expects a negative or at best neutral response. So in many cases when a supervisor communicates, in one way or another, some form of criticism to an employee he may not be showing displeasure. In reality he may be pointing out that at least the employee is noteworthy and has the ability to benefit from criticism.[7]

Handling employee criticism is one thing; however, applying discipline is another. How do you tactfully communicate with an employee after he has flagrantly broken an organizational rule? The way the manager handles the situation and how he approaches the problem will greatly affect, for better or worse, the employee's morale and consequently job behavior.[8] LRC managers are provided with "road maps" on how to discipline the offending employee (see figure 10). These set forth the policies, responsibilities, and standards for the administration of employee discipline and deal with both formal and informal disciplinary actions. In applying discipline, however, the uniqueness of the scientific research center employee-management relationship is a strong factor. The manager is forced to apply discipline not only to his technical peer but often to his social and economic peer as well. The role of the manager, as viewed by the scientist or engineer, is not the same

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[7] Ibid, p. 9.

[8] Ernest W. Fair, "Guides to Applying Discipline," Supervisory Management, Vol. XII, (August 1967), p. 44.

MANAGEMENT MANUAL
LANGLEY RESEARCH CENTER

INSTRUCTION 3700.2
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SUBJECT Discipline

1. PURPOSE

This instruction establishes the policies, responsibilities, and standards for the administration of employee discipline at the Center.

2. POLICY

a. Disciplinary action is taken for the purposes of correcting offending employees and maintaining discipline and morale among other employees. Where this can be accomplished through informal oral admonishment, formal disciplinary action shall not be taken.

b. Disciplinary action is to be initiated promptly after it has been determined that a prima facie case against an employee exists. A prima facie case is one established by sufficient evidence to justify a presumption of guilt.

3. DEFINITIONS

For purposes of this instruction, the following definitions will apply:

a. Formal Disciplinary Action. Formal disciplinary action is any action taken to discipline an employee which becomes a matter of permanent written record in the employee's Official Personnel Folder. The four types of formal action which will normally be used are:

(1) Written reprimand
(2) Suspension
(3) Demotion (in grade or rank)
(4) Removal

b. Informal Disciplinary Action. Informal disciplinary action involves an oral warning or admonishment of an employee but such action does not become a matter of official written record. However, supervisors may keep unofficial written records of such informal actions which may be used later as criteria for determining what formal action is necessary whenever the employee is presumed to be guilty of continued offense, or another offense, etc., within the reckoning period.

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Figure 10.- LRC Policies, Responsibilities, and Standards Concerning Employee Discipline.

c. Reckoning Period. A reckoning period is a specific interval of time commencing with the occurrence of an offense and expiring absolutely at the end of the period of time specified in the Table of Offenses (see Attachment A) for the particular offense. Reckoning periods are not cumulative.

d. Disciplinary Official. The Personnel Officer or his designated representative shall be the disciplinary official in all formal disciplinary actions. In cases of informal disciplinary action, the immediate supervisor shall be the disciplinary official.

e. Immediate Supervisor. The official who has first-line supervisory responsibilities over the employee being administered disciplinary action.

f. Table of Offenses. Attachment A to this instruction is the NASA Table of Offenses and Penalties which provides a reasonably complete list of offenses. However, it is not intended to cover every possible situation. This chart is conspicuously posted on bulletin boards throughout the Center.

4. PROCEDURES

a. General. When a supervisor is considering disciplinary action against an employee, he shall immediately contact a representative of the Personnel Division for advice and assistance. This is necessary since the Civil Service Commission has very detailed regulations that must be followed in disciplinary actions and also since most disciplinary actions are appealable.

b. Developing Evidence. Disciplinary procedures shall not be used by Langley officials to provide a means for prosecuting an employee. In this respect, the employee must be confronted with any and all evidence that influences management's consideration of the case in order that he may properly defend himself. Classified information may not be used as a basis for disciplinary action unless it has been developed in unclassified form by a separate investigation, if necessary.

c. Facts and Circumstances. Facts and circumstances which form the basis of a charge against an employee shall be specific and detailed in order that the employee would be able to prepare his defense.

Figure 10.- Continued.

TABLE OF DISCIPLINARY OFFENSES AND PENALTIES FOR
EMPLOYEES IN THE NATIONAL AERONAUTICS & SPACE ADMINISTRATION

1. This table is to be used as a guide and only when it has been determined that formal, in lieu of informal, disciplinary action is necessary. When an employee is orally admonished (informal disciplinary action), the admonition shall not be made a matter of record in the employee's Official Personnel Folder and shall not be counted as a previous offense in determining the number of offenses in the current reckoning period. Reckoning periods are not cumulative.

2. This table is not intended to cover every possible type of offense. Penalties for offenses not listed will be prescribed by the installation personnel office.

3. Many of the items listed on this table combine several offenses in one statement, connected by the word, "OR". Therefore, when drawing up charges, use only that part of the applicable item on the table which actually describes the offense under consideration. Do not use the word, "OR", in a charge; usage of this word in a charge makes it nonspecific.

4. Penalties for disciplinary offenses will, in general, fall within the ranges indicated. In unusual circumstances, depending on the gravity of the offense, the past record, and the position of the employee, a penalty either more or less severe than the MAX or MIN range, provided for herein, may be imposed.

5. Depending on the severity of the offenses, removal proceedings may be instituted against an employee for the fourth of any four offenses committed in any 24 month period.

6. The suspension penalties listed herein are applicable to work days only. (Caution: Section 14, Veterans' Preference Act of 1944 — "Suspended for more than 30 days" is interpreted to express calendar days)

NATURE OF OFFENSES	RANGE OF PENALTIES FOR STATED OFFENSES Number of Occurrences in Reckoning Period						RECKONING PERIOD
	1st		2nd		3rd		
	MIN	MAX	MIN	MAX	MIN	MAX	
1. Falsification, misstatement, exaggeration, or concealment of material fact in connection with employment, promotion, any record, investigation, or other proper proceeding.	Reprimand	Removal	15 days	Removal	Removal		2 years
2. Immoral, indecent, or notoriously disgraceful conduct.	Reprimand	Removal	15 days	Removal	Removal		2 years
3. Failure to pay a just debt without sufficient cause.	Reprimand	3 days	3 days	10 days	10 days	Removal	1 year
4. Falsifying attendance record for oneself or another employee.	Reprimand	Removal	15 days	Removal	Removal		2 years
5. Engaging, directly or indirectly, in financial transactions which create real or apparent conflicts of interest.	Reprimand	Removal	15 days	Removal	Removal		2 years
6. Soliciting or accepting gifts or gratuities.	Reprimand	Removal	15 days	Removal	Removal		2 years
7. Failure to request approval of outside employment; performing unauthorized outside employment.	Reprimand	Removal	10 days	Removal	15 days	Removal	2 years
8. Unexcused absence on 1 or more scheduled days of work.	Reprimand	5 days	3 days	10 days	10 days	Removal	1 year
Charge may also be used for failure to report for overtime. The charge of EXCESSIVE UNAUTHORIZED ABSENCE with the penalty of removal may be used when the absence is prolonged to exceed five work days or when it appears the employee has abandoned his position. Extenuating circumstances offered by the employee should be considered.							
9. Leaving job to which assigned or NASA premises at any time during working hours without proper permission.	Reprimand	5 days	3 days	10 days	10 days	Removal	1 year
10. Unexcused tardiness.	Reprimand	1 day	1 day	5 days	5 days	15 days	6 months
Disciplinary action is in addition to non-pay status for period of tardiness.							
11. Sleeping during working hours.	Reprimand	Removal	15 days	Removal	Removal		1 year
12. Loafing or wasting time.	Reprimand	5 days	3 days	10 days	10 days	Removal	1 year
13. Disrespectful conduct; use of insulting, abusive, or obscene language to, or about, other personnel.	Reprimand	Removal	15 days	Removal	Removal		2 years
14. Making false or unfounded statements which are slanderous or defamatory about other employees or officials.	Reprimand	Removal	15 days	Removal	Removal		2 years
Consider the duties and position of the employee, the nature of the statements made and the extent to which they damage the installation or the injured party, the nature and timing of any retraction by the employee, and the extent to which the damaging statements are supported by established facts.							
15. Disorderly conduct; fighting; threatening or attempting to inflict bodily injury to another; engaging in dangerous horseplay; or resisting competent authority.	Reprimand	Removal	10 days	Removal	15 days	Removal	2 years
16. Promotion of gambling on NASA premises.	Reprimand	Removal	15 days	Removal	Removal		2 years

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17. Gambling or unlawful betting on NASA premises.	Reprimand	10 days	10 days	Removal	15 days	Removal	2 years
18. Selling intoxicants on NASA premises.	Reprimand	Removal	10 days	Removal	Removal		2 years
19. Reporting for duty or being on duty under the influence of intoxicants; unauthorized possession of intoxicants on NASA premises.	Reprimand	Removal	10 days	Removal	15 days	Removal	2 years
20. Failure to safeguard classified matter.	Reprimand	Removal	15 days	Removal	Removal		2 years
	Consider the nature of the employee's position or assignment, whether disclosure resulted, and the classification of the jeopardized matter.						
21. Failure to carry or show proper identification on NASA premises as required by competent authority, or misplacement or loss of identification badge.	Reprimand	1 day	1 day	5 days	5 days	15 days	6 months
22. Disobedience to constituted authorities, or deliberate refusal to carry out any proper order from immediate supervisor having responsibility for the work of the employee; insubordination.	Reprimand	Removal	15 days	Removal	Removal		2 years
23. Failure or delay in carrying out orders, work assignments or instructions of superiors.	Reprimand	5 days	3 days	10 days	10 days	Removal	1 year
24. Actual or attempted theft of Government property or the property of others.	Reprimand	Removal	15 days	Removal	Removal		2 years
	Whether or not restitution was made should enter into the determination of the penalty for this offense.						
25. Malicious damage to Government property or the property of others.	Reprimand	Removal	15 days	Removal	Removal		2 years
26. Misuse of Government time, material, equipment or services.	Reprimand	Removal	10 days	Removal	15 days	Removal	2 years
27. Loss of or damage to Government property or the property of others, or endangering same, through carelessness.	Reprimand	10 days	10 days	Removal	15 days	Removal	2 years
28. Covering up or attempting to conceal defective work; removing or destroying same without permission.	Reprimand	10 days	10 days	Removal	15 days	Removal	2 years
29. Careless workmanship resulting in spoilage or waste of materials or delay in production.	Reprimand	5 days	3 days	10 days	10 days	Removal	1 year
30. Endangering the safety of, or causing injury to personnel through carelessness.	Reprimand	Removal	15 days	Removal	Removal		2 years
31. Smoking in unauthorized places or carrying matches in explosive areas.	Reprimand	Removal	15 days	Removal	Removal		2 years
32. Failure to observe precautions for personal safety, posted rules, signs, written or verbal safety instructions or to use protective clothing or equipment.	Reprimand	5 days	3 days	10 days	10 days	Removal	1 year
33. Failure to report personal injury or accident.	Reprimand	1 day	1 day	5 days	5 days	15 days	1 year
34. Violating traffic regulations or reckless driving on NASA premises; improper operation of Government motor vehicle.	Reprimand	3 days	3 days	10 days	10 days	Removal	1 year
	Driver's permit to operate vehicle on premises may be suspended or revoked, in lieu of other penalty, if vehicle involved is privately owned and recklessness or hazard to others is not involved in offense.						

Figure 10.- Concluded.

OTHER OFFENSES: Information concerning other offenses for which employees may be punished by removal, fine or imprisonment may be found in Chapter C-2 of the Federal Personnel Manual. In case of infraction, appropriation action will be taken in cooperation with the proper authority.

RECKONING PERIOD: A reckoning period is a specific interval of time commencing with the occurrence of an offense and expiring absolutely at the end of the period of time specified in this table for the particular offense. This table provides for more serious penalties for the second and third occurrences of the same offense within the reckoning period.

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as the role of the foreman as viewed by the factory worker. Applying formal discipline for other than routine offenses usually goes beyond the first level of management (see figure 3) and involves both division level management and help from the administrative directorate. The managers interviewed approached the problem of employee discipline as indicated in the responses to question one and related during the previous discussion concerning employee criticism.

The supervisors interviewed indicated that the roles of higher management and the personnel office were similar with regards to aiding in applying discipline to offending employees. Neither became or were asked to become involved in disciplining employees for minor offenses except as consultants. Only two of the supervisors interviewed ever had discipline problems that were other than minor, and in these cases higher management readily became involved and aided in applying discipline to the offending employee. Most of the supervisors stated that they rarely had any problems with employees requiring even the mildest form of discipline, either formal or informal.

From an analysis of the interviews with the managers who had been involved in applying discipline or severe criticism, the following ideal guidelines were assembled; (1) conduct the interviews with the offending employee in private and as soon after the offense as practical; (2) allow the employee to fully relate his comments on the situation; (3) recognize and treat inadvertent rule breaking lightly; (4) stay within Government regulations and NASA policy when considering penalities, and (5) indicate that future infractions will not be treated lightly. These

are not new revelations and most fall within procedures previously suggested by both Morton[9] and Fair.[10]

Communicating Changes

In an organization, a possible trouble situation can arise when a subordinate discovers any change which will either affect him or his group. Particularly if he senses a threat to his well being or security, he tries to find out additional information. Such changes can be small (e.g. a new employee in the work group or a conference between the boss and another subordinate) or large (e.g. a reorganization or a general layoff of employees). In these situations, explanations from the grapevine are generally upsetting and rarely completely true. However, as pointed out by A. S. Hatch[11] these explanations are usually the first to reach the employee.

Grapevine information, arriving first, sometimes insulates the employee from official explanation. Therefore any plan for change should be communicated to those concerned as early as possible. Studies have shown that management has more to gain from early communication of available information, than in holding all communication until all details are in.[12]

At LRC, two major changes affecting at least indirectly all personnel have recently occurred. First, a reorganization of the entire

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[9] Morton, p. 12.

[10] Fair, p. 45.

[11] A. S. Hatch, "Explaining Changes: If You Don't, the Grapevine Will," Supervisory Management, Vol. XII (April 1967), p. 38.

[12] Ibid, p. 39.

Center resulting in the creation of new organizational groups, the merger of other groups, and the dissolution of still other groups was accomplished during the summer of 1970. A large number of employees were shifted into different organizations and physically relocated. No loss of jobs was involved and the major threat to employees involved new work, new supervisors, and possible loss of face as others were promoted. In general, employees could not be kept officially informed as to the day-to-day changes occurring within the reorganization effort and consequently rumors were abundant. Second, a reduction-in-force (RIF) requiring the loss of approximately 200 Center positions by October 1971 was announced by the Director in January of 1971. Since theoretically no one was exempted from losing his job and the details of how the RIF was to be accomplished was not clear, the RIF was the major cause of concern and the prime topic of discussion for the entire year.

The communication approaches utilized by various LRC supervisors in informing the staff about these two major, as well as other minor changes, varied. As revealed during the interviews, the majority felt that the employee should know everything and would immediately relate all the information permitted by higher management. A few would go so far as to pass on rumors which they had unofficially heard, although they would stress that the rumor was unofficial. At least one evidently felt that a minimum amount of communication was all that was necessary and was reluctant to give full details to the employees. He theorized that revealing information bit by bit, no matter how factual, was more harmful than waiting until the plan was totally complete before any information was given to the employees. However, all managers interviewed indicated they did reveal all information that they were required by upper management to convey to the employees.

The communication techniques applied by various managers also differed. One usually called all employees together and passed on the same information to all, inviting questions and general discussion. Others would go to each office, relate the information to whomever was present while still others would discuss the topic individually during the normal course of work, sometimes requiring several hours to reach all employees.

Hatch[13] indicates that the approach used in communicating changes is all important. Above all, the supervisor should adopt uniform policies in communicating policy changes. In most situations the supervisor should talk to the employee in a group rather than individually to help insure standardization. Employees tend to be sensitive to the length of the communications line between him and the boss compared to others. Also individual communication fosters more grapevine activity than does group communication. By keeping the subordinates equally and simultaneously informed on matters of common interest, the supervisor will find announcement of changes a more simple task and can expect better cooperation from all employees.[14]

Situations might occur where management does not wish to communicate all details concerning an impending change. In other cases several plans are being considered only one of which affects his men. What should the employees be told? According to Stern[15] information

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[13] Ibid.

[14] Ibid.

[15] L. E. Stern, "Should You Tell Employees Everything?" Supervisory Management, Vol. XII (February 1967), p. 12.

that should be communicated to employees can be classified into three areas: First, and most obvious, is information needed by the employee in order to do his job properly; second, is information whose disclosure might directly or indirectly affect the employee; and finally, is information that management believes would be helpful to the employee toward attaining organizational goals.

The amount of detail actually conveyed would depend on the individual employee. Stern[16] points out that in some cases employees on the same level require different amounts of information in contrast to Hatch's[17] general feeling that all employees on the same level should be given the same information at the same time. Stern points out that an employee can be told too much as well as too little. An employee shouldn't be burdened with a huge mass of unwanted details. In general employees should not be told information if (1) disclosure might be harmful to the organization (e.g. style changes in the clothing industry), (2) the data is covered by government or industrial security regulation, (3) managements' plans are incomplete (Hatch disagrees)[18] or, (4) the information must formally pass down through channels. In this last situation (4) early disclosure of information at the wrong level could interfere with organizational promotional concepts or hurt the feelings of other subordinates who feel that they should know first.[19] These rules are meant for general applications concerning groups or individuals,

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[16] Ibid.

[17] Hatch, p. 39.

[18] Ibid.

[19] Stern, p. 13.

however, they may have to be altered for specific situations.[20] There is no formula which can fit every situation so the manager must apply common sense, honesty, and diplomacy about what information should be given or withheld from his subordinates.[21]

The Langley Research Center managers interviewed differed in their opinion concerning the latitude they were allowed in relating information about major changes to their men. One indicated that he was given no latitude at all and instead was given rather explicit orders as to what he could say and could not say. Another said that he was instructed by higher management to tell his men everything official concerning the reorganization and the RIF. Both of these supervisors implied that the choice of what information should be revealed to what employee should be left to their discretion. However, most supervisors were given no instructions or restrictions concerning these matters, and obviously were expected to use their own judgment to decide how much and when they would tell their men. Did the supervisors want more or less latitude? In answer to this question, a large majority expressed a desire for more latitude, although two interviewees stated that the status quo was sufficient.

Summary

This chapter has addressed the communication approaches utilized by some of the middle and lower level managers at Langley Research Center to deal with two classic management-employee communication problem areas:

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[20] Ibid, p. 14.

[21] Ibid, pp. 13-15.

(1) Employee criticism and discipline, and (2) organizational changes. In addition, these techniques are compared with the recommendations of experts in employee communication as related in recent research publications. As expected, the Langley Research Center managers differ in their approaches to these problems, but so do the experts in some cases. The real issues, however, are how effective are these approaches, are they working, and how can any weaknesses in the system be corrected? To seek an answer to these questions and to determine the effectiveness of other aspects of employee communication at Langley Research Center, personal interviews were held with a number of Langley Research Center employees. The results of these interviews are the subject of the next chapter.

One recommendation can be made here, however. Most lower and middle management in the research divisions at Langley Research Center do not have academic degrees qualifying them as managers or supervisors. As in most research organizations, promotions are based on performance and performance is demonstrated in scientific and technical areas requiring little, if any, management skills. Recognizing this, Langley Research Center has long provided written guidelines and provided classes conducted by management experts to upgrade the management skills of Langley Research Center supervisors. Evidently, however, either little emphasis is placed on communicating major organizational changes with the employees or the lessons are not "sinking in" since no consistency is demonstrated by the managers in dealing with this problem. Consequently, it is recommended that steps be taken to: (1) Formulate a uniform policy dealing with management-employee communication during a major organizational change (if such a policy is not now in existence)

and (2) insure implementation of such a policy by providing the necessary classes taught by qualified instructors for all supervisors.

V. MEASURING THE EFFECTIVENESS OF EMPLOYEE COMMUNICATION

How is the Effectiveness of Employee Communication Measured?

How effective is communication between supervisor and employee at the Langley Research Center? As discussed in earlier chapters, LRC is part of the mammoth federal establishment and as such must adhere, at least officially, to rigidly defined communication procedures. Also the "product" of the Center is scientific and technical information -- a prime example of communication. Yet, the essence of employee communication is communication between manager and employee where no number of formally established procedures can assure success.

No absolute yardstick has yet been devised which will measure the effectiveness of communication with any high degree of confidence, although the state of employee morale is often considered a good indicator. Working independently, probably no two people would use the same approach. For example, one approach might be to divide the communication concept into the smallest discernible units and then apply an individual judgment evaluation technique using a good-fair-poor type measuring system. Another approach could be to keep records of the time spent by each person in the categories of upward, downward, lateral, and informal communication and compare the data with some industrial or organizational norm. Presumably some correlation could be made between time spent communicating and the effectiveness of the communication. An indirect method would be to determine the ranking of an organization

with other comparable organizations by some yardstick such as financial or economic status, reputation, or employee turnover, and assume that the higher ranked organizations had the best employee communication. All approaches have unique advantages and disadvantages.

The approach chosen to measure the effectiveness of employee communication at LRC involved utilizing personal interviews with several supervisors as well as with a number of scientists and engineers to record, and later to assess, their thoughts and responses to questions concerning employee communication. An obvious advantage of this approach is the personal contact between interviewer and interviewee. The interviewer is able to clarify any misgivings or questions which the interviewee may have about the intent of the questions. In addition, responses to questions requiring a simple evaluation on the part of the interviewee are spontaneous and as such are apt to be honest. No time is provided to ponder the question or to consider possible ramifications of a response given to a particular question. Such would not be the case if the questions were typewritten and handed to the interviewee requiring a written response within a suitably long time period.

Disadvantages also exist. Because of the time involved, the number of interviewees must be necessarily limited, thus allowing the question of whether or not the results and recommendations from the interview are obtained from statistically sufficient data, particularly if the interviewees are randomly selected. The burden of breaking down the responses given into comparable yes or no answers is lifted from the interviewee and placed on the interviewer. He must then determine if there is more yes, no, or maybe in each reply. Also the interviewee is allowed no time to carefully consider his response to questions asking

for suggested improvements in the status quo resulting probably in a less than complete list of alternatives.

Employee Interviews

A total of 20 LRC employees, below the supervisory level, having from 1 to 20 years experience with NASA were personally interviewed during the spring and summer of 1971. Persons interviewed ranged from those holding only bachelor's degrees to those having achieved Ph.D.'s. The interviews consisted of confidential question and answer sessions and general discussions held in private. The interviewees were assured that their names and responses to questions would be treated confidentially.

Twenty employees randomly selected out of a population of 1631 technical professionals (including supervisors) are statistically inadequate if one is seeking a high degree of confidence. However random selection processes were not used here. Instead the interviewees were carefully selected on the basis of age, working experience, and academic achievement. In the opinion of the author the 20 engineers and scientists selected are a good representative sample whose responses reflect the concensus of the total LRC technical professional population.

In order to assure some consistency among interviews, the same pre-selected set of questions were asked each employee. In many instances these questions served primarily as seed questions with the discussion ranging to other closely related topics. It was interesting, but not surprising, to note that the interviewee tended to become more open with his opinions as the discussion diverged from the set format. The questions asked were grouped into seven categories: Employee Background; Upward Technical Communication; Downward Communication; Lateral Communication;

Personal Communication with Management; Communicating Changes; and Grapevine Activity.

Because of the nature of the topic, the format of the interview, and the characteristics of the interviewees, direct responses to many questions were not obtained. Consequently, whether a question was answered "yes" or "no" became the judgment of the interviewer. The questions asked in each category and the tabulated responses are as follows.

Employee Background

The three questions asked in this category were utilized to assure that a wide range in employee experience and academic achievement were included during the interviews and to serve as a brief warm up setting the mood of the interview.

1. How many years have you been employed by NASA?

   (one to twenty; median twelve)

2. Have you been employed other than at NASA?

Response	Number
Yes	3
No	17

3. What is the highest academic degree that you hold?

Response	Number
BS	9
MS or MA	8
Ph.D.	3

Upward Technical Communication

The questions here were intended to determine the role played by the employee in formally communicating technical information to high levels of management and to determine if the employee was satisfied with the status quo.

4. Have you ever written or aided in writing any of the following: Job Order; RTOP, Work Unit, Project Description Document, Memorandum (of a technical nature)?

Response	Number
Yes	19
No	1

5. If so, did the finished product represent your technical judgment or were your technical opinions subjugated to those of management?

Response	Number
Represented engineer's technical judgment	19

6. Do you feel that management should rely more extensively on engineers or scientists for inputs to these documents?

Response	Number
Yes	1
No	18

7. Do you feel that the methods utilized by NASA/LRC allow you and other engineers a fair chance to obtain the necessary center resources to accomplish your proposed research task?

Response	Number
Yes	10
No	8
No opinion	2

8. During meetings attended by management, have you felt restrained from presenting your technical opinion?

Response	Number
Yes, frequently	1
Yes, but rarely	5
No	14

9. During meetings between you and your supervisor, do you feel any barriers to technically communicating?

Response	Number
Yes, initially	3
No	17

10. What is your overall judgment of the opportunities provided you to communicate your technical opinions?

Response	Number
Good or excellent opportunities	14
Fair	6

Downward Communication

The intent of the questions in this category was to determine whether or not the employee was officially and adequately informed about national, agency, and Center policies concerning space and aeronautics as well as administrative matters more directly effecting the employee.

11. Does NASA through its various forms of communication (i.e., green sheets, memorandums, guidebooks, handbooks, "Langley Researcher," announcements, etc.) inform you to your satisfaction about the broad objectives and goals of the NASA and LRC?

Response	Number
Yes, without qualification	4
Yes, NASA; no, LRC	8
No	8

12. Do you feel adequately informed on such items as schooling to be offered by NASA, changes in pay schedules, safety hazards, and availability of other positions at LRC?

Response	Number
Yes	20
No	0

13. Do you desire more or less information of this type?

Response	Number
Status quo is adequate	19
More	1

Lateral Communication

No attempt was made to trigger discussion concerning lateral technical communication as represented by the formal publications and presentations of the organization. Instead, the intent of the questions was to allow the employee to consider the adequacy of officially provided methods of primarily non-technical communication among employees.

14. What vehicles do you use to provide and obtain information of a non-technical nature at the employee level?

Response	Number
"Langley Researcher"	20

15. Is the "Langley Researcher" (LRC newspaper) an effective communicating tool? Does it serve to keep you informed on center activities?

Response	Number
Yes	17
No	3

16. Should additional vehicles of lateral communication be provided? Should the format of the "Langley Researcher" be expanded?

Response	Number
No, status quo adequate	15
No new vehicles but expand "Researcher"	5

Personal Communication with Management

The purpose of this section was to determine whether enough opportunity is provided the employee to discuss personal matters with his supervisor, and to determine if the employee was provided sufficient orientation upon his arrival at LRC.

17. Do you get adequate opportunity to discuss with your supervisor your: a) performance, b) pay, c) working environment such as desk location, office partners, and office equipment?

Response	Number
Yes	19
No	1

18. As a new employee, did you get sufficient orientation concerning LRC, your division, branch, and section?

Response	Number
Yes	15
No	5

Communicating Changes

Two significant changes, a Center reorganization and a reduction in force (RIF), have occurred recently at the Langley Research Center. Both actions generated much discussion among Center employees and most employees were affected in some manner. The intent of the question asked here was to determine how the employees assessed the manner in which these changes were communicated, and to determine the degree of personal concern felt by each employee.

19. In your opinion, were employees' interest and feelings considered during the reorganization of the center? Should they have been considered?

Response (first part)	Number
Yes	5
No	15

Response (second part)	Number
Yes	14
No	6

20. Were you informed to your satisfaction about the purpose for and the objectives of the reorganization?

Response	Number
Yes	6
No	14

21. Were you personally concerned about the reorganization?

Response	Number
Yes	19
No	1

22. A planned reduction in force (RIF) has been announced by the Director for LRC. Do you feel that you have been provided with adequate information concerning the: (a) justification for the RIF, (b) details as to how the RIF would be accomplished, and (c) chances of your getting "riffed"?

Response (a)	Number
Yes	2
No, without qualification	16
No, not totally	2

Response (b)	Number
Yes	4
No, without qualification	16

Response (c)	Number
Yes	0
No, without qualification	16
No, not totally	4

23. If not, was this because your supervisors were not informed themseves or because they did not want to tell you?

Response	Number
Upper level management did not know	8
Supervisors did not want to tell	8
Supervisors were not told by upper management	4

Grapevine Activity

A grapevine exists in all organizations and is generally considered detrimental to both the employees and the organization. The questions in this section were asked to determine the employees assessment of the value of a grapevine to the organizations and to determine the extent of grapevine activity during the RIF.

24. A lot of rumors have been generated about the RIF during the last few months. Do you actively seek and "pass on" these rumors?

Response	Number
Yes, without qualification	12
Yes, but passively, not actively	6
No	2

25. Do you believe that a large percentage of your peers seek and pass on these rumors?

Response	Number
Yes	19
No	1

26. Are these rumors "good" for NASA?

Response	Number
Yes	1
No	19

27. Should management try to minimize the number of rumors?

Response	Number
Yes	19
No	1

28. Have you heard the rumor that indicates that management will make a strong effort to protect the "good" workers and in turn eliminate the marginal performers? How do you assess this rumor?

Response (first part)	Number
Yes	20
No	0

Response (second part)	Number
True	19
Did not know	1

29. Should management make an effort, within regulations, to protect the "good" workers and, in turn, eliminate the marginal employees or should they "let the chips fall where they may"?

Response	Number
Yes, protect good workers	20
No	0

Management Interviews

The same basic approach and interview format was used to interview six LRC lower and middle level supervisors during the same approximate time period as the employee interviews. The intent of interviewing the supervisors was to determine how well management felt they personally were doing in communicating with their men and how they assessed the status of NASA and LRC employee communication in general. In many cases, supervisors and employees from the same organizational units were interviewed. With the exception of the questions concerning the employee background, the same categories were covered and generally the same questions were asked the supervisors as were asked the employees, however, with a different slant. The wording of the questions was altered to

reflect the change from an interview with an employee about himself to an interview with a supervisor about his men. The questions and responses are as follows.

Upward Technical Communication

1. Do you seek the assistance of your men in writing any of the following: Job Order; RTOP; Work Unit; Project Description Document; Memorandum (of a technical nature)?

Response	Number
Yes, often	6
No	0

2. How often do you override the technical judgment of your men with regards to these documents?

Response	Number
Never	5
Seldom	1

3. Do you feel that management should rely more extensively on engineers or scientists for inputs to these documents?

Response	Number
Currently relied on to fullest extent	6

4. Do you feel that the methods utilized by NASA/LRC allow engineers a fair chance to obtain the necessary Center resources to accomplish his proposed research task?

Response	Number
Yes, but proposed research must be within scope of NASA	6

5. During meetings have you ever restrained your men from presenting their technical opinions?

Response	Number
No	6

6. During meetings between you and your engineers do you feel any barriers to technically communicating?

Response	Number
No	6

7. What is your overall judgment of the opportunities provided your men to communicate their technical opinions?

Response	Number
Good or excellent opportunities	6

Downward Communication

8. Does NASA through its various forms of communication (i.e., green sheets, memorandums, guidebooks, handbooks, "Langley Researcher," announcements, etc.) adequately inform the engineers about the broad objectives and goals of NASA and LRC?

Response	Number
Yes	3
No	3

9. Do you feel that the engineers are adequately informed on such items as schooling to be offered by NASA, changes in pay schedules, safety hazards, and availability of other positions at LRC?

Response	Number
Yes	6

10. Do you feel that the engineers should be supplied with more or less information of this type?

Response	Number
Status quo is adequate	6

Lateral Communication

11. What vehicles are used to provide and obtain information of a non-technical nature at the employee level?

Response	Number
"Langley Researcher"	6

12. Is the "Langley Researcher" (LRC newspaper) an effective communicating tool? Does it serve to keep the engineers informed on center activities?

Response	Number
Yes	5
No	1

13. Should additional vehicles of lateral communication be provided? Should the format of the "Langley Researcher" be expanded?

Response	Number
No, status quo adequate	4
No new vehicles but expand "Researcher"	2

Personal Communication with Management

14. Do you provide adequate opportunity for your men to discuss with you their a) performance, b) pay, c) working environment such as desk location, office partners, and office equipment?

Response	Number
Yes	6

15. Does NASA provide sufficient opportunities for new employees concerning LRC, their division, branch, and section?

Response	Number
Yes	4
No opinion	2

Communicating Changes

16. In your opinion, were employees' interest and feelings considered during the reorganization of the Center? Should they have been considered?

Response (first part)	Number
Yes	2
Yes, but in a secondary position	3
No	1

Response (second part)	Number
Yes	3
Yes, but in a secondary position	3

17. Were your men adequately informed about the purpose for and the objectives of the reorganization?

Response	Number
Yes	1
No opinion	4
No and should not have been	1

18. Were your men personally concerned about the reorganization?

Response	Number
Yes	6

19. A planned reduction in force (RIF) has been announced by the Director for LRC. Do you feel that your men have been provided with adequate information concerning the: (a) justification for the RIF, (b) details as to how the RIF would be accomplished, and (c) chances of their getting "riffed"?

Response (a)	Number
Yes	3
No	3

Response (b)	Number
Yes	3
No	3

Response (c)	Number
Yes	3
No	3

Grapevine Activity

20. A lot of rumors have been generated about the RIF during the last few months. Did your men actively seek and "pass on" these rumors?

Response	Number
Yes, the majority did	2
No, the majority did not	4

21. Are these rumors "good" for NASA?

Response	Number
Yes	0
No	6

22. Should management try to minimize the number of rumors?

Response	Number
Yes	6
No	0

23 Should management make an effort, within regulations, to protect the "good" workers and, in turn, eliminate the marginal employees or should they "let the chips fall where they may"?

Response	Number
Yes, within regulations	5
No	1

Results of Interviews

Employee Background

The employees interviewed had from less than one to more than twenty years of scientific or technical experience with NASA. The median was twelve years. Twenty percent of the employees indicated that they had participated in the cooperative engineering program so that from two to four years of their experience was prior to receiving an academic degree. Only three employees interviewed had worked other than with NASA. Fifteen percent of the interviewees had achieved Ph.D.'s in some technical field and forty percent had received at least one masters degree (several held degrees in management). Of the employees currently holding only bachelors degrees, twenty percent were actively pursuing programs leading to higher degrees. Seventy-five percent of those interviewed worked in one LRC division, while the other twenty-five percent represented three other divisions.

Upward Technical Communication

All but one of the employee interviewees had taken some part in initiating formal technical communication primarily intended for upper level management. The one exception had been at LRC less than one year. All who had taken part indicated that their technical inputs had not been significantly altered by lower or middle management. Only one interviewee said that management should rely more heavily on inputs from the employers. Overall the employees indicated satisfaction with their role in communicating technically with upper management and, in general, hinted that lower and middle management probably could not perform such tasks without them.

The managers interviewed tended to agree. All managers indicated that they relied heavily on their men in the preparation of technically oriented documents, such as RTOPs or Project Description documents, which were intended for higher management. They pointed out that the best technical expertise concerning a specific research area was represented by the men doing the job and that a supervisor would be foolish to ignore this source of information. Several supervisors indicated that they almost entirely left the task of preparing such documents to their cognizant engineers and limited their own inputs to dictating the format of the work and deciding what should be emphasized and what should be "played down."

Question seven, which concerned obtaining Center resources for proposed research, stimulated much discussion from the employees interviewed. Most felt that the situation had changed drastically during the last several years. Previously any well-justified research program requiring minimal Center resources had a high probability of being funded. Currently many technically sound programs having enthusiastic backing at many management levels are not being funded. Most of the engineers did believe, however, that the national shift in emphasis away from space and aeronautics was the underlying cause of the situation. Fifty percent of the engineers interviewed indicated that current NASA-LRC methods still allowed for obtaining Center resources to accomplish a proposed research task, although it was becoming increasingly more difficult to do so due to management stifling and the amount of "selling" required. Forty percent of the interviewees indicated either mildly or strongly that no reasonable chance remained because decisions were politically and not technically based, and that management did not give adequate,

if any, explanation as to why the proposed research was denied. Several complained that communication with management in this area was a "one way street" indicating that the quantity and quality of management "recommunications" was woefully indadequate. Suggested improvements from the interviewees in this area all centered around having management take more time to discuss and even define the rationale behind their decision with the employers.

The majority of the supervisors interviewed, however, indicated that in most cases the necessary Center resources could be found to back worthwhile scientific endeavors. They all admitted that, particularly during the last two years, they could recall a number of scientifically solid proposals being turned down for lack of available funds. Several pointed out that in the past the scope of NASA was broad enough to cover research in many directions, some only faintly related to space and aeronautics, while today's national goals required research to be confined to very narrow bands of activity.

In general, the employees at LRC felt little if any communication constraints concerning scientific or technical matters as indicated by the answers given to questions eight, nine, and ten.

Seventy percent of the employees answered that absolutely no constraints were placed on them by their supervisors dealing with the expressing of their opinions at meetings attended by management. Twenty-five percent of the employees replied that at some time during their careers they were instructed to refrain from discussing certain aspects of technical problems at meetings but felt that such constraints were politically motivated and were not an attempt to hinder the flow of technical communication. One interviewee said that he had been pressured

by his supervisors on numerous occasions to refrain from discussing all aspects of a technical problem during meetings with high level management.

All of the managers indicated, when discussing restraining employees during meetings, that they never prevented their men from speaking freely during such sessions. Several pointed out that they would sometimes halt discussions which had strayed from the topic of the meeting or the interest of the meeting attendees. In addition, they would intervene during a lengthy discussion limited to one topic when many more had to be covered within a limited time period.

The replies given to question nine indicated that most scientists and engineers judged their supervisors as being no barrier to scientific communication. Only fifteen percent of the employees indicated any lack of technical understanding on the part of their supervisors, and in these cases the lack of understanding occurred initially usually to be quickly eliminated after further discourse between employee and supervisor.

The supervisors concurred with the employees by indicating that technical misunderstandings with most of the engineers were superficial and were usually eliminated in short order. The only exceptions to this usually happened with new employees fresh out of school who often required more extensive explanation of technical problems. All supervisors implied that they were competent to discuss and understand all aspects of their employees work although several indicated that they would like to be able to do this more rapidly.

When asked to give an overall judgment on the status of technical communication (question 10), seventy percent of the LRC employees interviewed gave single word responses of good or excellent. Other replies received also indicated general satisfaction but with some

reservations as to the necessity and value of such communication with their supervisors. They viewed such communication as time consuming, felt that no valuable technical feedback could be expected from their supervisors, and indicated that management could be better served if they waited to obtain technical knowledge by reading the employers' formal technical or scientific publications. Several employers scoffed at any suggestion that their supervisors might be a source of technical help.

The managers interviewed stated that the opportunities for technical communication for all levels of employers at LRC were almost unlimited and that they never knowingly constrained their men.

Downward Communication

Only twenty percent of the employees interviewed stated without qualification that NASA and LRC had informed them about the broad objectives and goals of both organizations, although forty percent indicated satisfaction with information supplied concerning NASA as a whole. The responses from the other interviewees indicated a general dissatisfaction with the amount of solid information given them by their employers. Many indicated that they were avidly interested in the course in which the space program was headed, particularly since national interests had decisively shifted from this area, and were hoping for firm direction from top management. Several of these volunteered the information that they felt adequately informed but by Aviation Week and Space Technology, an industrial magazine, and not through efforts of management. Most of the criticism, however, was reserved for the lack of understanding of the objectives and goals of the Langley Research Center and its numerous organizational units. They cited lack of firm direction was

evident from most of the divisions, branches, and sections, but again conceded that this was probably due to the national situation. It was interesting to note that those who felt the best informed often read the "NASA Activities" publication mentioned in chapter three.

The employees interviewed generally felt well informed (at least to the extent of their desires) about the more mundane aspects of the organization such as schooling, availability of Center positions, changes in pay, etc. The only improvement recommended by one interviewee in this area concerned more timely announcements about the availability of other LRC positions.

The supervisors interviewed were evenly split in their views concerning the adequacy of information officially provided the scientists and engineers at LRC. Half said that the announcements, green sheets, and memorandums either distributed to each employee or posted on bulletin boards conveniently located for all employees, along with the monthly technical programs and other ad hoc programs to which all employees are invited were sufficient to keep everyone adequately informed. They backed their position by stating that they rarely, if ever, heard complaints from their men about not being kept properly informed about the objectives and goals of the organization. The remaining supervisors, although recognizing the amount of material made available to the employees, took the position that there is always room for improvement particularly now since space and aeronautical research is no longer a prime national goal and the job opportunities are no longer plentiful for scientists and engineers in the aerospace industry. Several indicated that making "NASA Activities" available to all levels of employees would be a step in the right direction.

Lateral Communication

All employees interviewed indicated that the official LRC newspaper, the "Langley Researcher," was their primary communication vehicle for items of a non-technical nature. All except fifteen percent replied that the newspaper was an effective communication tool but effective only from the "social" standpoint. Although the paper provides articles of a technical nature, most felt that there was room for much improvement in this area. Many suggested that it should be expanded technically and that the technical information provided should be more detailed and that the technical information provided should be more detailed and written to appeal more to scientists and engineers and not for the scientific layman. Of course, these interviews were confined to research level personnel which comprise only half of the Center staff, the remaining employees would probably object to any significant increase in the technical level of "Langley Researcher" articles.

One employee suggested that the paper could be expanded along the lines of the NASA headquarters publication "NASA Activities," and be used by management to set forth Center policies, goals, and objectives. In contrast, another employee stated that the paper was currently too management oriented and should instead be oriented more toward what the employees are doing. A third employee felt that the paper was too stilted and conservative and should be liberalized along the lines of other NASA Center papers which were more adult and entertaining.

In addition to the previously listed questions, the supervisors were asked: (1) How well they assessed the status of lateral communication at LRC, (2) whether or not the "Langley Researcher" met the needs of employees in providing non-technical communication among employees,

and (3) if they had any suggestions for improvements to the paper or for additional communication vehicles which could be used at LRC. The answers implied that the supervisors had not given much thought concerning non-technical lateral communication among employees. Most felt that the "Langley Researcher" was a helpful and entertaining diversion which served the needs of the employees. Suggestions for improvement of the paper were similar to those voiced by the employees and no additional communication vehicles were recommended.

Personal Communication with Management

Evidently a strong personal communication link exists between employees and supervisors at LRC. Ninety-five percent of the twenty employees interviewed related that they had almost unlimited opportunities to discuss such matters as pay raises, performance and working environment with their supervisors. As could be expected they further related that such discussions were not always fruitful but nonetheless, the opportunities were abundant.

The replies by the supervisors echoed those of the employees. All implied that they maintained an open door policy with regards to discussing employee pay, performance, and related areas and indicated that this was probably the case with all LRC technical supervisors. The extent of utilization of this open door policy by the employees varied widely — some engineers were visibly concerned and often approached their supervisors on such matters while others never initiated any such conversation with their bosses.

Seventy-five percent of the interviewees reported that they received sufficient orientation when they were new employees at the Center. In general, the bulk of the orientation programs were reported

as completed within the first six months after reporting for duty and consisted primarily of a series of lectures by cognizant engineers or scientists in various disciplines. Several interviewees indicated that too much detailed material was presented during the lectures to be adequately absorbed by the listener. Others indicated that the technically oriented program was good but that too little effort was devoted to the administrative aspects of the job. Such matters as the location of cafeterias, material reproduction facilities, badge and pass offices, and the procedures for ordering special equipment, requesting leave, and the preparation of job orders were mentioned as being omitted from the orientation procedures.

Four or sixty-seven percent of the supervisors felt that LRC does provide sufficient orientation for new employees. The other two or thirty-three percent of the supervisors had never received new employees since they had been supervisors for less than a year and had no opinion concerning current orientation procedures. The supervisors were also asked if they used any special methods of welcoming or introducing new employees to their organization. Several replied that they had few occasions to welcome new employees (engineers fresh from school) and therefore had established no set procedures. Consequently, each new employee received a unique welcome. Most of the supervisors indicated that they did discuss such items as lunch, hours of work, security regulations, and office procedures with the new men and generally tried to size up the new man by determining his educational goals and personal aspirations.

Communicating Changes

As could be predicted, almost all of the employees interviewed were vitally concerned during the recent reorganization of the Langley Research Center. This feeling of concern existed even among those employees either eligible for retirement or who considered themselves in a position which would be unaffected by such action.

Only twenty-five percent of the employees believed that any consideration was given to the employees in general during the course of planning for and implementing the reorganization. Several of these had either been consulted or knew of other employees who had been consulted by management concerning specific aspects of one or more versions of the reorganization plan. However, the majority expressed the belief that most organizational units and employees were manipulated with total disregard as to the desires of the individual employee. Seventy percent of those interviewed stated that employee interest should have been considered to a much greater extent and that the employee should have been given some role in determining his fate. The remaining thirty percent generally felt that such individual consideration was unnecessary and, furthermore, was almost impossible during the course of such a massive event. They felt that such consideration would be prohibitively time consuming with more individual anamosity and dissatisfaction resulting than was the case using the method employed by NASA management.

Two or thirty-three percent of the supervisors stated that the employees interest and feelings were considered during the reorganization while one or seventeen percent stated emphatically that they were not. Fifty percent of the supervisors indicated that the employees were considered but as a secondary consideration. They indicated that numerous

reorganization plans were considered and that lower level management had to consider the working effectiveness of each organizational unit in each scheme as well as personnel likes and dislikes. Each engineer could not be consulted about his position in each reorganizational scheme. They pointed out that most units (groups, sections, and branches), if affected at all, were transferred intact and that in most cases, the work assignments of each individual remained the same. In general, when engineers were transferred to other units resulting in different work assignments, they were informed before the transfer became official. One supervisor said that most employee dissatisfaction resulted from engineers listening to and believing rumors concerning where he was going and what he would be doing.

When asked whether or not they had been informed about the purpose for and the objectives of the reorganization (question 21), seventy percent of the engineers replied no. Of those that replied yes, twenty percent said they obtained their information from sources outside of NASA while the remaining ten percent did not recall the source of their information. One supervisor stated that the men were adequately informed. Four or two thirds felt that they were in no position to answer the question and therefore indicated no opinion. One supervisor indicated that the purpose and objectives of the reorganization were the concern of higher management and that neither the employees nor lower level management should be concerned about these matters, since their day to day work would not be disturbed.

The degree of concern among employees was very high during the reorganization but was nevertheless eclipsed by the concern expressed during the preparation for the reduction in force (RIF). Possibly such

a state existed because the interviews were conducted between the announcement and implementation of the RIF. All employees, no matter what their status, expressed an intense apprehension about the RIF. The senior employees feared being pressured into retirement while the newer employees were concerned about being "bumped" out of their jobs and, consequently, forced to seek employment elsewhere. The supervisors unanimously agreed that their men were concerned about the reorganization. They reached this conclusion because of the number of questions they were asked by their men and because of the numerous and extensive "bull sessions" concerning the subject.

Eighty percent of those interviewed replied without qualification that they were not supplied with adequate information concerning the justification for the RIF, the details about how the RIF action would be accomplished, and the possibilities of being personally effected by the RIF. None of the remaining were totally satisfied; several stated that the justification for the RIF was never provided while all desired much more information about how they would be personally effected.

When asked whether or not the employees were provided with adequate information concerning the justification for the RIF, the supervisors were divided in their opinions. Half indicated a position similar to that taken by a supervisor when asked a similar question about the reorganization: The justification for the RIF is the concern of national policy makers and high level NASA management and does not concern either the engineers and scientists or their immediate supervisors. The others felt that a RIF was a vital concern for personnel requiring a job to economically survive and, consequently, everyone should be kept completely and quickly informed about all aspects of the RIF, including its

justification. Most of the supervisors interviewed felt that higher management was providing all the concrete information about the implementation of the RIF either directly to the employees or indirectly through their supervisors. All supervisors interviewed indicated that they never intentionally withheld such information from their men although some were reluctant to relate all details to their men.

The opinions were almost equally divided as to why the employees were not provided with more RIF information. Forty percent indicated that they were sure that they were being told everything about the RIF as it became "firmed-up" and that any confusion or lack of solid information was the result of indecision at the highest NASA or other government levels dictating the terms of the RIF. An equal number replied that they believed all levels of management knew more than they were relaying to the employees. This lack of communication was considered to be by design because it was the approach requiring the least involvement by the supervisors. Twenty percent of the interviewees felt that lower management (section heads and some branch heads) communicated everything while upper management (division level and above) purposefully withheld vital information from the employees.

Grapevine

Bull sessions, rumor mills, and the grapevine were obviously very active immediately after the reduction in force announcement by the Director. The employees were worried and employee morale was on the down swing. Only ten percent of the employees interviewed denied any part in grapevine activity, pleading pre-occupation with work and exhibiting a "what will be, will be" attitude. Sixty percent indicated, without qualification, that they were actively involved in seeking and

passing on rumors about the RIF. Most of these quickly pointed out that they would not relate any restricted information received officially from their supervisors. The six remaining indicated that they did not actively ask for RIF information but neither did they refuse to listen to apparent rumors from other employees. They also indicated that they either entirely refrained from further relating rumors or that they only passed "accurate" rumors to friends who they felt would be affected by the rumored action. Accurate rumors were generally defined as unofficial information obtained from a person who: 1) was in a position to know the facts, or 2) through past results had been judged as a source of accurate rumors, or 3) had never previously been considered a "rumor monger" and therefore must be relating the truth.

It is interesting to note that all but one employee interviewed believed that a majority of his peers were engaged in either generating, seeking, or passing on rumors. In addition, all supervisors and all but one employee strongly indicated that such rumors were not in the best interest of the organization. Reasons for this opinion include lowering of employee morale, inefficiency due to time spent discussing rumors, and loss of confidence in the NASA organization and management due to the misconceptions arising out of such rumors. One engineer had a different opinion and indicated that rumors were probably better than no information at all based on the theory that something is better than nothing.

Most supervisors were aware that rumors were plentiful during the RIF proceedings but probably did not realize the extensiveness of grapevine activity. The bosses were generally not included as part of

the grapevine and also had less need for rumors because hopefully they were an active part of the RIF proceedings.

When asked how LRC could minimize the effects of rumors spreading through the grapevine during a major organizational change, the employees and supervisors all basically had the same suggestion: Management should quickly and simultaneously inform everyone about all decisions affecting the employees as they are made and relate all non-proprietary information concerning the change to the employees.

According to government policy, a reduction in force at a government agency cannot be used by management to eliminate marginally performing employees since other means are available for such action. However, a rumor had been circulating that management would use the RIF to get rid of undesirable workers. In order to assess the extent of this rumor, the interviewees were asked whether they had heard the rumor and how did they evaluate the truthfulness of the rumor. All the employees responded that they had heard such a rumor and all but one believed that the rumor was true, basically because it was a logical management approach. Most indicated that, in their opinion, management would try to hold on to the good employees but would do so within the applicable government regulations. When questioned further, the interviewees unanimously approved this approach rather than the alternative of "letting the chips fall where they may." This unanimity was surprising because three of the employees interviewed indicated that they would probably be adversely affected if management chose to protect the quality employees during the RIF.

Summary

There are numerous ways to measure the effectiveness of employee communications within an organization. The method chosen for the NASA Langley Research Center involved personal interviews with 20 engineers and scientists and six supervisors having a wide range of academic background and professional experience and with six of their supervisors (Section Heads and Branch Heads). In order to assure consistency, the same set of questions was used during each interview, but the interviews were allowed to diverge somewhat from the set format in order to let the employee express himself with a minimum of constraint. The managers were asked questions concerning their men rather than themselves.

The questions were grouped into categories to cover the usual areas of Upward, Downward, Lateral and Personal communications in addition to the communication problem areas of Communicating Changes and Grapevine Activities. The questions have been listed, the responses compiled, and the results of the interviews discussed in this chapter. An evaluation of the effectiveness of employee communication at Langley Research Center, as well as a number of conclusions and recommendations based on the interview results, are included in the following chapter.

VI. EFFECTIVENESS OF EMPLOYEE COMMUNICATION

Recapitulation

An attempt has been made to study and determine the effectiveness of employee communication existing at the NASA Langley Research Center. The term employee has been defined to encompass only the professional engineers and scientists at the Center. To obtain an understanding of the subject organization, an organizational analysis including history, purpose, structure, and employee education and salary has been performed. In addition, the upward, downward, lateral, and informal vehicles of employee communication utilized at the Center have been reviewed.

The study has concentrated on two areas involving employee-management communication which involved personal interviews with supervisors and employees. The first area dealt with the communication approaches utilized by management in dealing with employee criticism and major organizational changes. These approaches are compared with techniques recommended in publications relating recent research in employee communication. The second area addressed the effectiveness of several aspects of employee communication but focused on communication subsequent to a Center reorganization and during the implementation of a reduction in force at the Center.

Evaluation of Results

Twenty employees classified as scientists and engineers having a wide range of academic achievement and years of working experience with NASA, and hopefully representing a cross section of Langley Research Center employees were interviewed. In addition, six lower and middle level managers were interviewed to determine their techniques in employee communication and to give the management's side to the questions asked the employees.

The interviewees were not randomly selected on the basis of age, working experience, and academic achievement and, in the opinion of the author, represent a good statistical cross-section of the LRC technical professional population.

Both employees and supervisors are satisfied with the role of the employee in communicating items of a technical nature with their supervisors and to high levels of management. This is particularly true when such items are being championed by lower and middle management and the employees' contribution is limited to technical matters. This situation often exists for RTOPs, Work Units, and Project Description Documents because the supervisors and engineers work as a team while preparing these documents. The supervisors rely heavily on employee contributions for these documents and the employees are willing, and in some cases insistent, that they do so. Everyone seems to feel that the status quo in this area is best for the individuals and organizations concerned. However, the effectiveness of employee communication in situations where the proposed research task originated with the employee has not yet obtained the full support of management and requires additional Center resources is another matter. Here the research engineer

is usually on technically firm ground and is at best the technical peer of any higher level decision maker. The only question is how well his proposed task stacks up against others in the eyes of management who are working with a restricted budget. The employees indicate that a large number of technically sound proposals have been killed during the past several years without adequate explanation. They feel that either their supervisors "don't know" or "won't tell" why their proposal was not approved. Yet management indicates that the reasons, whether technical or budgetary, are always provided to the interested engineers. Obviously this is a situation where communication between supervisor and employee is not effective and must be improved particularly since the prospects for any expansion in aerospace research are dim for the near future. One method of improvement would require the level of management responsible for killing a proposed or existing project to either prepare a memorandum or hold a meeting for all concerned where the rationale behind the decision was explained in detail and the alternative course of action chosen by management discussed. Restricting such explanation and discussion to management who would in turn inform the employees is not sufficient.

How effective is LRC in informing the employees about organizational policies, goals, and objectives? Most employees are seeking more information of this type. The recipients (GS 13 and above) and readers of "NASA Activities" indicated much greater satisfaction in this area than did the other employees who received information only from green sheets, announcements, and brochures provided by the Center. This document (discussed in Chapter 3) often includes portions of presentations to Congress, significant speeches, and letters to the employees by top

NASA management dealing with NASA policy under existing national goals. A possible solution to increase the effectiveness of employee communication would be to issue all employees copies of "NASA Activities" which would provide information about the entire NASA organization. To provide more information about the path of LRC in particular would require either an expansion of "NASA Activities" to include more information about the field centers or a separate parallel publication focusing on the goals and activities of the Center.

In general, the employees are satisfied with or at least are little concerned about the officially provided methods of non-technical communication among employees as represented by the "Langley Researcher". Although some suggested improvements in the paper were offered, the current status of lateral non-technical communication evidently meets the needs of the employees. In addition, the communication techniques utilized by management in dealing with their men on such personal matters as pay raises, employee performance, and working environment are very effective and no changes are recommended. Such a good relationship in this area is probably a characteristic of most scientific research organizations where there exists no peer group division between the research engineer or scientist and his immediate supervisors.

From the technical or scientific viewpoint, the orientation procedures provided by Langley Research Center satisfy the majority of new employees although several complained that too much material was presented in too short period of time. However, both the physical orientation aspects, dealing with the location of employee support facilities, and the procedural aspects, dealing with the preparation

of administrative forms should receive more emphasis during the orientation program for new employees.

The interviews indicate that the employees were very dissatisfied with the amount of information they received concerning the last reorganization and the RIF. Even though a certain amount of concern and apprehension among employees is natural during such significant organizational activities, the general dissatisfaction evident during the interviews indicate a lack of management employee communication during both events. Most employees felt that their personal concerns were not considered by management and they were considered only as commodities to be juggled by management. The important thing here is not whether or not the employee feelings reflected fact but that the employees were allowed to exist in an environment where such feelings could develop. The employees indicated overwhelmingly that they were not satisfactorily informed about the objectives of or details of implementation for either the reorganization or the RIF. Obviously the management approaches utilized at LRC to communicate major organizational changes to the employees are not totally effective. Whether or not they are intended to be is not a question addressed by this thesis. In all probability all non-restrictive information concerning these events were provided middle and lower management. However, due to implementation uncertainties, potential legal problems, and possible government regulation violations, the supervisors may not have been directed to pass all details to the employees. Nonetheless all aspects of the NASA would benefit if management would establish a policy and guideline for the dissemination of all non-restricted information to employees concerning the objectives and details for implementation of actions which could be categorized

as major organizational changes. A major feature of the policy should be to quickly and simultaneously supply the employees the non-proprietary details of all action related to the change which could concern the employee.

Conclusions and Research Findings

As stated earlier twenty employees randomly selected out of a population of 1631 is statistically inadequate if one is seeking conclusions based on a high degree of confidence. However random selection processes were not used in choosing the employees to be interviewed. Instead the interviewees were carefully selected on the basis of age, working experience, and academic achievement. In the opinion of the author, the engineers and scientists are a sample whose responses reflect the concensus of the total LRC technical professional population. As with any statistical analysis based on a small sample, any inferences, conclusions or research findings are only probable and are not conclusive.

1. Few barriers or lack of opportunity exist for technical or scientific communication between employee and his supervisors at LRC. All engineers judged their supervisor as being both technically able and willing to discuss any items of a technical nature with their men.
2. Management is remiss by not providing interested personnel with the rationale behind the cancellation of existing projects or the disapproval of proposed research projects. Here the employees feel that the communication is all one way and consequently seek more "recommunication" from management.

3. The employees are, in general, adequately informed about the normal operational aspects of the Langley Research Center.
4. During normal Center operations (i.e., no major organizational changes) a very effective supervisor-employee communication link exists concerning pay raises, performance, working environment, and other matters of personal concern to the employee.
5. Current orientation procedures are inadequate in the areas dealing with the location of employee support facilities (e.g., cafeterias, material reproduction and badge office) and the preparation of administrative forms (e.g., travel requests and purchase requests).
6. During the past two major organization events (reorganization and RIF) management-employee communication was ineffective, resulting in much employee apprehension and extremely high grapevine activity.
7. No consistency exists among supervisors in communicating organization actions (such as reorganization or a RIF) which generally are preceived as a personal threat by the employees. Consistency is mandatory to alleviate the information imbalance among employees which generates inefficiency due to more "bull sessions" and grapevine activity.

Recommendations

1. Objective: Improved employee understanding of why a proposed or existing research task was killed.

Goal: Maintain high morale among employees. Help assure a continuous stream of fresh, new scientific proposals from the creative staff members.

Method: Require the level of management responsible for killing a proposed or existing technical project program, area, task, etc., to either prepare a memorandum or hold a meeting for all employees concerned where the rationale behind the decision is explained in detail and the alternative course of action chosen by management discussed.

2. Objective: Satisfy employee desires for a better understanding of the goals, objectives and policies of both the NASA and LRC organizations.

Goal: Suppress the fears and anxieties of employees concerning the future of their employer.

Method: Distribute "NASA Activities" to all employees. Also expand "NASA Activities" to include more information about the field centers or provide a separate parallel publication focusing on the goals and activities of the Center.

3. Objective: Provide more effective employee orientation program.

Goal: Eliminate confusion and wasted time associated with the day to day employee activities.

Method: During orientation procedures, place more emphasis on telling the new employee the location of such employee support facilities as the cafeteria and reproduction and more emphasis on the preparation of administrative forms.

4. Objective: Increase the effectiveness of management-employee communication during major organizational changes.

Goal: Reduce employee apprehension and subsequent grapevine activity and consequently increase employee effectiveness during major organizational changes (e.g., reorganizations and RIFs).

Method: Establish a policy and guideline for the rapid and simultaneous dissemination of all non-restricted information to employees concerning the objectives and details for implementation of actions which could be categorized as major organizational changes.

5. Objective: Establish consistent management techniques for communicating information about major organizational changes with the employees.

Goal: Reduce employee inefficiency and apprehension resulting from an information imbalance among employees during major organizational changes which are preceived as threats by the employees.

Method: Formulate a uniform approach dealing with management-employee communication during such an event and instruct management in its implementation prior to the event occurring.

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