TECHNICAL WRITING IN THE AEROSPACE INDUSTRY: THE EDUCATIONAL BACKGROUND, DESIRABLE QUALITIES, EXPERIENCE AND SALARY OF THE WRITER; THE NUMBER OF WRITERS; THE POSITION AND NORMAL RESPONSIBILITIES OF THE TECHNICAL WRITING DEPARTMENT WITHIN THE COMPANY

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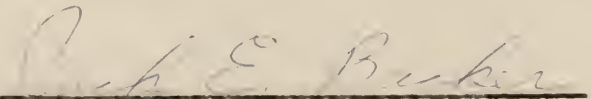

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CHAPTER I

INTRODUCTION

> "Except as ye utter words easy to be understood, how shall it be known what is spoken?"
> --St. Paul to the Corinthians

The problems of communication are not new. But these old problems are compounded when they are considered against the background of the startling increase in technical material to be communicated. This justifiably has been called an "information explosion."

One publications manager has given what he calls "conservative" estimates of where this information explosion will lead within the next five years:

*Gross National Product: It was $350 billion in 1950 and $500 billion in 1960; it will reach $700 billion by 1970.
*United States labor force: It was 65 million in 1950, and will climb to 87 million by 1970.
*Technical and scientific community: It was 1 million in 1950 and 1.25 million in 1960; there will be 1.5 million by 1970.
*Research and development expenditures: These were $2.25 billion in 1950 and $12 billion in 1960, and will rise to $28 billion by 1970.
*Technical books: There were 1,000 issued in 1950 and 1,500 in 1960; there will be 2,000 in 1970.
*Published technical articles in the United States: There were 650,000 in 1950; there will be 1.2 million by 1970.
*United States military technical manuals: There were 20,000 published in 1960; by 1970, 30,000 will be published annually.

*United States industrial manuals: In 1960, there were approximately as many technical manuals published for industry as for the military--20,000. In 1970, the civilian market will be larger than the military

*Unpublished United States research and engineering reports: In 1960, there were approximately 437,000; by 1970, there will be 600,000 each year.

*Technical proposals: There were 25,000 in 1960; this number will increase to 50,000 annually by 1970.

*Total number of technical publications: The addition of these estimates, with an extra 25 per cent to cover various media of commercial technical communication, such as trade and technical magazines, technical advertising and sales literature, brings the predicted 1970 total to nearly 2.5 million publications.

*Dollar value: This technical documentation cost $2.3 billion in 1950 and $4.3 billion in 1960; the cost will be $7.5 billion in 1970.[1]

It was estimated that, in 1961, approximately $2 billion out of a total defense budget of $40 billion was spent for documentation.[2] There is no reason to believe this ratio is any less in 1965.

That the presentation and documentation of scientific and technical information occupy so large a place should be no great surprise, because the scientific method depends on recording results.

As Stuart Chase has pointed out:

> The scientific method demands that whatever B finds can be so clearly communicated to A, that A can repeat the same experiment and either reach the same conclusion, or report that B seems to be in error. The description is thus as important as the

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[1]F.M. Van Sickle, "Introduction to the Education and Training Session," Society of Technical Writers and Editors, Proceedings of the Seventh Annual Convention, (Chicago, 1960)

[2]Charles P. Bourne, "The Beginnings of Automation of Technical Drafting, Writing, and Editing Functions," Society of Technical Writers and Publishers, Proceedings of the Eighth Annual Convention, (San Francisco, 1961), footnote, p. 57

> experiment, for if the latter cannot be communicated it might as well never have been made.[1]

This paper is not concerned with the broad spectrum of scientific and technical writing, but only with that narrow band concerned with what is produced by the aerospace industry. Yet the same principles apply: there is overriding importance placed on accuracy, and there is a communication that must take place between writer and reader.

Equipment has grown so complex that it must be accompanied by instructions in its use. As Allan Lytel, director of Publications at the Avco Corporation, has pointed out:

> Instruction books or manuals are necessary in industry and government. Every piece of military equipment--every truck, tank, radio set, guided missile, or aircraft--requires an instruction book. Complex electronic and mechanical systems are needed by the military, but these must be operated and maintained, often, by unskilled men under great pressure.[2]

The point about the need for communication is echoed by Henry E. Marschalk of the Publications Branch of the Navy's Bureau of Ordnance: "Because of the extreme complexity of today's industrial machinery and weapons defense . . . technical manuals must be prepared according to new high standards of ready understandability."[3]

It has been impossible to separate the description of the

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[1]Stuart Chase, Power of Words, (New York: Harcourt, Brace, and Company, 1953), p. 112

[2]Allan Lytel, Technical Writing as a Profession (Cincinnati: by the author, 1959), p. 6

[3]Henry E. Marschalk, "Technical Manuals: Their Increasing Importance to Industry and Defense," Science, April 15, 1955, p. 539

equipment from the equipment itself, as is pointed out by Ralph L. Cummins, manager of the Writing Section, Publications Branch, of Chrysler Corporation. He said:

> Technical manuals are an essential part of a weapons system and are just as much a component of a missile as the nose cone. Without manuals, "the bird cannot fly." In the weapon system concept, the hardware and the men who operate and maintain it are inseparable. These men must be given accurate, reliable, up-to-date information on the operation and maintenance of each component of the entire system. Our manuals provide this information. They must be as accurate and reliable as the weapon system they support.[1]

The impression that technical writing is a new field must not be allowed to remain. It is, in fact, older than history itself. Dr. Herman M. Weisman, Chairman of Technical Journalism at Colorado University, brought this idea into sharp focus:

> Technical writing might be traced to the prehistoric cave paintings in France and Spain, which describe pictorially man's techniques for hunting buffalo. More directly, technical writing had its origins in the earliest cuneiform inscriptions of the Akkadians and the Babylonians. Modern science had its beginnings in Babylonia. The ancient Babylonians achieved many accomplishments in astronomy and mathematics; they were the first to divide the year into 360 days, and the circle into 360 degrees. They were also our first agricultural scientists. We know this from their technical writing which has survived in the form of clay tablets. In the New York Metropolitan Museum, for example, is a clay tablet of about 2000B.C., a technical manual, which gives instructions on the proper making of beer.
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> The Egyptians invented paper. We have remains of Egyptian technical writing in the fields of medicine and mathematics, written on papyrus, dating back to about 500 B.C. Among the more prolific technical writers were the ancient Greeks. Their writings in mathematics, the

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[1]Ralph L. Cummins, "Industrial Training of Technical Writers," Society of Technical Writers and Editors, Proceedings of the Seventh Annual Convention, (Chicago, 1960)

> physical sciences, astronomy, biology and psychology were more than a historical curiosity. Present-day mathematics, physics, and medicine show the influence of Euclid, Archimedes and Hippocrates. Aristotle's writing on physics, astronomy, biology and psychology were used as texts far into the 15th Century. Writers today may learn much about principles of writing from Aristotle's Poetics and Rhetoric.[1]

In more recent years, the predecessors of today's technical writers began to apply their talents to military equipment. The early military manuals contained, within one cover, all weapons of one branch of service, such as the artillery or the infantry. The types of weapons, their use and their maintenance occupied no more than a single manual. The first technical manual for a specific weapon was written in 1856 by Commander John Dahlgren to describe an advanced type of naval gun. Thereafter, there appeared other special instruction books on such weapons as the Gatling machine gun.[2]

As weapons grew more complex, the manuals describing them grew more lengthy, until the number of manuals required by today's sophisticated weapon systems strains the imagination. Lieutenant Colonel Frank E. Napper of the Army reported that documentation for the Nike-Hercules surface-to-air missile involved sixty-three technical manuals and seventy-one supply manuals, representing a total of 1200 pages.[3]

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[1]Herman M. Weisman, Basic Technical Writing (Columbus, Ohio: Charles E. Merrill Books, Inc., 1962), p. 2

[2]Ibid., p. 3

[3]LtCol. Frank E. Napper, "Preparation of Ordnance Publications for Guided Missile Systems," Society of Technical Writers and Editors, Proceedings of the Sixth Annual Convention, (Washington, D.C., 1959)

The author has had experience as a member of the launch crew of a liquid-fueled intercontinental ballistic missile. The operations manual, which merely summarizes the functions of the various missile and missile silo sub-systems, is nearly 400 pages long. The more detailed operations and maintenance manuals occupy seven standard bookshelf sections. But these manuals only give information on equipment maintenance and repair that can be done at the site itself. When more extensive maintenance is required, the equipment is returned to the base or depot, where still more lengthy technical manuals describe maintenance and repair procedures.

With equipment this complex, and so much at stake in its faultless operation, the standards of technical writing must be set high. In the view of Dr. Morris Freedman:

> Technical writing calls for the same kind of attention and must be judged by the same standards as any other kind of writing: indeed, it calls for a greater attention and for higher standards. And I say this as a former science and medical writer for the popular press; as a former writer of procedure manuals and directives for the government; as a former editor of technical studies in sociology, statistics, law, and psychology; as a former magazine editor; as a writer of fiction, essays, and scholarly articles; and, not least, as a professor of English. We can see at once why technical writing must be measured by higher standards, or, at least, by different ones, if anyone will not grant me they are not higher. Technical writing is so immediately functional. Confusing directions accompanying an essential device in a jet plane may result in disaster; bad writing anywhere else can have as its most extreme effect merely boredom.[1]

Because the Armed Forces represent the largest customer

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[1]Dr. Morris Freedman, "Seven Sins of Technical Writing," Technical Writing Review, IV, no. 2 (June, 1957), p. 23

for this sort of technical writing, it is appropriate to consider to what extent they rely on these manuals. Commander Charles W. Postlethwaite, USN, gave this information:

> Our manuals are designed to serve several purposes. First, we must include technical information in a form to be useful to Command and/or Management. Second, the operator of the equipment must turn to the manual for detailed instructions in the operation of the equipment. Third, the manual is the source of detailed technical data required by the maintenance personnel. Fourth, the manual serves as the text for the Navy Class C schools. Fifth, the manual must be used by personnel, both yard and shipboard, to effect installation of the equipment. And sixth, the manual is an important part of the technical documentation package used for follow-on procurement of the equipment itself. So it becomes readily apparent that technical manuals come very near to being "all things to all people."[1]

The Air Force keeps in its current files approximately 80,000 technical manuals. The technical order program is a dynamic one, with about 25,000 changes, revisions, or new manuals each year. In fiscal year 1963, keeping technical manuals up to date required approximately 2.2 billion pages. These were distributed to 1,300 units.[2]

Standards of military technical writing exert great influence on the aerospace industry, because much of the technical writing done in that industry must meet those standards. The various issues of military specification MIL-M-5474 outline these requirements for writing. For instance, military

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[1]Cdr. Charles W. Postlethwaite, USN, "Potential Application of Graphic Techniques for Data Documentation," Service Publication Committee, Aerospace Industries Association, Program and Presentation Delivered at the Government Day Meeting, (Philadelphia, April 22, 1964)

[2]LtCol. Richard S. Robinson, USAF, "Technical Manual Management," Ibid.

specification MIL-M-005/74C states:

> The text shall be factual, specific, concise and so clearly worded as to be readily understandable to relatively inexperienced personnel. It shall:
> 1. Provide sufficient information to insure peak performance of the equipment.
> 2. Omit discussions of theory except where essential for practical understanding and application.
> 3. Reflect engineering knowledge in the most easily understood wording possible.
> 4. Avoid technical phraseology requiring a specialized knowledge, except where no other wording will convey the intended meaning.
> 5. Contain essential information from other publications, condensed and modified as necessary.[1]

Technical manuals are the most important phase of technical writing, from the user's or customer's point of view. These manuals describe the operation and maintenance of a piece of equipment, generally broken down into seven chapters: (1) general description, (2) initial preparation for use, (3) operating instructions, (4) principles of operation, (5) organizational and field maintenance, (6) overhaul, and (7) parts list or parts breakdown.

This type of manual usually is prepared according to a rigid writing specification, particularly if the equipment is to be sold to the Armed Forces.

There are, however, other types of technical writing.

1. Technical reports are usually for intra-company use. They might be evaluation reports of specific products under investigation; progress reports on projects being undertaken; investigation reports, perhaps dealing with the feasibility of certain processes; or process reports, step-by-step narrations

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[1]quoted in Writing Group Procedures, number 3.0, Ling-Temco-Vought Aeronautics Division, April 15, 1964 (mimeographed)

of what was done to bring about certain results.

2. Technical proposals are designed to convince a potential customer that the organization is capable of conducting certain research, or a development or production project. These proposals range from a simple letter to masses of data. One manufacturer spent $1 million in developing its proposal on the C-141 jet transport project. The proposal ran to 11 printed volumes of 75 to 100 pages each, plus a non-technical summary. In addition, a full-scale wooden mockup of the proposed design was presented. The total contract was estimated to be worth $1 billion.[1]

3. Technical articles are those written for publication. They may be magazine articles, books, or newspaper articles; they may be for general circulation, for school purposes, or for appearance in trade publications. Many firms encourage their technical people to write these articles, both as a means of broadening the individual and as a means of attracting potential customers and building up the firm's reputation.

4. Technical films often give the most graphic demonstrations of processes or concepts. Scripts for these films are a form of technical writing.

5. Technical advertising and publicity are methods the manufacturer uses to let the general public and potential customers know of scientific or engineering advances.[2]

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[1] A. Stanley Higgins, "News and Views," STWP Review, October, 1963, p. 28

[2] For a full discussion of these types of writing, see Richard W. Smith, Technical Writing (New York: Barnes & Noble, Inc., College Outline Series, 1963)

It is necessary to have a definition of technical writing that will cover these activities. Harold S. Black, a member of the technical staff of Bell Telephone Laboratories, defines good technical writing as "the creation of technical communication put on paper to be subsequently read and adequately understood by each reader."[1]

There are two aspects to this definition. The first is that technical writing deals with technical subjects in which, as already pointed out, accuracy is important. The writer must understand the subject if he is to write intelligently about it. The second is the problem of communication--that is, the writer must make clear to the reader what he means to say.

And communication is, of course, the particular service the technical writer provides. He is a writer of technical information, but the key concept to keep in mind is the burden of communication. Irving Khan, President and Chairman of the TelePrompTer Corporation, put this burden in an unusual light:

> So there are many definitions of that word--communication. But all fall short unless they take into consideration the factor of the last quarter-inch. In short, it is not enough to carry a message to Garcia. To be truly effective, we must be certain that Garcia understands the message.
>
> This is the mission of the technical writer. His is the vital responsibility of taking complex information and breaking it down into bite-size chunks for the layman.[2]

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[1]Harold S. Black, "Modern Communication Concepts Fundamental to Good Technical Writing," STWP Review, January, 1963, p. 23

[2]Irving Khan, "The Last Quarter-Inch," Society of Technical Writers and Publishers, Proceedings of the Eighth Annual Convention (San Francisco, 1961), p. 12

On the technical writer rests the complete responsibility for communicating meaning. He often works closely with the engineer, who furnishes him with the needed information. This relationship between writer and engineer was discussed by John V. E. Hansen, business manager of the National Research Corporation:

> Technical writers are not intended to relieve engineers, either wholly or in part, of the responsibility for the technical accuracy of the material prepared. Basically, the technical writer is charged with the responsibility of enhancing the engineer's work by seeing that technical data is issued in its most attractive, accurate and useful form, consistent with the specifications involved. Thus, the work of the technical writer is always subject to final review by the engineer.[1]

But different companies have different policies on whether the technical writer assumes responsibility for the technical accuracy of his work. The Ling-Temco-Vought Aeronautics Division follows the principle outlined by Hansen:

> The writer is responsible only for his craftmanship, which includes accuracy and thoroughness. The engineering project office for any particular system is, on the other hand, responsible for the validity of all data pertaining to the system. Through the project office, Technical Publications obtains a formal technical review of the writer's product as protection against misinterpretation of the designer's intent.[2]

In other organizations, writing is considered part of the complete engineering package. Henry A. Pohs, of the Engineering Department of the Gardner-Denver Company, believes that "one of a designer's last duties, once a new product has

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[1] John V. E. Hansen, "How to Use Technical Writers to Increase Efficiency of Engineering Functions," Machine Design, November 28, 1957, pp. 94-95

[2] Writing Group Procedures, p. 23

been designed, developed, and tested, is to inform others what he's accomplished." Pohs advised engineers to "consider the written information about a product as part of your complete design commission."[1]

Lytel defined technical writing in more functional terms: "A technical writer does three things: he gathers facts, he organizes the collection of material, and he writes, illustrates and presents the information in a manner most suitable to his audience and the purpose of the specific publication."[2]

A more colorful and descriptive definition of a technical writer was given by Professor Donald L. Sears of the Department of English at Upsala. He called them "mugwumps who . . . can carve a career on the edge where two disciplines meet."[3]

The term "mugwump" is not in general use, but there are many other titles used throughout industry to describe this individual.

He is variously called "technical writer," "engineering writer," "specification writer," "technical editor," "technical report writer," "publication aid," "publications engineer," and the like.

It is not the purpose of the writer to determine the best name for this individual. It seems, however, that the best

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[1]Henry A. Pohs, "Engineers Write News?" Product Engineering XXXV, (January 6, 1964), p. 78

[2]Lytel, p. 4

[3]Donald A. Sears, "Wanted: More Mugwumps," Association of Technical Writers and Editors, and Society of Technical Writers, 1956 TWE-STW Convention Proceedings, (New York, 1956), p. 75

generic name is "technical writer," and this title will be used throughout this paper to describe the individual who either gathers and writes technical information, or edits for format and readability technical information furnished by other individuals.

Enough information already has been presented in this paper to give indication of the basic problem encountered in this study of technical writers. Because they work, as Sears has said, "on the edge where two disciplines meet," there is no single approach that can be used to describe them. They belong to the technical world, and yet they belong to the world of communication as well. This dualism is reflected in the backgrounds of individual technical writers, in the orientation of different technical writing departments, and the activities of the writers in these departments. These factors will be examined at length in following chapters.

CHAPTER II

METHODOLOGY

The first consideration in approaching the study of technical writers was to narrow the field of inquiry. There are technical writers in medicine, agriculture, the natural sciences, forestry, home economics, and a host of other fields. Each writer must gather information from his field and communicate it to an audience, either inside or outside the field.

It was decided to restrict this study to the field of aerospace technical writers both because of the author's experience and interest in the field, and because it was a readily identifiable field with large numbers of technical writers in a relatively small number of companies.

A review of publications revealed that there was little previously published information in this field. There are many articles dealing with proper methods of technical writing: hints on how to prepare proposals, proper steps in making out technical reports, and suggestions for writing and selling technical articles. But the men who do the writing were generally neglected.

The only way to get the necessary information was to go to the aerospace industry. For this purpose, the author

used the membership rolls of the Aerospace Industries Association of America, Inc. This association is composed of 61 major companies manufacturing aircraft, spacecraft, missiles, propulsion systems, accessories and supporting equipment. Association members employ more than 700,000 people and produce some 85 per cent of the nation's defense and space hardware.[1]

The aerospace industry is the nation's biggest employer, with more than 1,200,000 on its payroll, including a third of the nation's scientists. It has over $20 billion annually in sales, second only to the automobile industry. About 85 per cent of its business is with the government--primarily the Defense Department and the National Aeronautics and Space Administration.[2]

A visit by the author to the Beech Aircraft Corporation in Wichita, Kansas, was of help in understanding how technical writers fit into the structure of the organization and in drafting questions for the survey questionnaire.

The questionnaire, two pages long, was printed on yellow stock and mailed to aerospace companies, along with a cover letter and a pre-printed, stamped return envelope. See Appendixes A, B and C.

The questionnaire was designed to be filled out by the

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[1] Policies, Procedures, Practices of Product Support Committee, Spare Parts Committee, and Service Publications Committee, published by the Aerospace Industries Association of America, Inc. (Washington, D.C., undated)

[2] The National Observer, April 19, 1965, p. 7

individual responsible for supervising the work of technical writers in these companies. The author concentrated on this individual as representative of the highest qualities and most desirable academic and experience background in the technical writing field, and as a point of contact with all technical writers within the company.

There were two major considerations in following this procedure.

First, it was felt that these managers were in the best position to specify what a technical writer should possess in the way of background and experience.

Second, and as a practical matter, it was felt that many managers would object to providing detailed information on the academic level and background of experience of each of their writers, particularly with a large group. It was feared that too many managers would refuse to answer such a detailed questionnaire, thus destroying the value of the entire survey.

A total of 217 questionnaires were mailed on March 19, 1965, addressed to Aerospace Industries Association members and the various independent divisions of these companies. It was reasoned that, when a company had a number of divisions, the majority of technical writers would be found in the divisions, rather than at the address of the parent company.

The initial mailing was followed up 19 days later, April 7, with a reminder letter. See Appendix D. A third mailing was made April 21 to those who had not responded by that date. This third mailing contained another copy of the

questionnaire and another stamped, pre-printed return envelope, with a cover letter promising that a copy of the results of the survey would be furnished to all respondents. See Appendix E.

The questionnaires were addressed to the "Manager of Technical Publications" of the company or division. It was discovered that this title is not in universal use throughout the industry, but the survey form usually found its way to the proper individual. However, in some companies, such as General Dynamics, it was discovered that there was no one individual in each division responsible for supervision of all technical writers. These companies grouped their writers in various "projects," and the questionnaire was completed by the leader of one of these project groups. To the extent that the writers in other project groups are not included, the compiled results lack completeness of coverage.

But it was felt that these project leaders are in a position comparable to the managers of technical publications in other companies, and their comments are just as pertinent. Their reports have been included with the rest.

A total of 131 replies were received, including 20 which indicated that no technical writers were employed at that location, and one which objected to the form of the survey and refused to answer. One reply answered for the parent company and two subordinate divisions; another answered for two separate divisions.

Eighty-nine replies were received from the first mailing,

twenty-three from the second, and nineteen from the third.

An unusual pattern of returns was noted. Most mass mailing surveys will bring in the largest numbers of answers a few days after mailing. In this survey, however, the pattern of returns was erratic. See Table 1.

TABLE 1

PATTERN OF RETURNS FROM MAIL SURVEY

Date Received*	Number Received	Date Received	Number Received	Date Received	Number Received
23	1	9	3	27	1
M 24	5	10	0	28	3
A 25	16	12	1	29	3
R 26	12	13	0	_ 30	2
C 27	9	14	4	1	0
H 29	14	15	9	3	3
30	0	16	1	4	0
_ 31	5	17	1	5	0
1	9	19	0	M 6	0
A 2	6	20	1	A 7	1
P 3	1	21	1	Y 8	3
R 5	1	22	3	10	0
I 6	1	23	1	11	0
L 7	2	24	1	12	0
8	4	26	2	13	1

*Sundays have been omitted, because no mail was delivered.

A simple code on the survey form identified the answering corporation or division, so that the respondent would not be troubled by follow-up letters requesting the same information he had already furnished.

When replies were received, the results were posted under the various headings, and an attempt was made to group answers to arrive at certain generalizations and correlations.

CHAPTER III

DESIRED BACKGROUND AND QUALITIES OF A TECHNICAL WRITER

Educational Background

There is no agreement on what sort of formal education best prepares a man for the job of technical writing. As a matter of fact, there is some evidence that formal education past high school is not even necessary, in some cases, to do an adequate job. The largest number of technical writers in this survey had college degrees, but a considerable number had only some college education. Over 20 per cent did not go past high school. See Table 2.

TABLE 2

EDUCATIONAL LEVEL OF SURVEYED TECHNICAL WRITERS IN THE AEROSPACE INDUSTRY

Educational level	Number
Ph.D.	3
Master's degree	110
Bachelor's degree	942
Some college	821
High school	481

Yet certainly, the more education, the better. Supervisors of technical writers generally specify some form of college training as desirable, as will be discussed later. The major question is: what sort of education?

One cannot learn much about what is desired in a technical writer by searching the want ads in the classified section of the newspaper. This sort of perusal reveals only that most employers want a combination of Ernest Hemingway, Werner Von Braun, and Norman Rockwell.[1] In practice, employers settle for much less.

The kind of man needed, according to Roger M. D'Aprix, on the writing staff of the Light Military Electronics Department of the General Electric Company, is one who is

> acquainted with the broad principles of science, one who can analyze, observe, and perceive scientific relationships. A thorough knowledge of the theory and application of communication principles is also essential; these are the writer's tools. Beyond this there should be no neat pigeon-hole for his job description.
>
> The only real measure of a tech writer's success is his ability to communicate technical ideas to his audience. If he cannot--regardless of his background, regardless of his degree--he is not a technical writer.[2]

In the survey of the aerospace industry, no attempt was made to discover the academic specialties of technical writers, chiefly because of a fear that such a request to an organization would result in no information. There have been studies of smaller groups, however, which give some indication of the college majors of technical writers.

One survey of technical writers at a symposium of the Professional Group on Engineering, Writing and Speech revealed that thirty-one of the eighty-two respondents did not have a

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[1]Roger M. D'Aprix, "Technical Writing: Superstition and Fact," Electronic Industries, October, 1963, p. 197

[2]Ibid.

college degree. Of the fifty-one with degrees, eighteen specialized in electrical engineering and seven others had assorted "hard science" degrees. Against these twenty-five technical backgrounds, twenty-six respondents had degrees in the humanities.[1]

A survey of the Boston Chapter of the Society of Technical Writers showed that 54 per cent held bachelor's degrees; fewer than 20 per cent of the total respondents held degrees in engineering.[2]

Lytel emphasized the problem of describing the best academic background for a technical writer:

> Technical writing is a peculiar field for many reasons. One of the things which hinders a more rapid development toward professional status is that many writers have come from various educational backgrounds. It is not surprising in a group of technical writers to discover five or six different fields of endeavor which were major studies in undergraduate school. Very few of us in the field of technical writing have ever seriously started on a course of undergraduate study with the ultimate intention of becoming technical writers.
>
> There are two paths which the writer may have taken in his formal education. One of these is the path of scientific education or engineering education. . . . If he was one of the fortunate ones he did some graduate work in the field of either English or journalism before starting his writing career.
>
> The second path is, of course, where the writer did his undergraduate work in the field of journalism, He probably had some courses in science but his undergraduate degree was not in science but was rather in either journalism or English. In order to prepare properly for technical writing he would normally need either additional work or training in the scientific field of his choice.

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[1] Ibid., p. 195 [2] Hansen, p. 96

> One of the most difficult things to measure is which of these two paths has the greatest [sic] chance of leading to success.
>
> . . . . . .
>
> Very probably a technical writer in a highly specialized and technical field, writing what has become known as Engineering data, such as handbooks or engineering reports, really requires a sound fundamental scientific background. On the other hand, a writer whose prime job is the preparation of brochures, proposals, or advertising matter does not need this scientific background. He can do a better job with his journalistic tools.[1]

There are those who take strong positions on either side of the question of whether a technical or a writing education is best for the technical writer. The argument stood in sharp focus at a local chapter meeting of the Society of Technical Writers and Editors in 1958, at which Dr. Harry F. Arader, Project Director of the Development Program at the University of Pennsylvania, and Dr. Sterling P. Olmstead, Head of the Department of Language and Literature at the Rensselaer Polytechnic Institute, debated "What the Technical Writer Needs."

Dr. Arader asserted "an essential difference" between the writer and the engineer:

> The writer deals with symbols, the engineer with actualities.
>
> . . . . . .
>
> What are words other than the more or less arbitrarily selected symbols that man has created? The writer works in the direction of the symbolic, the abstract. . .
>
> The engineer, on the other hand, works in the opposite direction. He casts his mental images into concrete, visual molds. An engineer, after all, is a man who has to do with objects, with mechanisms. . . he must have a strong propensity for going from the ideal to the real. . . .
>
> As the engineer differs from the writer, so also,

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[1]Allan Lytel, "Dismiss or Promote--A Decision Matrix," Society of Technical Writers and Publishers, Proceedings of the Eighth Annual Convention, (San Francisco, 1961), pp. 125-26

> obviously, do engineering tasks differ from writing tasks. As I see it, a blurring, a confusing of these different tasks is the unsound basis of the argument that the technical writer must be an engineer.

Dr. Arader contended that the technical writer trained primarily in writing skills could pick up the special vocabulary he needed during his first months on the job.

Dr. Olmstead took the opposing position: the technical writer does not do writing as his principal job. He is, instead, "a middle-man, a go-between," who needs technical knowledge as basic as possible for his job plus as ability to analyze a communication problem and design a publication which will do the job economically for a particular audience. This technical education is necessary because, as Dr. Olmstead stated:

> He must be able to interpret concepts and systems which have not yet even been thought of.
>
> The greater the difference between the technical level of the subject matter and the technical level of the audience, the greater the need for skilled interpreting. The real problem arises when the technical difficulty of the subject matter is great, and the reader is relatively untrained. The principal function of the technical writer is to solve this problem.[1]

A survey among industrial firms hiring technical writers revealed that seventy-three either required or desired academic degrees in science or engineering, and forty-five either required or desired degrees in English, journalism, or liberal arts.[2]

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[1] "What the Technical Writer Needs," STWE Review, July, 1958, pp. 10-12

[2] B. H. Weil, "The Technical Editor in Industry," STWP Review, January, 1961, p. 7

A more far-ranging survey was aimed at finding opportunities in technical and science writing. Its results were based on replies from 88 industrial and business organizations, as well as 86 publishers and editors, 20 trade and professional organizations, 19 United States governmental agencies, and 6 research foundations. Of this group, 119 required journalism training, and 57 declared it helpful, whereas 114 required engineering training, and 27 said it would be helpful.[1]

Perhaps the most detailed study was conducted among technical writers employed in the aerospace industry in the Dallas-Fort Worth area. Sixty-six technical writers were surveyed, of whom sixty-one reported on their academic standing. The results were placed in four categories: seven held master's degrees, thirty held bachelor's degrees, twenty had done some college work, and four had only a high school diploma.

A breakdown of those holding either master's or bachelor's degrees showed that these thirty-seven individuals had academic majors in twenty different fields. See Table 3.

Among the respondents, none had pursued a technical-writing curriculum, although some reported having taken a college-level course in technical writing at some time.[2]

There are many authorities who, like Drs. Arader and Olmstead, vigorously support either a technical education or a liberal arts/journalism/English education for the writer.

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[1]Susan Shaffer Dibelka, "Training the Technical Writer," STWE Review, July, 1958, p. 8

[2]Charles A. Glauber, "Profile of Technical Writing in the Dallas-Fort Worth Area," STWP Review, October, 1963, pp. 17-18

TABLE 3

ACADEMIC MAJOR FIELDS OF TECHNICAL WRITERS IN DALLAS-FORT WORTH AREA

Academic Major	Number Reporting
Education	8
Engineering	8
Business Administration	6
Physics	6
English	5
Government	5
Mathematics	5
History	4
Biology	2
Economics	2
Journalism	2
Psychology	2
Speech	2
Agriculture	1
Art	1
Chemistry	1
Drama	1
German	1
Sociology	1
Zoology	1

Air Force Brigadier General Dale O. Smith stresses the point that technical knowledge must have first priority. Addressing a group of technical writers, he said:

> I'm convinced that the first requisite of a good technical writer is that he knows enough about his subject to have some real feelings about it.
>
> And when you learn your subject, you'll come to understand who needs to be taught the material. You'll pitch it to them in terms of their interests and levels of understanding. Military writing is no different from writing in any other field, once you learn the military--your subject and your audience.
>
> . . . Technical writing is considered dull, unenduring, and certainly not creative.
>
> This is a fallacy. Some of the greatest of the great writing has been technical. But it springs from a burning desire to teach something that has been learned. In other words, the subject matter, interest

and learning come first, then the writing.[1]

Herbert Bohn Devries, an instructor in English at the College of Engineering of the University of Colorado, believes that an engineer must only "develop a communicative attitude" to succeed as a writer. He continued:

> Once this has been accomplished, problems of syntax and composition can be solved as surely as problems in basic algebra. After all, the engineer has been trained to think logically, to attack problems systematically. And by following any good style manual or English textbook, he can learn where the commas usually go and where they don't. All that is left is that the engineer must want to explain, must enjoy sharing his ideas with others.[2]

This point is reinforced by Professor P. M. Zoll of the English Department of Los Angeles State College. Describing how the engineer can easily write material, he said:

> In developing each of the points he has chosen to include, his common sense will tell him when he has said enough or not enough to suit his reader. He should be able to judge what evidence he will need and whether it is sufficient for his purpose. This involves understanding his reader well, but his common sense has the virtue of being common. Thus he can imagine what his reader ought to know and how much can be taken for granted.[3]

But the idea that any engineer with a desire to communicate, a good style manual and common sense would make a good technical writer is disputed by Hansen:

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[1]Brig. Gen.Dale O. Smith, USAF, "What the Armed Forces Expect of Technical Writers," Association of Technical Writers and Editors, and Society of Technical Writers, 1956 TWE-STW Convention Proceedings (New York, 1956), p. 2

[2]Herbert Bohn Devries, "Writing: Aptitude or Attitude?" Mechanical Engineering, LXXXIII (February, 1961), p. 36

[3]P. M. Zoll, "Understanding the Engineering Writer," Journal of Engineering Education, XLIX (March, 1959), p. 616

> Technical writing is a job for which the engineer is not trained by virtue of his engineering education. Technical writing is a field that requires specialized training--not in writing alone, but in writing, editing, photography, art, layout, reproduction processes, specifications, and the technical area in which the writer is to work.
>
> . . . . . .
>
> Although some engineers can be trained readily to become good technical writers, there are many who would require extensive training. There are some on whom the training would be lost effort. For the same reason that some engineers are temperamentally or mentally unsuited for research work, so there are those unsuited for technical writing.[1]

Warren Wood, uniquely qualified as a member of the Engineering Department of the Convair Division of General Dynamics and an Adjunct Professor of English at Texas Christian University, observed that not all engineers find it as easy to write as others have said it is: "You cannot talk to engineers, read their writing, nor watch their miserable drudging to put a report together without being intensely aware that report writing is without question the least efficient, least liked, most criticized and most deserving of criticism of all the engineer's activities."[2]

This situation is perhaps explained by Robert R. Rathbone, Associate Professor of English at MIT:

> Most engineering students resign themselves at an early stage to a sort of "peaceful coexistence" with such courses "from the other side of the campus," and not infrequently with the English language itself. Some aren't convinced of the importance of developing

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[1]Hansen, p. 96

[2]Warren Wood, "Reporting Through the Looking-Glass," Journal of Engineering Education, XLVIII (May, 1958), p. 722

> their writing skills until they are face to face with their first on-the-job report assignment.[1]

Harold Stephens, a free-lance technical writer, does not believe that a technical writer needs a technical education. He wrote:

> A qualified technical writer does not need a degree from MIT, nor is a technical background necessary. He must be able to do research, have patience, love to write, and be able to communicate his ideas to a select group of readers. He must have a forceful command of the English language. The rest is a matter of practice and training.[2]

An extensive technical background could in fact be a handicap to a technical writer, according to Edwin R. Steinberg. He conducted a study of the communications problems of a major industrial concern, and reported his findings to the 1958 Convention of the Society of Technical Writers and Editors. He told them:

> The single problem referred to most frequently by these people was the difficulty the technical specialist has in writing for someone who is not a specialist in his area. Someone who is scientifically, but not as deeply immersed in either the subject matter or the specific project being reported should not have that difficulty. A good middle man can often understand both the producer and the consumer better than the two can understand each other. A technical writer and editor is in an important sense a middleman.[3]

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[1]Robert R. Rathbone, "Cooperative Teaching of Technical Writing in Engineering Courses," Journal of Engineering Education, XLIX (November, 1958), p. 126

[2]Harold Stephens, "Technical Writing: A New Specialty," Writer's Digest, February, 1959, p. 15

[3]Edwin R. Steinberg, "Developing an Undergraduate Curriculum for Training Technical Writers and Editors," Society of Technical Writers and Editors, Proceedings of the Sixth Annual Convention, (Washington, D.C., 1958)

In another study of technical writing in industry to determine the best academic training for writers, Martin J. Bergen concluded that the orientation given to engineering students was inappropriate for the development of technical writers. At the 1956 Convention of the Association of Technical Writers and Editors, and the Society of Technical Writers, he reported:

> The startling thing that the data constantly showed was that training in engineering subjects, as it is now given to engineering students, was neither appropriate nor effective for the training of technical writers, in spite of the fact that training in the same fields of knowledge was needed in both engineering and technical writing. In addition, it was found that the point of view of the educator had to be entirely different when training technical writers, as compared with the point of view of the educator training students of engineering. These differences in training can be summed up by saying that the engineering student was being trained as a problem-solver, whereas the student in the technical writing field must be trained to go one step past problem-solving--he must be trained as a COMMUNICATOR--and this training must start with his first day as a student in the field!
>
> The technical writer, therefore, must be trained from the start, in the EMPATHIC point of view. . . .
>
> After having "stood in the other fellow's shoes," the technical writer must resume his own personality, and with the information thus collected, he then must be able to communicate with the person he has been visualizing (who, of course, is a member of his audience), in one or a combination of the following languages:
>
> (a) His mother tongue--for example: the English language.
>
> (b) Engineering and Science in Mathematics--the analytical Language of Science and its applications.
>
> (c) The Language of Graphics--the Universal Language by which we communicate with the crafts of the Mechanical and Industrial Trades.
>
> (d) The Language of Behavior, of the objective type which encompasses trade and craft "know-how."
>
> (e) The Language of Feeling and Behavior of a reactionary or an emotional type which encompasses the language of art, perception or feeling.

> Communication between the technical writer and his audience must be established by means of any of these languages, or any combination of them. Communication will fail to be established if the writer fails to use language which is understood, believed, and used by his audience.[1]

Larry Pathe, a technical editor in the Product Support Publications Department at General Electric's Flight Propulsion Division, is emphatic in stating that a writing background is the best training for technical writing. Speaking to writers, he said:

> A large segment of the technical writing fraternity considers an exclusively technical background more of a detriment than a help in attaining success as a technical writer. While the curricula of engineering schools contain a smattering of subjects in various disciplines, a particular technological field is rather severely circumscribed. It is unlikely that a mechanical engineer would be able to write satisfactorily on a subject in the field of electronics or chemistry, for example; yet you, as journalist or free-lance writer with a good grasp of the principles of physics and chemistry, should be able to cope with such an assignment without undue difficulty. What you might lack in technical savvy would be offset by your ability to think verbally.[2]

P. J. Kalsem, Engineering Division, Glenn L. Martin Company, observed

> a tendency among employers to specify that technical editors must be engineering graduates. There are definite disadvantages, however, to restricting the source of technical editors in this way, for experience has proved that there are other desirable sources for such talent.
>
> The editor . . . is almost wholly engaged in the communication of ideas, with emphasis on the printed

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[1]Martin J. Bergen, "Formal Training Programs," Association of Technical Writers and Editors, and Society of Technical Writers, 1956 TWE-STW Convention Proceedings, (New York, 1956)

[2]Larry Pathe, "Writing for Industry," Writer's Digest, November, 1962, pp. 24-25

> word and accompanying illustrations. As an editor, he must have enough background to understand the engineering ideas concerned, but his primary attribute is the ability to communicate them effectively to his readers.[1]

Lytel seconds the primacy of the communication aspect of technical writing:

> The technical writer is first of all a writer: he wants to write; he likes to write. His raw materials are the facts of technology and the miracle of science.[2]
>
> (He) is no longer the scientist turned writer, he is a new breed. He does not conduct research, but explains it. Sound scientific knowledge is required, but it should be basic information, not specialized scientific or engineering information.[3]

Aside from the arguments advanced that a technical writer must be skilled primarily in the techniques of communication, there is the question of whether technically trained people are used to most advantage as technical writers.

Richard W. Smith, in his College Outline Series book, Technical Writing, took this approach:

> There have never been enough fully trained technical writers to go around.
>
> Industry has attempted to fill the gap by promoting its best technicians from the laboratory bench to the typewriter--with haphazard results. Engineers have been diverted from active engineering assignments to writing--again with haphazard results. Engineering schools have never been able to give enough course time during the heavy college engineering program to make good expository writers out of good engineers. The use of experienced engineers to produce writing also appears to be a

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[1] P. J. Kalsem, "Educational Requirements for Technical Editors," Journal of Engineering Education, XLVI (June, 1956), p. 832

[2] Lytel, Technical Writing, p. 3 [3] Ibid., p. 25

waste to industry personnel managers.[1]

Hansen also made the point that engineering talent cannot be spared:

> Today, when it is necessary to use our engineering talent as effectively as possible, any attempt to convert experienced engineers (and physicists should be included) to technical writers is, in effect, taking our engineering wealth out of one pocket and putting it into another.[2]

The academic debate could be continued at length, yet the various industries that hire and use technical writers must still develop some practical solution to their practical problem of obtaining somebody who can do the work that must be done.

W. S. Spafford, technical editor at the U. S. Navy Civil Engineering Laboratory, Port Hueneme, California, threw some light on this problem:

> Were I to have the job of staffing a technical writing and editing group--and I have done this--I would look <u>first</u> for someone who had a facility with the language. Then, my acceptance or rejection of him would depend on his interest in and knowledge of things scientific and technical. I would <u>not</u> assume that because he had a degree in the sciences he was, therefore, qualified as a technical writer or editor. Neither would I automatically reject him on that count. People in our field come from both sides of the coin.
>
> Much has been proposed and discussed about the curriculum required for a college or university to graduate someone with a degree in technical writing. Several institutions of learning now offer such degrees. However, the discussions are still going on. Why? I believe it's because successful technical writers and editors feel that whatever combination of talents,

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[1]Smith, p. viii [2]Hansen, p. 96

> education, and experience brought them into the field is the right one.[1]

Results of the questionnaire survey of the aerospace industry have emphasized the validity of this last statement. The men who responded were the supervisors of technical writers in the various organizations and thus, presumably, successful by definition. They were asked to give their own academic backgrounds, and also state what kind of formal education best prepares an individual for technical writing. Fifty-five respondents indicated by their answers that they believed that what they themselves had done was what others should do to prepare themselves for technical writing.

This could, of course, reflect the supervisor's pride in his own attainments, or it could reflect the hiring policies of the organization, which might lean toward one academic field or another because of its own particular requirements.

The formal education these supervisors want for technical writing presents the researcher with the task of reconciling the irreconcilable. There is strong support for both humanities-oriented and technical-oriented subjects. Training in English grammar and composition was desired by forty managers; writing, thirteen; liberal arts with exposure to science or technical subjects in general, twelve; journalism, eleven. Among technical subjects, training in engineering was mentioned

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[1]W. S. Spafford, "Technical Writing and Editing: Profession or Specialty?" Society of Technical Writers and Publishers, Proceedings of the Eleventh National Convention, (San Diego, 1964)

by fifty managers; science, sixteen; electronics, sixteen; physics, nine; technical subjects, nine.

Following are some comments from the managers on what a technical writer needs:

> B.A. or B.S. in a technical or scientific field with a minor in English or journalism, or vice versa
>
> Wide liberal arts background, with technical work in some specialized field.
>
> Technical Writing such as at Purdue University. Next best is science and engineering minors with journalism or English major
>
> A solid technical background (at least six years) with approximately two years college with emphasis on English or journalism
>
> B.S. or B.A. in physical science plus as much English composition and public speaking as possible.
>
> A good technical background (engineering oriented) plus an understanding of graphic arts. English is helpful but it isn't the sole consideration.
>
> Combination of journalism (for writing <u>skills</u>) and technical survey courses (for basic <u>knowledge</u> of subject content)
>
> College work in English composition together with on-the-job technical experience.
>
> Engineering or physics plus extra English--writing, not literature
>
> B.A. (with some technical training)
>
> Engineering or other related technical training, plus technical illustrating and drafting
>
> It is my considered opinion that a journalism or English major who has detoured into the field of Technical Publications is worthless. True, he does a grammatically perfect job of putting together words highly spiced with technical jargon, but which are worthless to the craftsman or the military technician trying to perform a task under field conditions

Basic engineering and English

English and physics

Formal high school or college courses in writing

College education, ideally engineer with writing skills. In practice, we settle for less.

Arts and science (not engineer)

A combination of the engineering and liberal arts curricula, substituting engineering drawing (blueprint reading is vital), mechanics, dynamics, math, electronics, and other physical science courses for foreign language and social sciences.

A technical education in the basic sciences, including physics (lots and lots) and electronics (lots and lots), along with some courses in expression. The type of expression--whether technical or literary--is unimportant.

English major, technical minor. The ability to produce coherent writing takes precedence, in my opinion, over technical competence.

Journalism or engineering

College

Without some inherent writing ability, no amount of formal training will enable a man to become an outstanding technical writer. Courses in English (grammar, punctuation, composition) and many journalism courses would be helpful.

Bachelor of Science degree in Aeronautical Engineering, Mechanical Engineering, Civil Engineering, Industrial Engineering and, of course, advanced degrees in these majors. Subsequent to obtaining such formal education, courses in Business Administration broaden the employee's background and prepare him for "managerial" positions. We have not been successful in utilizing journalism majors in preparing our publications because such men do not possess an adequate technical background to enable them to analyze technical engineering data and convert such data into non-technical prose easily understood by the Customer's personnel.

Technical and English composition

> College degree, strong in English grammar and composition, general science, engineering and mathematics
>
> Anything beyond a 2 year or B.A, B.S. degree interferes with the individual's ability to write to the layman
>
> Technical training mandatory
>
> Either route can be successful--English or journalism with technical aptitude, or science or engineering major with writing aptitude
>
> Business, journalism and engineering students have been successful in our organization
>
> A technician in hydraulics, power plant, electrical, etc., with 3 or 4 years experience who has the ambition to improve himself (night school courses in English grammar and technical writing) is most desirable.

These and other comments on the type of formal training desired in a technical writer are summarized in tabular form in Appendix F. As is evident, it would be impossible to reconcile these statements into a generalization on what these managers as a group look for in a technical writer.

Such comments only point up the problem of describing the "ideal" education for a technical writer. Some authorities attempt to solve this problem by advocating some form of balanced education, with equal emphasis on technical and communications subjects. Edwin R. Steinberg, head of the Department of General Studies in Margaret Morrison Carnegie College of the Carnegie Institute of Technology, stressed such a balance:

> Technical writers . . . need to know enough science to understand the major outlines and implications of a scientific or technical report. That means that they must be trained in the basic sciences: mathematics, physics, chemistry, and biology.

> As professional writers, they should know their language and its resources and how to use them, and something of how it has been used in the past. That means training in composition, journalism, technical writing and editing, the nature and function of language, and literature. And they should have some skill in the artistic and mechanical means by which written language is recorded and presented: typing, layout and design and the graphic arts processes.
>
> As members of the industrial community they must work with all kinds of people and the various institutions of our society. They must also know some psychology, economics and history.[1]

Smith also supports some balance in the education of a technical writer:

> The ideal college training for the aspiring technical writer would not be a specialized education. It is assumed that a young man selecting technical writing as a career will aspire to advance within the field. To do this, he must obtain sufficient practical training in science and writing to enable him to perform adequately during his first few years on the job. At the same time, he must obtain a broad background in liberal education to enable him to advance when the opportunity arises.
>
> The education of a technical writer must create an awareness of the world of science and technology rather than a deep knowledge of it. The actual education of a technical writer is never complete. A shift in company policy may force a man who has spent several years at writing about underwater naval weapons to learn the mysteries of outer space and satellites.[2]

He goes on to describe the "ideal" technical writer's formal education:

> Mathematics: through analytical geometry. The writer must be aware of the scope of the mathematical tools available to the scientist and the engineer.
> Science: physics and biology--laboratory courses, not survey courses. He needs exposure to the laboratory technique and the experimental method that underlie

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[1] Edwin R. Steinberg, "Developing an Undergraduate Course for Training Technical Writers and Editors," STWP Review, October, 1960, p. 16

[2] Smith, pp. 4-5

scientific research.
English: this is the one subject that he must know and understand thoroughly, including at least a year of composition.
Literature: at least two years. Above all the writer should attempt an awareness of style. He should begin to sense that there is a right phrase for a right time.
Language: at least two years of college-level study in a modern foreign language to sharpen the student's thinking about grammatical structure. The search for adequate expression in translation will emphasize the importance of finding the correct word to express the precise shade of meaning.
In addition, there should be courses in the humanities and the social sciences.[1]

Perhaps the root cause of the difficulty in describing the "ideal" formal education of a technical writer lies not in the occupation, but in the specific job that the writer is hired to undertake. Susan Shaffer Dibelka, free lance writer and staff writer for the Institute for Research of Chicago, stated it this way: "To say, dogmatically, that one kind of training, as engineering, or journalism, or liberal arts plus science is best or most desirable, seems to me impossible, unless one specifies also the particular area in which the writer is to work."[2]

D'Aprix gave further insight:

> The term "technical writer" . . . is a misnomer. Subject matter may be technical, but the primary purpose is the same for all writers--to communicate ideas.
> William Gilman, in The Language of Science, states: "Whether the technical writer comes from the science or English corner of the campus matters less than his having a reasoning mind and the ability to explain. Here, then, is a new specialty which is not so highly specialized after all. It isn't so much being 'strong in science

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[1]for a full discussion of this suggested curriculum, see Smith, pp. 5-6

[2]Dibelka, p. 5

and weak in English' or vice versa, as having what a good writer and a good scientist share--awareness of the reader and willingness to work for clarity."

The opposing argument can be reduced to the following statement: any writer not professionally trained in the field in which he is writing cannot do a thorough and accurate job of presenting information because he must depend on others to check the technical accuracy of his writing.

This assertion is based on an erroneous conception of technical writing. Usually the people who offer this argument see the technical writer as the one who refines a batch of raw engineering data sheets into polished technical documents. This individual usually writes instruction books and proposals exclusively. Most want-ads specify this type of person. The trouble is that instruction books and proposals are only two of the many facets of technical writing. Ignored are such chores as editing symposium presentations, converting research findings into reports and signed articles, editing technical house organs, and preparing press releases and speeches.

A good share of industry's technical writing is not original work by the writer. It is instead a professional give-and-take relationship between the technical writer and an engineer with the writer assisting the engineer in documenting his ideas and the engineer checking the work for technical accuracy. Under these circumstances the technical writer is 90% reporter and 10% author.[1]

Smith also pointed out that the job the technical writer is to do determines the qualifications he is to have:

How much technical knowledge and how much writing skill a writer should have is one of the enduring controversies of the field. There is no final answer. This is not an either/or proposition. It is only common sense that these two talents must be combined in the same man, but the proportions in which they should exist depend, in large measure, on the work to be assigned and on the temperament of the writer himself.[2]

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[1]D'Aprix, p. 194 [2]Smith, p. 1

Other Desirable Characteristics

Supervisors of technical writers in the aerospace industry are far from unanimous in listing what other important qualities a writer should have. However, there are a number of factors which appear more often than the rest; and there are no irreconcilable elements, as there were in the description of a desirable academic background.

A composite description of the sort of man sought in the aerospace industry would be a writer who has practical technical knowledge and a flair for expression, a keen mind and a talent for getting along with people, and good work habits. Specific factors mentioned by three or more supervisors are listed in Table 4. The complete list appears in Appendix G.

Charles M. Reesey, in a presentation before the 1956 Convention of the Association of Technical Writers and Editors, and the Society of Technical Writers, summed up the characteristics desired by management in a technical writer:

> 1) A strongly specialized background, obtained either through formal education or experience
> 2) An ability to work with others and gain their trust to develop a team spirit, along with integrity and sincerity
> 3) A knack for knowing what information his readers need
> 4) A firm base in good grammar, as well as the talent to write accurately, concisely, and clearly
> 5) A feeling for illustrations that will make his text more interesting and understandable
> 6) An inquisitive nature and an analytical mind, coupled with the ability to know an interesting story when he sees it and develop it into an article for publication
> 7) An ability to be a tactful critic in reviewing speeches or articles prepared by management or others in the organization

8) A capability to develop himself and grow in his job.[1]

TABLE 4

DESIRABLE QUALITIES OF TECHNICAL WRITERS IN THE AEROSPACE INDUSTRY

Quality desired	Number of managers Listing quality
Writing skill	
Ability to express self	25
Writing to the level of the reader	3
Technical writing experience	3
Knowledge of printing and layout	3
Ability to express complex systems in simple terms	3
Technical skill	
Practical technical experience	25
Mechanical aptitude	4
Basic engineering knowledge	3
Ability to understand mechanisms	3
Knowledge of company's products	3
Mental skill	
Inquiring mind	15
Ability to organize	11
Logical mind	9
Adaptability	8
Common sense	7
"Three-dimensional thinking" (visualization)	4
Imagination	4
Intelligence	3
Creativity	3
Human relations skill	
Ability to get along well with people	34
Work habits	
Industriousness	8
Initiative	7
Ability to work independently	5
Tact	5
Aggressiveness	4
Perseverance	4
Pride in work or product	4
Conscientiousness	3
Concern for detail	3
High energy level	3

[1]Charles M. Reesey, "What Management Expects of Technical Writers," Association of Technical Writers and Editors, and the Society of Technical Writers, TWE-STW Convention Proceedings, (New York, 1956), pp. 6-7

Robert Osborne, a senior writer in the Automatic Programming section of the Burroughs Corporation, outlined these qualities of a technical editor (writer):

> He is trained in logical analysis and objective judgement. In his daily work he makes use of that background, plus (we hope) a great deal of tact. He must always balance his wish for perfection against the available time, manpower and budget, and he must be able to handle a number of unrelated jobs at the same time without confusion. In addition, he must be able to give clear and explicit directions for typing, format, art work, typesetting, layout and printing, which in turn means he must know something about these activities. In short, a technical editor must combine objective judgement with broad knowledge. The perfect technical editor is an infallible machine without emotions; none is known to exist.[1]

Smith stated that the most important characteristics of the technical writer were intelligence, curiosity, appreciation of the importance of detail, ability to grow in scope, and internal discipline.[2]

Dibelka emphasized "the qualities that make up the personality of the writer--the gregarious, impertinent, intrepid, nosy, brazen, curious, everlastingly skeptical mental attitude of the writer."[3]

The more experienced the writer, the more responsibility he may assume. Sundstrand Aviation Corporation has established three classes of writers--project writers, lead writers and group leaders--with increasing qualification requirements and responsibilities at each level. These requirements are broken

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[1]Robert Osborne, "The Technical Editor: Man or Master," STWP Review, October, 1961, p. 11

[2]Smith, pp. 2-4 [3]Dibelka, p. 8

down in terms of expected educational requirements, experience and learning capabilities, initiative, judgement, effort, working conditions, leadership, motor skills, personality, and monetary responsibility.[1]

In-Plant Training of Technical Writers

There is a growing movement to establish some sort of training program within industry for technical writers. One survey of fifty-four research centers and companies indicated much concern in industry about the standards of writing among scientists and technologists.[2]

Another survey of some 300 industrial organizations indicated that 130 firms were already conducting some in-plant training in written communications. Of the remaining 170, 126 stated they believed such training would be helpful; 43 didn't know; 1 stated such training would not help.

Most of the 130 organizations offering this training believed that the writing turned out by their people was not clear and that it was poorly organized, and wordy, with a style ill-adapted to the material. Other areas of concern were poor word choice, punctuation, grammatical and spelling errors.[3]

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[1] Technical Writer Qualifications, Sundstrand Aviation Corporation, Rockford, Ill., (mimeographed, undated)

[2] "Problems of Communicating Scientific and Technical Information," The Engineer, CCXV (February 1, 1963), p. 234

[3] John A. Walter, "In-Plant Training in Technical Communications," Society of Technical Writers and Publishers, Proceedings of the Eighth Annual Convention, (San Francisco, 1961), pp. 36-37

The Aerospace Industries Association conducted a survey of its membership in 1963 to determine how many were training new technical writers. It discovered that roughly half were conducting classes in technical subjects, but only about one in five were conducting classes in basic writing techniques. Most companies relied on training on the job to prepare a man for a writing assignment. See Table 5.

TABLE 5

AEROSPACE INDUSTRIES ASSOCIATION MEMBERS CONDUCTING IN-PLANT TRAINING

Type of training	do	do not
Formal classroom instructions on basic writing	11	45
On-the-job training for specific assignment	51	8
Formal classroom instruction on technical subjects	28	26

[1]

Olmstead is fully in favor of in-plant training as a way of developing technical writers. He wrote:

> It is perfectly clear that technical writers and editors can be developed through on-the-job training. After all, this is the way they have been developed in the past. Most professions were at one time in this position: they first trained practitioners by the apprentice system.[2]

Just where do these trainees come from? Rathbone said

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[1]"Technical Manual Study Results, Service Publication Committee," a publication of the Aerospace Industries Association, Inc., Washington, D.C., March 30, 1964

[2]Dr. Sterling P. Olmstead, "A Graduate Curriculum in Technical Writing," Journal of Engineering Education, XLV (March, 1955), p. 559

most technical writers:

> have entered the profession through the back door: from journalism, from publishing, from sales, from personnel, from public relations, from administration, from science and engineering, from teaching, from advertising, from law, and even from industry's libraries.
>
> Yes, practically all of our experienced technical writers are retreads.[1]

James L. Engfer, of the Engineering Publications Department of Honeywell Aeronautical Division, stated that hiring and training untrained personnel has been "the most successful" method of acquiring a staff. Although Engineering Publications "has no formal training program (because each new employee needs a different level of training), it does have a standard style guide, format rules, and company product line information and regulations which everyone must know and understand."

Engfer estimated it took "from three to six months" for the new writer to become "reasonable effective." One skill cannot be taught, he said:

> the knack of working with other people's words and thoughts. . . . It is the hard-won product of a combination of natural feeling for language and good solid experience in the techniques of both editing and writing.
>
> The rest of the job can be taught or acquired. This would include such things as technical vocabulary, broad acquaintance with technological concepts, specific knowledge of company procedures, familiarity with the contract terms, and basic knowledge of graphics.[2]

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[1]Robert R. Rathbone, "Growth of the Technical Writing Profession," STWE Review, January, 1958, p. 6

[2]James L. Engfer, "Staffing the Editorial Team: An Old Problem for Our New World of Information," Society of Technical Writers and Publishers, Proceedings of the Eleventh Annual Convention, (San Diego, 1964)

The Chrysler Corporation has a more extensive program for training technical writers. Ralph Cummins described it:

> Because this rare breed of cat--the qualified manuals writer--is so rare and because . . . the demand for his services is constantly increasing, we have developed a formal program for training inexperienced, apprentice writers to help us cope with our own "information explosion."
>
> . . . . . .
>
> This six-months training program is divided into two major parts: The first part consists of seventeen weeks of classroom training, including workshops in which the trainees actually write simple manuals to the military specifications. The second part is made up of nine weeks of closely supervised on-the-job training.
>
> . . . . . .
>
> In recruiting and screening candidates for our program, our recruiting and placement departments look for prospective trainees who can meet the following requirements:
>
> 1. A demonstrated ability to learn, as evidenced by high academic records.
> 2. A minimum of three years of mechanical or electrical engineering, graduation from a recognized technical trade school, or a degree in English or journalism.
> 3. Acceptable performance on a battery of seven intelligence and aptitude tests.
>
> . . . . . .
>
> We consider the duration of the entire training program to be a minimum of one year, although the formal program extends for only six months. No matter how well a trainee has mastered his lessons during the six-month training period, rarely could we consider him to be a full-fledged technical writer at the end of the first six months. The trainee's performance during the second six-month period is evaluated frequently. Although he is given increasingly difficult assignments as his progress warrants, he continues to work under the watchful guidance of more experienced writers.
>
> . . . . . .
>
> We consider a training program to consist of three parts:
>
> The first part is the portion we have discussed here today--the training of the apprentice writer who will be able to perform acceptably, after a relatively short period of intensive training, under the guidance of experienced writers.
>
> The second part is the indoctrinating of the newly-hired, experienced writer to the job requirements and concepts of his new employer.

> The third part, and possibly the most important from a management viewpoint, is supplemental and "refresher" training of long-time employees. Even experienced writers must be formally coached to assure continued improvement, and to assure that they will be able to change concepts, and adapt to new situations as the customer and the customer's requirements change.[1]

The Aeronautics Division of Ling-Temco-Vought, on the other hand, does not have a formal training program. Instead, the beginning technical writer progresses from relatively simple assignments to more complex and demanding ones under the direction and guidance of experienced supervisors. This procedure permits productive use of beginning writers' skills without the expense of a formal training program.[2]

It is evident that there is no one best answer to the problem of obtaining properly trained technical writers. Various companies have different problems in what sort of matter must be communicated, and to whom. Not all companies have made satisfactory arrangements to overcome these problems, as evidenced by the concern expressed at some of them over their poor writing.

The technical writer is pulled in two directions. He is expected to communicate with scientists and engineers, understand their language and their thought processes and draw from them, in logical order, the steps they have taken in a particular process or procedure. He also is expected to communicate with his audience, whose education might range from high school

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[1]Cummins, Procedures

[2]letter from R. H. Chambers, LTV Aeronautics Division, Dallas, Texas, Supervisor of Publications Quality Assurance and Requirements, April 13, 1965

through the more advanced degrees, to tell them in terms they can understand what the scientists and engineers are doing.

Either job would be difficult enough. The technical writer must do both.

CHAPTER IV

DUTIES OF THE TECHNICAL WRITER

The field of technical writing, although not new, is still developing. But two monumental studies have been made of the functions of a technical writer.

The first study was developed by the United States Civil Service Commission in 1961; it sets the standards of performance of technical writing and editing in government service. Indeed, it has been said that this standard, GS-1083-0, "more than any other document . . . fixes the nature of technical writing in the United States because the theory behind the criteria guides the personnel divisions of private organizations."[1]

The criteria used by the Civil Service Commission in the evaluation of these positions are the difficulty of the writing or editing project, the extent of originality and initiative required, and the degree of judgement needed.

Five levels of this specialty were established in government service, ranging from GS-5 (virtually a trainee) through GS-12 (an independent writer or editor working in highly sensitive areas or in radically new patterns of publications).

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[1]John Mitchell, "American Approach to Technical Writing," Engineering, May 18, 1962, p. 649

Here is how the Civil Service Commission summarized the tasks of a technical writer:

> Technical publications writers prepare original papers, articles, or reports covering technical or professional subject matter based upon interviews with workers in the field, upon notes and background files of research workers, and upon independent reading. Information is sometimes also obtained through watching experiments, tests, etc. To carry out assignments of this sort the writer must have substantial subject-matter knowledge.

A technical editor's duties are summarized as follows:

> Technical publications editors prepare manuscripts for publication by assuring that the report, article, etc. says what it is designed to say, that there is a logical arrangement of parts, that the level of concepts, expression, and vocabulary are appropriate for the audience to which the written material is directed, that the conclusions drawn are valid and supportable by reference to the facts adduced, and that statements made or opinions expressed are in accord with agency policy.[1]

The complete text of this standard is found in Appendix H.

It should be noted that this Civil Service Commission standard treats technical writers and technical editors separately. And so they are in some organizations having need for many people skilled in either aspect of the field. In this paper, writers and editors have been grouped together for study, because it is difficult to separate the writing function from the editing function in most companies.

As a parenthetical note, this standard limits technical writers and editors to individuals with extensive technical backgrounds. Specifically excluded are "writers or editors

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[1]U.S., Civil Service Commission, Writing and Editing Position Standards, Technical Writing and Editing Series, GS-1083-0

who are dealing with technical material, but who are not required to have substantial subject-matter knowledge in the field of work involved."[1]

The other major study was performed in 1957 at the Center for Technical Publication Studies of Fordham University. It grew from a seminar-workshop study involving a group of recognized leaders in the technical publications field from both government and industry.

Their first step was to determine what functions were at that time being carried on by individuals bearing the title "technical writer." They found a variety of functions were included. See Table 6.

After the duties were listed, the group decided which ones were properly the duties of the technical writer. These they determined to be those listed under the general headings of Researching, Preparing the manuscript, and Liaison in Table 6.

The group finally prepared a detailed job description for a technical writer, the full text of which appears in Appendix I. The major points were:

> The technical writer is one who writes instructive or descriptive material on scientific or technical subjects, interpreting and creating an acceptable presentation of the facts or ideas and theories of others for a given audience.
>
> The work includes the following:
>
> 1. Performs research necessary to obtain complete understanding of the proposed publication, and to gain a thorough technical knowledge of the subject.
> 2. Organizes the proposed manuscript to provide an

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[1] Ibid.

orderly plan for the preparation of the required text material.
3. Prepares a draft of the manuscript in accordance with the detailed outline.
4. Revises and rewrites the text to meet technical editor's and/or customer's review requirements.

TABLE 6

TASKS PERFORMED BY TECHNICAL WRITERS

Technical publication tasks	Number of organizations reporting performance of task by personnel with job title of technical writer
Estimating	
Obtain data for estimate	3
Analyze specifications and format	4
Prepare proposals	7
Organizing the job	
Establish methods and procedures	3
Schedule work	4
Plan production	6
Researching	
Technical check on material	3
Test to develop data	3
Preparing the manuscript	
Organize text	3
Write	17
Plan illustrations	4
Direct preparation of art, photography	8
Evaluate reviewer's comments	3
Technical Editing	
Inspect text and art	3
Check final copy	4
Copy editing	
Literary edit	10
Proofreading	6
Layout	8
Liaison	10
Supervision	5
Purchasing service and materials	4

[1]

It is significant that this Fordham study describes a technical writer who does not require the technical background

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[1]Joseph Child and Robert Johnson, A Report of a Study to Determine the Duties and Responsibilities Called for under the Job Entitled "Technical Writer", Center for Technical Publications Studies, Fordham University

that the Civil Service Commission specifies for government technical writers and editors. This is another instance of the lack of agreement that characterizes many aspects of this field.

The job descriptions of technical writers in the aerospace industry do not differ widely from the recommendations in these studies.

At Bendix Products Aerospace Division, for example, a general guide was established, with specific job assignments made by the supervisor. This guide reads:

> 1. Establish and maintain internal and external sources of information for engineering background data, changes in design and specification, equipment characteristics and performance, and customer requirements.
> 2. Select, edit, write, or rewrite technical material for publication, to meet established objectives.
> 3. Specify type and quality of charts, pictures, or other illustrative material, and arrange for preparation of art work.
> 4. Obtain approval for technical writing and art work.
> 5. Arrange for publication and distribution.
> 6. Consult with engineers, customers, or outside agencies on special problems.
> 7. Perform other tasks as assigned.[1]

And at the Denver Division of the Sundstrand Aviation Corporation, this is the general statement of the duties of a senior technical writer:

> Prepares technical brochures, time compliance technical orders, service bulletins, technical manuals, operation and service instructions, field maintenance instructions, overhaul instructions and parts lists for aircraft and space vehicle accessories such as constant speed drives, gear boxes, accessory power units, hydraulic pumps and motors, and other products as required. This requires researching, coordinating,

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[1]letter from R. H. Lambka, Bendix Products Aerospace Division, Manager, Product Support Publications, March 25, 1965

> accumulating, compiling, and arranging engineering data; analyzing, studying, and discussing accumulated data for an understanding of function and operation; and writing the above listed logistic items in compliance with governing customer, company and military requirements and specifications. Responsible for complete and accurate layout of publications and documents including illustrations, graphs, charts, tables and other materials or information needed to insure completeness, accuracy and understanding and otherwise insure that communication objectives are accomplished.[1]

The study of technical writers in the Dallas-Fort Worth area included an investigation into specific job activities performed by respondents. Results indicated that there was no standardization of technical writing tasks within this group. See Table 7.

TABLE 7

SPECIFIC JOB ACTIVITIES OF TECHNICAL WRITERS

Activities	Frequency
Check logical organization	50
Edit for readability	49
Write original drafts	48
Work closely with others	46
Work from blueprints	45
Edit for technical accuracy	43
Advise of planning and writing	41
Check accuracy of English usage	40
Estimate man-hours, costs	35
Proofread copy	34
Check technical drawings	32
Direct illustration preparation	32
Collect and select data	28
Prepare correspondence	27
Analyze for gaps in argument	27
Observe at field tests	26
Edit art work or illustrations	25
Take part in document planning	25
Perform format layout	24

---

[1] "Job Title: Technical Writer - Senior, M. Pub." Denver Division, Sundstrand Aviation Corporation (mimeographed)

TABLE 7, continued

Activities	Frequency
Make workload forecasts	24
Prepare simple illustrations	23
Allocate work	23
Determine publication format	23
Put documents in standard form	22
Check blueprints	21
Analyze and interpret data	21
Prepare copy for reproduction	19
Reduce data	18
Handle report distribution	17
Determine reproduction methods	16
Use slide rule	16
Determine type faces and style	14
Make oral presentations	13
Write abstracts or summaries	12
Assemble documents	12
Typewrite	12
Direct others' editing	12
Supervise personnel	11
Compile alphabetical indexes	11
Do library research	11
Direct others' proofreading	9
Take part in experiments	9
Handle report reproduction	8
Write style manuals	7
Prepare photo illustrations	6
Select paper stocks	5
Check mathematical formulas	5
Check chemical formulas	3
Use calculator	3
Use mathematics above calculus	3
Conduct writing courses	3
Splice or opaque negatives	2
Use adding machine	2
Determine illustration content	1
Estimate number of pages required	1
Direct others' writing	1
Check specification compliance	1
Make cost forecasts	1

Out of the sixty-six respondents in this study, eighteen did not write original drafts, although bearing the job title "technical writer." Much emphasis has been placed, by some

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[1]Glauber, p. 18

authorities, on the need for the technical writer to have a background in journalism and the graphic arts. However, these functions--directing illustration preparation, performing format layout, preparing copy for reproduction--are performed by fewer than half of the respondents, and other functions of similar nature by only a small proportion of these writers.

N. A. Briggs, general supervisor of publications for the MITRE Corporation, made a distinction in the work of technical writers, depending on whether they work in what he described as "hardware" or "software" companies. The "hardware" companies manufacture equipment; "software" companies do not manufacture, but are research firms, systems development companies, testing and evaluating centers. The most tangible product of the "software" companies is the paperwork it produces: the written report or monograph. Briggs said:

> Software companies tend to create a functional difference between technical writer and technical staff that sometimes does not exist, or when it does, does not exist as openly, in hardware companies. In software companies, the people who author many of the formally published documents are actually members of the technical staff, and not technical writers. The original authors of the reports, articles, lectures, and presentations are engineers and scientists working on the various technical projects. The scientific and technical obligation of the technical staff includes first-pass writing. This, of course, is equally true of hardware companies, when it comes to preparing engineering reports. This doesn't mean that technical writing support isn't needed in a software company, but it does mean that technical writing support consists largely in reorganizing, rewriting, editing, packaging, and seeing to the effective communication and timely delivery of documents. What the technical writer does is to provide "final" writing, as opposed to "original" writing

services. His responsibility is to provide publications support, not engineering and scientific support. And this continues to apply when it comes to jobs calling for "original" writing, such as facility brochures, house-organ articles, and project histories.

Ideally, the technical writer in software functions as a specialist, knowledgeable in the field of publications, and blending in his person a spectrum of writing and editing talents. . . . Publication groups in software companies are often found on the administrative rather than the technical side of the house. Consistent with this situation is a marked preference in software for the writer-editor who is a humanities graduate with a general knowledge of science and technology.

In the hardware company--particularly in publications groups whose main responsibility is the preparation of technical manuals-- the picture is different. The technical writer is considered to be more engineer than writer or, as it sometimes seems, would like to have people think of him as such. We are all familiar with the tendency to call technical writers "publications engineers" or "engineering writers." We are all familiar with the philosophy that supposes the B.S.E.E. --or some other engineering degree--to be the really significant degree in technical writing. Some of us know of companies where it is impossible to hire a technical writer unless he's brought in on an engineering requisition. Most of these companies fall into the category of hardware companies. And, for most, the preparation of technical manuals is the mainstay of their writing operation.

Unlike the writer-editor in the software company, the technical manuals writer in hardware tends to do "original" rather than "final" writing, "original" in the sense of not having to rework or edit someone else's manuscript. But there is another sense of "original" that may be applied here. The word can also be used to refer to work performed by a writer in "originating" or "generating" new data from a variety of uninterpreted source material. And it is true that the technical manuals writer usually has more opportunity than software's writer-editor for working from uninterpreted data.

The technical manuals writer can start from scratch, often using uninterpreted schematics as his point of departure. Because of this, it might be supposed that he has more opportunity for "original" work, in the creative sense, than does his counterpart in software. But the ability to "interpret" schematics has little to do with original writing. It's simply the ability to read a specialized language (the language of schematics) and translate it into a common language (the language of prose). It's a matter of reading and writing. The man

who can read a schematic isn't generating anything new. He's reading what's already there. Of course, on the writing end, there is room for original work, though originality in the preparation of technical manuals is limited pretty much by the applicable specifications. But, in this respect, there is also room for original work on the part of the writer-editor, perhaps more, for he isn't bound to detailed specifications quite as much as the technical manuals writer. And, of course, from the point of view of "creative writing," the writer-editor in software does find opportunities to originate magazine articles, house-organ articles, and brochures and pamphlets, opportunities that are not usually open to the technical manuals writer.

. . . . . .

One of the first things to strike a newcomer to the software publications group is the wide variety of jobs that writer-editors may have to handle.

Not only may writer-editors have to act as writers, editors, and publications coordinators, but they may, in addition, be called upon to handle all manner of documentation, from handbooks, brochures, lectures, reports, and histories through magazine, journal and house-organ articles. It's not uncommon for a single writer-editor to handle a progress report, a project history, a handbook, a facilities brochure, and all at once.

Writer-editors may also be required to adapt to a wide variety of technical projects, ranging, for instance, from computer technology, radar techniques, geological analysis, and meteorology through nuclear engineering, economic factors, psychometrics, and systems integration. Within the same week, a man may work on a computer handbook, an underground sites report, an air traffic control brochure, and a house-organ article on fee-sponsored research.

Finally, writer-editors must be able to work with a wide variety of professional personnel--engineers, mathematicians, physicists, economists, psychologists, and philosophers. . . .

Things are different in the production-based hardware company. It needs to employ writing "specialists" in a number of different categories. Technical manuals specialists, proposal specialists, spec writing specialists, and IPB [Illustrated Parts Breakdown] specialists come readily to mind. Developing an effective publications capability in software isn't the same as gearing up to provide technical manuals support for a company whose main objective is the production of hardware.[1]

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[1]N. A. Briggs, "The Hardware-Software Split: Its Effect on Technical Publications," Society of Technical Writers and Publishers, Proceedings of Eleventh Annual Convention, (San Diego, 1964)

As there are varying needs in different companies, so also are there varying approaches to using people for technical writing. Two widely separated approaches are illustrated by two aerospace companies.

The Hamilton-Standard Corporation does the design, maintenance and fabrication work on aircraft accessories, propellors and space capsules. They have developed two separate style manuals, for internal and external communications. Scientists and engineers are required to communicate using only the formats outlined in the manuals. This requirement serves a dual purpose. First, newly hired technical people are confident that they are writing what is expected of them, and it is in a form acceptable to the reader. Second, they become skilled in using these formats through repeated application. This approach saves much professional time which might other wise be spent developing an acceptable standard of writing.

The Boeing Corporation is a primary manufacturer of airplanes. Its approach is to make its entire writing groups job-oriented. Boeing had, for instance, some 200 writers working on the maintenance manual for the 707 jet. The prime contractor was the Air Force, so the manual had to be compatible with the military specification. (The Air Force used this plane as its KC-135 refueling jet tanker.) There was a standard weapons-system approach: the manual was divided into such chapters as hydraulics, electronics, flight controls, etc. A single writing group would concentrate on a single system, and this

procedure allowed the training of lay specialists. The subject matter was narrow for each group, but the coverage was deep because of the intensity of coverage. This approach allowed a relatively short training time for each group, since only a small amount of material had to be presented.[1]

The writer must consider various facets when he plans his writing task. If he is writing a military manual, he must study the various military specifications that apply, and plan accordingly. A second important consideration is the expected user: the level of writing suitable for practiced technicians would not be suitable for apprentice specialists. The time available for writing might force a compromise on desired quality, but meeting a delivery date is often more important than achieving perfection, however desirable. The environmental conditions under which the manual will be used will affect type size and form of the publication. The number of copies to be printed will determine methods of printing. Finally, the total amount of money available must be considered.[2]

The duty of the technical writer, according to H. C. McDaniel, Director of Technical Information of the Westinghouse Corporation, is to "expedite the flow of information" between the specialized group and the audience, which may or may not be specialized. He went on:

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[1]Mitchell, p. 649

[2]F. Clark Thurston, "Opportunities in Technical Publications for Engineers," a paper presented at the National Convention of Engineering College Magazines Associated (University of Minnesota, October 8, 1954)

> To do this successfully, he must be able to grasp the intended meaning of the writings of the scientists, must have a good feel for what and how much can be said about the discovery, and finally, must translate the language of science into the language of the reader group regardless of the difference in knowledge and intelligence of the various reader groups.[1]

Robert T. Hamlett, Manager of Publications at Sperry Gyroscope Company, prefers the title of "Publications Engineer" to describe the individual we have been discussing under the title of "technical writer." He said his title:

> more clearly designates the duties of such a worker, and also places him in a proper professional status with fellow engineers, where he rightly belongs. For he is an engineer first, and secondly a writer. The term "Technical Writer," as commonly accepted, refers to a writer who writes material on technical subjects to various levels of intelligence but who is not usually concerned with the actual publication processes and problems.
>
> The Publications Engineer is an engineering specialist who relieves other engineers of the major portion of the responsibility for production of all publications required as a result of the engineer's work. The Publications Engineer writes technical material, plans and directs preparation of copy, and carries through on all details concerned with production of the publication. It is necessary to repeat that he is first an engineer, then a writer, and finally, a publications man.

He placed this individual in "still another field of specialization within the Engineering profession--that of TECHNICAL WRITING." Figure 1 shows the duties of the Publications Engineer as Hamlett outlined them.

We do not have to accept this title to recognize that what is outlined depicts the activities of any technical writer in a relatively small organization. In a larger

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[1]H. C. McDaniel, "Technical Communication," a presentation made before the 14th Annual Chicago Area Career Conference, Chicago, April 7, 1962

organization, liaison with patent attorneys, sales and advertising personnel, and printers probably would be handled by technical writing supervisors, but there would be contact by the writer with all the other individuals mentioned.

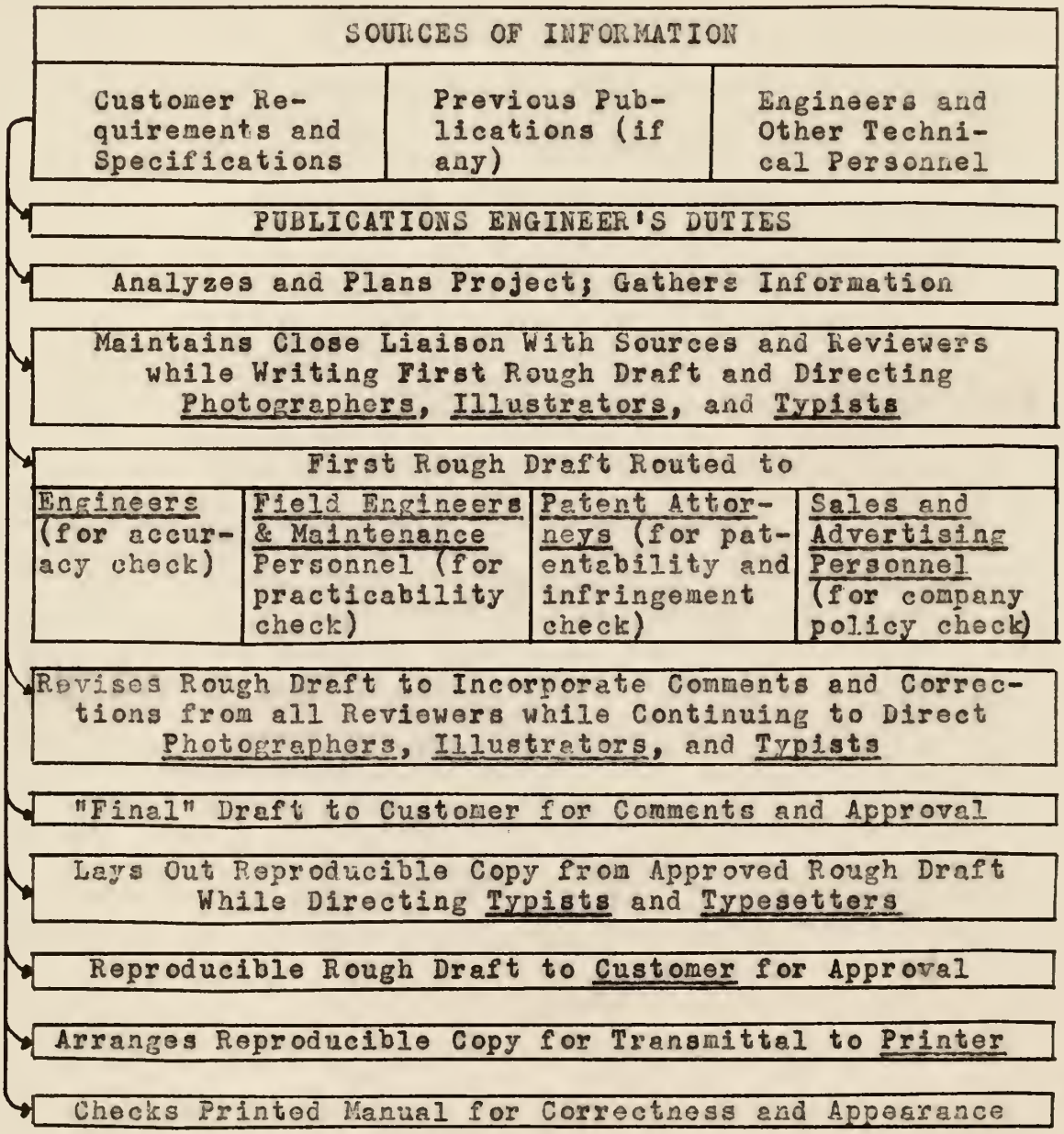

Figure 1.--Duties of a Publications Engineer

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[1]Robert T. Hamlett, "Technical Writing Grows into New Profession: Publications Engineering," Proceedings of the I.R.E., XL (October, 1952), pp. 1157-59

CHAPTER V

SALARIES AND OPPORTUNITIES FOR TECHNICAL WRITERS

The occupation of technical writing was listed for the first time in the Occupational Outlook Handbook of the United States Department of Labor, 1963-64 edition. In that handbook, this salary outlook is given:

> In 1962, inexperienced technical writers, hired in private industry for trainee positions that require only a limited amount of technical training, were paid starting salaries averaging about $100 a week; those who were graduates of engineering schools generally averaged higher starting salaries--about $130 a week--depending on their major, class standing and other qualifications. For experienced technical writers, the average salaries ranged from about $125 to over $200 a week, depending on such factors as their prior experience and the type, size and location of the firms. Earnings of free-lance technical writers vary greatly and are related to the writer's reputation in the field.
>
> In 1962, the annual entrance salary for technical writers in the federal government was $6675, $8045, or $9475, depending on the kind and amount of experience and training.[1]

In the aerospace industry, no relationship between salary and experience can be drawn in this study, because no attempt was made to ask for the background and salary of each writer. Nevertheless, the range of salaries was determined, and it appears broader than that mentioned in the Labor Department Handbook.

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[1]U.S., Bureau of Labor Statistics, Occupational Outlook Handbook, Bulletin No. 1375 (1963-64 ed.), p. 262

The average salary of technical writers in the aerospace industry surveyed in this study would be somewhere close to $9,000 annually. See Table 8. One technical writing supervisor volunteered the information that a good technical writer in his industry with four to five years of experience would earn from $150 to $170 a week, and the starting salary for a writer with little or no experience was from $125 to $140 a week. He also made the point that "experience" does not necessarily mean a college degree.

TABLE 8

SALARIES PAID TECHNICAL WRITERS IN THE AEROSPACE INDUSTRY

Salary	Number*
less than $4500	1
$4501 to $6000	61
$6001 to $7500	282
$7501 to $9000	697
$9001 to $10,500	533
more than $10,501	367

*No information on salaries was supplied by 6 firms employing 430 technical writers

The results of this survey are consistent with results of other surveys made of the salaries of technical writers. One survey of industry in 1961 indicated that beginning writers averaged $5,500 annually, and top salaries averaged $9,600. See Table 9.

Another survey made of technical writers in the Washington, D.C., area covered industries in that area along with federal agencies. Salary figures in that study are comparable to those in aerospace. See Table 10.

TABLE 9

SALARIES OF TECHNICAL WRITERS IN INDUSTRY

	Average of replies	Range	Organizations reporting
beginning	$5500	less than $4000 to $8000	24
average	$7100	$4000 to $10000	26
top	$9600	$5000 to more than $15000	26 [1]

TABLE 10

SALARIES PAID TECHNICAL WRITERS IN THE WASHINGTON, D.C., AREA

Salary	Private		Government	
	number	pctg.	number	pctg.
less than $4500	5	2.8	25	4.9
$4501 to $6000	38	20.7	81	16.0
$6001 to $7500	42	22.8	143	28.0
$7501 to $9000	57	31.0	118	23.3
$9001 to $10,500	19	10.2	104	20.4
more than $10,501	23	12.5	38	7.4 [2]

It should be noted that these last two surveys were completed four and six years ago, respectively, so that some allowance can be made for salary increases since that time.

Salaries for technical writing are of great interest to the engineering graduate, who may be concerned that his salary for writing may be less than that for performing normal engineering functions.

The Washington survey included this area of concern. It appears that there is no clear pattern of comparison between

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[1] Weil, p. 8

[2] "Washington, D.C., STWE Survey," STWE Review, July, 1959, p. 17

engineering and writing staff salaries, and that an engineer contemplating entering the writing field can, by careful evaluation of the openings available to him, assure himself a salary at least as large as he could obtain in the engineering field. See Table 11.

TABLE 11

COMPARISON OF ENGINEERING AND WRITING STAFF SALARIES

Salary schedule for writers and editors	Organizations	
	Private	Government
Same as the engineering staff	21	18
More than the engineering staff	3	0
Less than the engineering staff	7	9

[1]

F. Clark Thurston, head of the Engineering Publications Department at the Sperry Gyroscope Company, stated of technical writers:

> These men, usually engineers in their own right, are accorded the same dignity and respect granted to members of other branches of the engineering profession. Because of the unusual combination of abilities required, they are paid equivalent salaries (in some organizations their income may exceed that of engineers of a similar status).[2]

Marshalk saw this combination of technical education and communications ability in an encouraging perspective. He declared, "The leaders of the future world of science, engineering, and technology are more likely to be those men who are not only proficient in their specialized fields, but who are also proficient in their ability to set forth clearly their

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[1] Ibid. [2] "Opportunities in Technical Publications . . ."

worthwhile ideas."[1]

Lytel gave this estimate:

> There is an approximate equality between engineers and writers. The amount of money an engineer receives varies between companies, with changes in the general economic picture, and among different industries.[2]

And, of course, these same factors will influence what an individual technical writer will be paid in a particular job. As Stephen D. Smith put it in the Bridge of Eta Kappa Nu:

> Technical writing salaries for engineers are dependent upon ability, experience, amount of supervision of others--in short, the usual determinants of salaries for engineers in any area. The man right out of school could well start below $6000 per year [this estimate was made in 1958] and the editor with considerable experience in engineering and publishing could earn $15,000 yearly. A typical annual salary for a publications supervisor directing several writers would be $9,000.
>
> Promotion is, of course, highly dependent upon individual capacities and the size of the organization in question.[3]

Much the same opinion is expressed by McDaniel, who said:

> The technical communicator . . . (with a sound educational background) commands essentially the same starting salary as the engineer with a baccalaureate degree--$6000 to $7000 a year. If he applies himself with diligence, energy, and imagination, he can expect his earnings to increase at a rate equal to that of engineers.[4]

It seems clear that an individual with technical knowledge and a talent for expressing complex ideas in simple terms need have no fear that his efforts will go unrewarded. Indeed, as Marshalk said, this unique combination of talents might be the

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[1]Marshalk, p. 540 [2]Lytel, Technical Writing, p. 19

[3]Stephen D. Smith, "Are There Opportunities for Engineers in Technical Writing?" Bridge of Eta Kappa Nu, LIV (Summer, 1958), p. 34

[4]"Technical Communication"

key to further advancement. It also appears that a formal college education is not a requisite for achieving a high salary. A comparison between the educational level of technical writers employed and salary scales in the aerospace industry shows that many writers with only high school or limited college educations are drawing more than $9,000 yearly.

The numbers of technical writers employed in aerospace companies ranged from 1 to 200. The ratio of technical writers to the entire labor force also ranged widely, from 3 technical writers in a force of 25,000 to 3 in a force of 32, with the overall ratio averaging approximately 1 writer for 230 workers.

The respondents in this survey employed 2,383 technical writers. Five years ago, these 111 firms employed 2,556 writers. There were sharp fluctuations, both ways, in the number employed at individual companies. The major part of the decrease in technical writers employed by companies surveyed was at two companies; the number plunged from 400 to 41 in one, and 200 to 75 in another, over the past 5 years. Other companies showed marked increases, although not large enough to offset the losses of those showing sharp declines. One company increased its technical writing staff from 1 five years ago to 30 at the present time; another went from 13 to 129; another from 0 to 20.

The aerospace industry is, of course, in dynamic change. There are shifts of emphasis in the defense budget, and new developments in weapons systems. These shifts are reflected

in the labor force of the aerospace industry.

Despite the over-all drop in the number of technical writers employed over the last five years, there still is room for more writers at some of these companies. According to the answers of department managers, these firms need an additional 282 technical writers at the present time. Their forecasts for the next five years show that from 723 to 782 additional technical writers will be needed, based on present company plans. This is an approximate 30 per cent increase, and indicates a continuing need for this specialty in years to come.

An applicant for a job in the aerospace industry as a technical writer must pass through the usual application procedures. This will usually include a personal interview with the personnel director or his assistant, and probably also an interview with the manager of technical publications. The applicant may be asked for a resume of his experience, or some samples of his writing.

Most companies will require him to take some sort of writing test. One company, for instance, asks an applicant to write a technical manual on a flashlight--description, initial preparation for use, operating instructions, principle of operation, maintenance and parts list. Another requires the applicant to write on the subject, "What is an Automobile?", to determine whether he can describe how a mechanical object functions, in a clear, logical, organized form.

A few other companies require a mechanical aptitude test,

a personality and temperament test, a vocabulary test, an electronics test, an intelligence test, a spatial relations test, or a test on government specifications.

Many also require the applicant to undergo a security clearance, for access to classified information.

The long-range outlook for technical writers is good. The Department of Labor estimated:

> Well-qualified and experienced technical writers are expected to continue in short supply through the remainder of the 1960's. Beginners who have outstanding writing talent will have many opportunities; those with minimum qualifications will have much competition for jobs. The greatest demand will probably be for technical writers with backgrounds in electronics and communications, particularly in research and development, to work in aerospace and related industries.
>
> The demand for technical writers is likely to increase over the long run, because of the need to put the increasing volume of scientific and technical information into language that can be understood by management, for making decisions, and by workers, for operating and maintaining complicated industrial equipment.[1]

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[1] Occupational Outlook Handbook, p. 262

CHAPTER VI

TECHNICAL WRITING DEPARTMENTS

There is little agreement on what to call the particular departments into which technical writers are organized. As a parenthetical note, there also is no agreement on whether to call them "departments." Some companies have strict guidelines on how large an activity must be to merit that title. Nevertheless, to avoid confusion among the various departments, branches, sections, groups, and offices, they will be referred to as "departments" in this paper.

Of the technical writing departments in the aerospace industry, some fifty-six bear titles containing the term "Publications." Of these, twenty-three are called "Technical Publications" and eleven others simply "Publications." The titles of another nine emphasize the written product turned out by the department. Thirty-two appear, by their titles, to emphasize the engineering or technical aspect of the information in which they deal, while the titles of eleven give indication of emphasis on relations with sales or customers. The complete list of titles appears in Appendix J.

There is dissimilarity also in the place this technical writing department has in the company's organizational structure. Some fifty departments are placed in administrative channels,

twenty-one of these under supervisors of sales or marketing. Eleven are placed directly under management, and forty-one are in engineering channels. It was not possible to identify the position of seven technical writing departments. The next higher element of these technical writing departments is in Appendix K.

The departments in which technical writers operate use many additional skills. The organizational chart in Figure 2 is that of the Publications Department at the Wasatch Division of Thiokol Chemical Corporation, and gives some hint of what functions are carried on in conjunction with technical writing.

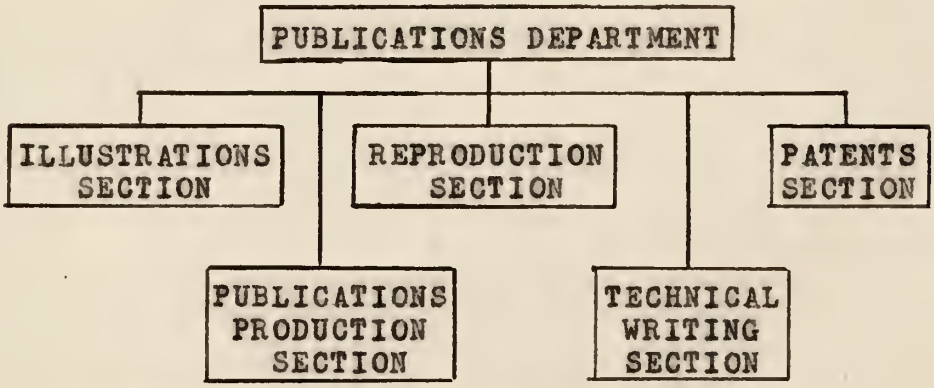

Figure 2.--Organizational Chart of the Publications Department at the Wasatch Division of Thiokol Chemical Corporation.

The Wasatch Division employs some 6,000 people. There are 150 specialists in the Publications Department, of whom 22 are technical writers. From 1,800 to 2,000 publications work requests are received in the department each week.

1. The Illustrations Section designs, lays out, and prepares art and dimensional concept work used in publications

and presentations. There is a model shop in this section which prepares scale models and mock-ups in support of the Engineering and Marketing functions. This section also prepares slides, exhibits and training aids.

2. The Reproduction Section provides printing and Diazo services for the entire division, along with microfilming and drawing reduction services.

3. The Patents Section receives invention disclosures, prepares patent applications, and promotes the patent protection of the organization by reviewing proposals and technical papers to prevent the premature release of proprietary information.

4. The Publications Production Section provides a single point of contact for the customer requiring Publications Department services. In addition, this section establishes and maintains Publications production schedules to insure minimum cost and production time; performs composition functions; maintains cost data for inclusion in proposals and budgets; and prepares marketing, public relations, and industrial relations publications.

5. The Technical Writing Section is responsible for researching, writing and editing technical contractual and noncontractual publications such as technical manuals, reports, and proposals. It maintains constant liaison with technical departments to insure current input data for technical documents. This section also provides assistance and advice to technical departments required to prepare contractual and noncontractual technical publications, and coordinates and

monitors the preparation of illustrations, photographs and other reproduction copy to insure the publication of well-integrated documents. This section is itself divided into four units:

a) The Reports Unit prepares contract status, technical operating, and technical documentary reports.

b) The Manuals Unit prepares technical orders, in-plant manuals, maintenance analyses, and aerospace ground equipment (AGE) support documentation.

c) The Proposals Unit prepares technical and management portions of solicited and unsolicited proposals.

d) The Quality Control Unit maintains and insures consistent quality, style, and format of reports, manuals and proposals in accordance with customer specifications and approved standards and procedures.[1]

Another type of organization is the Publications Department at the Sperry Gyroscope Company. See Figure 3. This department has been sub-divided basically according to the different writing products involved; that at Wasatch was along more functional lines. It performs much the same function as the one at Wasatch, except that patent protection has not been placed under this department.

In this form of organization, the IPB (Illustrated Parts Breakdown) unit under the Reports and Documentation Department

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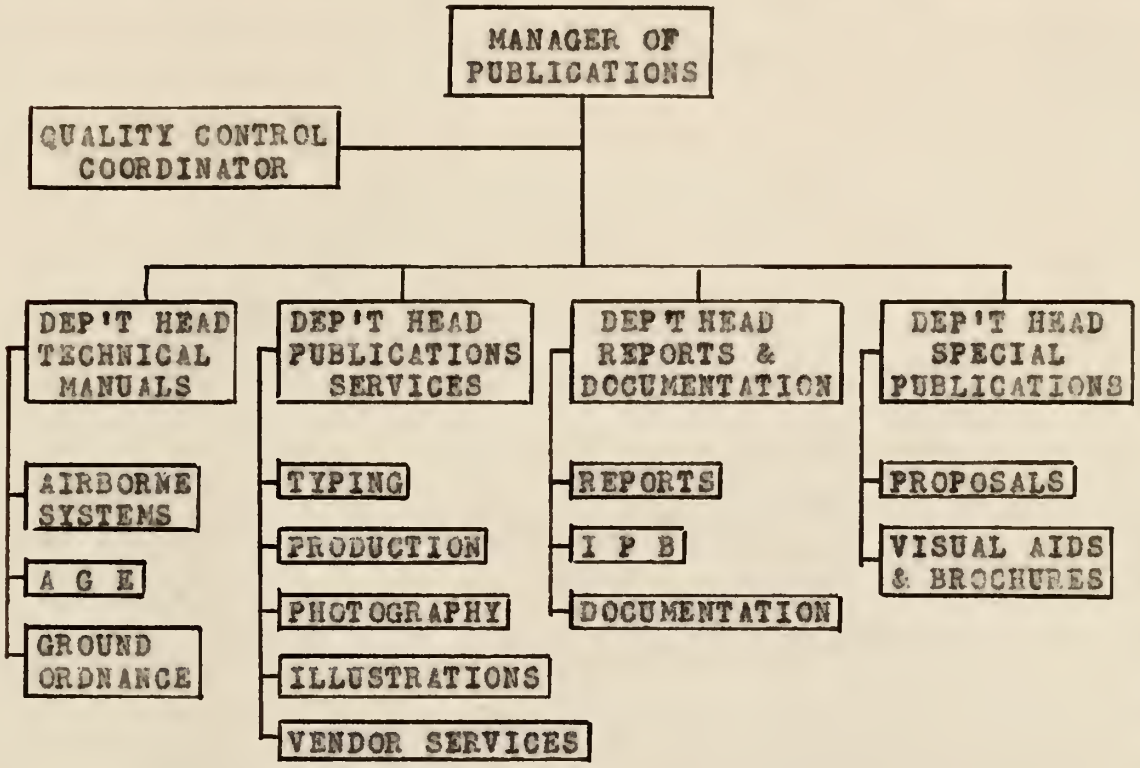
[1]Combination of information contained in an article by George Uibel, "Developing an Integrated Publications Organization," STWP Review, January, 1964, p. 6, and information supplied by Mr. Uibel in a letter to the author

would have to coordinate its research with the units of the Technical Manuals Department. And, of course, the Illustrations unit would have to service most of the other units.



[1]

Figure 3.--Organization of the Publications Department at Sperry Gyroscope Company

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[1] Joseph W. Kleinman, "Publications Quality Assurance," STWP Review, January, 1964, p. 18

CHAPTER VII

THE MANAGER OF TECHNICAL PUBLICATIONS

The manager who directs the operation of the technical writing department must be a man of many talents and qualities. Gunther Marx, himself the Manager of Technical and Management Communications of the Research and Development Division of American Machine and Foundry, describes the type of man needed for the job.

There are some talents and skills which any department manager must have. These are the ability to work under pressure, leadership, consciousness of quality and costs, mental flexibility and adaptability to change, and ability to make quick, clear decisions. But there are other qualities which he must have because his department deals in the intangible commodity of communications.

Most important, he must be able to translate the ideas of top management into effective, creative publications. Most often, these management ideas are expressed in broad, perhaps vague terms. The manager must absorb these ideas, analyze what is needed, interpret this in terms of what facilities are available to him, and carry out the project. On the results of the manager's activities frequently rests the total impression made by the company on its various publics.

The manager also is the expert on the company staff in the field of publications and communications. He must often counsel top management when different approaches are suggested within the company, as when the public relations department urges the announcement of new products and processes, and the patents department counsels that premature disclosures will weaken the competitive position of the company.

He must be highly articulate. Not that this characteristic is any different from that expected of other managers, but the manager of a technical writing department is himself between two highly articulate groups: top management above him and a group of skilled individuals below him whose strong point is their ability to express themselves. In this situation, the manager needs a sure command of language, including precise shades of meaning, precision, clarity and conciseness.

The manager must stand ready to intercede in behalf of his department with top management in order to bring about the most effective ways to prepare publications. He has a continuous responsibility to apprise management of the special talents and creative skills contained within his department.

He must establish the kind of rapport with his staff that will facilitate and assure the constant interchange of ideas necessary in any creative process. He must keep himself alert to detect when the work is not going well, and know enough about his people to be able to interpret their ideas to top management.

The technical writing manager also must be deeply

concerned with the professional development of his staff, and be mindful of their ambitions and aspirations. He must take an active part in recruiting and interviewing new writers. He cannot allow his people to stagnate in their field; he must promote their development to have a department that is characterized by ingenuity, sparkle and freshness of approach.

His abilities must also include that of being able to handle successfully a large number of projects simultaneously. In this respect he differs from most of his management peers, in that he has clear-cut responsibility for a greater number of different programs, each of which has its own schedule, specifications, and problems. The failure of any one program might result in severe financial loss to the company.

He also is the final arbiter of the quality of the product that emerges from his department. So his skill in writing, artwork, design, photography, typesetting and printing are called into play--not only to judge good work from bad, but to pinpoint exactly where and how improvements can be made in each case.

Lastly, he is the perpetual buffer and shock absorber for pressures which come to him from above, below, and the sides. He must protect his personnel as well as he can by his facility to schedule or reschedule work; he must protect higher management by getting the work out on time, and he must protect other departments in the organization by giving them the service they require for their own functions.[1]

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[1]Gunther Marx, "A Hard Look at the Job of the Publications/

This description will suffice for the organization which already has a functioning publications department fully staffed with writing, illustration and production specialists. But what of the company just beginning to realize that it needs a specialist in publications? What criteria can it use to staff a one-man publications department?

William S. Tilghman, Manager of Proposals and Presentations of the Military Products Division of Hoffman Electronics Corporation, has offered these guidelines:

He first recommends seeking a technical writer with professional writing experience, rather than an individual trained in a technical field with no writing experience. He should be knowledgeable in the four prime areas of reports, proposals, specifications and manuals. And he must have a thorough grounding in the various reproduction processes. Ideally, all this adds up to three to five years experience in the field.

This individual's personality traits also are important. He can be neither submissive nor autocratic, but must use the laborious middle route of diplomacy, persistence, and persuasion. He must also be blessed with an intuitive feel for what management wants and what is good for his company because, with much of his work involving nights-and-weekends crash programs, management will not always be around to give him the

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Communications Manager," Society of Technical Writers and Publishers, Proceedings of the Eighth Annual Convention, (San Francisco, 1961), p. 135

answers he needs.

Lastly, he should be a man likely to outgrow his job. He will leave a gap when he goes; but when he goes, he will leave behind a functioning publications concern.[1]

The study of the aerospace industry included a detailed look at managers of technical writing departments. Most of these managers, as was expected, hold college degrees. But it is instructive to note that 8 of these managers have only a high school education; yet they manage departments employing from 6 to 200 technical writers, including college and advanced degree holders. These 8 managers average more than 17 years employment with the same firm, and more than 18 years experience in technical writing. These figures indicate they worked their ways up to their present positions through superior performance in a number of lesser jobs. They make a telling point for the premium placed on experience in this position, even when formal higher education is lacking. See Table 12.

TABLE 12

EDUCATIONAL LEVEL OF MANAGERS OF TECHNICAL PUBLICATIONS IN THE AEROSPACE INDUSTRY

Level	Number*
High school	8
Some college	31
B.A. or B.S.	58
M.A. or M.S.	12
Other (trade or military)	13

*Some respondents provided duplicate answers, as college and technical school, for instance.

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[1]William S. Tilghman, "Staffing the One-Man Publications Department," Research/Development, October, 1963, pp. 37-39

Those managers who had done college work were asked to indicate their major field of study. Forty-one majored in engineering of some kind, and thirty-five others specialized in other industrial and scientific fields. There were fifty-six major areas of study from the humanities, twenty-nine of these being English or journalism. See Table 13.

TABLE 13

MAJOR FIELDS OF COLLEGE STUDY OF MANAGERS OF TECHNICAL PUBLICATIONS IN THE AEROSPACE INDUSTRY

Field	Number*
English	19
Engineering	14
Electrical Engineering	11
Journalism	10
Mechanical Engineering	8
Business Administration/Management	7
Mathematics	7
Physics	7
Electronics	5
Industrial Management	5
Industrial Arts	4
Advertising	3
Aeronautical Engineering	3
Chemistry	3
Economics	3
Accounting	2
Art	2
Chemical Engineering	2
Education	2
Geology	2
Industrial Engineering	2
Psychology	2
Science	2
Guidance	1
Industrial Design	1
Law	1
Marketing	1
Metallurgical Engineering	1
Philosophy	1
Sociology	1
Speech	1
Zoology	1

*Some respondents provided more than one field.

This near-balance echoes the arguments of those who debate whether a scientific/technical education is better preparation for technical communication than one in English or journalism. It also offers evidence to both sides, as well as to those who choose the middle course that what matters is not the formal education, but the blend in one man of knowledge of a field and ability to communicate that knowledge.

The other positions these men held before attaining their present managerial one presents much the same division. There were 113 positions involving writing in some form, mostly technical writing, and an additional 19 involving other communications skills, mostly teaching. There were 50 positions in engineering, and 13 requiring experience as a skilled or technical worker. Twenty-nine were in fields accessory to the technical area, and 34 were positions in the administration of some sort of technical activity. The complete list appears in Appendix L.

These managers were also asked to list the experience or education they found most helpful to them in their present position. Again, the same dualism exists. Sixty-three listed items related to communication; 98 were some technical factor; an additional 17 dealt with some phase accessory to the technical side, and there were 35 factors relating to management skills. This complete listing appears in Appendix M.

From these comments, the most valuable composite background for the position of manager of technical publications would include technical or engineering courses and practical

work in the field, a knowledge of English and technical writing experience, familiarity with the products of the company, management training and the ability to handle people.

The study of salaries earned by these managers is illuminating. Almost 60 per cent receive annual salaries in excess of $12,000. See Table 14. These salary figures indicate that the great responsibilities levied on this position bring correspondingly large rewards, and bear out the general statements made about the level of salary that a beginning technical writer can hope to receive.

TABLE 14

SALARIES OF MANAGERS OF TECHNICAL PUBLICATIONS IN THE AEROSPACE INDUSTRY

Salary	Number
$6001 to $7500	4
$7501 to $9000	6
$9001 to $10,500	13
$10,501 to $12,000	20
more than $12,000	64

There appears to be some correlation between level of education and salary in this field. Those with higher educations are clustered toward the right of the salary scale. The exception to this generality rests with those having only a high school diploma; but these are apparently special cases, being where they are partly as a result of extensive experience and longevity in the company. More than 60 per cent (thirty-six) of men with bachelor's degrees earn more than $12,000. Of the remaining 40 per cent (twenty-one), many have little

time with their present company and limited experience in technical writing, and are obviously just starting their careers. All those with master's degrees (twelve) are in the top salary category. See Table 15.

TABLE 15

CORRELATION BETWEEN EDUCATION AND SALARY OF MANAGERS OF TECHNICAL PUBLICATIONS IN THE AEROSPACE INDUSTRY

Education	Salary level				
	$6001-$7500	$7501-$9000	$9001-$10,500	$10,500-$12,000	more than $12,000
High school			1	2	5
Some college	3	4	6	6	11
B.A. or B.S.	1	2	6	12	36
M.A. or M.S.					12

There does not appear to be anything significant to learn from a study of the amount of time each manager has been employed by his present company. See Table 16.

TABLE 16

YEARS EMPLOYMENT AT PRESENT COMPANY FOR MANAGERS OF TECHNICAL PUBLICATIONS IN THE AEROSPACE INDUSTRY

Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Number	4	3	9	4	8	6	8	4	6	9	1	5	12	4	4

Years	16	17	18	19	20	21	22	23	24	25	26	27	28 --	35
Number	1	1	0	1	5	3	2	3	2	2	0	0	3	1

There is significance, however, in a comparison between years of experience in technical writing and salary. There is

a marked grouping of individuals with extensive experience in the higher salary categories. This could, of course, indicate that those with no future in this specialty discover this fact early and leave. This author believes that it is more indicative of the premium placed on experience. See Table 17.

TABLE 17

CORRELATION BETWEEN EXPERIENCE AND SALARY OF MANAGERS OF TECHNICAL PUBLICATIONS IN THE AEROSPACE INDUSTRY

Years Experience	Salary level				
	$6001-$7500	$7501-$9000	$9001-$10,500	$10,501-$12,000	more than $12,000
1					
2		1	1	2	1
3	1		1		2
4		1	1	2	2
5			1		1
6	2	2	2		2
7					2
8		1	2	3	2
9				2	1
10			3	4	5
11					
12					3
13			1	2	5
14					6
15	1		1	2	9
16					2
17					2
18				1	
19					3
20					3
21					2
22				2	2
23					2
24					3
25		1			4

CHAPTER VIII

THE PROFESSION OF TECHNICAL WRITING

This study of technical writers has revealed that there is little agreement about the field--the education required, the most valuable experience, the place of writers in the organization and their typical duties. And so it seems entirely consistent that this disagreement extends to the question of whether a technical writer is actually in a distinct profession.

Lytel describes technical writing as "a creative, exciting, and expanding specialized form of journalism, which is taking its place as a new profession."[1]

The Department of Labor's Occupational Outlook Handbook includes technical writing in the category "Other Professional and Related Occupations."

On the other hand, Israel Sweet, Dean of the Evening School of Pratt Institute, challenges this classification on the grounds that technical writing has no "body of knowledge" which is dictinctly its own. He said:

> If there is a body of knowledge directly related to technical writing, it must be, not the content of other disciplines, but a content of its own; and it might be assumed that such a body of knowledge might be

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[1] Lytel, Technical Writing, p. 5

> called technical communication. To a large extent, technical writing as a field has borrowed its knowledge wholesale from allied and related areas. With minor exceptions, existing in isolated situations, no fundamental research or inquiry has been undertaken in this area of technical communication. Until such research, inquiry, and analysis of accumulated data and information is developed on a broad scale under competent and authoritative supervision utilizing appropriate methodologies and acceptable research techniques, the body of knowledge which is needed for the achievement of profession will simply not exist.[1]

Spafford saw technical writing as a specialty, and not a profession in its own right. He stated:

> Just as neurosurgery is not a profession, but a specialty within the profession of medicine, technical writing and editing is a specialty within the profession of--what? Perhaps we could call it "communication" or publishing.". . . It seems to me it would be easier and make more sense to admit that what we do is not too far removed from what other editors and writers do--only the terminology is different.[2]

Spafford goes on to make the point that the ranks of technical writers are filled with what he calls "drifters," who work for a few months at one place and then move on. He brings this up as another point against calling a technical writer a professional, because, he says, "stability is, I think, one of the characteristics of the professional if not one of the criteria."[3]

On the subject of stability, one manager of technical publications in the aerospace industry supplied the information that his sixty-two technical writers had been employed by the company for an average of not quite ten years, and

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[1]Israel Sweet, "Is Technical Writing a Profession?" Society of Technical Writers and Editors, Convention Proceedings, (New York, 1957), p. 68

[2]Spafford, Proceedings [3]Ibid.

averaged almost five and a half years as a technical writer in the company.

Of course, one hallmark of a profession is the existence of a professional society, for the exchange of information and the strengthening of the profession.

One such society for technical writers is the Society of Technical Writers and Publishers, now established nationally after a series of mergers of smaller regional groups. The society had its beginnings in 1953, when two organizations interested in improving the practice of technical communications, the Society of Technical Writers and the Association of Technical Writers and Editors, were formed on the East Coast. These two merged in 1957 into the Society of Technical Writers and Editors. This organization was favored with rapid growth and, in 1960, merged with a Pacific Coast Group, the Technical Publishing Society, which had been formed in 1954. The resultant group bore the society's present name. It is today the only professional society in the Western Hemisphere solely concerned with technical communication via speech and communication.[1]

There are two other organizations whose names give hint that they might be societies of technical writers in the aerospace industry. The first is the Aviation/Space Writers Association, of Jenkintown, Pennsylvania. But this group of about 1,000 members consists primarily of writers with

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[1]"S. T. W. P." an information brochure published by the Society of Technical Writers and Publishers, Columbus, Ohio

newspapers, magazines, radio and public relations, with perhaps a dozen technical writers among its members.[1]

The other is the International Society of Aerospace Writers, of Ontario, Canada. But at last report, this group was dormant and struggling to maintain even its small membership.[2]

The Society of Technical Writers and Publishers now includes nearly 4,000 members. It is engaged in developing, establishing and maintaining writing and publishing standards as well as a code of ethics for those who practice technical communication.

In addition, it strives to achieve recognition for its members and to acquaint others with the profession. It encourages formal and informal training in technical writing and publishing.[3] The society was instrumental in developing the standards for technical writers and editors set by the Civil Service Commission.[4]

The code of conduct that the society developed for its members reads:

1. To encourage research in the communicative arts
2. To present and discuss technical subjects at Society meetings

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[1]Letter to the author from Ralph H. McClaren, Executive Secretary, Aviation/Space Writers Association, July 22, 1964

[2]Letter to the author from Ross Willmot, Secretary-General, International Society of Aerospace Writers, July 6, 1964

[3]"S. T. W. P."

[4]"Writing and Editing Position Standards," STWP Review, April, 1961, p. 4

3. To publish a professional journal
4. To cooperate with other professional groups
5. To encourage high standards of education
6. To honor outstanding contributions to the profession
7. To offer instruction in communication techniques
8. To further interdisciplinary understanding
9. To continue to raise standards of practice and performance
10. To exhibit professional performance at all times.[1]

The unique talents embodied in the best technical writers occasionally result in removing that individual from the field, and militate against the development of a profession. Smith pointed out:

> By the time a writer becomes truly proficient in his ability to translate technical information into clear, readable prose, he has achieved an excellent overview of many of the phases of the company's operation. At this point he is promoted to the post of administrative assistant to an engineering department supervisor. The capacity to organize ideas, to write clear reports, and to see the many ramifications of a given problem makes a good technical writer, but it is also the trait that makes a good administrator.[2]

Rear Admiral Rawson Bennett II, Chief of Naval Research, sees the field growing into much broader areas:

> Looking at technical communication as a budding profession, and thinking in terms of education for that profession, we should not be limited only to the desire to train highly skilled, creative technicians. This will be the core of the work, but we must also groom those people who will grapple with the broad problems of the profession of technical communication. This extends beyond writing and editing, to cataloging, better distribution methods, perhaps totally new formats, or the implications a new technical development could have for information handling. We will need people who can define what the problems really are. We will need people who can recognize when reports are not needed, or

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[1]Letter from Mrs. Norma Kennedy, Executive Secretary, Society of Technical Writers and Publishers, Columbus, Ohio, November 14, 1964

[2]Smith, p. viii

> we will be buried under a flood of technical literature. It is coming out of our ears already.[1]

The question of whether this field is a profession is largely a problem of semantics. One can, of course, draw definitions of the word to exclude this practice of technical writing. Yet one definition of "profession" has it "the occupation, if not commercial, mechanical, agricultural, or the like, to which one devotes oneself; a calling, as the profession of arms, of teaching."[2]

We speak of the acting profession, but recognize that it is filled with individuals in it for only a short time, and that it requires little if any formal training. Even the college teaching profession counts many members who entered via a number of widely divergent routes.

It seems to this author that this point can be made: technical writing <u>is</u> a profession: its function can be readily separated from the activities of other writers whose activities do not encompass technology, even if this function must be carved out of an area where two other professions meet. In this function there are some professional technical writers, and some who are not professional in their qualifications and performance.

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[1] RADM Rawson Bennett II, "Communication, the Lifeblood Research," <u>Technical Communications</u>, I (September-October, 1957), p. 19

[2] <u>Webster's New Collegiate Dictionary</u> (2d. ed.; Springfield, Mass.: G. & C. Merriam Co., 1958), p. 674

CHAPTER IX

CONCLUSIONS

The question of the best preparation an individual can make for the profession of technical writing may never be answered. Those who are practicing in the field today cannot agree, but this absence of agreement is not important.

What is important is the presence of dis<u>agreement</u>. This fact cannot be changed, and those who take radically different views may never be persuaded to arrive at a concensus. Their disagreement stems from their experience, and they have widely different experience patterns because technical writers perform widely different functions.

The key point in this study was that one cannot describe the ideal background for a technical writer until the job he is to do has been determined. The job might involve preparing technical advertising, or advising scientists on how best to prepare papers to be presented before symposia attended by equally specialized scientists, or drafting technical manuals to be used by semi-skilled technicians. Each of these jobs requires a different blend of writing skill and technical ability. In some technical writing jobs the critical factor is the depth of technical knowledge; in others, it is the facility to communicate.

In companies employing only a few technical writers, the practitioner must have at least a smattering of knowledge of all the factors involved in documentation. This knowledge may be either taught in formal classes or acquired by him through self-study, experience or observation. In companies employing large numbers of technical writers, it would be desirable to have individuals who are more knowledgeable in some of the specialized factors. That is, there could be a mixture of communications specialists with a background in technology and technical specialists with an ability to express themselves.

Other differences might exist because of the emphasis within a company on "hardware" or "software," and technical writers would be expected to employ different talents in each.

The dualism that exists in this profession will continue to exist, and there will continue to be a need for people trained in the technical fields who can communicate, and those trained in the communications field who can understand technical subjects. As technology becomes increasingly more complex, this dualism will become sharpened, rather than disappear.

To recognize this dualism is not to abandon hope that schools can train technical writers. But we must avoid trying to train technical writers who could step into any kind of technical writing job on graduation. Four years of college education--or even five--is not enough to give a student this kind of background. There hardly is enough time now to give student scientists and engineers the preparation they need.

And liberal arts graduates find they have barely begun their education of the world around them when they graduate. To attempt to combine the two curriculums would result in turning out individuals ill-prepared in either field.

Schools must recognize this dualism in their approach to training technical writers. Engineering schools, for example, have been turning out engineers who apparently do not like to write or who cannot write. Certainly part of the blame for this situation must rest on the schools themselves. The engineering faculty cannot depend on the English faculty, in a year of freshman composition, to instill in engineering students the love of writing which good communication demands. The engineering faculty must do this job. An engineer analyzes, designs, adapts and plans. But at some point in his activities he <u>reports</u>. He does not work in a vacuum; the results of his work must be communicated to others. This fact must be driven home to students of engineering. The communicative aspect of the job has been overlooked for too long. Engineers who would grow in their profession will find that, as their salaries and responsibilities increase, they deal more with the written word than with the slide-rule. This sort of idea can be conveyed throughout their education, and an engineer with this idea implanted in him would make a better technical writer.

If there is time for only one formal course to better prepare an engineering student for technical writing, let it be one that emphasizes that, whenever he communicates, there is an audience. The limiting factor in communication is the

ability of the reader or listener to grasp what the message is intended to convey. This course must teach that when one writes, he writes to some particular person or group. This would be a writing course, but one to train the student to write to someone in particular. The normal "Technical Report Writing" courses emphasize the format of the writing. This is not as important as the audience expected to understand the meaning of the message. In any case, most firms have their own formats.

Typical assignments in this course would be to explain the technical feasibility of a particular process to the supervisor of engineering, to explain the operation of a machine to a semi-skilled operator, to analyze a new theory for a group of engineers. In each assignment, the audience would be different, and the approach to the writing assignment would also be different. The instructor, in critiquing the assignment, would have to place himself as a member of that audience, and analyze whether the writing has the desired effect on that audience.

Needless to say, this instructor would have to be well qualified. If, as Chrysler Corporation's Ralph L. Cummins says, the qualified technical manuals writer is a "rare breed of cat," this instructor is a rarer "breed of cat."

Students who specialize in journalism or English--or whatever it takes to develop insight into the communicative arts--must obtain sufficient background to understand technology. This is admittedly a vague prescription; but in view of

the variety of technical writing jobs to be done, the best that can be made. The sort of courses needed are those which will help the student understand the work of the scientist or the engineer. A technical writer who is not himself involved in developing the product must depend for his information on those who are. He must be able to draw from them the information he needs. He must understand both their language and their methods in order to understand what they are doing, and to know what questions to ask to find the information he needs.

Obviously, a large number of survey courses in physics, mechanical engineering, electronics and the like would qualify the journalism or English student to apply for a large number of different kinds of technical writing positions. Any blank spots in his education would have to be made up through on-the-job training.

CHAPTER X

LIMITATIONS AND SUGGESTIONS FOR FUTURE STUDY

Technical writing is a profession which has a potential function in any specialized field. This study of technical writers was confined to those in the aerospace industry, and conclusions drawn as a result of this study might have no relevance to another industry.

In addition, conclusions drawn from responses to a questionnaire survey of some of the managers of technical publications in this industry must be limited ones. The group surveyed makes up only a part, albeit the largest part, of the industry; and response to the survey was not unanimous. These factors must be considered, then, in attempting to apply the conclusions of the survey to the entire industry.

The survey was aimed at obtaining a picture of the situation in technical writing in the aerospace industry as it is now, and not necessarily how it should be. When a manager was asked to outline desirable education or experience factors for technical writers, it is assumed he answered in terms of how his firm uses its technical writers. Perhaps there are better ways to use technical writers than are now employed, requiring a different sort of background; but this factor was not considered in the study.

Another factor not treated in this study was the technical writing done for the aerospace industry, but not by writers employed in the industry. There are aerospace firms which do not do their own writing, but which instead subcontract this part of the total project to an organization specializing in technical writing services.

It may prove instructive to make a detailed study of these organizations, because they must be prepared to undertake many different kinds of technical writing assignments, and their writers must be highly flexible and adaptable. Perhaps in these organizations will be found the "ideal" background which has proved so elusive in this study.

The following is a list of some of the firms which the author understands perform this function. No attempt was made by the author to verify the accuracy of this list:

Hayes International, Birmingham
Rohor-Rodger
Volt Publications
Ken Cook, Milwaukee
Cushing & Neville
H. L. Yoh Company, Philadelphia
Sanders and Thomas, Pottstown, Pa.
Technical Service Corporation, Philadelphia
Coastal Publications, New York

It is suggested that, if a study is made of these organizations, contact be made first with a cooperative manager in industry, who might be able to furnish more current information on these firms, because it is assumed that they would make known their availability for this writing service within the industry.

APPENDIXES

SURVEY OF TECHNICAL WRITERS
IN THE AEROSPACE INDUSTRIES

1. What is your official title? _____

2. How many years have you been employed by this company? _____

3. How many years experience have you had in the field of technical writing? _____

4. Education: please check your highest educational level

____high school	____M.A. or M.S.
____some college	____Ph. D.
____B.A. or B.S.	____other

5. If you have done college work, what was your major field of study? _____

6. What other position(s) did you hold before this one (in this company or others)?

7. What experience or education do you find most helpful to you in your present position?

8. What is the name of your department? _____

9. What is your current annual salary?

____less than $6000	____$9001 to $10,500
____$6001 to $7500	____$10,501 to $12,000
____$7501 to $9000	____more than $12,001

10. How many technical writers are employed by your department? _____

APPENDIX A

11. How many were employed five years ago? _____

12. How many additional writers, if any, are needed now? _____

13. Based on present company aims and plans, how many additional writers, if any, will be needed within the next five years? _____

14. Where does your department fit in the company's organization: what is the next higher division?

_____

15. How many people in all are employed by your corporation or division? _____

16. What sort of formal training do you think best prepares an individual for technical writing?

17. What other qualities do you want a technical writer to have?

18. Of the technical writers in your department, how many have

____a master's degree? ____some college work?

____a bachelor's degree? ____a high school diploma?

19. How many fit into the following salary categories?

____less than $4500 ____$7501 to $9000

____$4501 to $6000 ____$9001 to $10,500

____$6001 to $7500 ____more than $10,501

20. What procedure must an applicant go through before he is hired as a technical writer by your firm?

Kansas State University

Manhattan, Kansas 66504

Department of Technical Journalism
Kedzie Hall

Dear Sir:

This is frankly an appeal for your time. I am interested in technical writers: where they come from, what they earn, what they do. I am also interested in technical writing departments and what is done there. So I am writing to you as the one best able to provide the information I need.

My interest stems primarily from the four years I spent in the Air Force missile program. There, I gained a solid appreciation for the work of these writers, whose manuals could make clear to me how to operate, maintain and repair this complicated equipment.

I am conducting a survey of technical writers in the aerospace industries as part of my work for a thesis at the Graduate School of Kansas State University. The data accumulated from this survey will be averaged and used to draw some generalizations about this relatively new field of technical writing. Of course, all answers will be treated as confidential. You will note that the name of your firm does not even appear on the questionnaire.

I am asking that you complete the attached survey questionnaire. As you can see, it consists of some questions which require just a simple check mark, while others will require the insertion of some material. If you do not have enough room for comments on the front of the form, please feel free to continue on the reverse side.

As a note of clarification, I would like to explain that the technical writers I am interested in are distinguished from parts listers, publications aids, illustrators, and typists. I am concerned with those individuals who either gather and write technical information, or edit for format and readability technical information furnished by other departments.

Thank you for your time.

Sincerely,

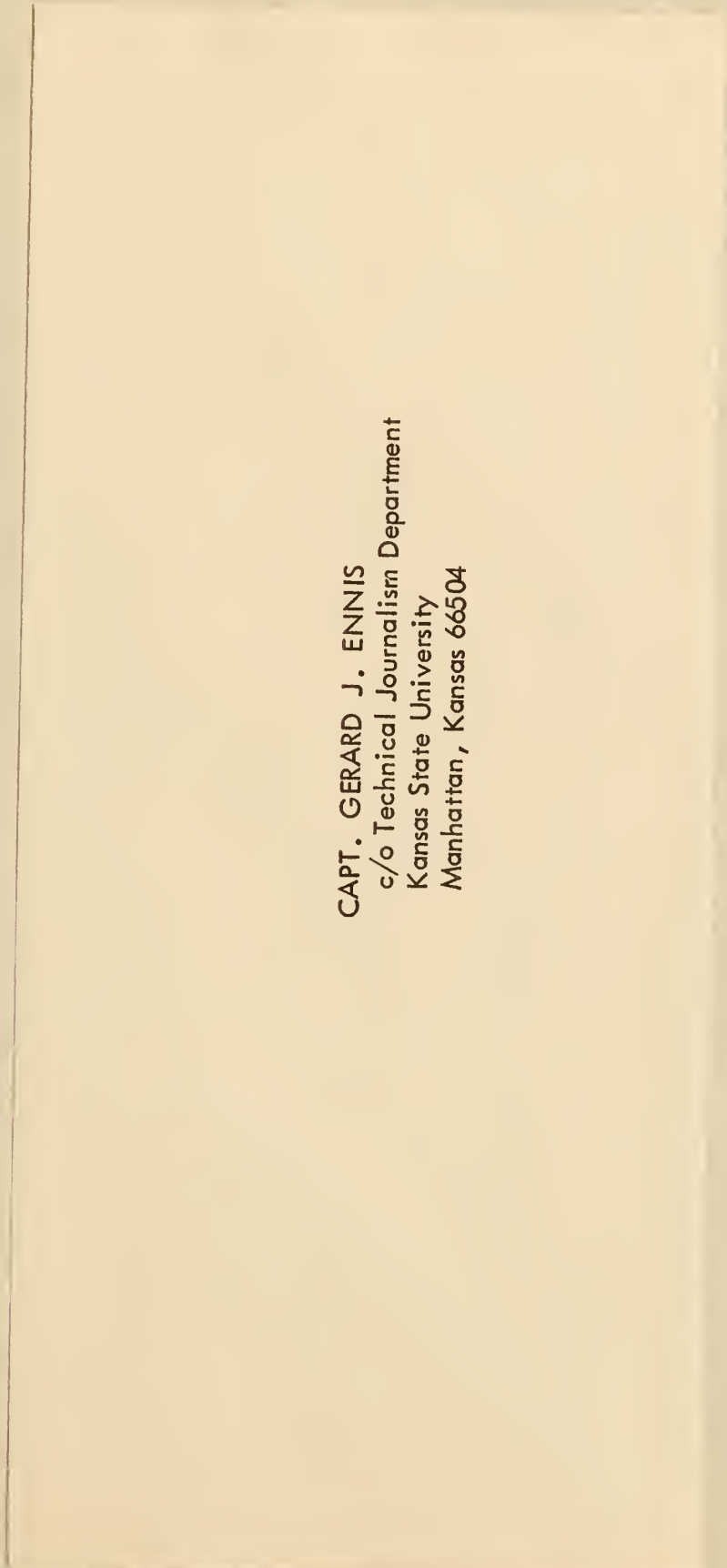
Gerard J. Ennis
Capt, USAF

APPENDIX B

THE FIRST COVER LETTER

APPENDIX C

THE PRE-PRINTED RETURN ENVELOPE



Kansas State University

Manhattan, Kansas 66504

Department of Technical Journalism
Kedzie Hall

Dear Sir:

Enclosed is another copy of the questionnaire I originally sent you a month ago. Since I have not heard from you in that time, I fear it is because the first copy has been misplaced. I hope you will take the trouble to fill it out and return it.

When all the results are in, I plan to summarize what I learn from this survey and provide this information to my respondents. I know this summary would prove interesting to you.

Sincerely,

Gerard J. Ennis
Capt, USAF

APPENDIX D

THE FIRST FOLLOW-UP LETTER

Kansas State University

Manhattan, Kansas 66504

Department of Technical Journalism
Kedzie Hall

April 7, 1965

Dear Sir:

Some weeks ago, I sent a questionnaire to your organization as part of a survey of technical writers in the aerospace industries.

The response so far has been heartening and highly instructive.

As the Chief of Aerospace Publications for Beech Aircraft wrote back to me:

> "It is gratifying to occasionally receive some indication that the 'forgotten field' is still attracting some passing interest. I personally believe that the profession of technical writing will continue to grow in importance as our hardware continues to become more complex, and that there will always be a demand for skilled craftsmen in this area."

I also feel that this is true, and that more study must go into the field if it is to attract these "skilled craftsmen" you need to continue to grow. And this is one reason I have undertaken this thesis study.

So far, however, I have not had the privilege of hearing from you. Naturally, I would like this study to be as complete and as thorough as possible.

So I am asking again that you take a few minutes from your busy schedule to complete the questionnaire and return it.

Sincerely,

Gerard J. Ennis
Capt, USAF

APPENDIX E

THE SECOND FOLLOW-UP LETTER

APPENDIX F

DESIRED ACADEMIC BACKGROUND OF TECHNICAL WRITERS

Humanities-oriented	Number selecting
English grammar and composition	40
Writing or technical writing	13
Liberal Arts with exposure to science or technical subjects in general	12
Journalism	11
General college education	5
Graphic arts	3
Business Administration	2
Technical illustrating	2
Journalism major with technical survey courses	2
Teaching	1
Arts	1
Public speaking	1
Advertising	1
Languages	1
Logic	1
General semantics	1
Wide liberal arts background	1
Major in communications, minor in electronics	1
Technical-oriented	
Engineering	34
Electronics	16
Science	16
Physics	9
Technical	9
Mathematics	7
Mechanical engineering	7
Drafting	6
Electrical engineering	5
Degree in technical or scientific field with minor in English or journalism	5
Mechanical trade schools	4
A&E	1
Aeronautical engineering	1
Aeronautical maintenance engineering	1
Chemistry	1
Civil engineering	1
Electricity	1
Electromechanical	1
Engineering administration	1
Experimental analysis: chemistry, biology	1
Hydraulics	1
Industrial engineering	1

APPENDIX G

OTHER DESIRABLE QUALITIES OF TECHNICAL WRITERS

	Number selecting
Writing skill	
Ability to express self	25
Writing to the level of the reader	3
Technical writing experience	3
Knowledge of printing and layout	3
Interest in and knowledge of all aspects of publications	2
Ability to write a good instructional sequence	1
Ability to prepare documentation which can be readily understood by others	1
Understanding use and value of good illustrations	1
Knowledge of the graphic arts	1
Reporter's "nose for news"	1
Capability of interpreting military specs	1
Ability to separate literary frills from logical conclusions	1
Technical skill	
Practical technical experience	25
Mechanical aptitude	4
Basic engineering knowledge	3
Ability to understand mechanisms	3
Knowledge of company's products	3
Ability to read blueprints	2
Piloting experience	2
Strong technical orientation	1
Hobbies: photography, ham radio, model building	1
Home study courses: airplane	1
Ability to analyze and interpret technical data	1
Mental skill	
Inquiring mind (curiosity)	15
Ability to organize	11
Logical mind	9
Adaptability	8
Common sense	7
Imagination	4
"Three-dimensional thinking" (visualization)	4
Intelligence	3
Creativity	3
Ability to concentrate	1
Alert	1
Conceit (to convince him he is qualified to prune an engineer's excess verbiage)	1
Free-thinker	1
Good sense of values	1
Man-oriented rather than subject-oriented	1
Objective	1
Understanding	1

	Number selecting
Human relations skills	
Ability to get along with people	34
Willingness to listen to constructive criticism	2
Persuasiveness	1
Modesty	1
Leadership	1
Work habits	
Industriousness	8
Initiative	7
Work independently	5
Perseverance	4
Pride in work or product	4
Conscientiousness	3
Concern for detail	3
High energy level	3
Accuracy	2
Neatness	2
Work well under pressure	1
Work long hours without loss of efficiency	1
Professional attitude	1
Patience	1
Manage the complete job	1
Ambitious	1
Service-mindedness	1

APPENDIX H

Writing and Editing Position Standards

Set by Civil Service Commission

For the first time in its history, the U.S. Civil Service Commission has issued a formal position classification for *technical* writers and editors. The product of several years of effort by the Commission, various government agencies, and STWP, this standard sets forth the precise classification criteria and complete functional descriptions for technical writing and editing positions.

The document is the official standard for differentiating among the many technical writing and editing positions of the Commission. But it has far broader significance than that: private organizations not governed by Civil Service regulations may well profit from a study of this detailed and carefully formulated presentation. While not every technical writing or editing group will find it suitable to organize its position classifications in this manner, they still can gain insight by comparing the Commission system with that used by their organization.

According to C. Mansel Keene, Chief of the Standards Division of the Civil Service Commission, the standard was based on an extensive occupational study that was conducted by the Commission. He points out that members of the Washington Chapter of STWP "made substantial contributions to the factual information and to the ideas and concepts expressed in the standard."

Commenting on the growth and future of the technical writing and editing profession, Mr. Keene states: "We recognize that, like many other relatively new fields of work, technical writing and editing is an evolving occupation. However, we believe that, through the cooperation and assistance of subject-matter specialists, we have succeeded in reflecting the present status of the occupation and, at the same time, have developed standards that will take into account the trend of its future development.

"While it is the first published standard for technical writing and editing that the Civil Service Commission has issued, it is not preliminary in nature; it is the official guide for the classification of these positions in the Federal service."

The complete series, which is known by the Commission as GS-1083-0, is printed below.

TECHNICAL WRITING AND EDITING SERIES

This series includes the performance or supervision of writing and/or editing work which requires the application of (1) substantial subject-matter knowledges, and (2) writing and editing skills, including the ability to determine the type of presentation best suited to the audience being addressed. Positions which require full professional or technical subject-matter knowledge and in addition, writing or editing skills, are excluded from this series.

INCLUSIONS

Included in this series are editor and/or writer positions which require a substantial knowledge of the subject-matter field, but less than the knowledge characteristic of fully-trained and qualified workers in the subject-matter field) and equally important, writing and editing skills. In recruiting for these positions neither type of qualification predominates. Technical editors and/or writers come from among those whose work experience or education has been in an appropriate subject-matter field or fields and who also have had some writing or editing experience. There are also some technical writers or editors among those whose work experience or education has been in the fields of writing, journalism, or English, and who have had, *in addition*, work experience (e.g., as nonprofessional support level or as a vocational instructor of a pertinent subject), technical school training, or college courses in an appropriate subject-matter field or in a combination of subject-matter fields. For positions in this series, the combination of both kinds of qualifications is always required and neither is the sole recruitment factor.

EXCLUSIONS

Excluded from this series are the following types of positions which may also be involved in the writing or editing of technical material:

A. Positions of writers or editors who are dealing with technical material, but who are not required to have substantial subject-matter knowledge in the fields of work involved. Such writers and editors acquire a knowledge *about* the subject-matter field; this knowledge is gained through editing reports, articles, etc., from collateral reading and study, and through association with subject-matter specialists. In positions of this type the principal recruitment factor is training or experience in the fields of journalism or writing. In such positions knowl-

edge *about* the broad field is preferable to intensive knowledge of a limited aspect of the field. These writers and editors must have a facility for acquiring, through interviews and reading, the subject-matter information which they need for the writing or editing project. Positions of this type *are not classifiable to the Technical Writing and Editing Series.*

B. Positions in which the predominant requirement is practical experience with equipment, devices, or mechanisms, not professional theoretical subject-matter knowledge. While some writing skill may be required in some of these positions, this skill is subordinate to the technical skills and knowledges acquired through practical experience with the equipment, devices, or mechanisms involved. These positions are to be classified to an appropriate nonprofessional series such as the Electronic Technician Series, GS-856-0, the Equipment Specialist Series, GS-1670-0, or other appropriate series.

C. Editor and/or writer positions which require full subject-matter competence in the professional and technical field. While editors or writers in such positions must have the ability to use the English language with skill, their subject-matter knowledge is paramount. They are recruited from among specialists in the subject-matter field who have writing or editing ability. Writing and editing positions that require such subject-matter knowledges are classified to the appropriate subject-matter series.

OCCUPATIONAL INFORMATION

Technical writing and editing as a separate occupation is a product of the rapidly developing and expanding twentieth century technology. The occupation has grown out of the need for rapid and precise communication of technological developments to those readers who are trained in the same or related subject-matter fields or who have need for the information. The technical writer or editor applies the art of communication, and combines it with a knowledge of the subject-matter field. He serves as part of the communication process required in translating the processes and results of the specialized thinking or findings of the natural sciences, social sciences, engineering, and law into the language of the various levels of the technically informed reader and in some cases, the lay public. Technical writers and editors thus apply knowledge and skill in verbal presentation to dissemination of information about technical subject matter. In order to do this, technical writers and editors must have a substantial knowledge of the subject matter involved, although not the same degree of knowledge as is required by the fully trained worker in the field.

Technical Publications Writers and Editors

Technical publications writers and editors are usually found in those Government activities which carry on a program of research, investigation or operation in the fields of natural and social sciences, engineering, medicine, law, and the like. Such activities include as a necessary part of their research program the dissemination of their findings or decisions to the scientific, administrative, and lay public. Technical information is disseminated by the publication of scientific or legal papers and reports in professional journals, agency publications, trade journals, or in magazines of general interest. Technical articles and reports may be aimed toward a scientific or legal audience, toward an administrative and program-planning audience, toward workers in the field whose main interest is in application rather than theory, toward an informed lay public, or toward the public at large.

Technical publications writers prepare original papers, articles, or reports covering technical or professional subject matter based upon interviews with workers in the field, upon notes and background files of research workers, and upon independent reading. Information is sometimes also obtained through watching experiments, tests, etc. To carry out assignments of this sort the writer must have substantial subject-matter knowledge.

Technical publications editors prepare manuscripts for publication by assuring that the report, article, etc., says what it is designed to say, that there is a logical arrangement of parts, that the level of concepts, expression, and vocabulary are appropriate for the audience to which the written material is directed, that the conclusions drawn are valid and supportable by reference to the facts adduced, and that statements made or opinions expressed are in accord with agency policy. Since research workers are often not skilled in verbal expression and communication, it may be necessary for the editor to review the work for grammar, sentence structure, and style. In some cases the editor may work with the original author in completely revising the method of presentation.

Other types of editorial jobs in this category include assignments as technical publications editors for the reports of a group or a committee. Such editors have responsibility for pulling together the various individual reports into a unified report which adequately reflects the total viewpoint of the group.

Other technical publications editors have responsibility for recognizing information needs of audiences and for planning appropriate technical information programs.

Many agencies also combine technical publications writing assignments with technical publications editing assignments in the same position.

Some technical publications writers and editors prepare abstracts, summaries, or digests of technical publications, reports, or similar material. When the preparation of these summaries requires substantial subject-matter knowledge, in addition to the ability to write abstracts, summaries, or digests, the positions are included in this series.

The work situations in which the technical publications writer or editor carries out his assignments vary considerably. His relationship to the original research worker or operating subject-matter specialist may be through written manuscripts only, or it may be direct and personal; for example:

1. A research worker may have completed a series of experiments which has produced results that are considered worthy of publication. He writes an original draft of his professional report which describes in his own language and from his own point of view what he has done and what the implications and results of his findings are expected to be. A draft such as this will probably mention and describe the equipment used in the course of the experiments. Before the report is ready for publication by the activity for which the research employee works or by a professional journal, the manuscript is edited by a technical publications editor.

The technical publications editor applies to the editorial process his knowledge and understanding of the subject matter, his skill in the presentation of ideas by words, pictures, tables, graphs, and other illustrative material, and his knowledge of the expected audience for the report. He makes sure that the report conveys the information that the research worker intends to convey so as to minimize ambiguities or areas of misunderstanding. He determines that words with meanings peculiar to the research worker's branch of knowledge are meaningful to an audience with a different professional background. He makes certain that descriptions of equipment are sufficiently developed for readers who will want to know about that aspect of the work. He assures that the organization and development of the report is logical and meaningful to those with less subject-matter knowledge than the author. In consultation with the research worker, the technical publications editor makes the necessary changes in presentation in order to achieve these objectives. This editorial activity represents an essential contribution to the communication of the research worker's findings.

2. A team of research workers has completed and published a number of papers that report piecemeal the results of their work.

A technical publications editor may undertake the assignment of combining these individual papers into a single publication. Editorial review in this case involves determining the relationship of each single paper to the whole, consulting with the research team in reassessing the relative importance of each of the aspects covered to the subject-matter field and to the team research project. The technical publications editor assures that questions raised in one paper with the expectation of future answers in subsequent reports are in fact answered. He must find out from subject-matter specialists the extent to which subsequent work has validated or changed the conclusions expressed in the earlier papers; he makes sure that the total report is presented in a uniform style.

3. A common situation which calls for a technical publications writer is the communication of technical, scientific, or legal information to an audience which is not professionally trained in the specific subject matter. In this case the technical publications writer starts out with his source material which very often is a publication in the professional or scientific journal, or an internal report of the activity. He considers the information contained in this material from the point of view of the particular audience (whether it is informed on the subject matter, whether it is a special-interest group, whether it is representative of the public) to determine areas of particular interest to the audience, how much elucidation is required, how to present the information in a popular, understandable fashion, what illustrative and pictorial material to use and at the same time avoid sensationalism, superficial treatment, incorrect or unwarranted conclusions, and the like.

In all of these examples, (and there are many other types of technical writing and editing projects besides those described above) the technical publications writer or editor acquires his information about the subject matter from a specialist in that field, from written sources, and through personal contacts. In order to understand and use this information he himself must have a substantial subject-matter knowledge.

Technical Manuals and Specifications Writers and Editors

In addition to technical publications writers and editors, this series also includes technical manuals and specifications writers and editors. These positions are found in Federal activities which carry on a program of applied scientific research and development for the purpose of developing better weapons, communications, and other types of systems, equipment and devices. These activities also write and distribute basic instruction materials on the new or modified systems, devices, or equipment. These materials are usually in the form of technical manuals and specifications.

Technical manuals and specifications are of many kinds and types. Some deal with the maintenance and operation of equipment. Others discuss the operational, tactical, and strategic characteristics of weapons, communications, and other types of systems. Some present design and development characteristics.

Manuals and specifications are put to a variety of uses. Technical manuals tell the field technician how to operate a new or modified piece of equipment or device, how to service it efficiently and safely, how to assemble it under field conditions, and how to track down and locate the causes of trouble spots. Field instructors use some manuals as textbooks. Other manuals tell the instructor how a training device can be used to simulate battle conditions, test proficiency of trainees, or sharpen individual or team technical skills. Policy-level administrators, field commanders and naval officers use manuals dealing with operational, tactical, or strategic characteristics of weapons or communications systems in evaluating alternative courses of action.

Specifications form the basis for procurement actions, and for assuring an objective basis for measuring the quality of equipment, devices, and systems during the course of production.

Since both technical publications positions and technical manuals and specifications positions require substantial subject-matter knowledge *and* writing or editing ability, they are included in the same series. However, the subject-matter knowledge is somewhat different in nature, and is obtained through different kinds of experience or training. For this reason, these two types of positions are treated separately in terms of titles, authorized specializations, and necessary qualifications.

Technical manuals and specifications writers or editors are required to have essentially the same kinds of subject-matter knowledge about equipment, devices, or systems as technicians who are working directly with the same or similar kinds of equipment. In many cases however, their subject-matter knowledge is considerably less detailed and complete than the subject-matter knowledge required of the technicians, whose positions are classifiable to such series as the Equipment Specialist Series GS-1670-0, the Electronic Technician Series GS-856-0, or other similar series.

In addition to subject-matter knowledge, technical manuals and specifications writers or editors also must have as an essential requirement writing and editing skills and knowledges which are beyond these characteristically required of technicians.

Authorized titles and specializations for technical manuals and specifications writers are described below.

Grade levels for technical manuals and specifications writers are not described in this standard. Such positions are evaluated on the basis of the difficulty of the subject-matter knowledge required and the writing and editing skills required.

The difficulty of the subject-matter knowledge required is evaluated by reference to published classification standards for appropriate nonprofessional classification series such as the Equipment Specialist Series, GS-1670-0 and the Electronic Technician Series, GS-856-0. In using such classification standards as guides, consideration must be given to differences both in intensity and extensiveness between the subject-matter knowledge required by a technical manuals or specifications writer and the subject-matter knowledge required by an equipment specialist or electronic technician working with similar equipment.

The writing and editing skills required, as well as originality and judgment are evaluated in accordance with the grade-level discussion in this standard for Technical Publications Writer and Editor positions, as presented below.

OFFICIAL TITLES AND SPECIALIZATIONS

If the paramount duties of a position involve writing abilities (as distinguished from re-write duties, as done by editors) the term "Writer" should be used in the title. Within the framework of this standard, duties such as monitoring of publications contracts and critical evaluation of a written product produced by someone else, etc. are editing functions. If editing duties predominate, the term "Editor" should be used in the title. If the two functions are of equal importance, the term "Writer-Editor" should be used.

Table 1 summarizes the more common types of positions and the appropriate official titles for them. Parenthetical additions designating specializations are authorized to be added to these official titles in accordance with the sub-section titled *Subject-Matter Specializations.*

Subject-matter Specializations. Subject-matter fields for technical publications writers and editors are extremely diverse and include most of the fields of social and natural science, engineering, and law. Positions may cover such broad areas of work as medical science, physical science, engineering, etc., or more specialized areas, such as chemistry, physics, international law, electronics, etc. However, the subject-matter knowledge required for positions of technical publications writers and editors is broad rather than specific.

The following specializations are authorized for technical publications positions and are to be used as parenthetical additions to the official title as listed above:

Engineering	Biological Science	Legal
Physical Science	Medical Science	

Where the nature of the substantial subject-matter knowledge required is in a narrower area of knowledge, specializations authorized for use are those for which the Civil Service Commission has established classification series; the title of the classification series becomes the title of the parenthetical addition to the authorized title as listed in the section entitled *Type of Positions and Official Titles.*

TABLE 1 — SUMMARY OF POSITIONS

Common Types of Positions	Official Titles
(1) Editor of individual or group prepared technical reports and papers, legal decisions and opinions, and other types of publications.	Technical Publications Editor
(2) Writer of technical reports and papers and other types of publications based upon reading of background materials, observation of tests and experiments, and interviews with subject-matter specialists.	Technical Publications Writer
(3) Writer and/or editor of technical articles for publication.	Technical Publications Writer Technical Publications Editor
(4) Editor of a technical publication with responsibility for its management.	Technical Publications Editor
(5) Editor who plans and advises on agency technical information programs.	Technical Publications Editor
(6) Writer of any one or more types of technical manuals based upon information gathered from interviewing workers in the field; from interviewing specialists; from independent reading; from interpretation of blueprints, diagrams, charts, engineering reports, and specifications; and from working with the equipment, device or system.	Technical Manuals Writer
(7) Editor of a series of technical manual issuances who directly supervises manual writers or who oversees the writing of manuals prepared either by a private contractor or by other Government agencies.	Technical Manuals Editor
(8) Writer and/or editor of one or more types of specifications which are based upon information gathered from interviewing specialists; from independent reading; from interpretation of blueprints, diagrams, charts, engineering reports and specifications; and from working with the equipment, device or systems.	Specifications Writer Specifications Editor

Subject-matter specializations for technical manuals and specifications positions are based upon practical knowledge of particular kinds of specialized equipment, devices, or systems. This knowledge is essentially similar to that required for positions in the Equipment Specialist Series, GS-1670-0 and the Electronic Technician Series, GS-856-0. Therefore, the specializations established for the standards for these series are also applicable to technical manuals and specifications positions.

Authorized specializations are to be used as parenthetical additions to the official titles given in Table 1.

Approved specializations for technical manuals and specifications positions are those authorized in

(1) the Equipment Specialist Series, GS-1670-0 in the section entitled *Specializations* beginning on page 4 of the published classification standard dated December 1958 (and any other specializations that may be authorized by the Civil Service Commission for the GS-1670-0 series). Additional specializations established by *agencies* for the GS-1670-0 series are not authorized for use in the GS-1083-0 series.

(2) the Electronic Technician Series, GS-856-0 in the section entitled *Subject-Matter Specializations* beginning on page 16 of the published classification standard dated December 1958 (and any other specializations that may be authorized by the Civil Service Commission for the GS-856-0 series).

The functional specializations in the standard for the GS-856-0 series are not authorized for use in the GS-1083-0 Series.

Technical Publications Writers and Editors

CLASSIFICATION CRITERIA

The criteria used in the evaluation of technical publications writer and editor positions are difficulty of the writing or editing project; the extent of originality and initiative required; and the degree of judgment involved.

Difficulty of Writing or Editing Project. The difficulty of the writing or editing project is measured in terms of the following considerations:

1. Whether the publication, report or research paper requires simple expository writing or whether it requires analytical presentation. Analytical presentation (which requires the writer or editor to present material pointing up new relationships, highlighting trends previously lost in detailed presentation or embodying conclusions drawn from the facts discovered) is more difficult than simple exposition.

2. Whether the subject matter of the publication covers a simple or complex field and whether it is in a well-established area or approaches the most advanced areas of knowledge or research in that subject-matter area.

3. Whether the writer or editor is required to have subject-matter knowledge of other work being done in the same or related fields in order to fulfill the requirements of his specific assignment.

4. Whether the material to be published differs from generally accepted theories or practices in the subject matter field covered. This consideration is significant only if the writer or editor is required to present the differing findings so as to convince his audience of their validity, value, and significance.

Originality and Initiative Required. This criterion includes two related facets of the jobs of technical publications writers or editors: the independence with which he works (e.g., the extent of freedom from written guidelines and technical supervision), and the amount of creativity required.

At the lower levels, assignments are specific and detailed instructions cover scope and content. There is limited opportunity for creativity. The writing or editing is in terms of the framework of the specific assignment. At the higher levels, however, the technical publications writer or editor has a per-

sonal impact on his assignment. Based on his knowledge of new developments or findings in a field, and on his knowledge of the technical information needs of the audience, he is expected to supply ideas for writing assignments and for the content of technical information programs.

Judgment Required. In this standard judgment covers the exercise of discretion and tact in personal contacts with subject-matter specialists. The criterion also covers the quality of discernment in assessing the needs of the technical publications audience, and the reactions of the audiences to the technical information program.

Qualifications Required. Qualifications required are reflected in the other three factors discussed above and are therefore not discussed separately.

GRADE LEVEL GUIDES

Technical publications writing and editing positions are to be evaluated on the basis of the following grade-level guides. Typical examples of each of the criteria are described at each grade level. Criteria which specifically involve writing are discussed on the left side of the page. Criteria which involve editing only are discussed on the right side of the column. Criteria common to both run across the width of the column.

Technical Publications Writer and/or Editor (Specialization) GS-5

At this level a technical publications writer or editor receives assignments to develop him for work at higher grade levels. Incumbent is taught the techniques of writing and editing, including the use of pictures, illustrations, graphs, and tables to enhance the presentation. He is expected to become familiar with available source materials and agency publication policies.

Technical Publications Writer and/or Editor (Specialization) GS-7

While the GS-5 level is the trainee level, GS-7 is the first operating level.

Difficulty of Writing or Editing Project. At the GS-7 level, a single process, experiment, development, test procedure, or legal decision or opinion is involved. The technical publications writer or editor is not required to have subject-matter knowledge of related writing or editing projects.

Usually at this level the objective of a project is to report information, or to describe a procedure. When a project involves highlighting trends, pointing up relationships, or explaining the significance of what is being reported the GS-7 technical publications writer or editor works under the continuing guidance of a more experienced writer or editor.

Originality and initiative. Scope for originality and initiative is limited. GS-7 technical publications writers and editors receive repetitive types of assignments which are covered by standard guides or clear agency precedents. If new types of problems are involved, the supervisor indicates the method of approach, sources of information, and the form of presentation. The supervisor sets priorities and keeps incumbent informed of latest requirements and developments. Work is checked during progress and upon completion.

Writer is given assignment of writing an article or a portion of a report or other publication. Source materials are readily available. Contacts are made with subject-matter specialists in the various parts of the agency for the purpose of gathering additional information. Writers outlines proposed report or article. The supervisor reviews the outline with the writer before the writer proceeds with the assignment.

Editor is assigned reports or publications which do not involve extensive editing. Editor has direct contact with authors, but usually takes up points needing change with authors after he discusses the nature of proposed changes with his supervisor.

Judgment. Subject to close supervisory guidance, the GS-7 technical publications writer or editor exercises judgment (1) in determining which details are to be used in the writing or editing project and which are relatively unimportant and may be omitted, (2) in evaluating the adequacy of source materials, and (3) in estimating the amount of information needed by the audience.

Technical Publications Writer and/or Editor (Specialization) GS-9

The essential difference between positions at this level and those characteristic of GS-7 is that at the GS-9 grade level the subject-matter knowledge required to carry out the writing or editing project is in a broader field of knowledge and the technical publications writer or editor works with a greater degree of independence.

Difficulty of Writing or Editing Project. In addition to the subject matter knowledge directly involved in the writing and editing project to which he is assigned, a GS-9 technical publications writer or editor must also have a knowledge and awareness of other publications (already published, or in the process of publication) insofar as they will affect the presentation aspects of his assigned project.

At this level the objective of most of the projects is to report technical information or to describe a technical procedure or process. A GS-9 technical publications writer or editor carries out this type of assignment independently.

Where the project involves highlighting trends, pointing up relationships or explaining the significance of what is being reported on, a GS-9 technical publications writer or editor works closely with subject-matter specialists in developing and expressing these ideas. A GS-9 incumbent receives continuing guidance and assistance from his supervisors in the methods and techniques of presentation required by this more difficult type of writing or editing project.

Originality and Initiative. As at the GS-7 level, incumbent receives specific assignments; source materials are generally readily available. Originality and initiative at this level differ from the GS-7 level in that incumbent performs most types of assignments independently. When assignments involve a problem or situation not faced before, incumbent works out approach with his supervisor.

A GS-9 writer differs from a GS-7 writer in the independence with which the GS-9 gathers information and selects what is pertinent to his writing assignment, and in the independence with which he completes the writing assignment, calling on the supervisor only when unusual problems of fact-gathering and interpretation or presentation occur.

A GS-9 editor differs from a GS-7 editor in that the GS-9 independently edits all usual types of articles, reports, legal decisions and opinions, and other publications within his particular area of subject-matter specialization. Editorial changes which do not involve a complete reorganization of the paper or a major change of emphasis are handled on the editor's own initiative with the agreement and approval of the author. If, however, the change is a major one, then the editor discusses the proposed change with his supervisor before discussing it with the author.

As at the GS-7 level, problems are largely those of discrimination and selection. But because a GS-9 incumbent operates without close supervision, errors in judgment could have a direct effect on the relationship between the editor and the author, or between the writer and the various subject-matter specialists. These relationships must remain harmonious in order for the writer or editor to operate effectively.

At this level, the technical publications writer or editor gauges the information needs and interests of the audience to whom the material is to be directed. He is responsible for judging whether the material is suitable to that audience and is presented in such terms as to receive a favorable reception. The GS-9 technical publications writer or editor is expected to be alert to wording in the presentation which might create an audience reaction that is not intended.

Technical Publications Writer and/or Editor (Specialization) GS-11

A GS-11 incumbent is usually assigned responsibility for the writing or editing of publications covering a specific subject-matter area or the work of an organizational segment of an activity. In carrying out this assignment he writes or edits the publications reporting the work being done and also works with his superiors and the subject-matter specialists in planning what additional subjects are to be included in the technical information program for the assigned area.

Difficulty of Writing or Editing Project. The subject of the writing or editing project often requires a knowledge and understanding of abstract ideas and theoretical concepts in the subject-matter field. The technical publications writer or editor must be familiar with the subject matter involved and must be aware of the relationship of his writing or editing project to the total technical information program.

The publication presents adaptations or departures from accepted thought or theory. In presenting these conclusions, it is necessary for the GS-11 technical publications writer or editor to make sure that each step of the process by which these conclusions were reached is presented clearly so as to convince the reader of the soundness of the conclusions and the manner in which they were derived.

Originality and Initiative. The GS-11 incumbent usually operates independently and plans the scope and content of the specific project assigned. Specific instructions are not received unless unusual or critical phases of work are involved. In addition to receiving specific assignments as at the GS-9 level, the GS-11 incumbent typically suggests to his supervisor ideas for possible articles or publications. He is responsible for keeping abreast of developments in an assigned field or fields and for considering them in relation to the technical information needs of the technical audience or audiences serviced. The technical publications writer or editor keeps abreast of the pertinent professional journals, magazines and trade publications in the field and the nature of articles accepted by such publications.

Frequently, the sources of information have not been widely disseminated. He must use his knowledge of what is being done in the subject-matter area and who is doing it in order to find out what written sources are available or whom he should interview in order to get the information he needs.

A GS-11 writer may have responsibility for writing reports about research or development work based on such material as notes of research workers, interviews with research workers, background files, etc.

A GS-11 writer may be assigned survey articles or he may suggest appropriate subject matter for articles or reports. Writing survey articles or reports at this level involves the surveying, interpretation and analysis of a number of specific developments, legislative actions, or court decisions in a specific field or in closely related fields in order to trace a significant trend or thread of development.

A GS-11 editor contacts authors and tries to get them to accept changes to correct such deficiencies, as lack of organization, incomplete presentation, and inconsistent statements and conclusions not based upon facts presented; these changes may require major revisions in the manuscript. Based on his knowledge of research being carried on at the activity and elsewhere, the editor may question the completeness or adequacy of the presentation of conclusions, etc.

An editor at this level frequently works with authors as a consultant to them on presentation of their material. He helps the authors organize their data, and makes suggestions as to methods of presentation. He may develop writing guides for use by authors in the agency or course materials for use in teaching inexperienced authors good principles of writing and organization.

Judgment. As at the GS-9 level, the GS-11 technical publications writer or editor uses judgment in evaluating both the needs of the audience and the objectives of the communicator in relation to the writing or editing project. Greater judgment is required than at the GS-9 level, however, in the evaluation of information that is being presented, because the sources of information often involve differing findings or viewpoints which the GS-11 writer or editor must help to resolve or highlight, in consultation with subject-matter specialists. Personal contacts generally cover about the same range of associations as at the GS-9 level, but the GS-11 very often makes such contacts not only to gather information but also in an effort to get subject-matter specialists to resolve differences in their viewpoints, or to get an author's or subject-matter specialist's agreement on a major change in proposed publications. Such contacts require the writer or editor to exercise a greater amount of tact and judgment than is usually characteristic of the GS-9 level.

Technical Publications Writer and/or Editor (Specialization) GS-12

This level differs from the GS-11 level in that the projects require knowledge and understanding of the most advanced theories and concepts in the subject-matter field. A GS-12 technical publications writer or editor works with a greater degree of independence than a GS-11 incumbent.

Difficulty of Writing or Editing Project. Characteristically at this level writing or editing projects involve (a) publications which require radically new or different report patterns or (b) publications for which special care must be taken to present serious adverse audience reaction or misunderstanding. Such adverse reaction or misunderstanding might otherwise arise because the publication or report departs from commonly accepted theories, data, or operations.

The nature of the writing or editing project is such as to demand a high level of skill in presenting advanced subject-matter theories and concept which are either being presented to the audience for the first time or are being presented in so radically different a context that care must be taken to assure a complete and cogent presentation of the subject. In many cases understanding and acceptance by the audience of the information being presented is essential to the activity's program.

Originality and Initiative. A GS-12 technical publications writer or editor works independently. He is responsible for defining the scope and content of writing or editing projects assigned, keeping his superiors informed if radically new approaches in presentation are called for.

Judgment. The subject-matter field involved is not only extremely complex but is changing rapidly. As a result there is not much definitive information in writing and many differing points of view are common. For these reasons GS-12 technical publications writers and editors must exercise considerable judgment in developing sources of information, in checking and verifying the information developed, and in synthesizing information. Ω

APPENDIX I

A REPORT OF A STUDY TO DETERMINE THE DUTIES AND RESPONSIBILITIES CALLED FOR UNDER THE JOB TITLE "TECHNICAL WRITER"--Center for Technical Publications Studies, Fordham University

Joseph Child and Robert Johnson

Technical writing is a new profession. As such, time is required to clear some of the job distinctions. Of the eleven tasks above,[1] three groupings are the actual work functions of others. The group leader or supervisor normally is responsible for at least some of the estimating, supervision, and purchasing. Also, less skilled persons perform the proofreading, the layout, and some of the other functions. Finally, editing is a true job in and of itself.

From this, writing was considered as the primary function of research, manuscript preparation, and liaison. These were used to develop the job description. Following the reasoning above, this job description was written.

The technical writer is one who writes instructive or descriptive material on scientific or technical subjects, interpreting and creating an acceptable presentation of the facts or ideas and theories of others for a given audience.

The work includes the following:

1. Performs research necessary to obtain complete understanding of the scope of the proposed publication, and to gain a thorough technical knowledge of the subject.

Receives verbal or written work order for the desired publication, together with instructions on its general purpose, and any available basic reference material, such as specifications, proposals, correspondence, engineering reports, drawings, photos, similar publications, and supervisory or sales memoranda and notes.

Studies the supplied reference material to acquire background information of the project and ascertain policy governing content, presentation, on the quality level. May consult with engineers, other technical personnel, the publications supervisor or sales personnel to clarify technical or other details of the writing project.

Analyzes information on hand to determine whether additional research is required or whether the supplied material is sufficient and can be adapted to the publications requirement.

If additional research is required, determines the most logical sources and best method for obtaining the required information. Performs the necessary research, may make field trips to libraries, government agencies, manufacturers, educational institutions, technical societies, etc. May confer with customer's technical staff through established lines of

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[1] Above, p. 52

liaison and may observe, study, or operate the actual equipment, object, or process.

Makes suitable notes to ensure proper correlation and retention of the information obtained.

2. Organizes the proposed manuscript to provide an orderly plan for the preparation of the required text material.

Prepares a general outline; breaks the subject material into major topics, considering:

a. The general purpose of the manuscript (catalog, magazine article, engineering report, equipment operation or maintenance manual, etc.)

b. The specific application (formal training, guide for field operations, promotion, general information, etc.)

c. The knowledge and skill level of the user

d. The complexity of the subject.

Arranges these major topics in logical order. Determines the logical sub-topics to be discussed or treated under each major topic and arranges these in proper sequence.

Classifies and indexes the reference material in accordance with the general outline.

Prepares a detailed outline: analyzes the reference material for each topic and develops and expands ideas into further sub-topics and groupings and arranges them to achieve continuity and the best subject coverage. Repeats this procedure for each topic, developing the outline for smaller and smaller portions of the manuscript, to the logical ultimate.

3. Prepares a draft of the manuscript in accordance with the detailed outline. Writes the text, drawing upon his developed knowledge of the subject and desired scope, and using his communications skills to create an acceptable presentation of the technical data for the given audience. May conduct additional research to validate or clarify portions of the technical data. Uses a style and format for the writing set forth in applicable specifications or may select or develop a style or format best suited for the presentation. Defines new and unusual terms.

Determines the illustrations required to supplement the written material and selects the most suitable type of illustration, such as a photograph, line drawing, rendering, etc. Prepares sketches or preliminary layouts of line drawings and renderings and specifies the requirements for photographs.

May supervise the photography. Assigns nomenclature to photographs by marking on overlays or other method. Requests the preparation of preliminary or final art from the art department and provides additional oral or written instructions as required.

Maintains written control and record of changes in cross references, figure references, tables and the like during the development of text and illustrations to ensure accuracy of these details in the final manuscript. Routes the final manuscript through established channels to obtain technical editor or customer approval.

4. Revises and rewrites text to meet technical editor's and/or customer's review requirements.

Receives the draft of the proposed publication after technical editor or customer review. Studies the corrections, comments, criticisms, or suggestions made to determine the specific revision requirements and their effect on other portions of the text. Rewrites affected portions of the text and requests new or revised illustrations as required. Checks very closely to assure that all references and notes in other portions of the text conform to the received portion and makes any required changes or corrections. Reviews the new or revised illustrations to ensure accuracy and conformance with required changes. Routes the revised text and illustrations for final approval. May obtain and present factual data as a basis for not accepting changes as requested by the editor or customer.

APPENDIX J

TITLES OF TECHNICAL WRITING DEPARTMENTS

	Number selecting
Writing-oriented	
Technical Publications	23
Publications	11
Service Publications	3
Logistics Publications	2
Technical Communications	2
Advertising and Market Publications	1
Aerospace Publications	1
Central Publications	1
Documentation	1
Documentation and Engineering Publications	1
Documentation, Presentations and Reproduction	1
Documentation Systems	1
Engineering Publications	1
Engineering Service and Publications	1
Engineering Service Publications	1
Engineering Technical Publications	1
Handbook and Art	1
Logistics Publications and Training	1
Product Support Publications	1
Proposals and Contract Documentation	1
Publications and Graphics	1
Publications and Information	1
Publications and Presentations	1
Publications and Specifications	1
Publications Engineering	1
Publications Services	1
Technical Manuals	1
Technical Publications Marketing	1
Writing Services	1
Technical-oriented	
Engineering	6
Technical Service	4
Engineering Presentation	2
Technical Data	2
Advanced Technical Studies and Proposals	1
Engineering Administration	1
Engineering Data Requirements	1
Engineering Services	1
Engineering Support	1
Logistics	1
Logistics Data	1
Operational Services	1
Presentations and Industrial Design	1
Project Engineering	1
Quality Control	1

	Number selecting
Technical-oriented, continued	
Systems Programming Documentation and Manuals	1
Technical Documentation	1
Technical Information	1
Technical Information Services	1
Technical Production	1
Technical Reports and Films	1
Technical Standards	1
Customer-oriented	
Service	3
Product Information	2
Customer Training	1
Marketing	1
News Bureau	1
Sales and Service	1
Sales Promotion	1
Service Manuals and Bulletins	1

APPENDIX K

NEXT HIGHER ELEMENTS OF TECHNICAL WRITING DEPARTMENTS

	Number responding
Administration	
Marketing	14
Service	7
Customer services	3
Product Support (Sales or Marketing)	3
Technical or Engineering Administration	3
Administrative Services	2
Contracts	2
Sales	2
Vice President for Administration	2
Administration and Marketing	1
Director of Communications	1
Finance and Administration	1
Industrial Relations	1
Management Controls	1
Management Services	1
Manager of Program Administration	1
Office of Administrative Assistant	1
Public Relations	1
Sales Promotion	1
Sales and Service	1
Technical Communications	1
Management	
Executive	6
Plant Manager	2
Assistant General Manager	1
Division Manager	1
Projects Management (General Manager)	1
Engineering	
Engineering	23
Engineering Services	7
Design Assurance	1
Design Services	1
Engineering and Advanced Planning	1
Engineering Design	1
Engineering Support and Services	1
Equipment Research and Development Labs	1
Operations	1
Plant Services (Power System)	1
Quality Assurance and Logistice	1
Undetermined	
Product Support	2
Field Service and Support	1
Logistics Support	1
Production Assurance	1
Service and Product Support	1
Technical and Administrative Services	1

APPENDIX L

PREVIOUS POSITIONS OF MANAGERS OF TECHNICAL PUBLICATIONS IN THE AEROSPACE INDUSTRY

	Number responding
Writing	
Technical writer/editor	44
Supervisor of Technical Publications	30
Senior Technical Writer	9
Editor (of newspaper, magazine, etc.)	7
Supervisor of technical illustrations group	5
Technical Illustrator	5
Marketing and advertising	3
Advertising production	2
Copywriter	2
Art director	1
Owner-editor of publication	1
Promotional Publications Analyst	1
Reporter/feature writer for newspaper	1
Supervisor of Technical Motion Pictures	1
Communications skills	
Teacher	9
Retailing	3
Supervisor of Training	2
Research Associate for University	2
Department Store Display Manager	1
Public Relations	1
Public Information (Army)	1
Engineering	
Field or Service	10
Design	7
Project	5
Assistant	3
General	3
Rocket	2
Test	2
Tool Designer	2
Proposal	1
Advanced Planning	1
Product Support	1
Contract Administration	1
Chief Preliminary Design	1
Staff Power Plant	1
Field Application	1
Liaison	1
Development	1
Broadcast	1
Sales	1
Staff Installation	1
Engineering Technician	1

	Number responding
Engineering, continued	
Material Analyst	1
Fabrication and Assembly	1
Equipment	1
Technical or Skilled	
Aircraft Mechanic	3
Electronics Technician	3
Bench Testman	1
Environmental testman	1
Turret Lathe Operator	1
Electrician	1
Chemist	1
Draftsman	1
Laboratory Technician	1
Technical Accessory	
Sales Representative	6
Quality Control	3
Layout Draftsman	3
Supervisor, blue printing	1
Expediter	1
Spare Parts Analysis	1
Manufacturing Analysis	1
Systems and Procedures Analysis	1
Parts Provisioning Aid	1
Supervisor, service records and cataloging	1
Production Planner	1
Data Analyst	1
Auto Dealer Order Department Manager	1
Chemical Laboratory Supervisor	1
Engineering Representative	1
Motion Picture Machine Operator	1
Supply Controller	1
Time Study Analyst	1
Inspection	1
Technical Representative (military)	1
Technical Administration	
Supervisor of Technical Groups	4
Department Head, Production Control	2
Foreman	2
Project Leader	2
Advanced Program Development	1
Department Head, Systems Procedures	1
Group Leader, Liaison Group	1
Program Control Administrator	1
Assistant Production Manager	1
Program Supervisor	1
Inspection Foreman and Technologist	1
Engineering Planning Supervisor	1
Aircraft Engine Manager	1

	Number responding
Technical Administration, continued	
Ordnance Depot Supply Officer (Army)	1
Ordnance Heavy Automotive Shop Maintenance Officer (Army)	1
Engineering Proposals Manager	1
Field Office Supervisor	1
Manager, Supply Support	1
Assistant to the Vice President	1
Production and Planning Supervisor	1
Administrator, Tooling Manufacturer	1
Chief, Weapons Utilization Staff	1
Engineering Manager	1
Chief of Service Engineering	1
Flight Line Supervisor	1
Customer Engineering Manager	1
Customer Service Supervisor	1
Product Support Manager	1
Miscellaneous	
Pilot	2
Administrative Assistant	2
Geologist	1
Credit Reporter, Retail Credit	1
Director of Employment and Personnel Services	1
Stock Broker	1
Owner of Technical Literary Consultant Firm	1
Resources and Manpower Control Manager	1
Account Executive	1

APPENDIX M

EXPERIENCE/EDUCATION FOUND MUST HELPFUL BY MANAGERS OF TECHNICAL PUBLICATIONS IN THE AEROSPACE INDUSTRIES

	Number responding
Communication	
English	23
Technical Writing	15
Graphic Arts	3
Illustration Experience	3
Journalism	3
Copywriting	1
Free-lance Writing	1
Industrial Education Technical Writing Course	1
Literature	1
Printing	1
Report Preparation	1
Magazine Article Writing	1
Supervision of Technical Publication Groups	1
Systems and procedures Writing	1
Dramatics	1
Speech	1
Art Background	1
Latin	1
Teaching Experience	1
Knowledge of production processes (printing)	1
Advertising	1
Technical	
Technical or Engineering Courses	28
Practical Technical Education	17
Drafting	7
Design	5
Electronics	5
Education in basic sciences	4
Physics	4
Aircraft Maintenance Experience	3
Mathematics	3
Military Specialist schools	3
Pilot Training	3
Chemistry	2
Field Engineering	2
High School Trade (Shop) Subjects	2
Mechanical Engineering	2
Knowledge of electricity	1
Mechanical and Electrical Knowledge	1
Service Engineering	1
A&E License	1
Technical Orientation	1
Mechanical Aptitude	1
Radar Work (Army)	1
Blueprint Reading	1

	Number responding
Technical Accessory	
Familiarity with company Products	6
Systems and Procedures Analysis	1
Expediter	1
Stockroom	1
Ability to Read Blueprints	1
Practical Machine Shop Work	1
Experience in Maintenance and Support	1
Aircraft Experience	1
Knowledge of Field	1
Engineering Liaison	1
Product Support	1
Technical Representative Experience	1
Management	
Business Administration/Management	16
Handling/Dealing with People	7
Industrial Management	4
Psychology	3
Analytical Ability	2
Accounting	1
Guidance	1
Contracts Administration	1
Miscellaneous	
Wide Outside Reading	5
Liberal Arts with some Exposure to Technical Material	2
Wide Liberal Arts Background	2
Air Force Officer Experience	1
Combination English/Electronics Education	1

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TECHNICAL WRITING IN THE AEROSPACE INDUSTRY: THE EDUCATIONAL BACKGROUND, DESIRABLE QUALITIES, EXPERIENCE AND SALARY OF THE WRITER; THE NUMBER OF WRITERS; THE POSITION AND NORMAL RESPONSIBILITIES OF THE TECHNICAL WRITING DEPARTMENT WITHIN THE COMPANY

by

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Any study of technical writing in the aerospace industry reveals the basic dualism surrounding the field, reflected in the type of training recommended for these men, in the typical tasks they perform, and in the placement of the technical writing department in the organization. A technical writer is a man who translates the work of the scientist and the engineer into prose that his audience can understand. This requires that he have the background to understand what scientists and engineers are doing, and the facility to express what he understands so that it is understood by a particular audience.

Managers of technical writing departments in the aerospace industry are divided in their opinions of what constitutes ideal training for the technical writer. Many say that training in engineering is essential; many others say that the best training is in written expression. Some technical writers are expected to do the entire writing job from conception through delivery; others are expected merely to polish the phrases of the engineer who does the actual writing.

Companies in aerospace use their technical writers in widely different ways. Some require scientists and engineers to pattern their writing within rigidly prescribed lines; others train non-technically trained writers in narrow technical fields in which they can write in depth; others assign beginning technical writers to experienced ones for indoctrination. Many companies have formal in-plant training programs, both to

teach technical people how to write better and to teach writers some technical knowledge.

Technical writers produce many different kinds of material, ranging from technical papers meant for technical audiences to instruction manuals describing the operation of equipment for semi-skilled workers and to technical publicity for a general audience.

Technical writing departments usually contain, in addition to the writers, specialists such as illustrators, typists, and printing artisans who together turn out documentation needed by the customer or the company. This department is sometimes found in the engineering line, and sometimes in the administration or marketing line.

Managers of these departments are generally well paid, with salaries roughly commensurate with education and experience. Their career progression and recommendations on education mirror the dualism already noted.

Professional development of this field of technical writing is hampered by the lack of any unifying scholastic discipline, and by the manner in which practitioners move into and out of this work.

There are growing opportunities in this field. The aerospace industry forecasts an increase in their need for technical writers of about a third in the next five years.

Training for this field hinges largely on the kind of technical writing involved in the job. Schools must adopt the dualism of the field in training technical writers.