NASA TECHNICAL MEMORANDUM

NASA TM X-53965

COMMUNICATION FOR THE 70'S

Compiled by Scientific and Technical Information Division
Management Services Office

December 12, 1969

NASA

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama

MSFC - Form 3190 (September 1968)

TECHNICAL REPORT STANDARD TITLE PAGE

1. REPORT NO.	2. GOVERNMENT ACCESSION NO.	3. RECIPIENT'S CATALOG NO.
TMX-53965		

4. TITLE AND SUBTITLE	5. REPORT DATE
Communication For the 70's	December 12, 1969
	6. PERFORMING ORGANIZATION CODE: A&TS-MS-I
7. AUTHOR(S): Compiled by Scientific and Technical Information Division	8. PERFORMING ORGANIZATION REPORT #
9. PERFORMING ORGANIZATION NAME AND ADDRESS: George C. Marshall Space Flight Center, Marshall Space Flight Center, Alabama 35812	10. WORK UNIT NO.
	11. CONTRACT OR GRANT NO.
	13. TYPE OF REPORT & PERIOD COVERED: Technical Memorandum
12. SPONSORING AGENCY NAME AND ADDRESS	14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

Prepared by: Management Services Office
Administrative and Technical Services Directorate

16. ABSTRACT

This report presents presentations given at the Ninth Annual Society of Technical Writers and Publishers (STWP) and Association of Technical Artists (ATA) Seminar held in Huntsville, Alabama from October 21 to October 23, 1969.

The purpose of this report is to emphasize the vital role of effective communication within technical fields. Scientific knowledge was disseminated through various media: reports, illustrations, presentations, and simple word of mouth.

The papers contained in this volume are in the order of their presentation during the seminar without regard for continuity of thought from one paper to the next.

17. KEY WORDS	18. DISTRIBUTION STATEMENT
	For Public Release

19. SECURITY CLASSIF. (of this report)	20. SECURITY CLASSIF. (of this page)	21. NO. OF PAGES	22. PRICE
Unclassified	Unclassified	188	$3.00

TABLE OF CONTENTS

TABLE OF CONTENTS (Concluded)

YOU BETTER BELIEVE IT

By

RUTH E. GILLER
Cape Kennedy Area Chamber of Commerce
Cocoa Beach, Florida

Ladies and Gentlemen, you've heard the story about the doctors: they're always saying that whenever a woman who comes up to them tells them, "Oh, you know doctor, I would just love to have been a doctor, something I've always wanted to do all my life." Well, I'll tell you a secret, I would like to be a technical artist, but I've been thwarted in my ambitions. In fact the last time I tried, they told me they didn't have any money to pay me. Through the centuries man's greatest scientific efforts and advances have come through military means. We've responded to the pressures of war. World War I served to get aviation off the ground. World War II gave us the growth of electronic equipment, computers, radar, sonar. In fact, the only thing which comes to mind as not having needed wartime impetus is the development of the automobile industry, because they tell me that it was the necessity for a truck which could go faster than 10 miles per hour to outrun the revenue officers during prohibition which got the automobile industry off the ground. Another thing, pencillin — it had been gathering dust on the laboratory shelves for years until the necessity for something to control battle wounds, the infection from battle wounds in World War II. But, what has come from nonwarlike events? As a matter of fact the space effort is the only thing which has come to us in recent years that was promoted by neither war-making nor law breaking. And this is where we are today.

Thirty-two billion dollars for 42 pounds of rock — Is that the sum total of the space program? Now I know there isn't one of you in the room who feels that way, but did you know that Mr. John Q. Public thinks so. The man in the street thinks that this is the case. Are you, even as professionals, involved with your own little flap in aerospace? Do you know what's happened to the thing that you produced for aerospace when it got down to the general public? This is where we have all been lacking. This is our biggest problem to date — telling the general public about the spinoffs of the space program. In fact one of the most popular games nowadays is the game of completing the following

sentence: If we can put a man on the moon, why can't we . . . ? Did you ever do that? The answers range from "solve the problems of our cities" to "get my shirts back from the laundry on time." We can do both; we can get everybody's shirts back from the laundry on time and we can solve the problems of our cities. And it's going to be the discipline of aerospace technology that is going to do both.

One of the greatest products that has come out of the space program is the marrying of engineering, of medicine, of technology, and of management into a single working unit to produce the space program. And if we don't do something about it those teams which made up the space program are being broken up and they are going to be scattered into other industries, and heaven knows when we can put them together again. In the Cape Kennedy area alone we are losing 5000 jobs. And the general trend among those men is to say good-bye to aerospace and when we need them again, when there's some spectacular breakthrough, it's going to be hard.

This afternoon I am going to try and make you believe in the necessity of informing the public, to use your skills as writers and illustrators to get down to the man in the street — not just fellow engineers, because even though he may be a civil engineer working in your state road program, he is still an engineer and he is interested. I am talking about the man in the street, who's worried about where his tax dollar is going. Every morning and every evening I drive across the Indian River bridges, across the waterways, and look across at the Vertical Assembly Building, the largest building in the world, and it is familiar to a lot of you who have passed through that area. That building symbolizes something of the space program, and is this type of endeavor to be allowed to just crumble away, and millions of dollars in installation and technology allowed just to rust under the Florida sun, Alabama sun, California sun; wherever you happen to be?

What Mr. Average Citizen does not realize is that this technology is the key to research for our cities and our social programs. Now it's quite understandable that while the job was being done, that there was not time for the aerospace companies to get out and inform the public. But that time has come now. What I will attempt to do, in the language of the modern television screen, is to tell you, "You'd better believe it" because this is the hour. There are innovations already in use that perhaps even you and certainly Mr. Average Citizen does not realize are a part of the space program.

Let's take Mr. Average Citizen to the hospital. He walks down the gleaming white corridor, he sees a nurse sitting at a console in the hall; she's

playing with dials and there are flashing buttons, and in his mind, it looks surprisingly familar and he realizes that the last time he saw this was in a television broadcast reporting on a manned space flight. So it is just that — by a system of sensors implanted first on the body of every patient on this floor — that a nurse sitting at her console in the hall can monitor the vital body functions of every single patient on that floor. In fact the very same apparatus that watched Armstrong, Aldrin, and Collins in moon flight is watching Grandma as she lies on her hospital bed. And he feels quite a lot better about it, knowing that in any emergency a nurse can be there in two seconds. It has the very same blinking lights and same buttons as that equipment.

Mr. Average Citizen is rather surprised to see a patient being wheeled by in what appears to be a space suit. Now they do tell him on the floor that this is experimental still; that it is being used for heart patients to reduce the work load on the heart and augment the coronary blood flow. And there are great possibilities for this equipment.

Mr. Average Citizen then saw a little boy playing in the hall wearing a space helmet. And he smiled and said to himself, "How nice of the hospital authorities to give him a real space helmet to play with, but isn't it a little extravagant?" Then he discovered that the helmet was actually in use and that instead of all that complicated equipment that one used to have to wear to get a basal metabolism test, this is now checked through an absolute replica of an astronaut helmet. And you can be certain that that child who would have kicked and screamed and fussed about equipment being placed over his face is going to relax and be perfectly happy wearing a helmet with Glenn, or Aldrin, or Armstrong stenciled on the front of it — a good deal of psychological benefit about that one.

In medicine is where some of the most spectacular advances of ths space program have come, not the least of which has been the benefit to doctors to study the healthy human body. How often did doctors in the past have the chance to see a normal excessively healthy human in his normal daily habits? We don't go to the doctor until we are pretty sick and if we go in for an insurance physical, the quicker we can get through the better; we don't say more than yes or no to the doctor when he asks us how we are feeling, you can be sure of that. But this opportunity to actually sit down and study has been tremendously important. And not the least discovery was the seasick remedy that didn't make you sleepy — a very small thing perhaps for you and for me. But imagine that you are an aircraft pilot who all of a sudden has developed air sickness. He certainly couldn't go around taking dramamine. Your job was finished, but the space program forced the necessity for the manufacture of a seasick remedy which didn't make you sleepy. It's on the market now, but it doesn't say on it anything about having come out of the space program, because I looked.

In fact perhaps you have been in your doctor's office, especially if your doctor happens to be an internist or cardiologist, and seen attached to his telephone a dial, rather like the things they record earthquakes on, and all of a sudden the bell rings and it starts writing. You know that he is recording a cardiograph that is being sent him by another doctor from miles across the country, perhaps, for his analysis. And this too is such a terribly important thing because it gives doctors the chance to tap the brains of the most eminent men in the field.

Have you, Mr. Parent, Average Citizen, tried to push a baby carriage through the sand, or across the sand lot to the play ground? It's quite a job. But you know that your child is going to grow up, that this is a temporary thing. But what of the parent of the invalid child, of the child who is condemned to a life in a wheelchair. Out in California now they are working with, and it is already in use in several crippled childrens' homes, a walking wheelchair. Now this chair does do just that — it walks. It has large flat feet and legs that walk and this thing can be operated by the most crippled child. It goes up and down flights of stairs; it walks on the beach; it can walk across rocks. The child becomes completely mobile, and the feet and legs for this equipment were developed for an unmanned lunar walker which carried instruments. It's a direct transposition from the space program to the public, and this is a tremendous breakthrough. The equipment can be operated by a chin strap, and also there is another type of equipment which came out of the space program and that is the sight switch. They decided, they being the aerospace powers that be, that there was a possibility that astronauts under the conditions of extremely high gravity would lose the power of their arms and legs and be flung backwards immobile, but switches were developed which are controlled by the voluntary muscles of the eye. If you want the details of how they work, you will have to ask someone more scientific than I. I just know that they work, and I've seen a demonstration of a man completely crippled, in a wheelchair, maneuvering this wheelchair around a course of obstacles, controlled only by the muscles of his eye. Now it may be a small thing, but the mobility that it gives the crippled patient is tremendous. And think of the patient flat on his back in the hospital, who couldn't even turn the pages of his book. You know they have these overhead readers, but he can now turn pages, turn on switches, turn on the television; it puts mobility back into his life. These are small things but each individually is very important.

When the metallurgists were given the challenge of finding new alloys for space capsules, they came up with these new metals. Then applying them to human medicine they found that they were better accepted by the human body for the replacement of parts than anything that has been used before. So the

fact that Grandma is walking now after her broken hip, and that Mr. Average Citizen's son is playing football again without a limp, may in part be due to the space program.

There are those who predict that within our own lifetime our cities will be covered with a ton of rotting garbage; that our rivers and our ponds will be contaminated beyond belief; and that our air will be full of contamination. And they would direct space funds for this purpose. What they don't realize is that this challenge has already been met; the challenge of producing a clean environment for three men for 10 days in a space the size of an elevator, not a very large elevator, has already been done. It's a test which challenged the ingenuity of any sanitary engineer; and they did it. They did it with a system of filters and even produced water from the system by a combination of using the battery water and by-products of the waste system, returning drinking water to the capsule. Now if they can do that, those men would just love to be let loose on city programs. And Mr. Average Citizen doesn't know it.

In a two-page ad in a national magazine recently, a company, not an aerospace company, indicated how they had solved the problem of a downtown motel in one of our industrial cities which was being put out of business by a chemical factory next door. They used the same kind of filters; the motel stayed in business and the chemical company stayed in business, and they both have a happy partnership today.

Mr. Average Citizen is seeing these items in action and he doesn't realize it. He doesn't realize the innovations and the details which have already come from the program. Miniaturization is not the least by any means of the products.

Does Mrs. Average Citizen realize when she takes her casserole straight from the freezer and pops it in the oven without it cracking, does she realize that that product was developed for nose cones to take them from the tremendous cold of outer space through the searing heat of reentry and then to a splashdown in the temperate water? Of course she doesn't — she just thinks, "What a nice new product it is." And does she realize that when she fries eggs in her nice Teflon-lined frying pan, being careful not to scratch it, that this product was devised for sealing gaskets in the Titan missile? Of course she doesn't. And she doesn't know also that the next development of the same product was in remolding the eardrums in surgery; that people who were completely deaf have had their hearing restored by a complete remodeling of the inner ear; that this stuff is accepted by the human body and that they can hear again because, of course, hearing is a mechanical thing and all it needed was the proper equipment.

Mr. Average Citizen doesn't know yet about the new silicone paints, the silicone-based paints, developed to coat aerospace equipment which are coming onto the market. They are still expensive but they are available and they will absolutely revolutionize the paint industry.

How many times have you bought a beautiful new refrigerator, new washing machine, or a dryer, and they worked perfectly in the store; perhaps a television set, and it was working beautifully and the color was magnificent, and you brought it home in the back of an open truck, dumped it in your living room, and of course, needless to say, it's fairly delicate equipment, and it didn't work. That's going to be past because in a very short time all equipment is going to be produced with an air pocket on the bottom, and this air pocket will be filled from the back end of a normal vacuum cleaner and the stuff will ride in on a cushion of air; it will go into the truck on a cushion of air, come off on a cushion of air, it will be placed, and then the air will be let out. And this is a means which is used today for moving missiles around. You can't have delicate equipment traveling across the Alabama countryside or Florida countryside with its rocks and bumps — the air cushion is the answer.

Are any of you from the farm country? Well, I am originally and I've had my equipment stuck in the mud many a time and have had to get out and push. The aerospace industry has revolutionized the wheel with a type of plastic wheel which gives and flows with the travel, like something out of a Dali painting. These new wheels will soon be available for tractors and go into production. I read that they were on the lunar crawler but fortunately I showed it to someone ahead of time and he said, "Oh dear, no dear, not the lunar crawler." So I still have to find out exactly what it is used on and I think it's lunar equipment, not the crawler itself.

In the National Geographic magazine in the October issue, there was a statement that I liked very much. They said, telling the story of the floods in the midwest, "Not since Noah has man had such authoritative warning of high waters to come." And I liked that. There was a description of the aerial photography and meteorological service offered by the weather satellites. And in this the warning given to these areas of the midwest last year resulted in no deaths at all. The satellites watched the snow buildup, photographed, and sent the results back to computers which actually computed the damage to come. And as I said no deaths, compared to many deaths in previous years with similar floods, because they knew when they were coming and they were able to prepare against them.

The communication satellites are going to open up the world. They end the ages of isolation for many people and hopefully the dawning of the age of instant communications to produce world peace. Pope Paul has said that development is the new name for peace. Communications satellites have a role too in safety. Did you have any problem getting here from your home city, if you are from out of town? Did you have problems on the highway, delay in your plane taking off the ground; perhaps you did and the answer lies in communication satellites. Because in time to come, pilots will be able to radio through a communications satellite to the airport when they are hundreds of miles away and not just when they are coming into the approaches as they have to do today. This will create safer and better landing equipment and definitely better conditions for those who fly.

When I came to America close to 20 years ago, and I wanted to place a telephone call to Europe, I booked my call and I sat by the telephone and waited until it came through. And heaven help me if I wasn't on the phone when it came through because I would have lost my turn. Nowadays if I want to make such a call, I make it as easily as if I were calling New York or California. That's a graphic demonstration of our communications age. It's not just for personal calls that this is important; it's important for business, for industry, for science, for medicine, and for world peace just as much.

Satellites are also used for solving problems. As an example, in the case of the tuna in California. They knew that warm silted water flowed into the Gulf of Mexico from the mouth of the Colorado River and it was also known that tuna live in clear water but swim into the silted water to feed. But they were not quite sure where the shrimp were in the silted water that the tuna were swimming after. Aerial photographs from satellites outlined the silted areas which couldn't be seen from above. Fishermen went into those areas and the catches have increased tremendously. Now this was great for the fishermen but hard on the tuna.

Manufacturers are excited about the possibility of making things in the weightless environment of the space station. I believe that Mr. Average Citizen fully believes that the Russian beginnings of a space platform were in the nature of some Buck Rogers science fantasy exploit; they were nothing of the sort. They are the beginnings of the setting up of space platforms. The idea to industry of making perfect ball bearings, perfect optical instruments, the use of the totally clean environment; these are things which fascinate them. Some time ago I heard Dr. Paine speak on this very subject with tremendous animation; the idea of being able to manufacture under these conditions is very very close to his heart.

Manned observations from outer space will offer major earthquake forecasts, weather forecasts two weeks in advance, precise gaging of agriculture inventory (this is the counting of diseased trees and things of this nature), global navigation and full traffic systems for ships at sea, and do away with the radio on ships. They radio and then they drift another hundred miles before anyone gets there and it's hard to find them. This way they would be precisely pinpointed.

And so, ladies and gentlemen, I feel as you should feel, that America is getting more than its money's worth. This investment pays dividends in national well-being and in security. If we heed history's lesson, we can learn that the nations that had ambition to develop their techniques were world leaders as long as they kept looking outward. When countries began to turn inward to their own problems, they let their technology slip. And these empires toppled. We can't even grasp the practical results of the expansion of knowledge. If you will recall, the ancient Greeks developed mathematics as an abstract intellectual exercise with no knowledge of what could come, and today we have an entire mechanical civilization founded on their mathematical theories — the same mathematical theories of Archimedes and of Euclid.

Who can dare to say that this is a waste of time or money to learn about the universe? The expansion of knowledge is the main product; the spinoffs are the benefits to justify the expense. Those well-meaning humanitarians who would sacrifice the space program for social justice on earth should be reminded over and over that it takes more than good intentions to bring about social reform. It's the hard cost, as the American taxpayer knows; it takes money, more and more dollars. And tax dollars in this country come from one source — gainfully employed American workers.

It isn't generally known how many companies up and down the United States are involved in the space program. For example, there's a tiny little factory in a barn, growing crystals, which is just as much a part of the space program as the giant aircraft companies of California. And the public doesn't know this. Many employees don't even know that their own companies are involved in the space race. I use the word race because it is a race; there's no getting away from the fact. How many workers at Ford, the automobile part of Ford, know that Ford is part of the space program. How many of Chrysler's automobile workers know that Chrysler is part of the space program. I venture to say not too many.

Ninety-nine percent of the space program money has been spent in the United States. And 93 percent of that went to private industry. This is the

message that I want you to take back and tell America, including the poverty striken, that employment and security and progress lie with the space program. That space technology has forced the development of new devises, new materials, and new methods, because the space program forces the demand for the never-done-befores.

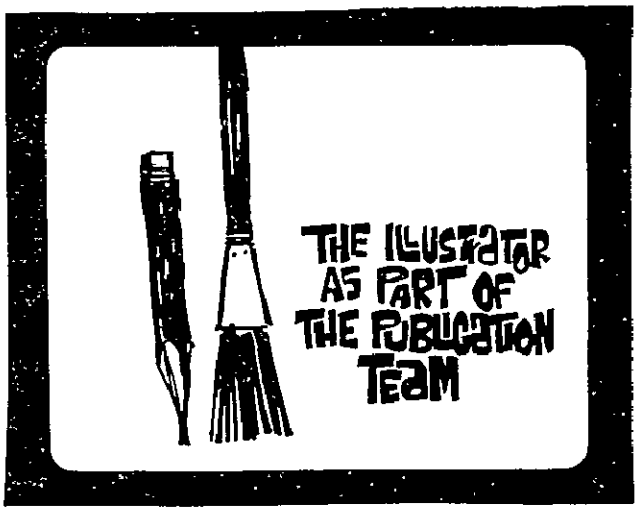
I said before, "You better believe it." Do you? Please take it home with you for this is the age of the 70's, the space age is the age of the 70's, and communication is going to be the by-word. As we reach out into the vast distances of space we create a greater ability to do things here on earth. We are creating a competence which is essential if this country is to lead the world in human dignity and in human wealth. Please help us, for it's with your ability that we could all succeed.

Nearly 3000 products, space technology innovations, have come out of the space program.

GRAPHIC ARTS

By

Sam F. Kennedy; Jr.
RCA Service Company
2611 Leeman Ferry Rd.
Huntsville, Alabama



I am not going to give you a course in technical illustrating. There are plenty of excellent courses available on the subject, but needless to say they take considerably more time than I have today.

MY PHILOSOPHY

Instead, I will attempt to stand back at a distance and view the total publication preparation process — the organization, the team, the illustrator's role as part of that team.

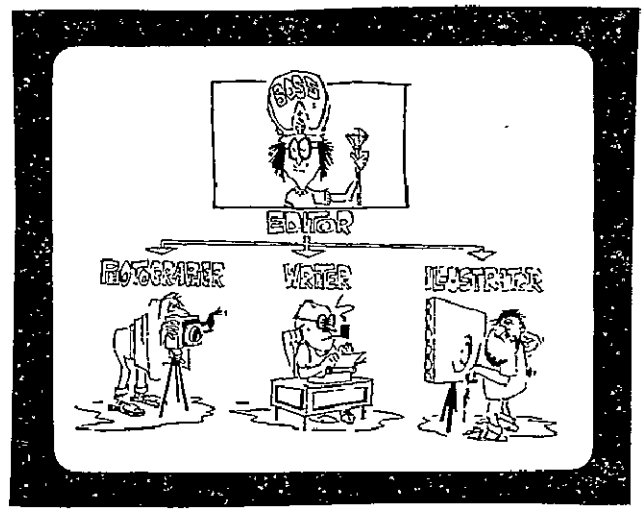
Without this overview of the total process, a discussion of the technical illustrator's job requirements becomes quite meaningless.

I would like for you to keep in mind that many of the points that I am going to make are my personal opinions, based on my particular experience. I will be the first to admit that my approach is not the only one. Those of you who are engaged in the publications business will probably note some situations and problems similar to your own, and those here whose jobs are only indirectly related to publications will, I hope, gain a little better insight into the process, especially the Graphic Arts phase of the process.

ORGANIZATIONAL CONCEPTS

Let's take a look at some basic organizational concepts that relate to producing publications.

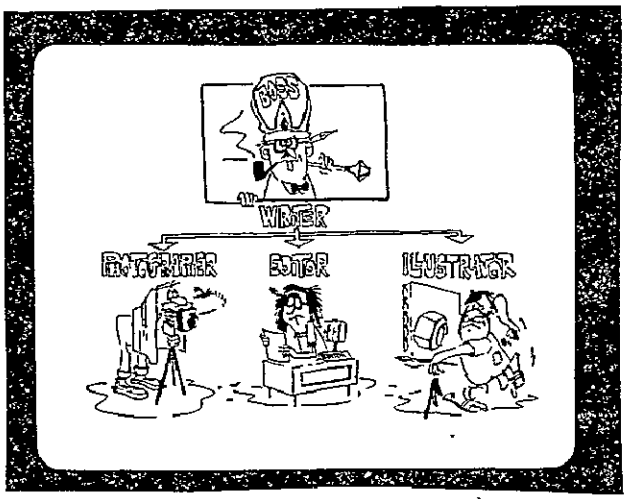
Editor-In-Charge Concept



In a highly simplified way, this illustrates a concept wherein the editor has "task responsiblity" and all the other members of the team are administratively subordinate to the editor. This technique of organizing is typical of newspapers and other rapid deadline activities.

This illustration of course omits several very important members of the team — the typist, the typesetter, the proofreader, the page make-up man, the printer, etc.

Writer-In-Charge Concept



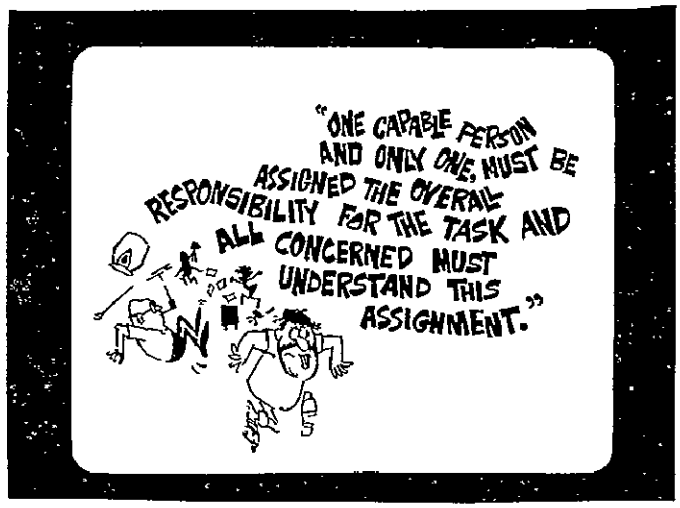
This technique or organization has found wide acceptance in the technical publications field. I have found that it has worked best for me especially for instruction book preparation. The writer has "task responsibility."

The writer is therefore administratively and functionally in charge; thus all other team members support the writer. The writer's responsibility includes schedule control, cost control, coordination, technical accuracy, and finally, customer acceptance of the product.

I have encountered those who have very strong feelings on this subject. Some feel that the "editor in charge" concept is the only way to operate, and others who feel equally strong about the "writer in charge" concept.

It is my opinion that those who are frustrated about the matter of who should be in charge are placing too much emphasis on this aspect of the operation. Indeed, here are practical considerations as to who should be in charge; however, only one thing is really important and that is administrative responsibility:

Administrative Responsibility



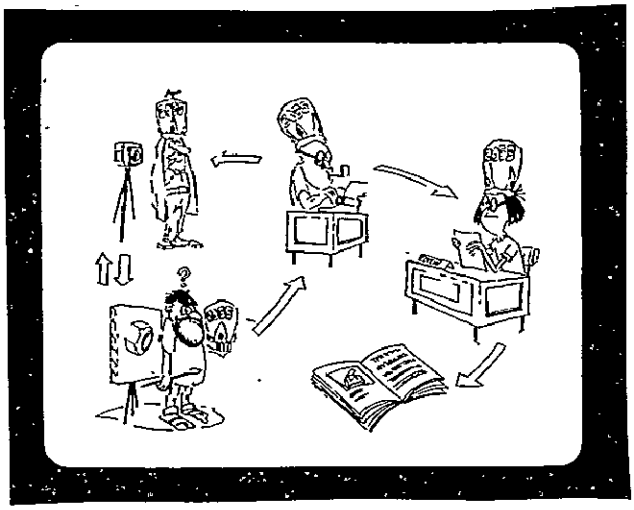
Much confusion and resentment has been generated over the administrative process, which only reinforces my conviction that a firmly applied, logical administrative approach is necessary; however, things don't end here.

The single most important aspect of the interrelationship of the team members is not administrative, but rather professional. Each specialist has a job to do. There are too many operations involved for one employee to accomplish the total job. Even when possible, it is seldom economically feasible. Therefore, the editor, the writer, the illustrator, the photographer, and all the others have their professional roles to play.

Flow Concept

If we will simply admit that someone must be in charge and turn the organization chart on its side we get this: a simplified flow chart of the technical publications process.

Simplified Flow

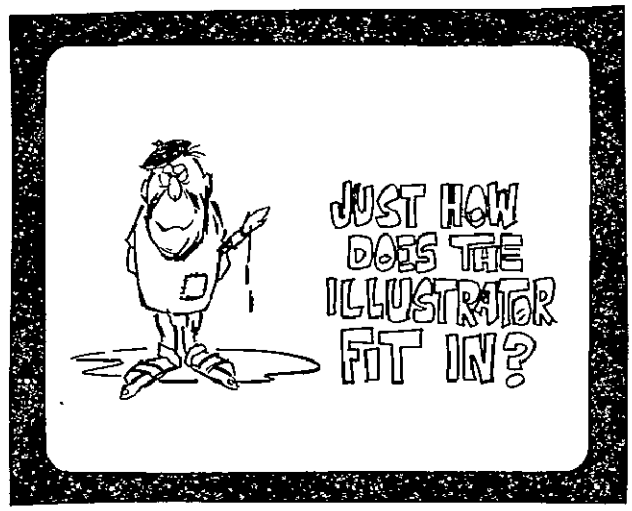


This makes it much easier to see that the editor is in charge of editing, the writer in charge of writing, the illustrator in charge of illustrating, the photographer in charge of photography, etc.

I believe it's the subtle interplay between all the individuals involved that makes the difference between success and failure. The editor must direct and redirect the writer on editorial matters; the writer must instruct the illustrator and the illustrator must advise the writer, etc.

In other words, no one person is really in charge from a professional point of view. Further, it's neither necessary nor desirable that one person control all aspects of a publication on an absolute basis.

Just How Does The Illustrator Fit In?



No matter how you organize or how the material flows, the technical illustrator is in a supporting role. You may ask, "What if the illustrator is both writing and illustrating a publication?" If this is the case, when he is writing, he is the writer, not the illustrator, and when he is illustrating, he is the illustrator, not the writer. This, of course, could be expanded to cover all aspects of the publication process; in other words, one man performing all functions. This no doubt is quite often done, but you can easily see that very few people can perform all these jobs in a professional manner. Also a person who has that level of talent would no doubt command a salary that would rule out his use on the less complicated tasks, because of cost alone.

In medium and large publications departments, an increased application of specialization becomes possible.

Illustrators Also Specialize

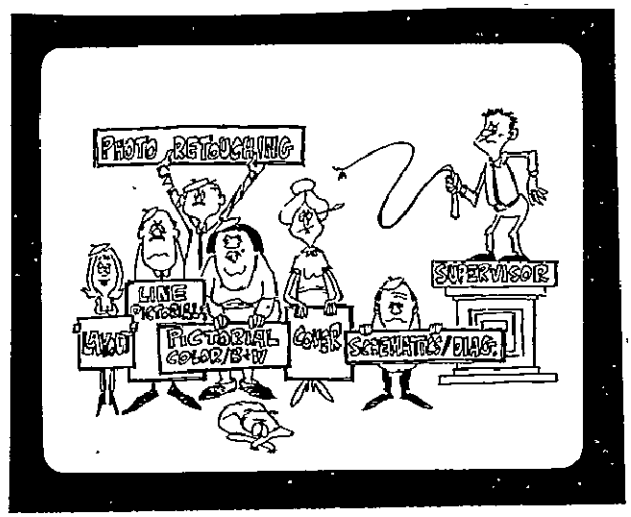
To be of maximum value to the department, the illustrator must be very versatile and at the same time he must specialize. This is a conflict — a dilemma — with which the illustrator must learn to live. Even so, management has a responsibility to promote cross-training activities and cross-utilization of employees at the same time that specialization benefits are being reaped.

How Does the Writer Get the Right Man Assigned to His Job?

If you have a small (or one-man) illustrating department, the problem resolves itself very easily — you take that which is available or do without.

If you are fortunate enough to have a medium or large illustrating department supporting you, it necessarily has to be effectively supervised. It then becomes the illustrating supervisor's problem to make certain that you get the right man on a particular job.

The Technical Illustrator Supervisor Assigns the Right Man



Necessarily the technical illustrator supervisor must run his department in an effective and efficient manner. Many factors must be considered constantly — pay rate of the employee, productivity of each employee, special abilities of each employee, limitations of each employee, deadline dates of other jobs, etc.

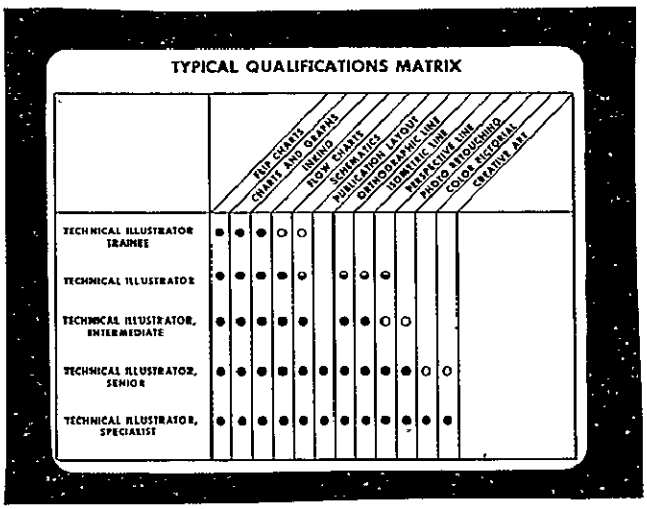
Even with the tight control that must be maintained by the supervisor, the subtle interplay of ideas between the writer and illustrator — the illustrator that is actually accomplishing the work — must not be disturbed. A similar relationship exists between all the members of the team.

Who Is the Right Man?

This question is difficult to answer — the right man under one set of circumstances is wrong for another. The selection of the right man must be made using "best judgment" based on the particular situation.

Even though no hard and fast rules can be made that will give all the answers in the proper application of an illustrator, a clear pattern does emerge.

Typical Qualifications Matrix



This matrix summarizes the manning philosophy of an 80-plus illustrator group which I now manage. This group performs work for both presentations and publications. Much of the work is dual purpose; that is, for publications and presentations.

Technical Illustrator Trainee

The technical illustrator trainee is a person who possesses the proper background, education, and desire to become a technical illustrator. Of the 80 illustrators in the department, we have no more than two trainees at any given time. The quantity depends upon how much work is available that can be most economically accomplished by this level. Operation of various machines, running errands, cutting materials, supply management, and other illustrating related items of work take most of the trainee's time. Gradually the trainee is expected to perform actual illustrating tasks including flip charts, simple charts and graphs, inking, etc. Our general philosophy is that a trainee must stay in this classification for at least 6 months but no longer than 12 months. If the trainee has not "taken hold" by the end of the 12-month period, he is usually assigned to another job classification outside the illustrating field.

Technical Illustrator

The technical illustrator may be a recent art school graduate or he (or she) may be an ex-trainee who has been promoted. In any case, he is proficient in the preparation of flip charts, charts and graphs, and inking, and with close supervision he is able to do more complex work. The technical illustrator category has developed to a point (as indicated by the "half" symbols) that he prepares simple line illustrations for publications. His immediate supervisor provides the help that is necessary to insure adequate quality for a professional level publication.

Technical Illustrator Intermediate

The intermediate level illustrator handles all types of work except color pictorial and creative art. In some individual cases they also may be proficient in those areas. The intermediate level illustrator handles many jobs without direct supervision. In some cases he may even be required to furnish working supervision.

Senior Technical Illustrator

The senior technical illustrator performs all types of publications and presentation illustrations of all complexities. The senior illustrator is able to work directly with any client without direct supervision. Although his capability may not be equal in all categories of work, color pictorial and creative art are the only areas in which he is less than proficient.

Specialist Technical Illustrator

The specialist technical illustrator is just what the title implies. He has outstanding capability in one or more of the most complex and demanding illustration categories. This usually is in the color pictorial — creative art — photo retouching categories. Usually such a person can accomplish all other types of work as well.

Illustrator Earning Power

The technical illustrator trainee's worth is based on his background and education and is comparable only with nonskilled jobs. As a result the "minimum wage level" is the typical starting rate.

On the other hand, the senior and specialist level's pay rates must be competitive on a nation-wide basis. He therefore commands top money in the illustrating business and is usually worth every cent he is paid.

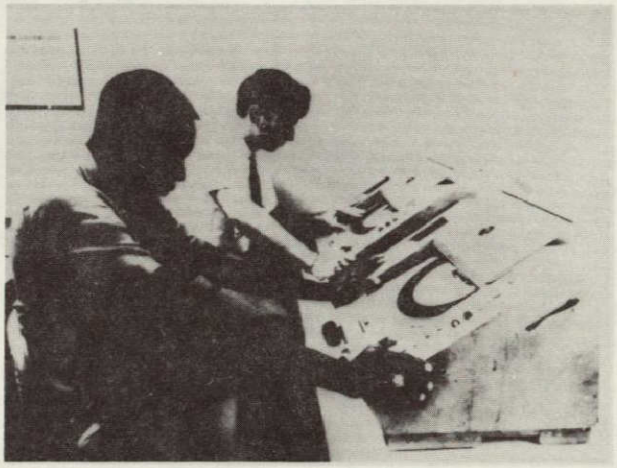
The job categories that fall in between likewise are paid on a graduated basis, depending upon the person's experience and ability to get the job done.

EXAMPLES OF WORK

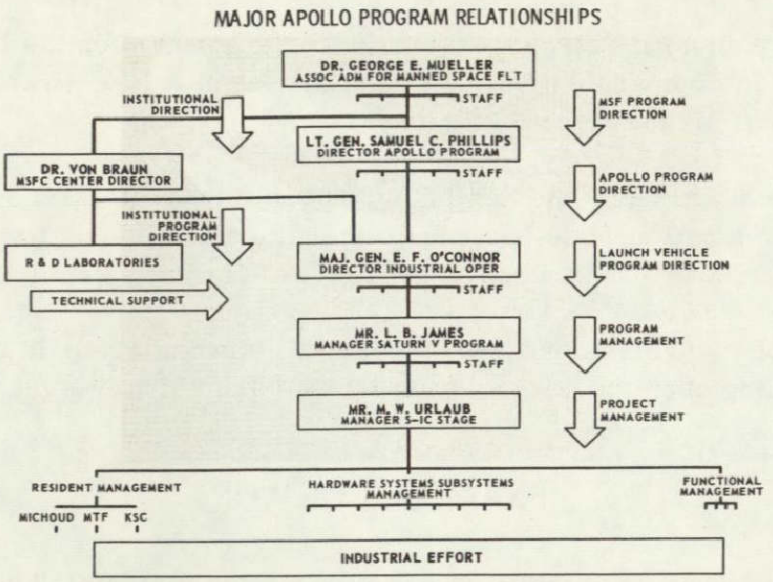
In closing — before opening the floor for questions — let's examine some typical examples of illustrating work.

The first example was accomplished by an illustrator trainee.

The Trainee

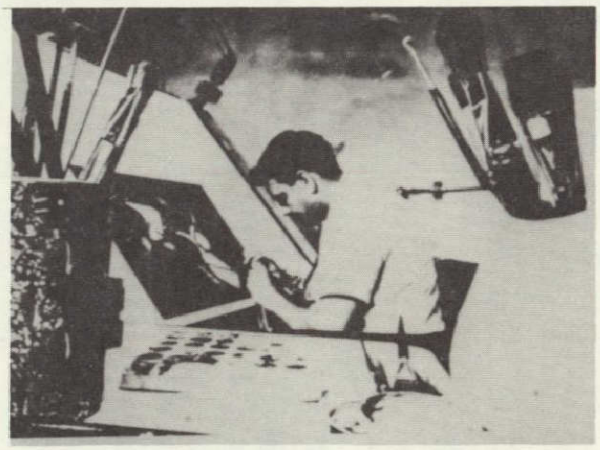


Trainee Performed Work

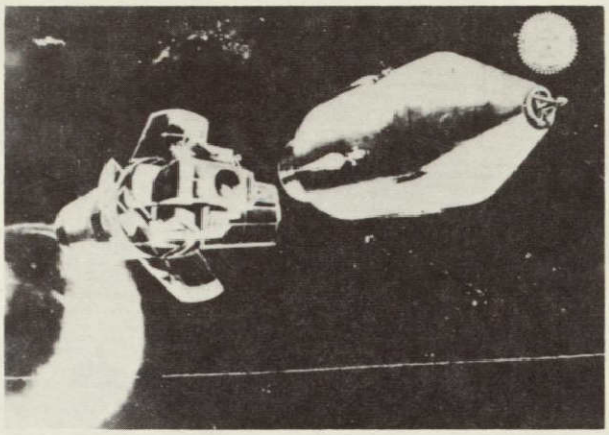


This is a simple chart but one that is typical of management control instruments. With moderate supervision the illustrator trainee can perform this level work on an economical basis.

The Specialist



Specialist Performed Work



This illustration, which I categorize a "color pictorial," won the 1968 International Technical Communications Conference award "Best of Show." The impact of such work in high quality brochures, reports, and presentations is without rival.

WHY BE A TECHNICAL ARTIST?

By

Richard W. Buckstone, National President,
Association of Technical Artists, Inc.

Why be a technical artist indeed? In the light of recent months of reductions, layoffs and so on, the short answer might be "Why bother? You're wasting your time even thinking about it."

In spite of this easy answer, however, there are a good many reasons why technical art is still a good field to enter and why it may even offer more scope in years to come; although artists smarting under the threat of being laid off may not be able to appreciate these possibilities so readily.

Technical art is one of those jobs that many people find they "fall into," not something to be achieved as a life-long ambition. How many small children, when asked what they want to be when they grow up, will reply "A technical artist?" Maybe an astronaut, a nurse or doctor, a senator, or even president, but never a technical artist. After all, nobody really knows what a technical artist is and even technical artists themselves have trouble defining their skills and outlining their place in the industrial field.

As an art student, I had no idea of ever becoming a technical artist; although the germ of the whole idea was obviously there, since I was the only student in the life class ever known to use a 5H pencil. The tutor discovered it, broke it into fragments, and gave me a stock of charcoal. Later I found enjoyment in pen lettering in commercial art classes, then discovered photography — both of which had a more or less mechanical flavor and could be controlled consistently and constantly — and decided that my art career lay somewhere along a mechanical line.

After a short career as a professional photographer after World War II, in a period of great shortages of materials, equipment, and money, I turned to illustration in what eventually was the most strictly disciplined field one could possibly find — preparing line drawings, graphs, etc., for medical publications. Everything was scrutinized to the Nth degree at every stage, and thrown out at the first sign of any deviation from the truth. Graphs were screened by a

battery of professors, surgeons, and other members of the teaching staffs and variations of a hair's breadth had to be corrected.

This period of strict outside control was wonderful training, and after a couple of years I began technical illustration at an engineering company — but only after an intensive cram course on the shop floor as an apprentice and in the drawing office as a draftsman. This opened my eyes to the relationship between the artist, the manufacturer, and the customer and finally decided me on a career in technical art.

The technical artist serves three masters: himself with pride in his job and work; his employer by his usefulness; and the customer by the effectiveness of his art.

The fine artist is usually not so restricted and can, to a certain extent, please himself and offer his work to only a clientele who like his style, although he usually needs some sort of patronage in the form of a regular employer, if he is to ever make a living solely from fine art.

To be a technical artist is obviously appealing only to a limited number of artists, since the discipline is much tougher and the freedom of self-expression a great deal more restricted. Why then, become a technical artist?

Basically, I feel there are three types of artist: the fine artist, the commercial artist, and the technical artist, and their terms of reference can probably be broken down roughly as follows:

The fine artist produces work more to express his feelings about life and the way he sees it, with financial reward very necessary (but incidental) to his desire to produce. Many fine artists work at entirely unrelated jobs for their bread and butter, yet make a profitable sale from art produced outside their normal working hours. Many artists will not agree that the true fine artist can function best in this way, but unless the artist is of independent means in these times he is hard pressed to make a living from full-time freelance fine art.

Commercial artists can be defined as the real workhorses of the art world, since they are often a combination of technical and fine artists both at work and in their spare time. The best commercial artists often make more than any other type of artist, and I am including magazine artists in this category. The whole point is: just how many artists of the specialist calibre

are there and how few of even those actually earn the fabulous sums that are usually offered as bait to get artists into these fields?

The technical artist is often something of both the fine and commercial artist, but his work is for information pure and simple — usually to impart information outside the scope of the layman. During his working life he can expect to make a fairly steady, reasonable income and is often better paid than the low-grade commercial artists and probably more consistently than the fine artists.

The technical artist's work is usually sold at the rate of somewhere in the region of $ 10 an hour (although I hasten to add that this is his employer's fee for his labours and not his own earnings, although freelance work can often approach this). This means that a fairly complex technical illustration can cost up to $ 800, which is quite a good figure for any work of art. Most work is considerably lower in cost than this, but it may give some idea of the money that is involved in technical art and also why the artist who can turn out good quality work in a short time will always be worth more to any employer.

Earnings of fine and commercial artists vary considerably and incomes of fine artists from their paintings alone may be quite meager when spread over a lifetime. On the other hand, if they can hit the "jackpot" they can scoop up very high earnings in a few years, although few of them actually do this.

Technical artists' earnings also vary from area to area, but their incomes are more easily reckoned by the year and are usually consistently good for most experienced artists. Some rare birds have been known to earn $ 1000 a month on the board and incomes of around $ 200 a week are not uncommon in many areas, with supervisors earning quite a bit more than that. It is not uncommon to average over $ 10,000 a year and most experienced artists should have no difficulty in reaching this figure in a short time.

The chief difference between most fine artists and technical artists is that the latter works at his craft as a full-time job, with regulated hours and fringe benefits — and is sometimes a little less "Bohemian" in his appearance. In fact, in most organizations you can hardly tell the artists from the normal people!

Other differences between the two types of artists are the "plusses." The technical artist must have basic art training, even some knowledge of painting, pigments, etc., but he must also have good basic understanding of engineering drawings and practices, or, in the case of medical artists, more

than a passing acquaintance with medicine and surgery — to say nothing of anatomy.

Many employers find it hard to categorize the technical artists, since to them, he is not fish, flesh, fowl, or good red herring. Although his uses are realized, it is not often clear where he fits into the order of things in a company. Usually his function is within the sphere of technical publications and he is attached there and probably forgotten as long as he keeps his nose clean and does a satisfactory job for his pay.

Until recent years, in this country at least, there had been no recognized qualification attainable by technical artists to put them on the same level as technical writers, who are often required to have degrees in engineering, writing, or both. The writers have a yardstick against which employers can evaluate them, and a scale of achievement that they can use for their own ends. Happily, this situation is being changed, albeit slowly, and it will soon be possible for the technical artist to qualify in the same way as the writer and produce domumentation that will equal or even surpass that available to the writer.

Courses are available in colleges on the West coast and at a few places elsewhere that provide two- and four-year degreed education in technical art. This overall pattern is very patchy, however, and in general it is very difficult in many states to find courses that are either adequate or even on the right track. This means that unless the would-be technical artist lives in the right area, he just cannot get any useful training at all. The fine artist on the other hand stands a better chance of getting art school or college training in most of the larger cities.

The basic need of the technical artist is to understand his prime problem of communication; and this is also where teachers of fine art have problems in preparing courses that will be of benefit to technical artists.

The fine artist is a personal communicator, conveying to the viewer his feelings or attitudes about a certain thing — even his feelings on the feelings of another. This gives the fine artist an infinite range if he cares to explore it — expressing himself in any medium he thinks appropriate from a pencil sketch to a vast, mechanical behemoth of steel. His communication made, the fine artist is not necessarily concerned with the outcome since his own creative urge has been satisfied and he is probably well on his way to the next expression of his thoughts.

The fine artist must make his own market, create his own demand, and also change his approach and outlook with the changing times. (The technical artist must also change his ideas from time to time, of course, but his end product remains largely the same.)

Pablo Picasso is one of the finest living artists in art history, yet he is largely known for what the layman refers to as "those nutty paintings where the eyes and ears are all stuck on in the wrong places." He has constantly been more than one jump ahead of many others and it is for his innovations in the fine art field that he is more noted. Unfortunately, many fine artists try to imitate the abstracts of Picasso without learning the fundamentals that he learned and skip the basic training. Unfortunately, to fellow artists — this shows, however, on the basis that you can fool most of the people for most of the time — some pseudo-artists can achieve a measure of success with the lay public, who, of course, know nothing about art, but do know what they like!

The technical artist cannot depart from the normal in this way and his communications must be strictly two-way affairs. If they are not, he is failing in his job. He cannot create his impression of the way a Czech auto mechanic, laboring under the muzzle of an invading Russian tank, would take apart a carburetor. He must show, clearly and dispassionately, exactly how a carburetor can be taken apart by an average intelligent person, with access to standard tools, working under a nice shady tree with ample time to do the job properly. A good technical artist can do this quite easily with one clear illustration in a very short time.

The medical artist must show the subject he is illustrating as accurately and precisely as possible, and if color is involved, then it must be exactly as in nature, since to a surgeon or doctor a change of color in tissue can mean various different things.

The fine artist has no such close limitations or restrictions. If he cares to paint a bowl of beautiful blue apples and white bananas against a background of red grass, the same surgeon who flung out the medical artist's work may buy this still life and hang it in his surgery room because he finds it relaxing to look at. The medical artist's work, incidentally, is the least known in the technical field, since his work rarely is seen by the lay eye and is confined to a limited audience, which is also hypercritical of his efforts. His work as an artist brings him into contact with most branches of medicine, and his work is scrutinized to a degree that no other art form must endure.

This is an area of technical art that has least appeal for the student since it is not everyone who can cooly stand behind the surgeon making sketches, or who can collect a dish of human organs from the pathology lab and prepare paintings of them. I used to encounter medical artists in two of the big teaching hospitals in London — occasionally one would be seen walking down the corridor to his studio with an extra hand or leg, or quietly painting from a specimen in the hospital museum of pathology.

However, much of the work of the medical artist is more humdrum and involves the preparation of graphs and readings from instruments, but it is always exacting in its nature.

One is often asked "why can't you be replaced with a camera?" since it seems that photographing something would be preferable to painting it if one wanted a truly accurate picture of the subject. This is only partly true, since the nature of photographic processes is such that colors are not always completely true in reproduction and a photograph of a scene has none of the personal sensitivity that a landscape painter can give it. On the technical side, the camera is an excellent aid, but is often distorting and not always small enough to have access to some things that must be illustrated. It is possible to take a photograph of an item such as the carburetor mentioned earlier, broken down into component parts in correct order for the purpose of parts listing or instruction. However, the preparation of such a photograph is very time consuming, since the parts have to be laid out on sheets of glass, hung on wires, propped up with pins and putty, etc., then all the props removed by retouching once the photograph has been taken.

The medical photograph is very useful as long as the color integrity can be maintained both in the film and in the separation for printing in a journal, but the medical artist can often do a better job than the camera.

The technical illustrator can depict the parts of the carburetor more clearly than the camera and even distort to advantage to show relationships that the camera shot might obscure.

A technical artist should be trained to visualize parts suspended in space in three-dimensions — from two-dimensional drawings supplied by the engineer. All the identical parts should look identical, and under some conditions the illustration must also be made to a scale that can be used for reference and design.

To learn the finer points of technical art takes time, since the artist must still not be oblivious to the fine arts and must learn the basic principles of drawing (perspective, for example) that apply to all forms of art. He must still be able to exhibit some sensitivity in his work in spite of its rigid limitations and the demands of deadlines that he may have to meet.

Technical art is not all exploded views or medical illustrations, and many works of technical art are as beautiful to the lay eye as many of the works of the great masters, showing imagination and skillful use of materials yet still retaining total accuracy of the subject depicted.

Concepts such as the popular ideas of lunar landings foraging forth from a vehicle have now been seen on TV, actually happening — yet the artist's concepts of this and other scenes were and are based on a highly detailed and specialized knowledge of the subject which was updated as more knowledge of the truth emerged.

As the former ideas that belonged only in the realm of science fiction become realities, the everyday readers of magazines become more aware of the activities of the technical artist and less skeptical of the possibilities of the illustration becoming an accomplishment.

The layman, however, is usually quite prepared to accept the concept of a new season's automobile when presented to him long before the first car is off the line, and many are prepared to order cars and airliners from an artist's concept — plus some very relevant performance and cost figures, of course.

The technical artist also has other functions to fulfill such as preparing information slides for training or selling, which means he also has to understand photographic processes — when the mere mention of the word camera is anathema to the fine artist. He also has to understand printing processes and the language of the printer.

The traditional fine artist usually is visualized by most of us as having unlimited time to produce his work, only actually producing when he has run out of bread and cheap wine in his garret in Montmartre. Of course, this is not true outside the film or novel, and many fine artists keep their own regular hours of work, like writers and other craftsmen who work at home or in studios.

Preparing technical art, however, is far from a leisurely occupation and, more often than not, the artist will be required to work to a deadline and must accept this from the start.

From this it may be seen that a technical artist needs far more than a basic art training in order to be a success, and every effort should be made to supply his training with good basic grounding in all the allied subjects he needs.

The technical artists of the future will need wider ranges of training than ever before, since new methods of preparing art are moving into industry and many of them are quite complicated. A company on the West coast uses computerized equipment for preparing technical illustrations and this can only be used by highly skilled and very "engineering-oriented" artists who can read blueprints upside down and inside out at high speeds. These computers do not follow the usual pattern of automation by enabling people of lesser skills to do more work, and the company in question has discovered early that the machines are no substitute for artists but a valuable tool that can only be of use to a highly skilled individual.

I also read of an English company using isometric drawings for all their internal and publications work, dimensioning them for use on the shop floor, and used with different callouts in manuals, etc. This conjures up the wonderful thought of the technical artist possibly replacing the draftsman in many areas, which is an avenue we should explore much more thoroughly.

The principle behind using isometrics in engineering is not a new one, but the usage has always been limited to small areas and it is interesting to see just how far the principle can be applied.

From this, it is possible to visualize a strong future ahead of new technical artists, since the use of computers and isometrics is certain to expand and will in turn provide openings for skilled artists. I stress the word skilled, since although the craft has little to offer the half-baked artists at present, it will have much less time for them in years to come and the technical artists of the future will have to be a distillation of all that is best in technical art today, plus being the masters of the technical skills of tomorrow.

The effect of distillation is always to reduce quantity, however, so the openings available to these artists will not be so numerous as they have in the past. This will mean that in order to get the best jobs, they will have to be exceptionally good at their work.

Of course, if you want to know where these super-artists are coming from and where they will receive the super-training they will need...then that is another question altogether! We can only hope that, with enough pushing and shoving, and guidance, educators can get together and agree on national standards for technical artists, a nationally recognized degree in technical art and a nationally taught course for them within a very few years' time.

The fine artists are entering new realms of art every month, some of which are hard to accept as art forms and some of which are hard to accept as anything at all. This is entirely due to the freedom of fine art that the technical artist does not have in the general sense; so, for the artist who cannot abide office hours, fine art will always be the magnet. However, the future may yet be more rewarding in terms of a life-long career for the technical artist and may be even more satisfying.

My personal philosophy about technical art is very simple and obvious, and summed up in the words of the great Charlie Brown — "Happiness is being a technical artist!"

GRAPHIC COMMUNICATIONS AND THE DESIGNER-COMMUNICATOR

By

Peter Robinson
Office of Manned Space Flight
National Aeronautics and Space Administration
Washington, D.C.

Communication is the art of transmitting information, ideas, and attitudes (Figs. 1, 2, 3, 4, and 5) from one person to another. Man's creative and inventive genius has produced the most complex and high-speed networks which enable him to transmit information, not only around the world, but into space and back. I am sure that we are all very proud of these technical miracles and we hope to see more of them. However, my talk today will concern itself with graphic communication and the role of the designer/communicator in developing effective presentations.

Graphic communicating has been with us through the ages. It employs visual language and becomes a vehicle for practical communication. In practice, graphic communication encompasses a variety of independent disciplines, ranging from technical illustration to visual education, with graphic thinking being primary and design becoming the vehicle that carries the graphic thought or statement. Today's technically oriented society has accelerated the need for quick and effective communications and has thrust upon the graphic designer the awesome responsibility of fulfilling this need.

With this in mind, I would like to discuss a few qualities or characteristics the designer must develop or acquire if he is to become an effective communicator. The well rounded designer/communicator thinks positively. However, he does not delude himself into thinking that every problem he confronts will fall if he thinks positively. He must deliberately approach his design problem with investigation, critical analysis, planning, and good judgment. The ideal designer/communicator cannot afford the luxury of interpreting everything that happens in terms of how it affects him. Instead, he must understand human attitudes — his own and his audience. In doing so, he will be better able to communicate with the people to whom his message is directed.

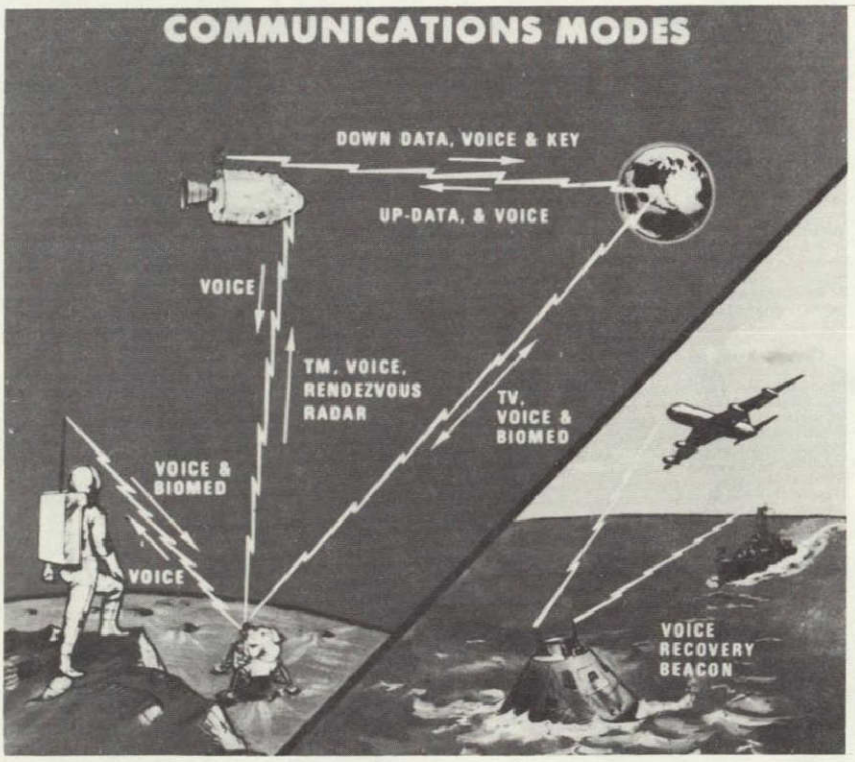


Figure 2. Communications Modes.

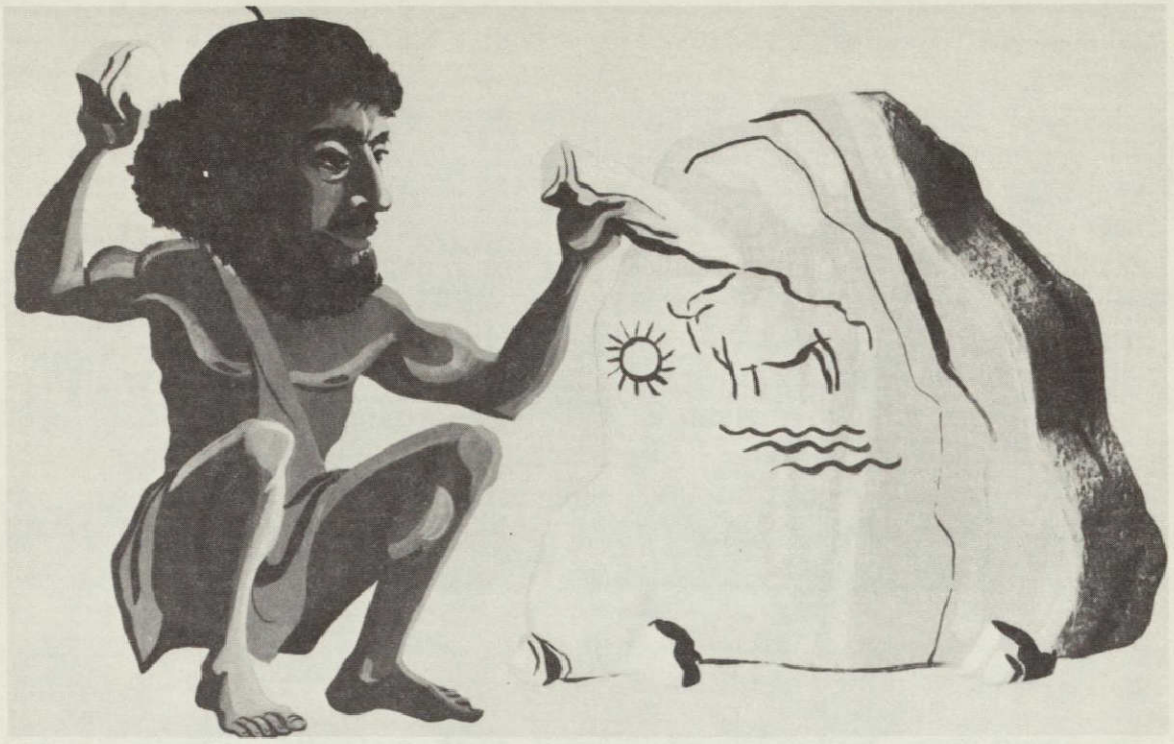


Figure 3.

Figure 4. Management Systems.

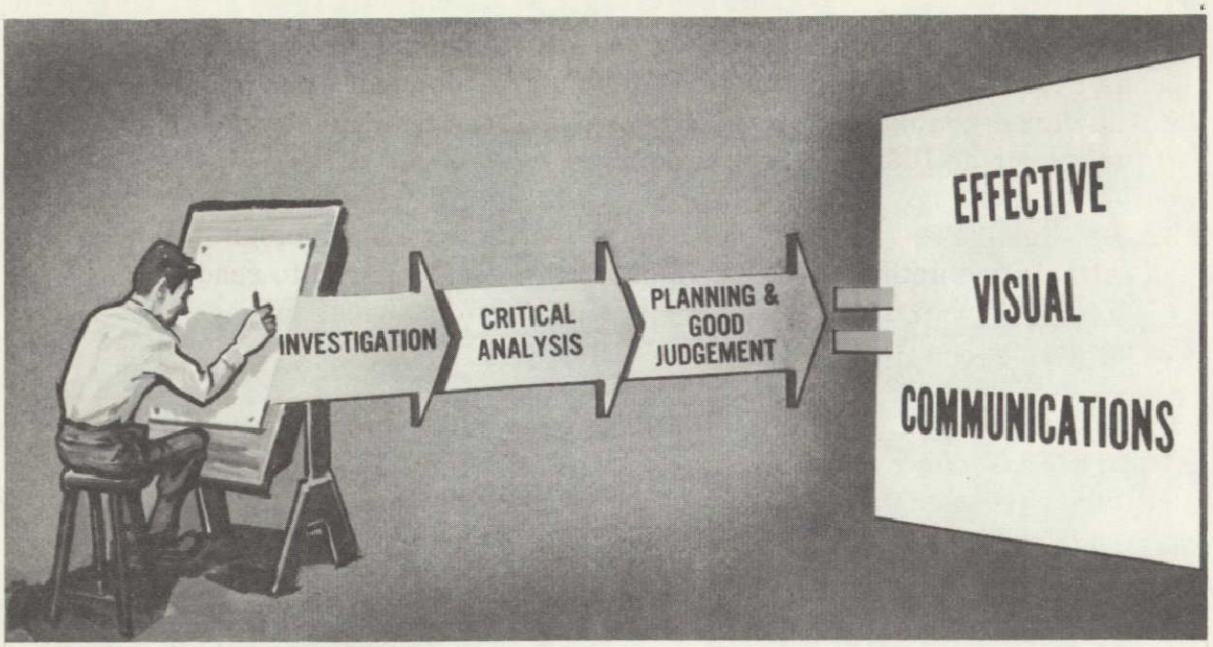


Figure 5. Effective Visual Communications.

A well understood and carefully applied personal perspective can be the proper beginning for the designer who wishes to present his ideas effectively. Consider the following suggestions (Fig. 6):

1. Become More Pragmatic — Think in terms of the results of your attempts to communicate visually.

2. Become Less Egocentric — The designer cannot be so wrapped up in his own knowledge of subject, talent, and natural egocentricity that he limits his ability to communicate.

3. Develop Discipline and Self Control — This speaks for itself and can be carried over into any form of endeavor. Do not design for the sake of design. The purpose of graphic presentation is to communicate quickly and clearly, and while doing this, the designer must control his own attitudes and reactions.

4. Become an Organized Thinker — Effective communication is also organization and planning. Communicating is like an iceberg, most of the work doesn't show. The effective designer must be organized and professional in the approach to his job.

5. Use and Practice Your Techniques — No technique works unless it is used and no skill area affords as many opportunities to practice as visual communication. Be a sponge, soak up all that you can and test your abilities whenever possible.

6. Be Flexible — A good visual communicator always develops alternate solutions to a design problem. Be prepared to readjust, retreat, or start over. Very often program changes, management decisions, or funding will dictate a change in plan.

7. Learn How to Break Rules — Do not be hampered creatively by artificial standards. Operate morally but do not feel guilty about circumventing an imposition of the social structure. Know how far you can go and calculate the risks against the benefits.

8. Operate With Integrity — The true designer/communicator gives to his client and to his project his best effort and he has empathy for the other man and his problems. He will not sacrifice an individual's reputation, position, or security for a moment of glory.

Figure 6. The Designer-Communicator's Perspective.

It will also be wise for the designer/communicator to have a working knowledge of the three basic channels of human communication — they are as follows (Fig. 7):

1. Emotional.

2. Physical.

3. Intellectual.

The emotional channel is the largest and most important. We like to feel that we are creatures of reason and in this sophisticated environment of ours, reason does play a major part in our daily lives. However, although we like to feel that our actions are based on facts and not feeling, no fact or logically presented idea is ever acted upon unless its receiver is emotionally and physically prepared to act. Facts may prove, evidence may substantiate, but it is almost always an emotion that initiates the desired reaction from the presentation, the design, the illustration, etc.

A few of the emotional drives are as follows (Fig. 8):

1. Possession (Fig. 9) — The universal drive to aquire wealth, possessions, knowledge, etc., is a measure of man's worth among his neighbors, friends, and associates. Any message couched in terms of money saving, acquisition, or protection almost automatically gains attention.

2. Ego Gratification (Fig. 10) — Here we have such specific appeals as personal power, dignity, sense of worth, personal appearance, self importance, youthfulness, and even suffering. The effective designer/communicator will use the gratification factor by subtly contributing to the security and enhancement of the audience.

3. The Urge to Belong (Fig. 11), or the Urge for Recognition — This is the drive that makes people buy certain labels, prestige products, etc. "Keeping up with the Jones," is what keeps cars washed, lawns green, and houses painted, and sells millions of dollars worth of products. This drive can also be used very effectively by the designer to support budget requests for research, to show product obsolescence, and to sell technology.

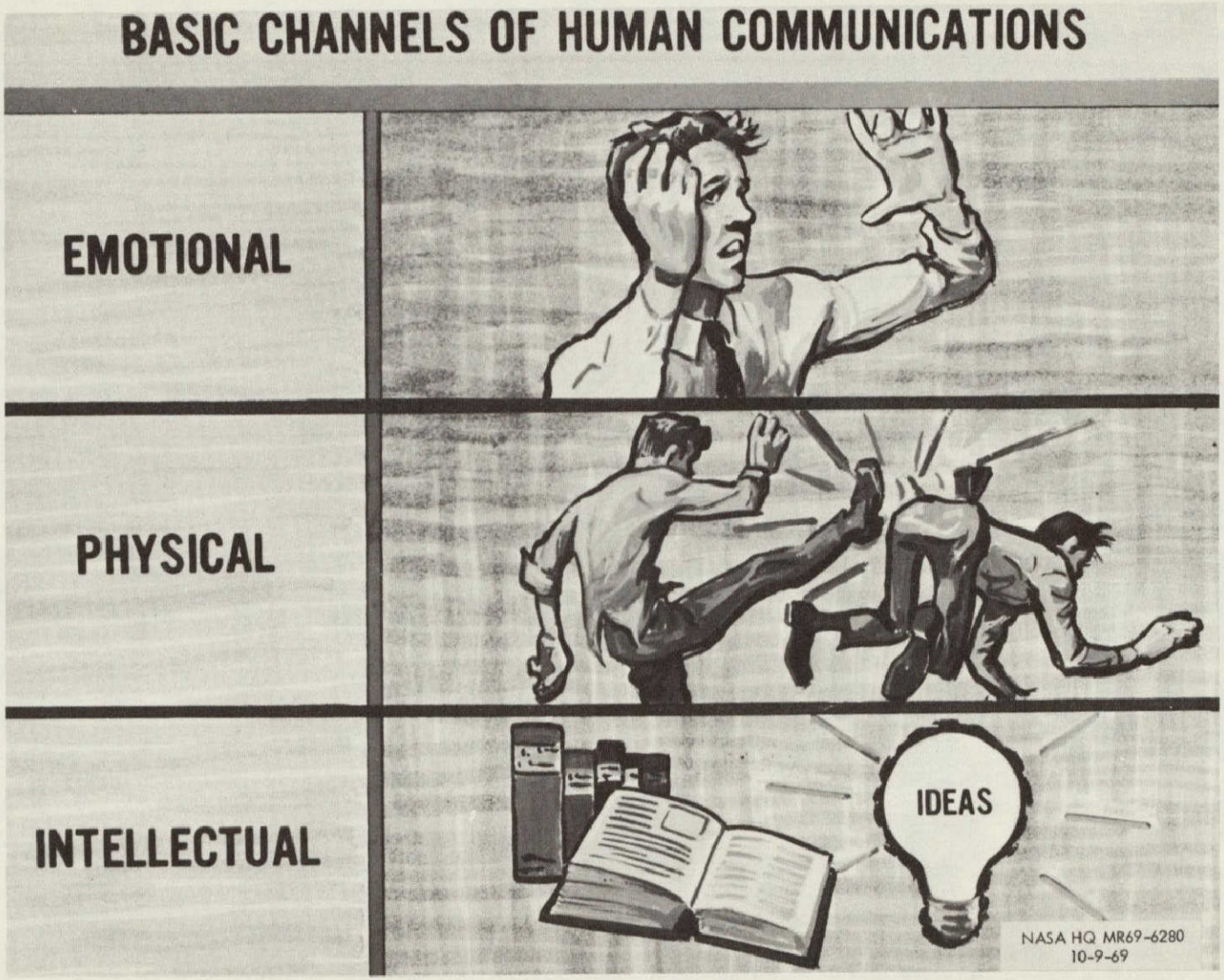


Figure 7. Basic Channels of Human Communications.

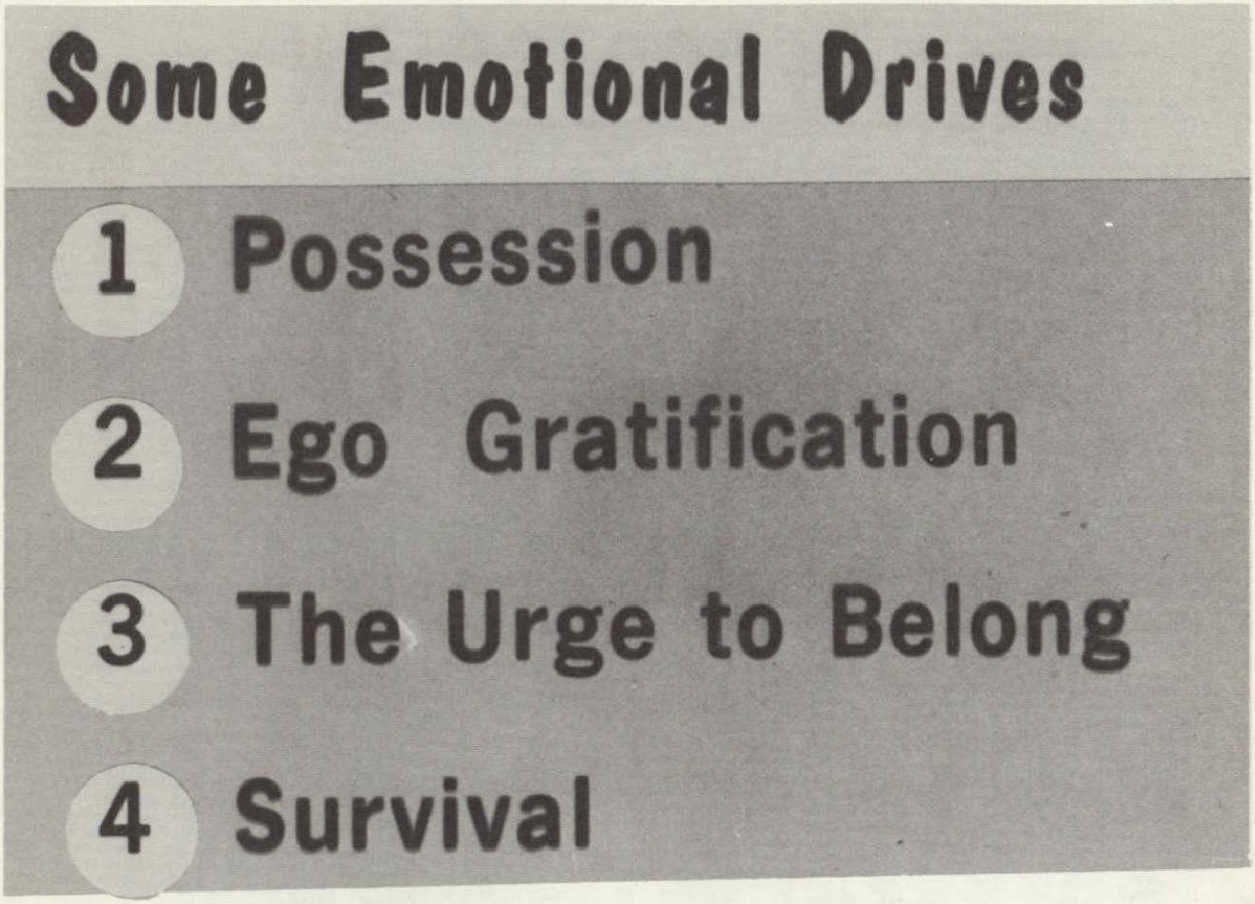


Figure 8. Some Emotional Drives.

4. Survival (Fig. 12) — The need to survive takes many forms and is not necessarily connected with life or death. The survival drive can be recognized in such daily activities as selection of certain brands of food or cigarettes, or giving to church. Survival includes longer life and having one's works or ideas live on after death. It also includes safety and financial security, and such everyday functions as saving time and effort, safety devices, and labor-saving devices. If the designer/communicator can successfully build in an undertone of survival, the presentation can be reasonably sure of getting attention and obtaining the response it is designed for.

The airlines, in their advertisements, subtly use the survival drive by not stating it. For example, comfort and status, the food, and the sophisticated clientel are the items played up. What the advertisers really are saying is, "safety is such a foregone conclusion that we concentrate on the comforts, the conveniences, and the status that air travel affords you."

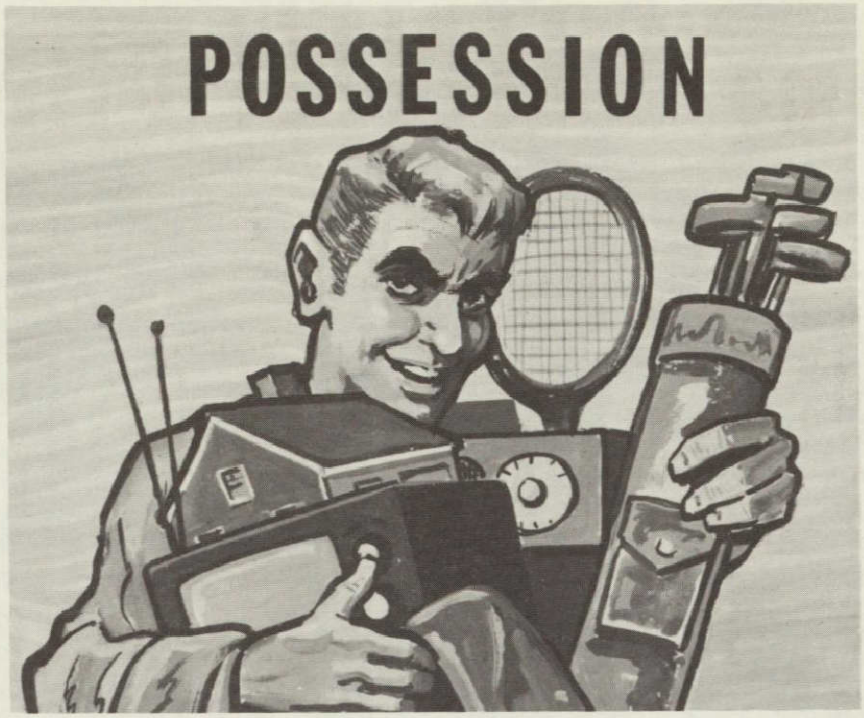


Figure 9. Possession.

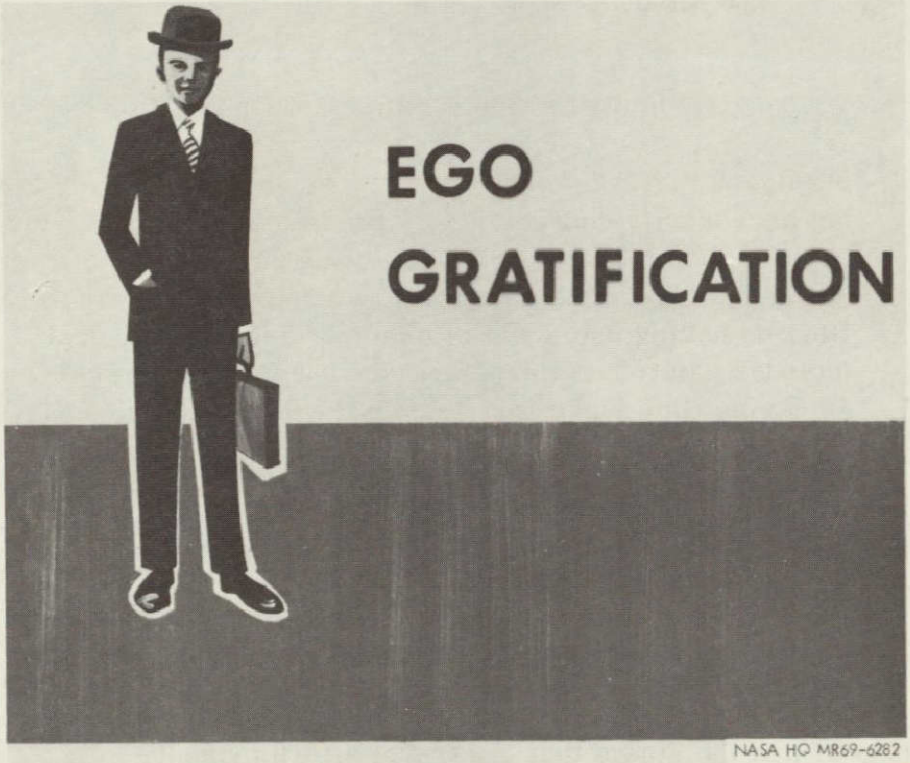


Figure 10. Ego Gratification.

Figure 11. The Urge to Belong.

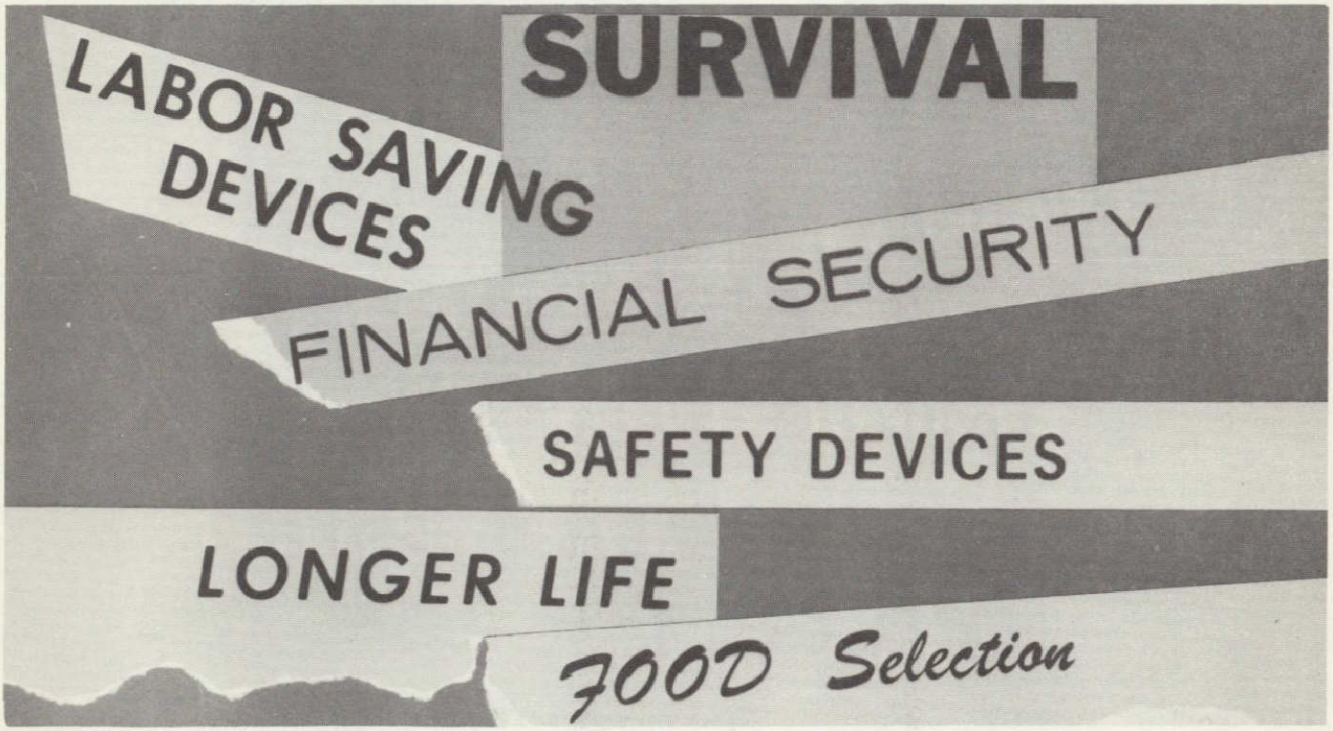


Figure 12. Survival.

These are by no means all of the emotional drives and it is hard to say which is the strongest. Most persons are likely to exhibit a combination of several. To be successful the designer must know his audience and design with their basic appeals in mind. For example, a technical presentation of a new product probably would be channeled through such drives as acquisition, pride, and personal power.

The next communication channel I wish to mention is the physical. Too often, those of us involved in developing presentations give too little thought to the basic physical drives of the audience as factors in the overall communication task. The designer/communicator should be aware of the environmental factors that may affect his audience (Fig. 13). Such mundane factors as temperature, ventilation, noise, weather, odors, the hardness of chairs; all of these things affect audience awareness.

The successful designer/communicator should also think multidimensionally and use the many facets available in the physical channel and when possible, combine the physical and emotional. People are not one-dimensional receivers. With this in mind, the designer should use the many possibilities available in conveying facts and information such as color, shape, type, style, scent, sound, silence, movement, blank space, etc. For example, in a presentation involving a new piece of hardware, the audience should not only see it, but if possible, should feel it, hear it, and smell it.

The designer must keep in mind the aesthetics of his message also. No matter how well the new item works, a poor appearance can affect its consumer acceptance. Therefore, it should be designed with human engineering in mind.

Last but not least is the intellectual channel (Fig. 14). Intellect deals with meaning and the more physical and emotional meaning an idea has, the stronger the intellectual meaning becomes. The designer/communicator must ask himself this basic question, "How can my layout, my illustration, my presentation, my message be presented in the most meaningful intellectual structure." (Fig. 15.) All educators know that idea structure is an important key to intellectual meaning. The designer must make use of this mental pathway or framework for the idea also, and use it in the presentation preparation process.

Presentations are most effective when they are designed to lead the audience along a single main pathway. Sometimes this is done very subtly and sometimes not so subtly. However, the goal is always to give the audience meaning through idea structure without actually forcing it upon them. This can be done in various ways. Consider the following:

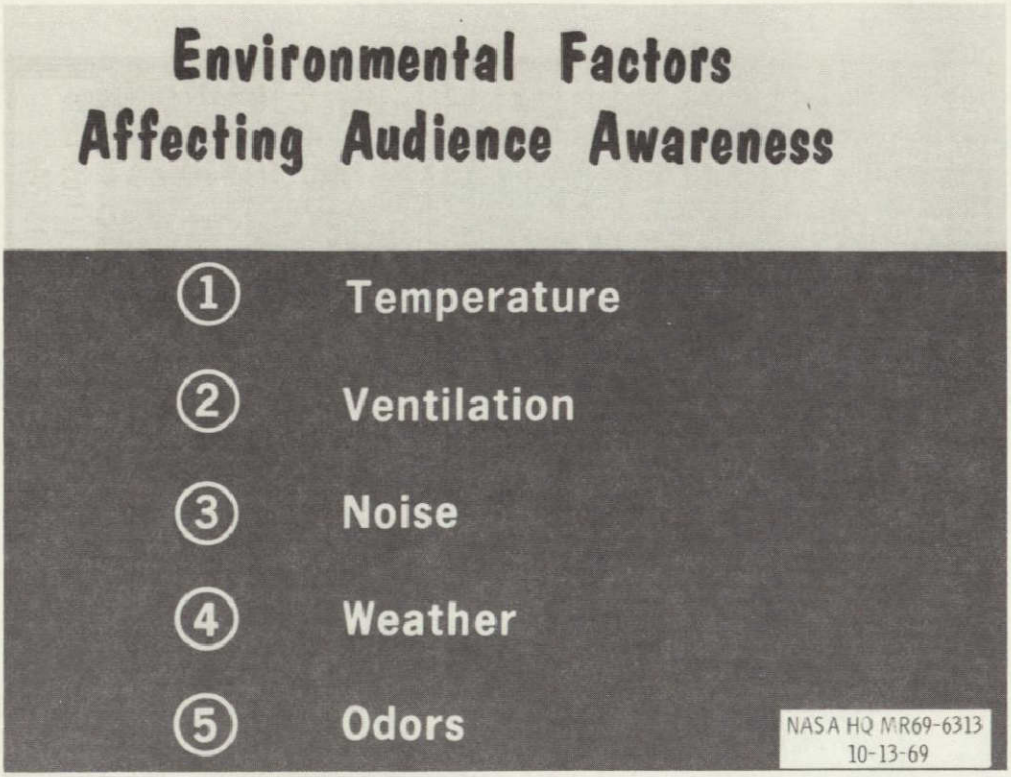


Figure 13. Environmental Factors Affecting Audience Awareness

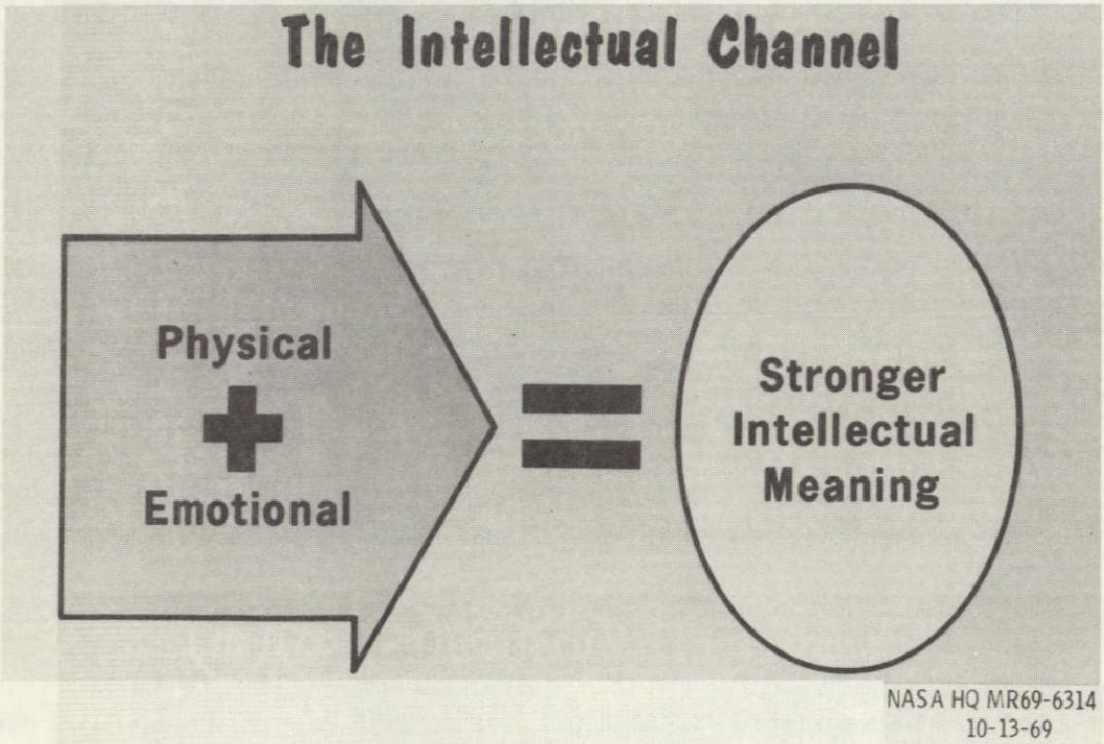


Figure 14. The Intellectual Channel.

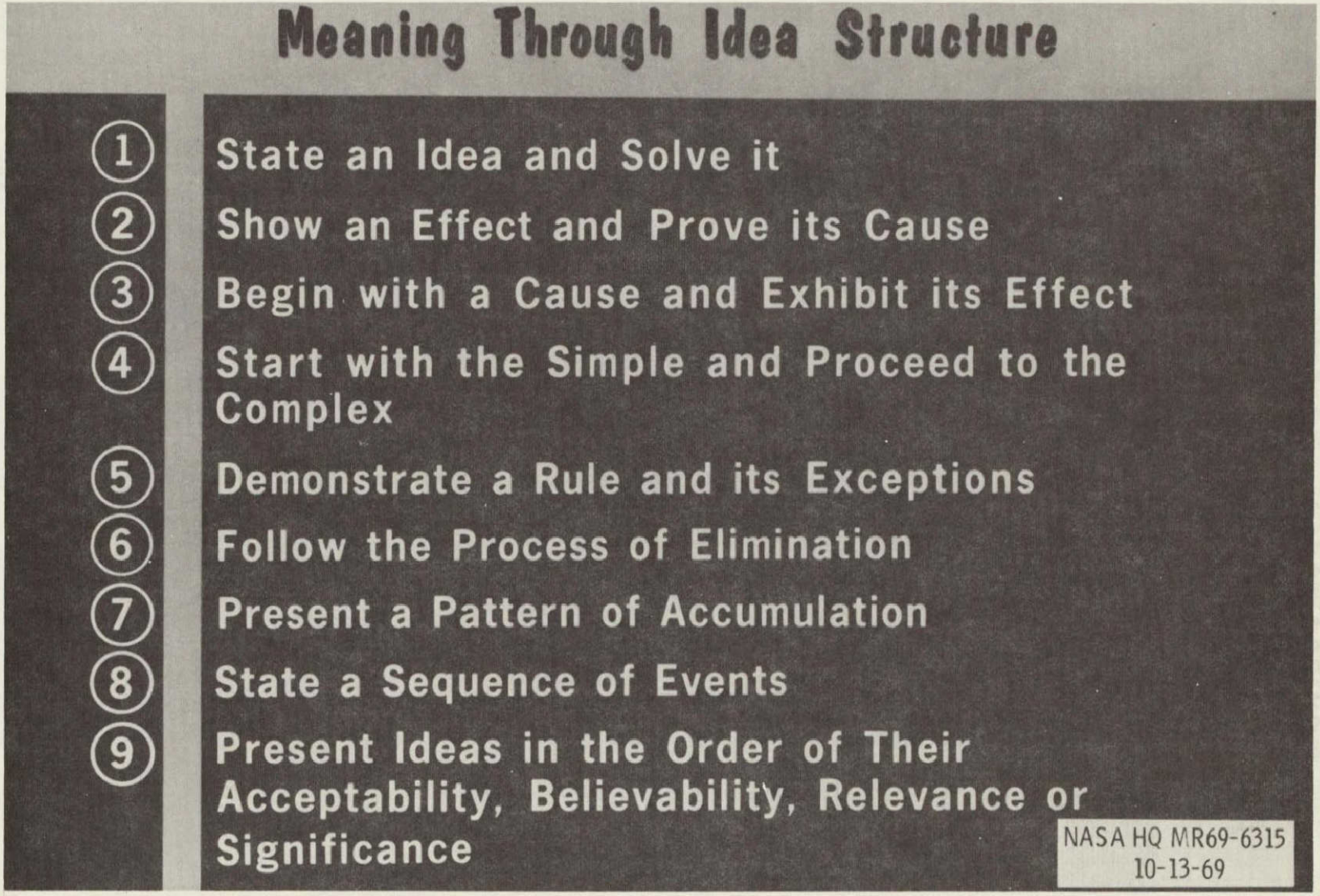


Figure 15. Meaning Through Idea Structure.

1. State an idea and solve it.

2. Show an effect and prove its cause.

3. Begin with a cause and exhibit its effect.

4. Start with the simple and proceed to the complex.

5. Demonstrate a rule and its exceptions.

6. Follow the process of elimination.

7. Present a pattern of accumulation.

8. State a sequence of events.

9. Present ideas in the order of their acceptability, believability, relevance, or significance.

Therefore, it is important that the designer of presentations, using whatever mode he chooses, stay with his basic idea structure throughout the presentation. He may use several forms of idea structure within his major plan or pattern, but his main idea flow must relate directly to singular objective development.

One of the most common idea patterns in today's sales oriented business-technological environment is the thought sequence pattern found in the need fulfillment structure. It involves revealing to an audience a need which it may not even know it has and is a very successful method of selling a technological product. For example, consider the countless new applications of the new computer technology (Fig. 16), or plastics, or metallurgy, or electronics. Very often, the new technolody (Fig. 17) creates the need in the sense that nothing was available to solve the problem before.

Therefore, when the designer/communicator describes the job to be done, if his presentation is successful, he has established the need and a pattern for implementing its fulfillment.

In summary, then, the successful designer/communicator (Fig. 18) is a person who understands his overall design problem, who is sensitive to human attitudes, who understands management's problems, who is flexible, and who has the ability to blend all of these factors into a meaningful presentation.

Figure 16. Computer Technology.

Figure 17. Materials Technology.

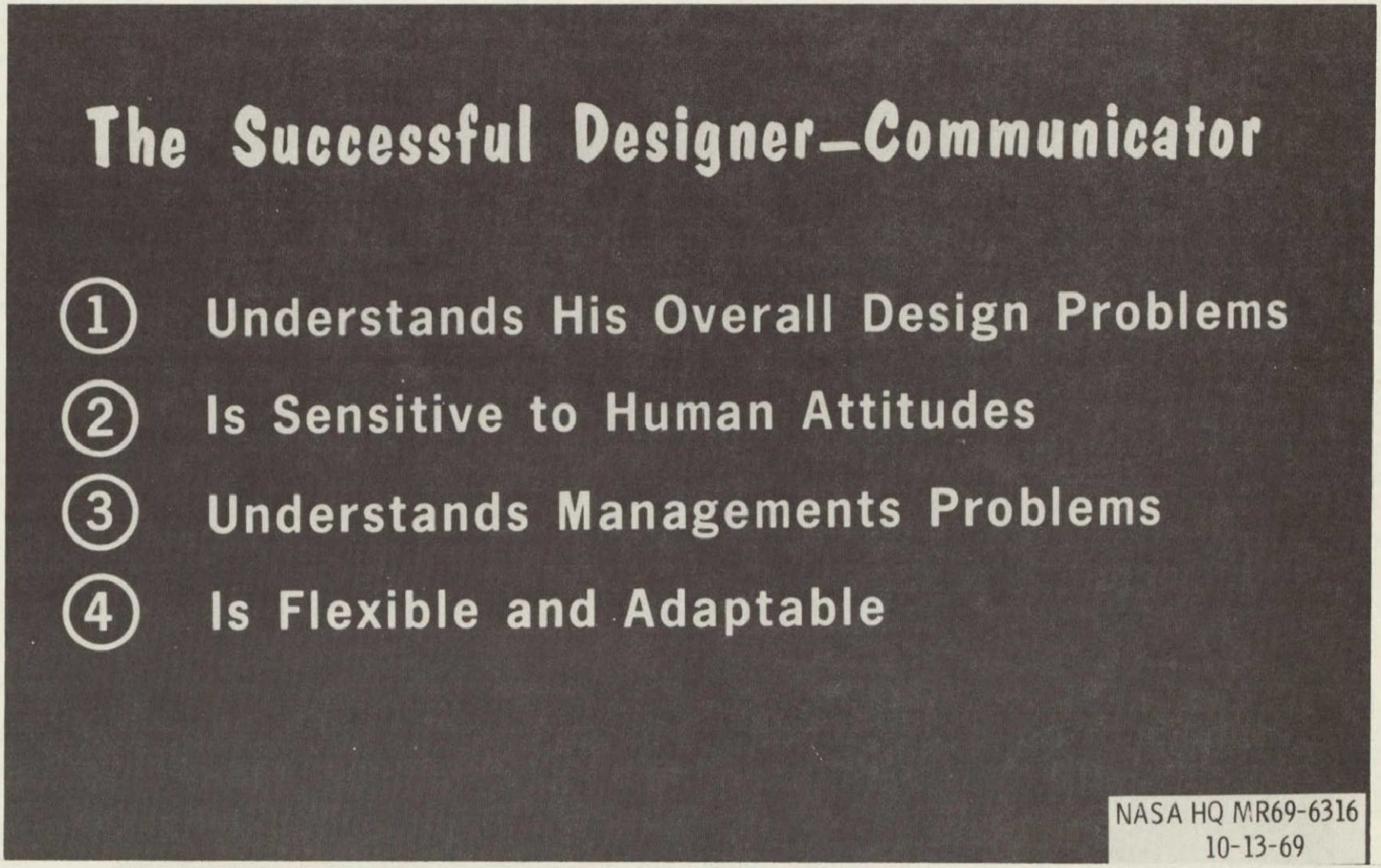


Figure 18. The Successful Designer-Communicator.

BIBLIOGRAPHY

Emery, Edwin: Introduction to Mass Communications.

Mambert, W. A.: A Guide to Audience Communication.

FROM THE TECHNICAL WRITER'S ASHES — THE PROFESSIONAL COMMUNICATOR

By

Michael Mogilevsky
John F. Kennedy Space Center
Kennedy Space Center, Florida 32895

The title of this paper might lead the reader to think at the outset that I am implying some sort of cataclysm will overtake the technical writer, and that out of his ashes a new technological man will arise to assume his, the technical writer's, role in the industrial community. With the exception of the actual incineration process, the reader would be correct in that assumption. Before the end of the coming decade I am hoping that the majority of technical writers shall have ceased to exist as technical writers, but would evolve into truly professional technical communicators of the first rank. I am further hoping that the Society of Technical Writers and Publishers shall have played the leading role in this transformation.

The steps leading to this would be the professional qualification by examination of the technical communicators and the establishment of Standards of Conduct of the Profession (a Code of Ethics). In this paper I will briefly mention our evolution to the present, explain the significance of my proposal, outline the possible paths that can be taken in this vital task, examine the funding for this project, and touch upon an alternate course of action, should the Society not choose to lead the way in this effort, one which I think would be unprecedented in scope and breadth.

For at least a generation, American private industry and government agencies and departments have been relying increasingly upon technical communication specialists to assist them, to further their progress, and to ease the growing burden of technical communication. In the earlier years most of these people were variously known as technical editors, technical writers, engineering writers, publications or documentation engineers, and so forth. As industry (both private and government) grew in size and sophistication, specialization and fragmentation began to occur within the ranks of the specialists. A very small precentage became true experts and actual authorities in a narrow area, or expanded their already broad knowledge of the gamut of the technical publication field and became accomplished generalists in their own right. This evolution could have been predicted.

What to many was not so readily apparent until it became a fait accompli was the gradual submergence of the technical communicators into the status of "second-class" citizens in the American industrial community. There were, of course, exceptions to this, but such things as position classifications, job security and stability, job status, and — very crucial — the opportunities for promotion and salary advancement of the communicators have become, on the whole, somewhat inferior to that of fellow engineers and technical managers with equal years of work experience and with corresponding educational levels.

Studies indicating all this have been repeatedly made. The situation, however, is still relatively unchanged. I think, therefore, the time has arrived to begin our logical transformation into true professionals. This, then, is what I propose today, and this is my objective:

- To encourage and to persuade the Society of Technical Writers and Publishers to uplift the technical communication field to that of a true profession.

- To make this profession equal in quality to that of any, by professionally qualifying the technical communicator through qualification examination and the establishment of a binding Code of Professional Ethics, first in the United States, then through coordination with technical publication societies and guilds in other countries, on a world-wide basis so that eventually there would be one commonly agreed-to set of international standards for the profession.

Although by far the most pressing reason for undertaking this proposal is the actual upgrading of the technical communicator, there are these other tangible reasons for this:

1. Practicing technical communicators would take pride in being in a field where one could obtain professional recognition. It would give the working writer something to shoot for, a goal.

2. Industry (and government) would have a better base upon which to recruit their communicators. There would be a supply of highly skilled professional talent that could be readily identified.

3. Industry would then become compelled to grant the communicator the professional status (through the Society, it is hoped) which even now is rightly his and which would become greatly enhanced through such a qualification program.

4. The communicator could and would command through his Society (in this case, acting as a bargaining agent with power) a fee for his services truly commensurate with his qualifications and job responsibilities.

5. He would finally become psychologically secure in his profession - an important though often-ignored point by the employers.

6. His status in the professional community would become assured permanently and universally.

7. Not least significant, a career with a professional level could be an incentive to draw new talent from undergraduate and graduate schools.

Now, how do we go about all this?

In such a field as ours it is not easy to establish hard criteria, particularly since it is a relatively new one; but a beginning must be made. First, a working study group must be created to examine the standards and criteria other related professions use in their qualification programs. This group must also study the interfaces of education, examine hundreds of statistical documentation, and only then develop preliminary criteria. After a broader group examines and modifies them, the work could continue. At the Society level, the final criteria would then be deliberated and adopted. Professional examinations and the Code of Ethics would then be prepared. Everyone within our field would be encouraged and even urged to take the examination. Once an individual passes, he would then be entitled to list himself as a "Professional Communicator" in the manner of the engineer who, passing his professional examination, calls himself a "Professional Engineer." He would now also be bound by his Code.

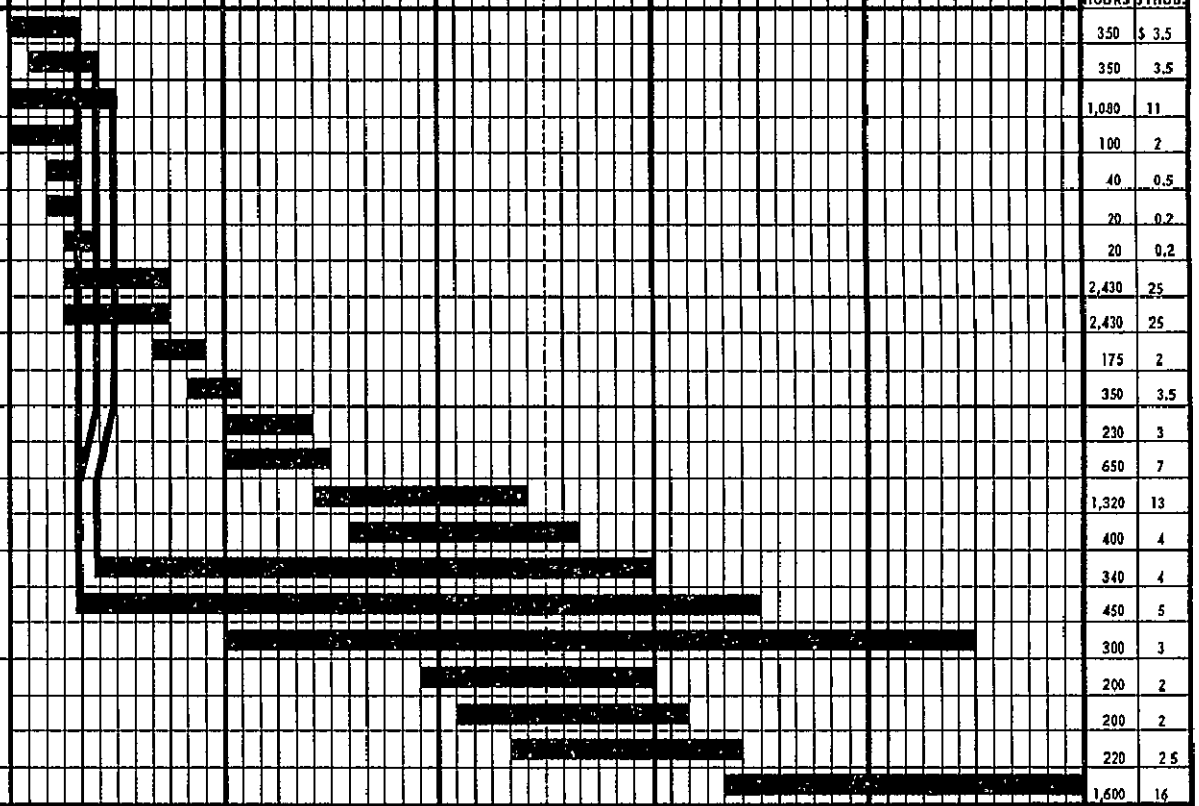
Choosing the people who will carry out this project is very important. Once the decision is made to proceed, the best qualified individuals must be selected. Another reason for the leadership of the Society is that, aside from a direct vested interest in its membership that the Society should have, with the abilities, professional experience and academic backgrounds many of its members enjoy, it is the natural organization for carrying out this project. Isolated efforts by small scattered groups, many of them in academia, are alone not enough.

The following illustration, a project work plan, shows a more detailed breakdown of the proposed project. I have divided the activities into major numbered steps and used January 1970 as the hypothetical starting date.

PROJECT WORK PLAN

232 HRS/MO.

PROFESSIONAL QUALIFICATION STANDARDS DEVELOPMENT FOR TECHNICAL COMMUNICATORS



MAJOR STEPS DESCRIPTION	MINOR STEPS DESCRIPTION	PROPOSED ESTIMATES MAN HOURS	COST $THOU.
1. ADVANCE PUBLIC RELATIONS	PREPARE MEMBERS	350	$ 3.5
	PREPARE NON-MEMBERS	350	3.5
	PREPARE INDUSTRY	1,080	11
2. APPOINTMENTS	KEY PEOPLE	100	2
3. OFFICE SPACE	LEASING	40	0.5
4. FURNITURE	ACQUISITION	20	0.2
5. SECRETARIAL	HIRING	20	0.2
6. RESEARCH	CODE OF PROF. ETHICS	2,430	25
	EXAM. QUALIF. CRITERIA	2,430	25
7. STUDY	COORDINATE FACTS	175	2
	SELECTION OF EXAM. SERVICE	350	3.5
8. DEVELOPMENT	CODE OF ETHICS	230	3
	EXAMINATIONS	650	7
9. ADMINISTRATION	EXAMINATIONS	1,320	13
	QUALIFYING	400	4
10. ACCEPTANCE	BY INDUSTRY	340	4
	BY COMMUNICATORS	450	5
	ABROAD	300	3
11. PROJECT EVALUATION	ASSESSMENT OF SUCCESS	200	2
	CORRECTIONS AND MODIFICATIONS	200	2
	IMPROVED VERSIONS	220	2.5
12. PROJECT CONTINUATION		1,600	16
	TOTALS	12,355	$142

OBJECTIVES:

TO ESTABLISH THROUGH STWP THE PROFESSIONAL STANDARDS FOR THE PROFESSIONAL TECHNICAL COMMUNICATOR INCLUDING A UNIVERSAL CODE OF ETHICS AND EXAMINATIONS – AT FIRST NATION-WIDE, THEN WORLD-WIDE.

M. Mogilevsky

M. MOGILEVSKY
OCTOBER 1969

DESCRIPTION OF MAJOR ACTIVITIES

1. Advance Public Relations

Before any concrete steps are taken, those concerned must be educated about the program and must be "sold." Those most important initially are the members of the Society, whose moral backing, full cooperation, and active participation are to be sought. But the number of nonmembers in the field is probably ten times greater than the number of members — maybe more. In logical sequence, these persons as well as the total industry that employs them must be convinced of the merits of the program. The success of this activity will lead to acceptance by industry and communicators by the conclusion of Step Number 10.

2. Appointments

At the very beginning, once the "go" signal had been given, the responsible Society officials must now select and invite the Key People who will stay with this program through their phases of endeavor. One man should become the Professional Qualification Administrator (PQA), who will stay with the program the longest and under whose overall direction the program will be undertaken.

3. A Place To Work

Since this program will take several years to complete, it would be desirable to lease a small office in some conveniently central location. Washington, D.C. would appear as the natural place because of the nearness of the Society Headquarters.

4. Furniture

Acquiring furniture for the office is a minor step, but an important one, as is the next step.

5. Secretarial/Clerical Help

This program will need the help of one full-time secretary/typist and possibly one or two more clerks during the peak periods that seem inevitable. At any rate, busy periods should be anticipated.

6. Research

The real work can now begin 3 or 4 months after the start of the program. The whole area of professional ethics and qualification examination criteria must be researched. This activity will require a person or persons well experienced in this type of effort, possibly from the academic area.

7. Study Of Early Findings

Specialists from both the Society and academic areas will now examine the findings from the previous activity and coordinate them in consultation with experts in statistics. They should then publish the findings in a report consisting of recommendations. The type of examinations necessary will here begin to take shape.

A professional examination for communicators should be in two parts, covering communication aspects in Part I and the technical aspects in Part II. It should be stressed that the communicator must, above all else, be able to communicate. Unless he is able to get his message across, he is not a communicator in any sense of the word, regardless of his background, experience, or education.

Part I (the communicating area) should include the following considerations:

a. The ability to write clearly and accurately.

b. Having a thorough understanding of basic grammar and proper usage of the English language.

c. Being able to present material in a logical and meaningful manner.

d. The ability to be concise without sacrificing clarity or content.

e. The ability to edit another's material.

f. The ability to rewrite to change emphasis, to interpret for the originator.

g. The incorporation of several foreign language "electives," particularly those languages important in technology.

In Part II (the technical area), there should be four or five options, such as:

a. General option.

b. Physical sciences option (mathematics, physics, chemistry, etc.).

c. Life sciences option (biology, psychology, medicine, oceanology, etc.).

d. Engineering option (electrical/mechanical).

e. Automatic data processing (ADP) hardware and software option.

8. Development

Developing the final professional examination and the Code will need yet another group of people. The services offered by professional testing organizations can be solicited for this phase of the effort in regard to the examination. The Code, however, is the responsibility of the Society.

Let me interject something here that could be bothering some people. I must emphasize that the professional examination should be open to the public regardless of membership in the Society, with membership added as a privilege to those who passed the examination. But if membership is applied for jointly with the examination, at a reduced rate, many new members would be brought in, and increased membership happens to be a standing goal of the Society.

9. Administration

This activity, the administering and evaluating of the tests and the qualification of the communicators, would be done under the supervision of the Professional Qualification Administrator, even though the testing portion itself is done outside the Society.

10. Acceptance

Acceptance is a logical continuation of the first activity, public relations. It is a never-ending step. The communicators and industry must accept what is being done not only on behalf of the writers, but also for industry, which stands to benefit from our efforts. The length of time I allotted to the acceptance of the program by the communicators is longer (38 months) than for acceptance by industry (31 months). This is because, from my experience, it is easier to persuade a group on the merits of a beneficial program than individuals, particularly technical writers. Bear in mind that the program will traverse rocky roads without early acceptance at the top echelons of the Society and industry.

By the end of the first year the program should be moving so well according to plan that we can start acceptance efforts (of at least the whole idea) abroad. This is an optional, though in my opinion, a highly desirable step. The Society has had several notable members who have gone to Europe and the Near East and who have been in contact with our counterparts there. These members should be consulted for the correct approach and the determination of the feasibility of this subactivity. A thorough discussion of this phase of the program would easily be meaty material for a companion paper.

11. Project Evaluation

After 2 years have gone by, the next logical major activity is to see how successful we have been. Although an assessment of the program has been going on informally from the start, the first formal meetings of the PQA, his staff, and the Society Directors would result in a formal progress report. Any deficiencies in any of the program areas and activities would be corrected. Tests would be modified to adapt to the changing conditions and state of technology. No time would be wasted in producing improved versions of the examination.

12. Project Continuation

By the middle of the fourth year, another "go" decision would be made — the decision to continue, if the evaluation had proved to be successful. At this point the professional communicator shall truly have come of age.

I purposely withheld any discussion of cost or total manpower until I could first present the whole plan to you. Now let us examine my proposed estimates of manhours of effort and cost estimates. I have used 232 hours as the basis for the available number of hours a month, but as you can see, not all the hours are solidly used throughout. The total program, in this manner, shapes up as an effort of 12,355 manhours at the rate of $ 11.50 an hour for a total cost of $ 142,000.

One final note: This program, or one like it, if seriously considered and energetically undertaken, might take some time to take full effect. Even so, the Society must not give up in midstream, because the program will actually benefit more communicators of the next generation than of this one, and that is of the utmost importance. Further, I earnestly hope the Society shall undertake this major effort in the coming decade, because if it does, its name would be brought before the silent legions of communicators in a new enhanced light. Many of them would look upon membership in the Society as a highly desirable thing, for it shall have embarked on a major program of lasting value.

If, on the other hand, the Society elects to "cool it," or to be reulctant to adopt this program, there will be some communicators and even some

industries that shall independently take up the challenge outside the framework of the Society. Already, the Boeing Company has embarked on a program to persuade college administrators in the Philadelphia area to work with it in developing a syllabus and criteria for examining writers in an accreditation program. Their goal is proof of professional competence.

By now, my wishes and views are well-known to you. Those of the Society with regard to professional qualification are not known. But one way or another, with or without the Society, the technical writer will evolve into the professional communicator, and it would be far better if the Society of Technical Writers and Publishers could claim responsibility for this than someone else.

> "It must be remembered that there is nothing more difficult to plan, more doubtful of success, nor more dangerous to manage, than the creation of a new system. For the initiator has the enmity of all who would profit by the preservation of the old institutions and merely lukewarm defenders in those who would gain by the new ones."
>
> N. Machiavelli
> 1513

ANATOMY OF A PRESENTATION

By

Calvin R. Gould
Oral Presentations Chief
Martin Marietta Corporation
Orlando, Florida

A national meeting of professional communicators was ending its second day with a banquet that featured a learned and distinguished individual.

Before the banquet, the speaker's assistant set up a pair of 35-mm projectors and a screen. This person would be the projectionist and would work from a cued copy of the speech. While this practice requires that the speaker read his material, it is more effective than asking for each slide, and if well rehearsed, can be professionally done.

The audience quite properly expected a worthwhile message from the speaker, a Vice President of a large manufacturing company. They weren't to be denied. His initial remarks, charging the audience with their responsibility to world communications, proved he was going to be a dynamic speaker.

As the first slide was projected the house lights went out right on cue. Everything was working like clockwork, even the pause that followed the first slide seemed effective and timely — except it seemed to be longer than necessary — really too unreasonably long. Finally the audience, the projectionist, and the speaker all seemed to realize simultaneously that the speaker's lectern lights went out with the house lights.

The 15-minute interruption required to recover from this unfortunate situation was enough to seriously damage the communications effectiveness of this presentation. I was in the audience, and I have long forgotten the message.

ODDS AGAINST TOTAL SUCCESS

There are many things necessary to make a presentation successful; so many, as a matter of fact, that the odds are heavily stacked against total success. To be certain, the victim of the example previously mentioned should never have a lectern light go out on him again, but what other pitfalls await his next presentation? It might be a screen so low many people beyond the front rows will not see the entire image. It might be a public address system that is improperly adjusted, or high noise factors coming from meetings in adjoining rooms. It could even be a problem caused by poor relationship of material to audience, or poor visual aids, or insufficient handout material. These areas of communications, when overlooked, cause static that interferes with the sending and receiving process of oral communications. When they occur they are called "goofs."

We seldom have the privilege of experiencing a "goof-proof" presentation. We seem to expect goofs to occur, chuckle a little when they do, then strain harder to hang on to the shrinking thread of understanding until finally the presentation is over — and maybe a little bit of learning has occurred. But the game goes on, the next presentation begins with the audience wondering what will go wrong this time, will it be as bad, or worse?

RESPONSIBILITIES OF THE PRESENTER

When a person accepts the assignment of a presentation, he has made an agreement with certain individuals that carries a significant responsibility. The extent that the speaker truly understands what that responsibility is, is often reflected in how many goofs occur during his presentation. If he really wants to communicate he should be able to plan an effective presentation and check against the possibilities of major goofs.

The example used to introduce this paper revealed that arrangements were made by the speaker too late to check the lighting situation. The net result was that the audience was disturbed about the lack of interest their featured speaker had in making a good impression on them. No apologies he would make could change that attitude.

Yet he may have thought he was a helpless victim of circumstances. He may have checked with the proprietor of the banquet hall to be assured that the projection condition was possible. Since the proprietor's primary interest and experience was in food service and the facility related to that service, his assurance was less than a guarantee. The meeting chairman in charge of arrangements could have given the same assurance. The room was spacious, the lights were locally controllable, etc. Ironically neither he nor the proprietor were familiar with the total projection requirement, this was known only to the speaker.

Let's look at the other areas of our Vice President's presentation that required support. The visual aids had to be prepared by an artist and converted to 35-mm slides by a photographer who needed a laboratory and photo technicians to process them. For his projectionist he needed a source of audio-visual hardware properly maintained to achieve a high degree of reliability. Additional support, such as a typist, a reproduction capability (printed handouts), an editor, a speech coach, etc., all were working against various deadlines for a presentation function that had a communication requirement known in total only to the speaker.

The speaker, or presenter, is the creator and director of the presentation. It is his responsibility to communicate his requirements to individuals within the supporting functions and to follow up to be sure his requirements are clearly understood and effectively related to the communication of the message. Now it becomes more evident that the original commitment to make a presentation is considerably more than a solo effort.

A SPEECH OR A PRESENTATION?

A distinction should be made between a speech and a presentation. For purposes of this paper, an oral presentation is identified as information presented by one or more individuals requiring a combination of speeches and various aids such as movies, slides, and (or) other support. To put it simply, a speech becomes a presentation if just one visual aid is required. While it may be more instinctive to identify a presentation with a seminar or a major proposal activity; the fact is, most meetings, large and small, are presentations needing a similar amount of attention for communications effectiveness. The distinction is important to make because a presentation requires so much more support than a speech. Perhaps a major reason for some poor presentations is that the presenter thought

of his presentation as a speech and he planned it independent of any outside support, then when he realized he needed help it was too late for that help to be effective.

Another important reason for the distinction is the trauma caused by the term "speech." Many good presentations have been made by nontrained speakers. The value of a presentation is measured by its showmanship, and its content is related to the knowledge and experience of the presenter on the subject he is presenting. If he looks upon his task as a conversation between he and his associates on the subject of his specialty he will have a higher confidence level than if he thought of it as a speech before a large and strange audience.

ONE-TIME-ONLY STIGMA

An interesting observation can be made of the fact that most communications problems occur in the low budgetted one-time-only presentation. Because the presentation would normally be given one time, little professional attention is given to this critical area of information dissemination. Industry allocates high budgets in the promotion of their product to mass media for advertising and sales meetings. Also, it is not unusual for major corporations to spend $ 50, 000 on their annual stockholders meeting. As a result, major commercial organizations do exist with professionals in the arts of advertising and theatrical productions to service industry in this specialized presentation field. Their high-paid staffs require large fees, making such services impractical for that ordinary but more frequent one-time presentation.

It's because of this that most presenters are left to their own devices. Still, the need for effective communications is equally as great, regardless of the size of the audience.

Good presentations are possible if individuals will make a sincere effort to communicate with their audiences. I believe people have a genuine desire to do their best and are constantly seeking ways to improve oral communications. Part of the solution is knowing what to do and what to look for.

The chart entitled ANATOMY OF A PRESENTATION (Fig. 1) is meant to be a roadmap for any presentation.

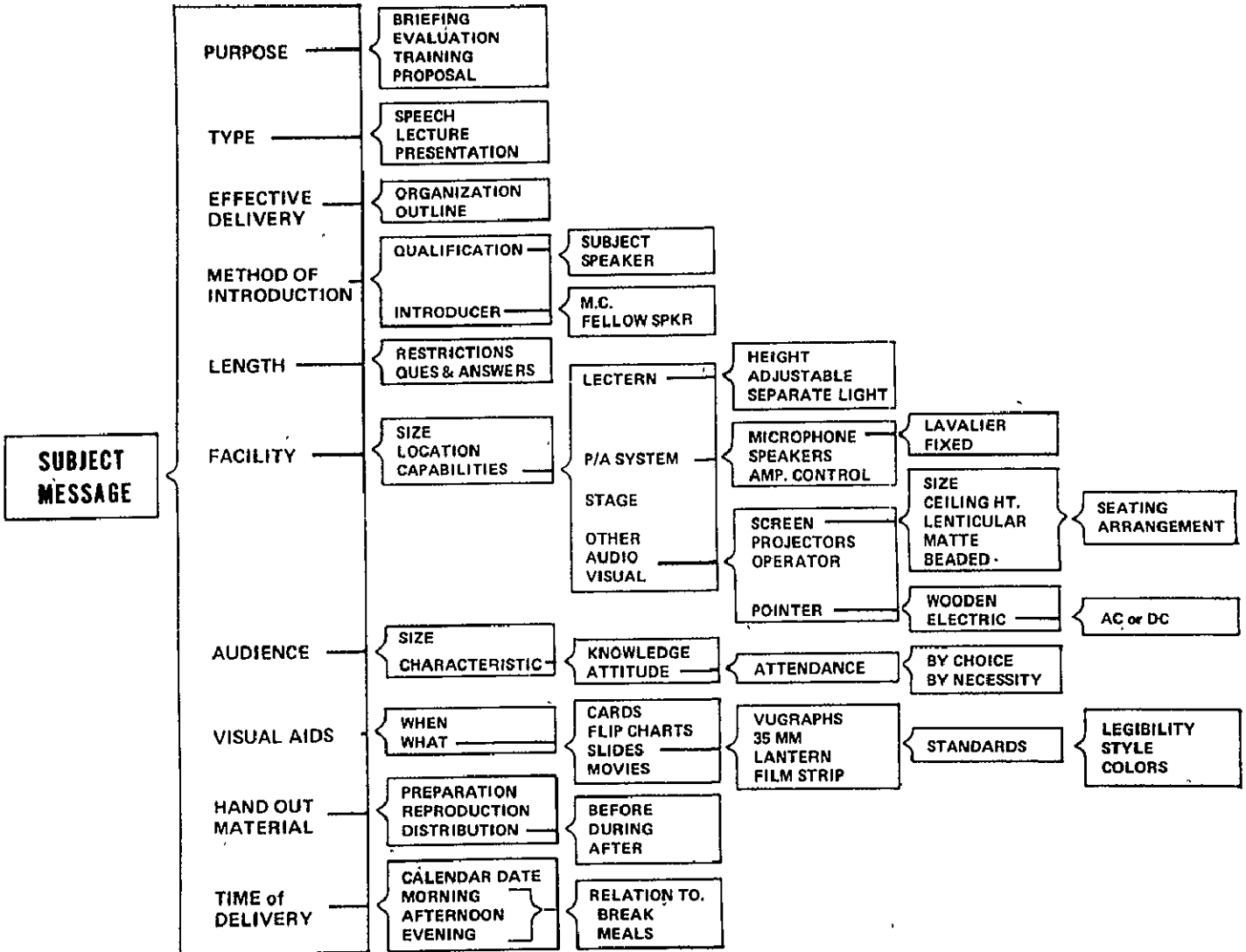
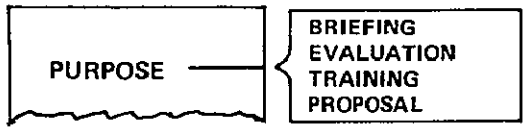


Figure 1. Anatomy of a Presentation.

This was developed as an attempt to identify the 10 primary considerations and to carry each of these points to its respective conclusions. This chart can be used as a checklist by the presenter to consider all aspects as they relate to his specific presentation.

As a general practice, about half of these points are overlooked until just before, during, or after the presentation, but too late to avoid the goofs which may be remembered long after the presentation has been forgotten.

An assumption is made with this chart that the objective of the presentation, its content, and organization are functions the presenter is capable of developing. The 10 primary points are usually given some attention, but most presenters would not have the experience to consider them in depth. A further definition of each of the subjects on this chart will make it more useful:



BRIEFING — mostly intercompany type of presentation — subordinates or superiors are updated on business activity, policy changes — conducted as staff meeting, project review, board meeting — may need strong support in low cost visual aids, projection hardware — brevity essential — informal atmosphere.

EVALUATION — appraise new concepts, develop comparative studies, rehearse major presentation — may need significant support in visual aids, projection hardware, handout material.

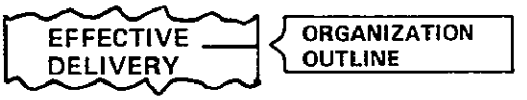
TRAINING — educational activity such as manufacturing training, company peculiar activities, orientations, outside technical meetings — in strictly training environments more complicated visual aids may be used in conjunction with handouts — strong emphasis on facility capabilities when meeting occurs outside company.

PROPOSAL — appeals for customer and management support for new business, creative approaches — sales presentation — often team of presenters — directness and brevity essential, emphasis on the novel — significant audio-visual support, outside facility capabilities, and ancillary requirements.

SPEECH — requires least support since it does not use visual aids — often entertainment, expression of opinion, appeal to voters — may require a public address system, lectern — more attention to personal appeal, voice modulation, brevity (20 minutes usual time threshold).

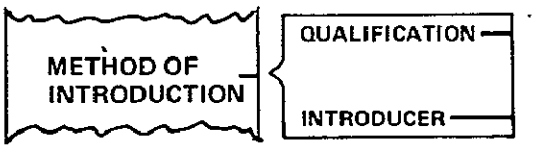
LECTURE — related to training and education — audience able to respond to discipline as established by the speaker, such as note taking, using handouts during lecture — more complicated visual aids acceptable — CAUTION — do not confuse lecture technique with speech or presentation — be sure your audience is prepared or you'll lose their interest and waste their time and yours!

PRESENTATION — speech with visual aids — visual aids must be uncomplicated and useful to the audience — may require extensive support from all sources — most other checkpoints will apply to this — emphasis on conversational approach — 20 minutes maximum for any one presenter — often a team effort.



OUTLINE — without a plan, the text of a presentation could be so jumbled that the audience would "tune you out" before you made any significant points. To be sure that effective buildup of thought occurs in logical order, a basic OUTLINE must be developed.

ORGANIZATION — once the ORGANIZATION is decided on, taping rehearsals for playback is the best way to catch and correct grammatical errors, poor enunciation, slow or fast talking, and other speaking defects.



QUALIFICATION — person who is going to introduce the speaker should be given information — SUBJECT should be related to previous activities of the meeting and SPEAKER should be introduced in a way that makes him obviously qualified on subject.

INTRODUCER — establishing rapport is important — in team presentations be sure to establish ahead of time who will introduce the succeeding speaker, MASTER of CEREMONIES, FELLOW SPEAKER, etc.

In FACILITY the reference is to a remote facility not physically connected with the presenter's place of business. This can mean a hotel or meeting room in other establishments.

We can pretty well assume that there is at least one individual connected to that facility who knows the physical capabilities of the meeting rooms. This means he can inform a presenter of its size, comfort, electrical outlets, etc., and he can also usually explain the support capabilities in projection hardware, public address systems, etc. This person becomes the "expert" in the minds of those scheduling use of his facility.

Of those scheduling use of the facility, we can assume they know the subject of their presentation or the theme of the meeting, thus, know what they want in terms of a general requirement, such as a projector to show slides or movies.

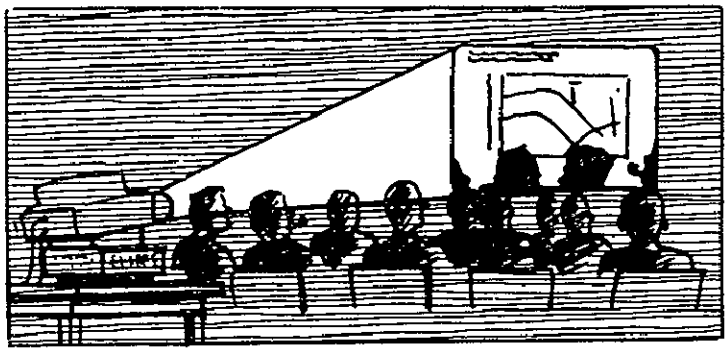
To the "expert" of the facility, the person requesting use of his facility is the "expert" on the presentation.

Now we have two individuals arranging a communication function who consider each other "experts," and yet the result could be chaotic.

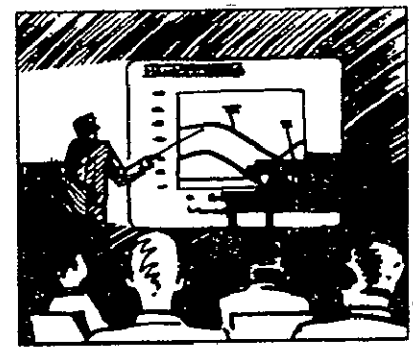
The fact is, neither one of the two parties generally arranging for meetings in a situation like this are experts on communication. Seldom would either of them know the difference between a lantern slide projector and a 2 x 2 projector, a 16-mm projector and an 8-mm projector, a super 8 or standard 8, a lenticular screen or a matte surfaced screen. Perhaps neither one would have the slightest idea what maximum legibility might be in particular circumstances.

As a result, the principals for whom the meeting is being held are the last ones to be considered. Who has really thought about the communication with relation to the audience? Who really cares if the screen is so located that half of the audience cannot see all of the image, and if what they can see is legible? Who really cares that there are mirrors and other hard surfaces to distort sound and cause distracting reflections? Who is concerned, ahead of time, if the meeting is held up to get a proper projector or replace a burned out bulb, or if the P/A feeds back with certain speakers?

PROJECTION ARRANGEMENTS that ALIENATE AUDIENCES

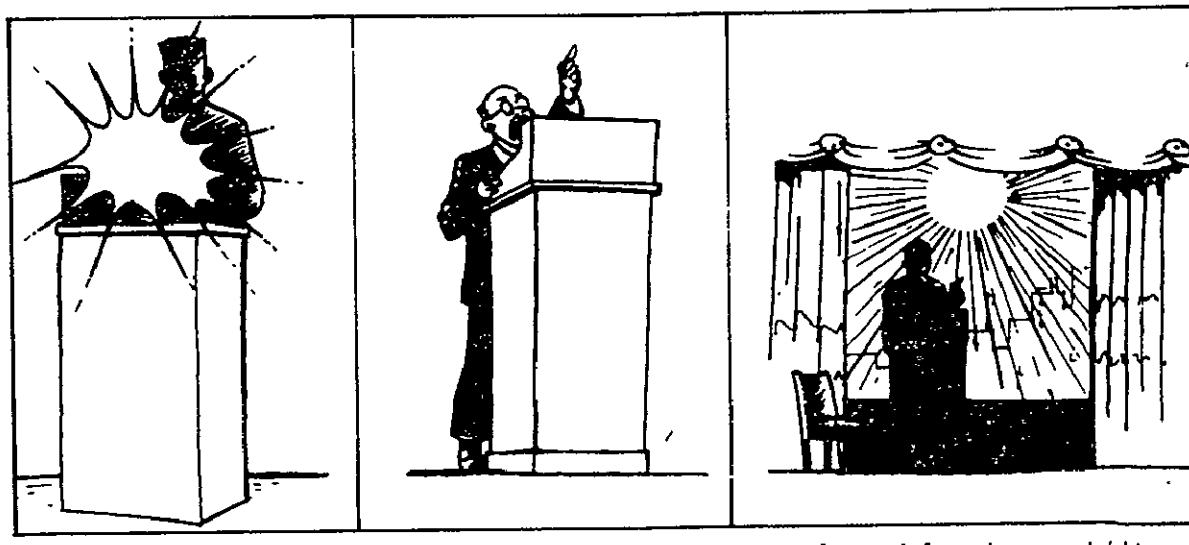


....Few facilities have projection tables



Stage arrangement may block image to some people

LECTERN SETUPS THAT ALIENATE THE AUDIENCE



Unshielded lectern light

....When lecterns are provided, they're usually for giants.

Set ups before a busy or a bright background

In the case of the facility "expert," his experience is most likely related to the type of business wherein the room is located. If it is a hotel or motel he knows the capability of the food and liquor services, the number and size of the bedrooms, the proximity of ancillary services that can make the customer's visit pleasant, but none of these are directly related to the subject of communications.

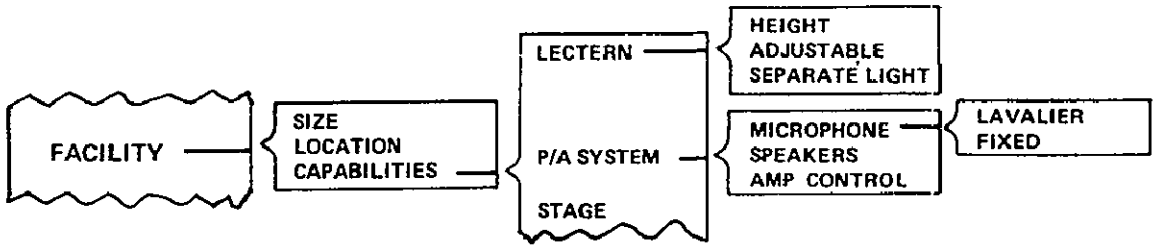
In my experience I have seen few hotels that have a projection table. A typical 30-inch table is provided which is too low to project over the heads of the audience. The result is that the projectors often are precariously balanced on makeshift stands. Many hotels today have a ceiling height of 10 feet, making it impossible, in some rooms, to have the screen high enough to permit the bottom one-fourth of the image to be seen by people in the back rows. Most often the rooms are divided by partitions which do not sufficiently eliminate outside noises.

This problem isn't limited to hotels and motels. The facility may be a conference room or an auditorium of a progressive business or organization that has the latest audiovisual hardware. Here again there can be problems, for this facility is usually designed to accommodate presentations peculiar to that organization. Presentations prepared outside of that organization could well include slides that would not fit the projectors, or be for front screen projection while the facility was designed for rear screen.

All presentations made are usually searching for that nonexistent expert, the presenter expecting him to be the program chairman, the program chairman expecting him to be the facility coordinator, and the facility coordinator expecting him to be the presenter. In the long haul, it will behoove any person required to make a presentation to conduct their own facilities investigation and plan that presentation against its known capabilities.

SIZE — dictates legibility — factors of items used as visual aids — formula for image size, front row of seats no closer than 2 times image width, back row no further than 6 times image width — space allotted at the rate of 6 square feet per person, plus allowance for stage and aisles — projectors should have lenses that permit them to be located behind the audience.

LOCATION — facility location with relation to public transportation and specific room location in cases of facilities with many meeting rooms.



In addition to establishing the basic comfort of the room, the furniture, the extent of darkness when room lights are out, noise level of equipment in the room and outside, the following hardware items take on importance of various degrees, according to the needs of the presentation.

LECTERN HEIGHT — few facilities have stand-up lecterns and when they do they seem to be designed for giants — if a short speaker uses lectern on a stage he could be hidden from front rows.

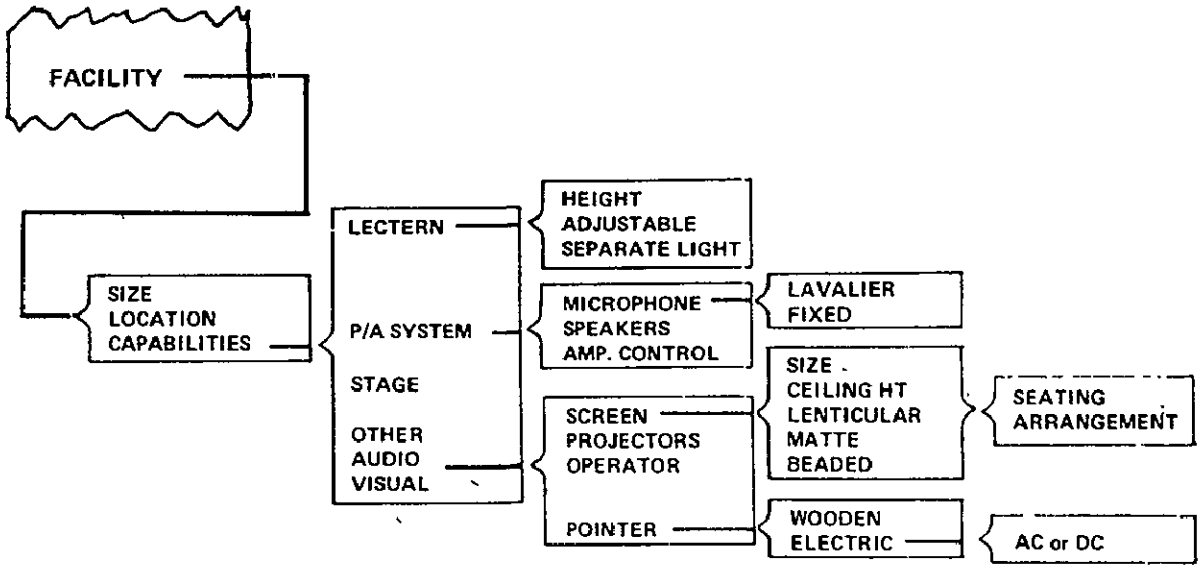
ADJUSTABLE — if lectern is not adjustable — may be necessary to acquire a riser for the speaker.

LECTERN LIGHT — often light shield omitted, blinding audience when they look up at speaker — be sure light is plugged into separate socket to avoid turning it off, with house lights or other electrical activity.

PUBLIC ADDRESS SYSTEM — microphone, largest source of feedback problems (screeching) caused by mike being located near P/A speaker — some mikes are permanently fixed, compelling speaker to stay in one place (a problem if this hasn't been considered during planning and rehearsal activity) — Lavalier is the type speaker loops over his neck, problem area in switching from speaker to speaker; preferred practice is to have switch off during mike changes — problem exists with systems built into room when users desire location of mike in an area other than designated by system.

AMPLIFIER CONTROL — often located in another room, impossible to ride gain on people with different voice levels — local, but inconspicuous control necessary if system to be controlled, or used to play back recorded material.

STAGE — best to have the stage elevated above the audience — avoid obstructions — lecterns and tables are often placed where image on screen is blocked to some — using stand-up lectern on elevated stage may require second platform — to keep speaker in view of front rows.



SCREEN — should be next to ceiling to get image as high as possible — low ceilings and suspended lights often impose severe restrictions to projection — keep bottom of image above 4 feet from floor.

BEADED — use for motion pictures, colored slides of normal contrast, narrow viewing rooms.

MATTE — close-up projectors such as overhead, and extreme contrasts. (Black and white.)

LENTICULAR — wide viewing rooms.

SEATING ARRANGEMENT — in addition to screen relationship to audiences as identified above, seating should be such that audience does not face an entrance, a large window, or other distracting elements.

PROJECTORS — typical are 35-mm slide (2 x 2), Lantern ($3\frac{1}{4}$ x 4), 16-mm motion picture, overhead (vugraph) — many 35-mm units have total remote control — other equipment requires operator support.

OPERATOR — give slides to projectionist in time to avoid problems — work with projectionist; if possible rehearse presentation with him.

POINTER — if DC unit is used check batteries, if AC is used check available outlet and length of cord — CAUTION — electric pointers do not work on rear screen!

SIZE — controls room requirements which in turn control other factors of the presentation and facility.

KNOWLEDGE — will they be able to understand technical depth and vernacular?

ATTITUDE — of significant concern to the manner in which you present — if they are in attendance by necessity, presentation has to change their feeling from "not wanting to hear and understand" to a feeling of "gratitude that they did attend." You must reward them with information that will improve their thinking and affect them mentally, spiritually, or economically — if they are attending by choice, you must return the compliment by giving them what was promised or what provoked their selection — don't let them regret their decision to attend!

Visual aid art is a specialty in itself and the cost can be high. This area of the presentation should therefore be well planned and the decision to use visual aids should be wisely made.

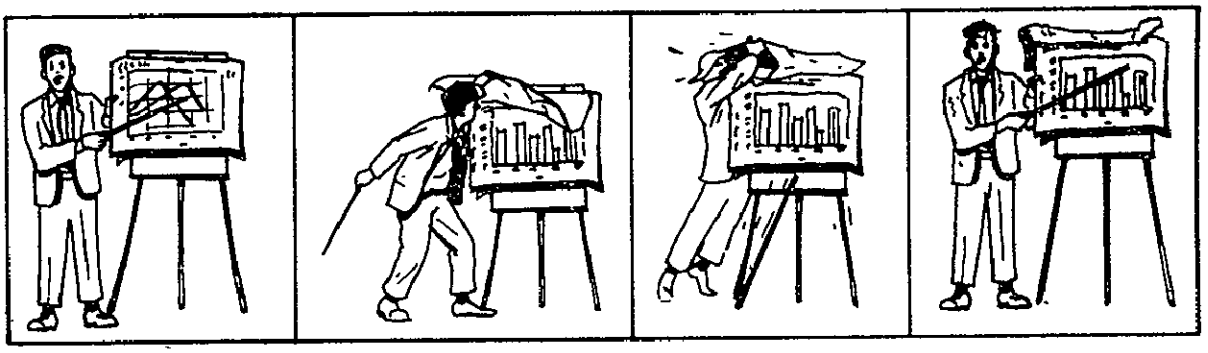
Transparencies can be made so cheaply and easily today that this technique, using a transparent overhead projector, has become very popular.

Unpracticed presenters often use many more visual aids than necessary. An economical approach is to rehearse with transparencies, cheaply and quickly made from everything the speaker feels is necessary. This should be done regardless of the type of visual aid that will ultimately be prepared by an artist. The real need for the visual aid becomes clearer through rehearsals of this type. The end result will be the elimination of material that cost little to produce. Ignoring this approach may result in costly art production of visual aids that would not, or should not be used.

WHEN — use of when words alone cannot develop audience understanding, when quick universal audience comprehension is required — use for illustration purposes primarily, picture as opposed to words, charts as opposed to tables and figures — analyze needs only after content had been developed.

WHAT — visual aids for the audience must be legible and clear to everybody — selection of type depends on presenter and services available — cards and flip charts adequate for audiences within 25 feet of speaker[1] — longer distances require projected slides.

FLIPPING CHARTS SUSPENDED from LONG SIDE can be a PRODUCTION



CARDS — table top presentations or small audiences — usually expensive to produce — awkward to use in large quantities — must have easel with shelf at least 40 inches from floor to display cards (twenty, 30- × 40-inch cards may weigh 10 pounds).

FLIP CHARTS — same environment as cards but easier to handle, cheaper to produce — flip charts are the only type of visual aids that are normally made in a vertical format — since they should be suspended from the short side — difficult to flip sheets hinged on the long dimension without ripping — suspended from long dimension, each "flip" becomes a production in itself.

MOVIES — require additional details, room darkness, projectionist, proper timing — should use room with booth — major audience objection is noise of projector — production very specialized, costly, and time consuming — when using sound film use separate speaker placed behind screen.

1. Twenty-five feet requires minimum of 3/4-inch letters and symbols.

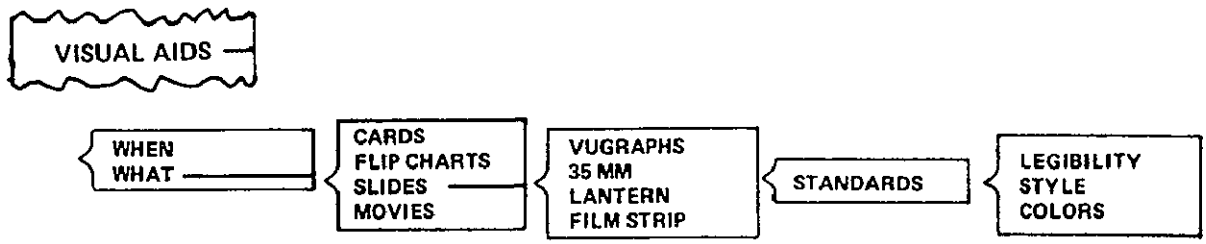
SLIDES

VUGRAPHS — most economical visual aid to produce since many low-cost copiers exist that enable user to make transparency from any copy within $8\frac{1}{2} \times 11$ inches — avoid using material not designed to be visual aid — avoid standing between audience and image, use separate projectionist if possible — vugraph technique exceptionally good for rehearsal of team presentations.

35-MM — most compact visual aid and most universal projection — best type to use for total speaker control since remote slide changing is possible with most projectors — requires competent art and photographic capabilities, cost high, more time and planning — changes and elimination of material costly — should be prepared in horizontal format.

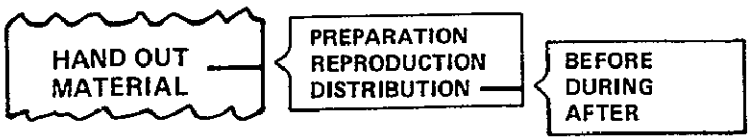
LANTERN — normally referred to as $3\frac{1}{4} \times 4$ inch slides — same production procedure as 35-mm except photographic production slower and costlier — size of slide makes package bulkier — glass mounted and easily breakable — normally requires separate projectionist — projected image brighter on screen; use when image width is required to be 15 feet or greater.

FILM STRIP — continuous visual aids on one 35-mm film strip — production cost high — no flexibility in visual aids — require special projector — greatest advantage is instant image changes.



STANDARDS — art for visual aids is significantly different from any other commercial art. It is the one area when the artist is most effective if he concentrates on selling the speaker and his message. Time-consuming artwork often becomes too detailed and conspicuous as an artistic accomplishment. What good have visual aids been that are remembered for their cleverness and artistic beauty if the message of the speaker is forgotten?

It is for this reason that basic standards should be established for visual aids that would eliminate illegible material, misuse of color, and encourage more simplicity and directness in visual aids.



This may require significant support; especially if art, production, or photography is required, so it should be planned early and thoroughly.

The question of distribution relates usually to the type of function; speech, lecture, or presentation. Distributing such material BEFORE the talk may be necessary in the case of a lecture in a training session for example, but it would be very distracting to circulate material before a speech or a presentation. Such nuisances as the sounds of the audience rustling paper, or their trying to read in a room darkened for projection purposes, or reading while the speaker is trying to hold their attention, would result.

When it is necessary to distribute material, arrangements should be made ahead of time to acquire needed assistance and to allow for the time to do it.

In addition to the date, the presentation to be made is a factor that should be determined early. A speaker is able to make certain adjustments if he knows he has the handicap of a poor time on a program.

The worst times are right before lunch or at the end of the daytime activity. These segments are often compromised by poor timing and discipline of preceding events.

Another bad time is within the first hour after lunch when drowsiness creeps into the audience. Avoid, if possible, making a presentation that requires projection with the lights out for a meeting during this time.

The favorable times are the first session in the morning and just after coffee breaks in the morning and afternoon. The audience is more alert for the first meeting and generally most comfortable after each break.

EDITING TECHNICAL ILLUSTRATIONS

By

Frank R. Smith
Corporate Manager – Technical Information
McDonnell Douglas Corporation
St. Louis, Missouri

I suspect that most of you here today are illustrators or publication specialists interested primarily in the graphic end of the publication business. Since I am by trade and training an editor of technical writing, I am somewhat like a male obstetrician. I can theorize about your labors, but I cannot empathize. Consequently, I have no intention of trying to tell you how to do your work. Rather, what I should like to do is to explain what the editor is trying to do when he marks up an originator's rough or sends back an illustrator's finished art.

As I see it, a technical editor handling technical illustrations performs three basic functions: he makes changes in the rough art sketched out by the author-originator; he makes changes to the finished art that has been prepared by a professional illustrator; and, finally, he makes changes in what I call the production art, or finished manuscript, which integrates art with text. I should like to discuss and illustrate briefly each of these kinds of editorial changes to technical illustration. I will be concerned primarily with art intended for textual presentation but incidentally also with art intended for use in oral presentations. My examples are all taken from real life, but some have been modified in minor ways to emphasize a point.

EDITING AUTHOR'S ROUGH ART

It is a little difficult to classify the kinds of changes that an editor makes in the rough art submitted to him by an author. In one sense, all changes can be classified as additions or deletions; in another frame of reference, all such changes can be called simplifications or elaborations; and ultimately, of course, all such changes, the editor would say, are intended to clarify. His concern is primarily with message and only secondarily with tone, style, and appearance.

But let's look at a few examples of editorial changes to author-prepared art to see what kinds of things are done.

This first example (Exhibit 1) is typical of the kind of author-prepared art that the editor sees with some frequency. It was prepared for a paper on meteoroid penetration, but even that knowledge does not help the casual observer interpret the meaning of the figure. This sketch is a perfect example of the kind of art that results when an author merely collects all his thoughts on one piece of paper in random order. As you can see, he jotted notes all over the page, including what was obviously an apologetic afterthought in the word "schematic."

The editor's procedure, when confronted with an illustration like this, is first to obtain an understanding of the message the author wants to convey. In this case, the conference disclosed the relatively simple fact that a meteoroid penetrating a thin sheet of aluminum will make a different kind of hole than will a meteoroid of the same size and velocity penetrating a thicker plate of aluminum.

Knowing that, the editor could then make a number of simplifying and clarifying changes to the illustration. Exhibit 2 shows the editorial marks that were added. For instance, the labels on the ordinate and abscissa were simplified from ratios to single elements, and a note was added that the projectile diameter remained constant. All the notes were collected in one place and labeled "Notes." The sketches of the hole cross sections were labeled and aligned and identified with specific portions of the curve. Since the author insisted on retaining the "schematic" designation, it was incorporated into the title, and the constant-impact-velocity condition was removed from the title and added as a note. The somewhat mystifying term "threshold penetration" turned out to be the same as no penetration. In other words, when the plate becomes so thick, the projectile will not penetrate it at the constant velocity assumed here.

This exhibit is unfortunately typical of the state of the art that is handed to you professionals. You have my sympathy and admiration. How you can look at that and produce a finished piece that looks like Exhibit 3 never ceases to amaze me.

The same author, writing on the same subject, produced the next exhibit. At first glance, this appears to be about as much text as it is art. However, even a close reading of the text failed to give the editor a clear understanding of the message; and so, again he had to have a conference with

the author. The first question that had to be answered was what the abscissa represented. That turned out to be velocity. The next thing that had to be discovered was the relationship between the two plates. The author explained that the thin plate was a shield whose function was to slow and break up the meteoroid before it struck the second plate. The purpose of the illustration, then, was to show two things: (1) the kind of debris that reached the second plate, and (2) the relationship between the velocity of the meteoroid and the thickness of the second plate that it could penetrate. The first of these two rather complicated messages was shown by the numbers on the curve and the text underneath; the second message was shown by the shape of the curve itself.

Since the author insisted that there was no other way of conveying this message, not even in two separate illustrations, the editor's attempt at solution is illustrated in Exhibit 5. His first major effort was to eliminate most of the text associated with the figure by reducing the wordiness of the description. At the same time he attempted to establish a closer relationship between the different kinds of debris and the range of velocity where it occurred. As before, he eliminated the ratio in the ordinate by assuming a constant projectile diameter, and he explicitly labeled the abscissa. Likewise, he modified the title and collected all the notes in one place. Finally, he added an arrow indicating the direction of projectile penetration and labeled the shield and the plate.

The result of his efforts (Exhibit 6) is a far cry from a simple, clear illustration; and yet it is at least intelligible after some study.

Fortunately, not all authors attempt to convey their entire message in a single illustration. Here, in Exhibit 7, is a simple straightforward engineering curve of the type you see every day. It is a simple plot of thrust against time; but the editor is trained to act dumb, and so his first question is, "What do those curves stand for?" Unable to figure it out from the sketch itself, he asks the author and is told that each line represents the thrust buildup of one of eight engines. "Which is which?" he wants to know; and he's told that the title makes that clear. Leaving that problem for a moment, the editor then asks, "If each of those curves represents one engine, which one does the label on the abscissa refer to?"

The result of these probing questions is shown in Exhibit 8. A simple sketch of the rear view of the booster shows the location of the diagonal pairs of engines whose thrust is represented in the curves, and the curves themselves are labeled appropriately. The meaning of the abscissa is clarified by the change of a few words.

The final result (Exhibit 9) is still a simple engineering curve, but because of the editor's questions the author has been compelled to add certain details that were obvious to him but not to the reader.

At this point I should like to make a plea to the illustrators. I would urge you strongly to help the editor in the kind of work that I have been describing; that is, in the simplification and clarification of the art prepared by the engineer and scientist. If someone hands you a piece of rough art whose message you cannot understand, don't hesitate to ask questions and make suggestions for improving the presentation. That, after all, is your business. You can make a real contribution to the quality of any presentation by capitalizing on your ability to communicate graphically. To say it another way, if an engineer's graphic communication is not clear to a specialist in graphics, like yourself, chances are that it will not be clear to anyone. He needs your help in visualizing the concept that he wants to communicate.

Not all of the editor's changes to the originator's rough art are as fundamental as those we have been discussing. Here, for example, in Exhibit 10 is a simple schematic representation of a landing gear. It is clear enough that even the uninitiated reader can visualize the stroke of the landing gear as it touches down and can see the different mechanisms that have been incorporated to absorb the shock.

The editor, however, is sometimes an auditor as well. Exhibit 11 shows that there are no bounds to the kinds of dumb questions he will ask. If 10 psi = 68.9 kN per meter squared, then 20 psi should equal 137.8. And, similarly, if 20 psi = 137.8, then 40 psi should equal 275.6.

On an even more trivial level, editorial changes to an originator's roughs are illustrated in the next two exhibits. The first (Exhibit 12) is a straightforward engineering sketch of a set of test panels. The second shows the editorial changes that were made to bring the sketch into conformance with the publication style of the organization. These detailed changes do not change the content at all, and yet they are necessary in order to maintain the consistency of the publications produced by the company (Exhibit 13).

On a slightly different note, the editor is occasionally given the opportunity to work on art that is being prepared for oral presentation. In Exhibit 14, for example, is a test flow diagram submitted by a speaker as part of his presentation. It is obviously just a print of a diagram taken from a publication; and you know, of course, that what is suitable for one form of presentation is not always the best suited for a different form of presentation.

Exhibit 15 shows what the editor did to simplify for oral presentation the more detailed statements intended to be read. This is the kind of thing that the illustrator has much more opportunity to do than the editor. Most speakers will bypass the editorial group in the preparation of their presentations, but they usually cannot bypass the illustration group. I would urge you, therefore, to be alert to the opportunity for improving the slides and vugraphs of the clients you serve.

EDITING FINISHED ART

The kind of editing that we have been discussing is part of the process that the editor goes through in making the manuscript of a report or proposal or article ready for publication. At some point in that process he must turn the edited rough art over to the illustrator to be converted into finished art. Then, while the editor is polishing the words of the text, the illustrator is interpreting the hieroglyphics on the rough art and producing a graph or a sketch intended for publication. Eventually, this product of the illustrator's skill is returned to the editor for integration with the text. At that point the editor performs the second of the categories of illustration editing that I postulated at the beginning of this talk.

What the editor does with the finished art is essentially no more than proofreading or at least it should be no more than proofreading, but the level of technical sophistication can vary a great deal. For example, Exhibit 16 shows a simple geometrical sketch which appears at first glance to be neat and complete. The editor's trained eye, however, spots a missing subscript; and the illustration overlay is marked and returned to the illustrator. The next exhibit shows that the critical CR has been added (Exhibit 17).

As a personal aside at this point, I should like to comment that I think this kind of proofreading is basically the function of the illustrator rather than that of the editor. To produce finished art that is complete and faithful to the original should be the illustrator's job. In his defense, however, I am quick to admit that the originals he works from are often so obscured by editorial marks as to be virtually illegible. Futhermore, I must admit also that I have yet to see a group of illustrators capable of adequately proofreading the product of their varitypist. Perhaps it is part of the artistic temperament, or perhaps it is simply a lack of interest. At any rate, I would strongly encourage the typical illustration group to employ a professional proofreader to perform this function.

A second kind of proofreading which the editor performs on the finished art produced by his illustration group is exemplified in the next two exhibits. The first (Exhibit 18) shows a typical chart prepared for presentation. The second shows the editorial changes that were made in the chart. Most of these changes have to do with editorial style such as capitalization and spelling. A couple of them, however, such as the location of the footnote symbols, are proofreading corrections of the type examined in the last exhibits. Again, it could be argued that the illustration group should, after a time, become aware of the company's editorial style and that it should, therefore, not have to be told to use all uppercase letters in column headings for charts; but then if the illustrators could do that, there would be little need for us editors, would there?

The last of the three kinds of editorial changes to finished art that I will discuss today is somewhat more sophisticated than the previous ones. Exhibit 20 shows a relatively simple set of log-log curves. Despite its neat and clean appearance, however, something about it bothered the editor. It just did not look right. Upon investigation he found out what was wrong, and the next exhibit shows that to him the proportions in Exhibit 20 were misleading. The curves appeared to be much steeper than the text suggested they should be because the horizontal scale had been compressed to form a square grid. You will notice, incidentally, that the editor added grid lines to the finished curve in order to make it easier for the reader to pick off specific values, which the text required in several places. He also added the parenthetical explanation that a curve with a ratio $\frac{r}{a} = 1$ is a spherical segment. I might add that he could have gone a step further and explained what r and a stand for, as well as what the ordinate and abscissa represent.

I also wanted to mention another editorial function concerning finished art. The editor — with the originator, of course — sometimes finds it necessary to request changes to be made in an artist's renderings of new technical devices and concepts. Since the subject of such paintings does not actually exist, it is not unusual to find that the artist has misconstrued some small detail, and the editor is responsible for pointing these out when he can. However, I was unable to locate a before-and-after example of this kind of editorial change since the painter, like the surgeon, buries his mistakes.

EDITING PRODUCTION ART

In the final stages of the publication of a report or proposal, the editor performs one additional function in connection with the illustrations included in his document. I'm not sure that this function can be called the editing of technical illustrations, but I am sure that it is not technical editing in the sense of textual editing. Lying somewhere between the two, it seems to me to warrant being called the editing of production art.

In my mind, there is no question that that the primary responsibility for the layout of a textual illustration or a chart for an oral presentation or a page in a report should belong to the illustration group. At times, however, there is a small conflict between the artistic inclination of the illustrator and the editor's attempts to conserve space, integrate art and text, and improve readability. When these conflicts arise, there may well be some question as to whose word is final; but experience suggests that logic and reason will prevail.

For example, the next two exhibits show the results of such a discussion between editor and illustrator. The first represents the illustrator's solution to the problem of representing three kinds of buckling of sandwich shells. He visually separated general buckling from dimpling from wrinkling while grouping the two examples of wrinkling. The editor comprehended his logic and agreed with it, but pointed out that in the text those distinctions were not emphasized nor was there in fact much discussion beyond a simple reference to the figure. In short, the importance of the illustration warranted only a quarter of a page, as in Exhibit 23, instead of a full page (Exhibit 22).

The next pair of exhibits illustrates a similar discussion. The first (Exhibit 24) is a slide intended for use in an oral presentation. The curve and the table say the same thing. The illustrator argued that the graphical statement was more readily comprehended than the verbal-numerical statement. The editor, who had a few other comments to make about the illustration, did not disagree with the artist's reasoning, but he pointed out that reversing the table and the curve would permit the title to be placed in its conventional place, top left, and that the whole slide would be better balanced that way (Exhibit 25). In this instance, the editor seemed almost to be taking the part of the artist in being concerned about balance, but he was also interested in the increased clarity he could achieve by presenting the verbal details before the graphical summary of the idea.

The next example of the editor's manipulation of production art is an actual one, but it is typical of a wide variety of similar instances. When a document was laid out, as the upper part of the next exhibit shows, Figure 2 was discussed in the bottom half of page 18. The illustration group, operating on standing instructions to insert figures as near as possible after their first mention, inserted Figure 2, a half-page figure, at the top of page 19. Unfortunately, the discussion of Figure 3 also began at the bottom of page 18 and was continued under Figure 2 on page 19; but since Figure 3 was a full-page figure, it could not be inserted until page 20, after the text had begun discussion of a new topic. Although this layout achieved the greatest compactness, the editor felt that it obscured the clarity of the presentation and required the reader to flip back and forth several times.

Accordingly, he suggested the layout shown in the lower half of the exhibit. The text on page 18 was opened up so that it essentially filled the page, and the discussion of Figure 2 led immediately to the figure itself on the top of page 19. Similarly, page 19 was opened up slightly, and the entire discussion of Figure 3 occupied the bottom half of that page and introduced the figure itself on page 20. Parenthetically, I might add, as I am sure you have noted, that if the document had been printed two sides, the problem would have disappeared.

There is still another aspect to the editing of production art which I will not go into today, but will simply mention; that is, the integration of text and art so that they are mutually supporting. I could show you a hundred examples of figures crying for textual explanation but getting only the quick "See Figure 5." In contrast I will show you only one example of an illustration that is properly supported in the text. In this final exhibit, as you can see, the figure is rather complicated. It presents a great deal of information in highly condensed form. Fortunately, however, the author does not make the reader study the figure at length in order to interpret its significance. Rather, he presents immediately below the figure the two significant conclusions which he wishes the reader to draw (Exhibit 27).

While this kind of editing is not strictly the editing of technical illustrations, it emphasizes the mutual dependence of word and art, and it gives me a convenient opportunity for saying that the artist and the editor are also mutually dependent. The clear, precise figure interpreted and embellished by the well-chosen word can be the product only of the cooperative union between the illustrator and his friend, the editor. I hope you will continue to foster that relationship.

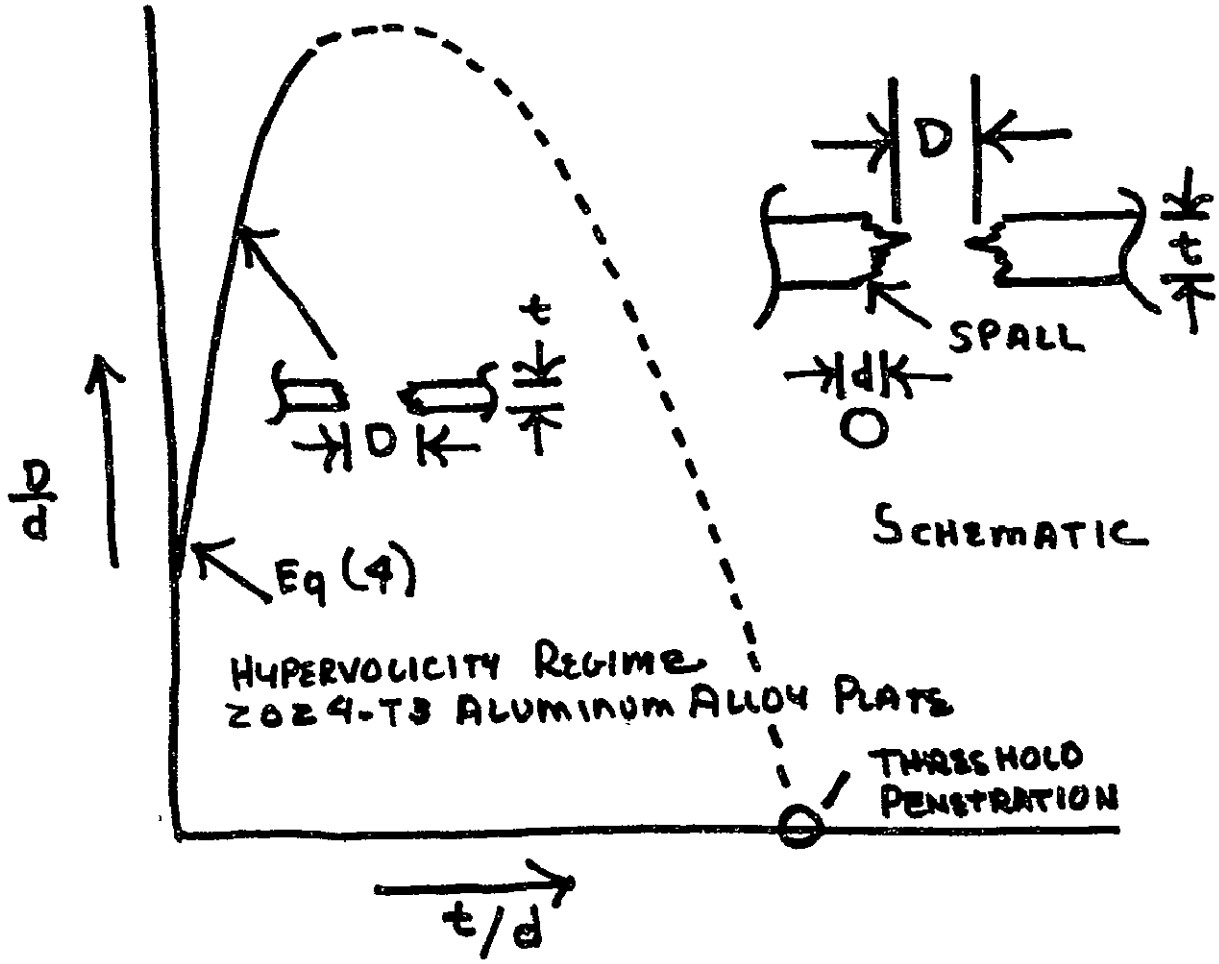

D/d
D
t
Eq (4)
D
t
SPALL
d
0
SCHEMATIC
HYPERVOLICITY REGIME
2024-T3 ALUMINUM ALLOY PLATES
THRESHOLD PENETRATION
t/d
SOLID LINE DEFINED BY Eq (4)
DASHED LINE NOT WELL DEFINED

EXHIBIT 1

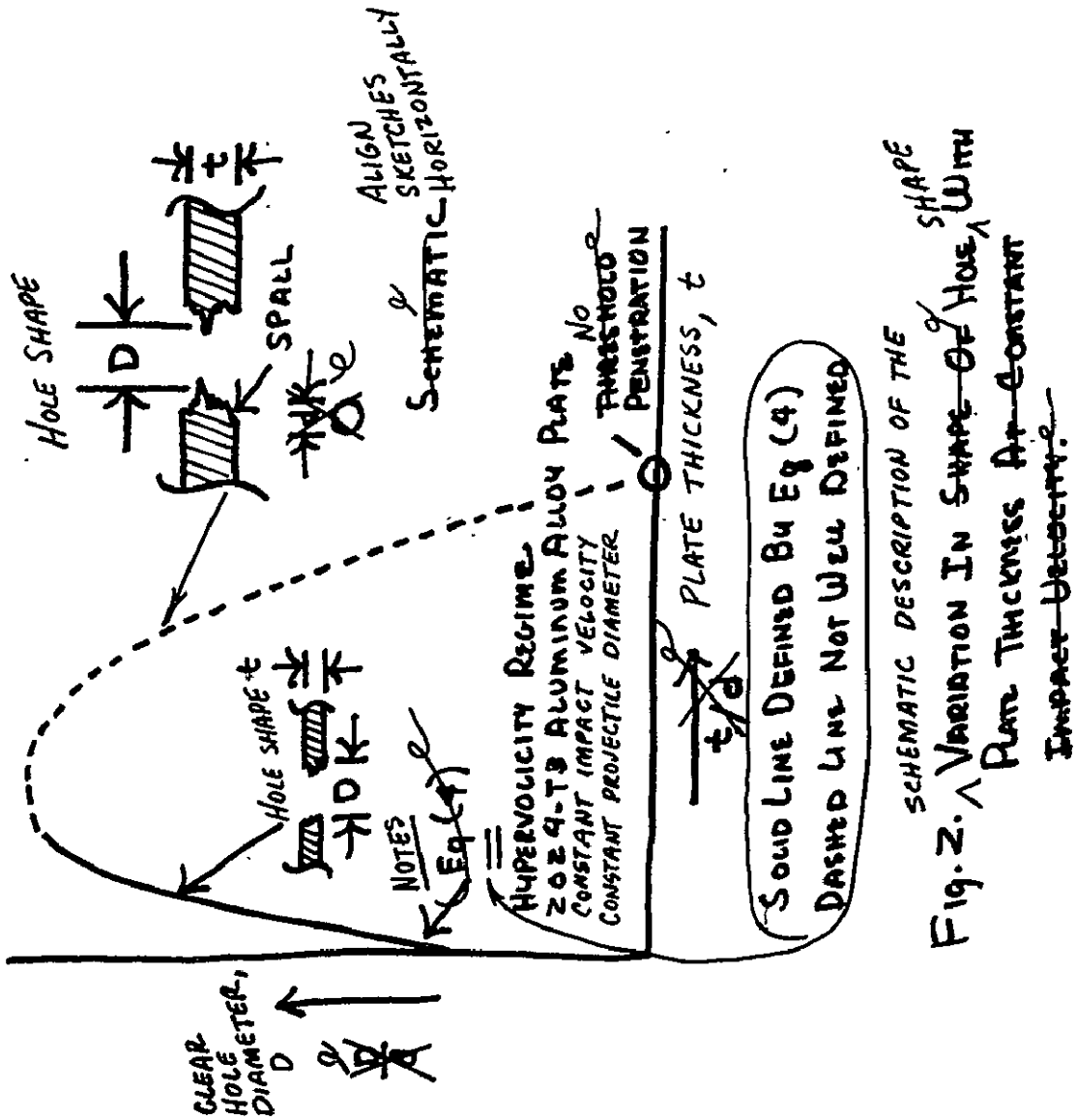


Fig. 2. Variation in Shape of Hole with Plate Thickness at Constant Impact Velocity.

SCHEMATIC DESCRIPTION OF THE SHAPE

EXHIBIT 2

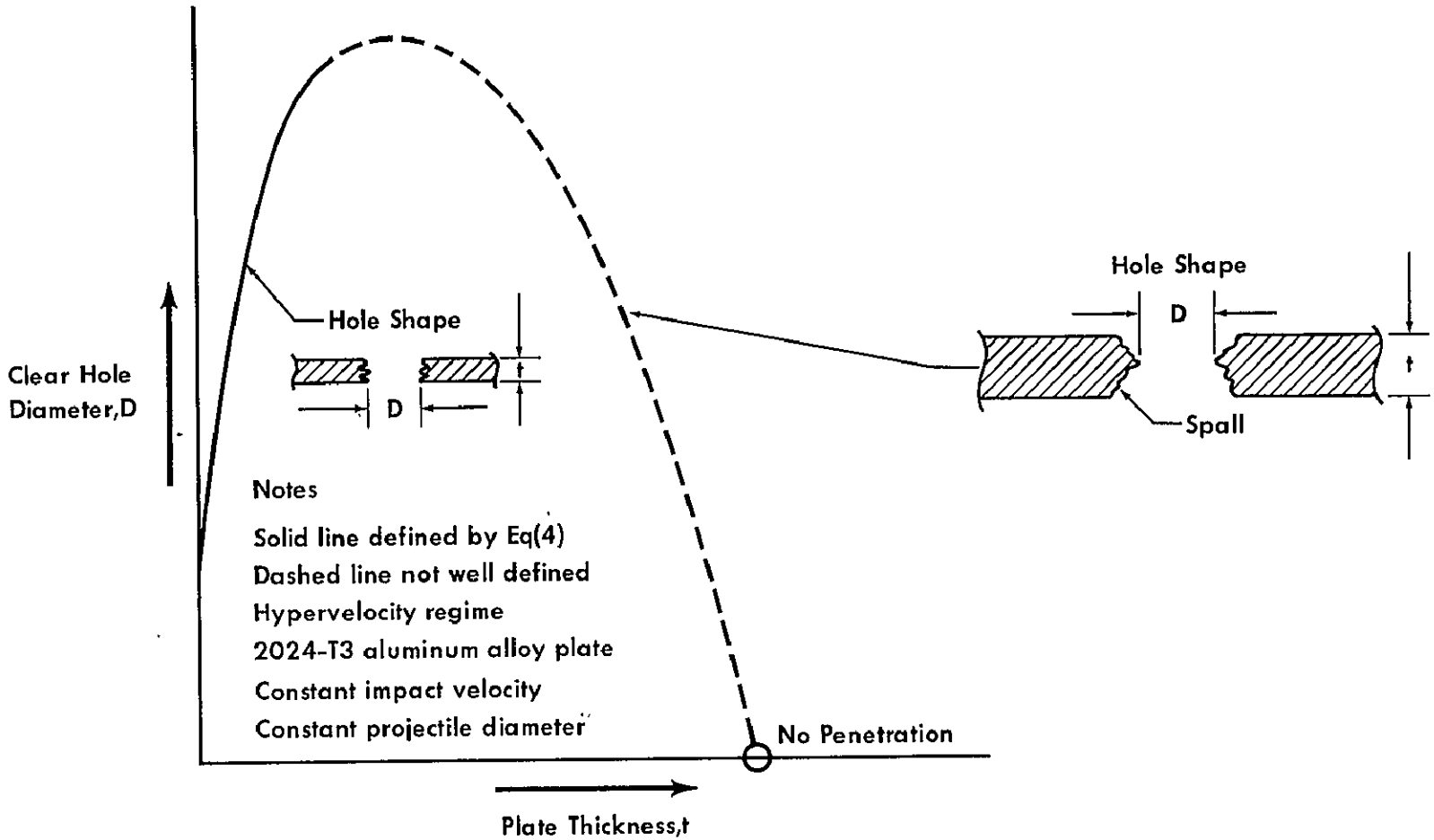
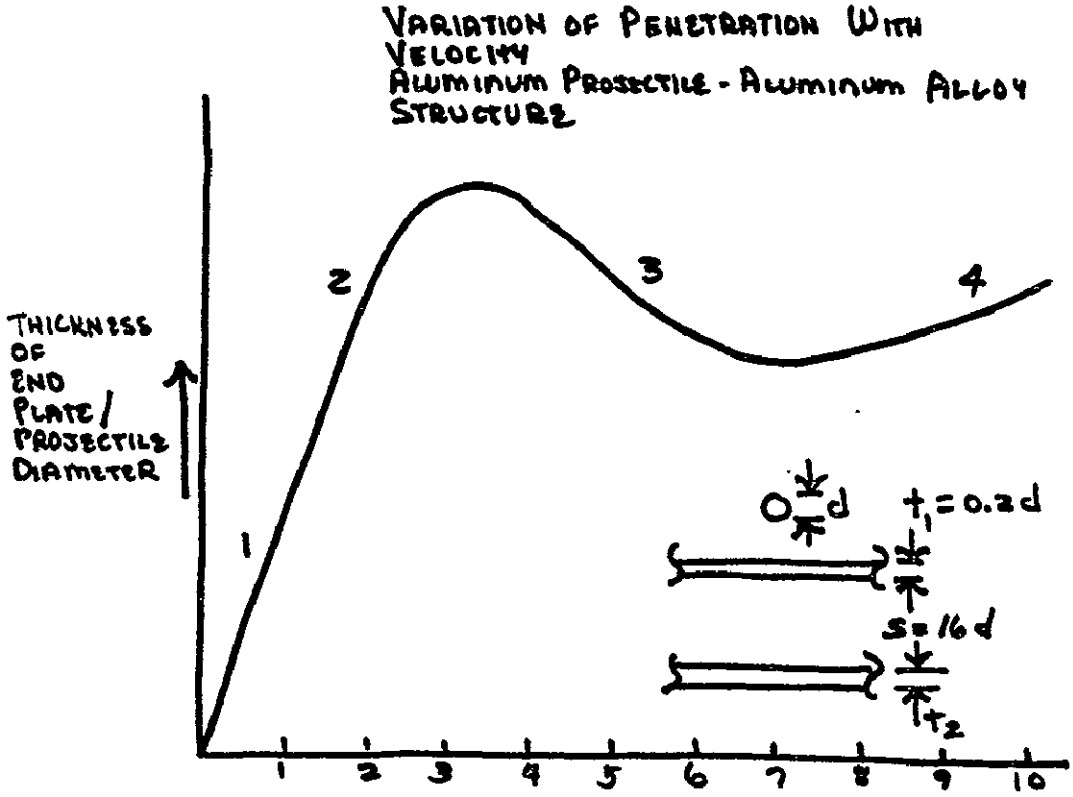


Figure 2.

Schematic Description Of The Variation In Hole Shape With Plate Thickness

EXHIBIT 3



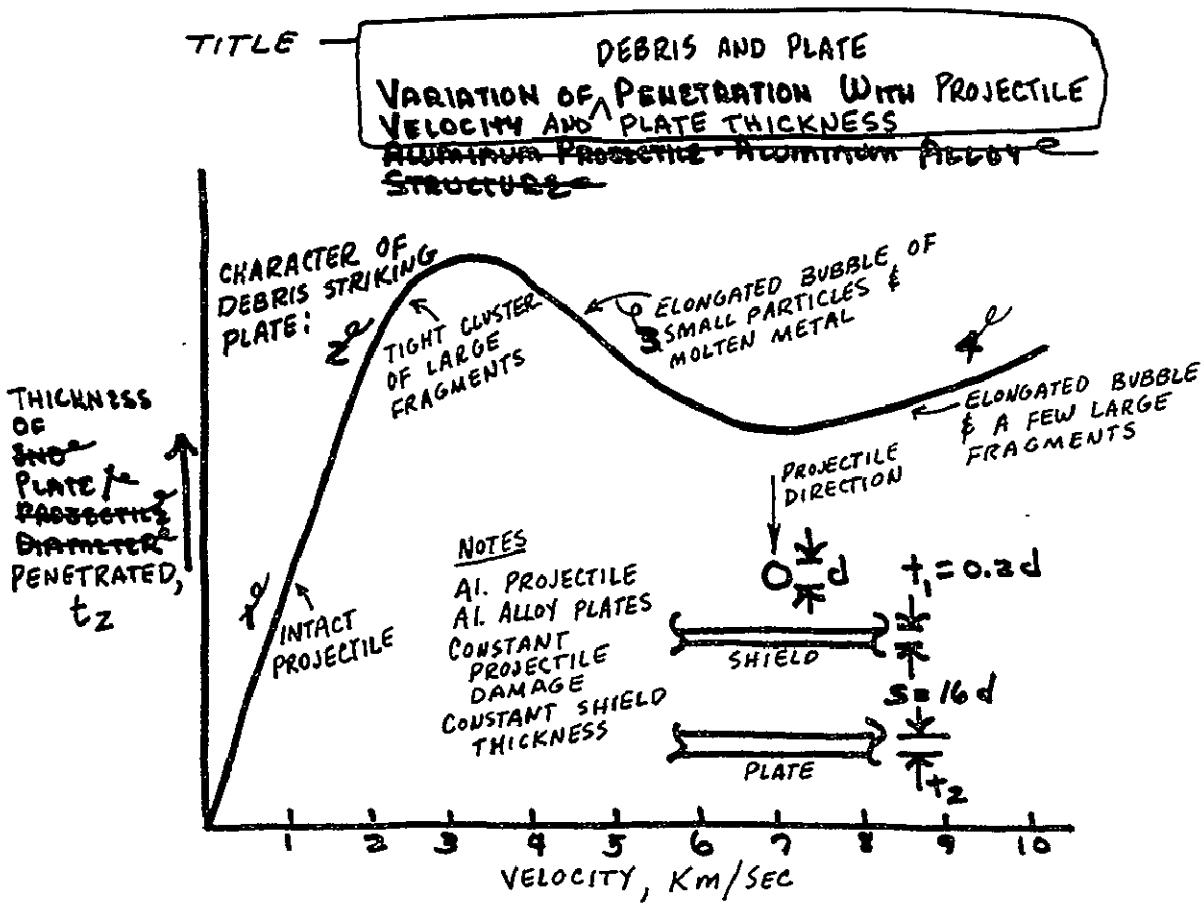
1. INTACT PROJECTILE.

2. TIGHT CLUSTER OF RELATIVELY LARGE FRAGMENTS OF PROJECTILE & SHIELD.

3. DEBRIS IN SHAPE OF ELONGATED BUBBLE WITH SURFACE COMPOSED OF NUMEROUS SMALL PARTICLES OF PROJECTILE AND SHIELD.

4. DEBRIS CONSISTS OF TWO COMPONENTS:
   a. ELONGATED BUBBLE CONSISTING OF VERY SMALL PARTICLES MINUTE DROPS OF MELTED METAL, AND METAL VAPOR.
   b. A FEW SOLID FRAGMENTS WHICH ARE LARGER AND SLOWER THAN THE BALANCE OF DEBRIS.

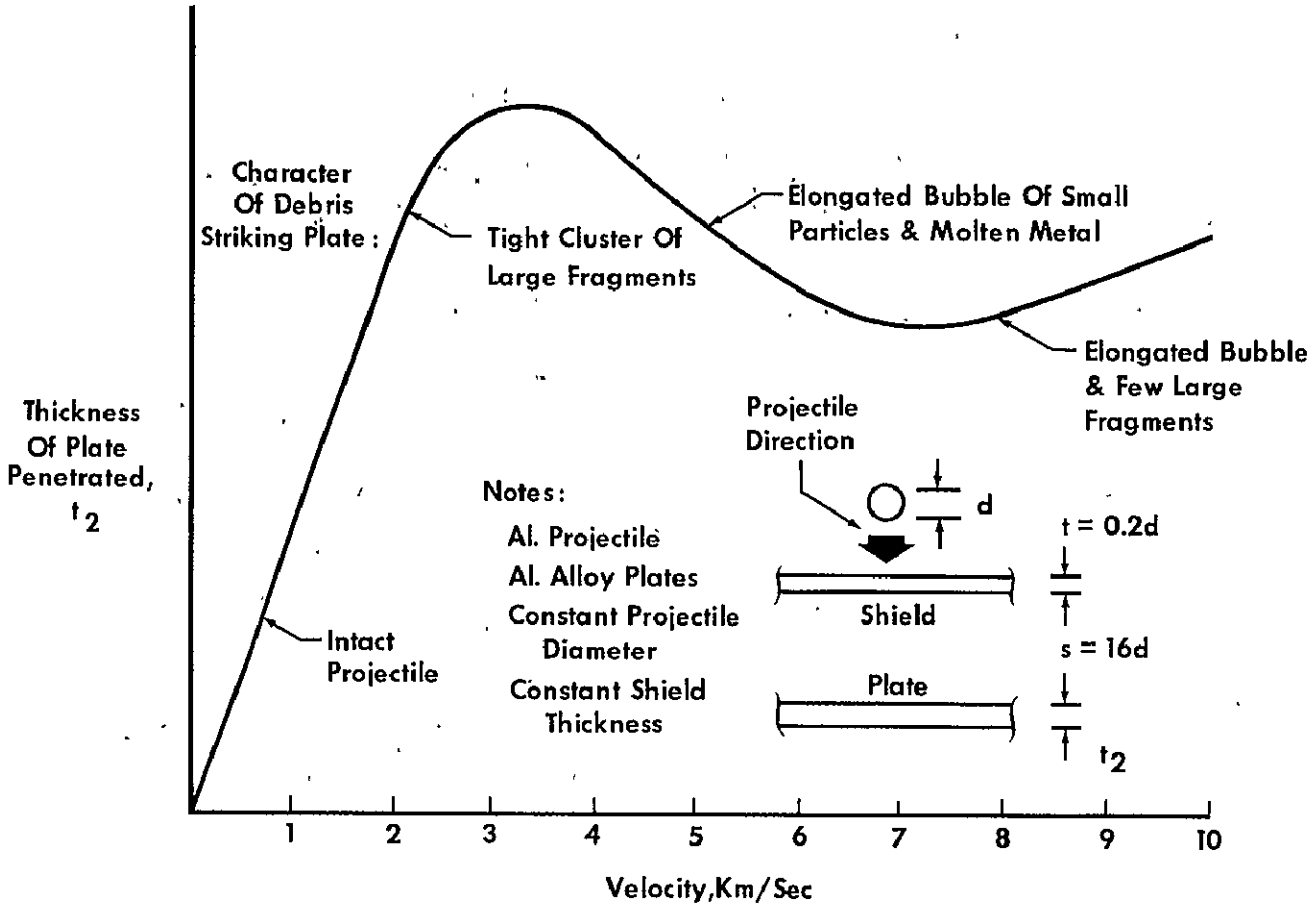
EXHIBIT 4



TREAT IN TEXT

1. INTACT PROJECTILE.
2. TIGHT CLUSTER OF RELATIVELY LARGE FRAGMENTS OF PROJECTILE & SHIELD.
3. DEBRIS IN SHAPE OF ELONGATED BUBBLE WITH SURFACE COMPOSED OF NUMEROUS SMALL PARTICLES OF PROJECTILE AND SHIELD.
4. DEBRIS CONSISTS OF TWO COMPONENTS:
   a. ELONGATED BUBBLE CONSISTING OF VERY SMALL PARTICLES MINUTE DROPS OF MELTED METAL, AND METAL VAPOR.
   b. A FEW SOLID FRAGMENTS WHICH ARE LARGER AND SLOWER THAN THE BALANCE OF DEBRIS.

EXHIBIT 5



Variation Of Debris And Plate Penetration With
Projectile Velocity And Plate Thickness

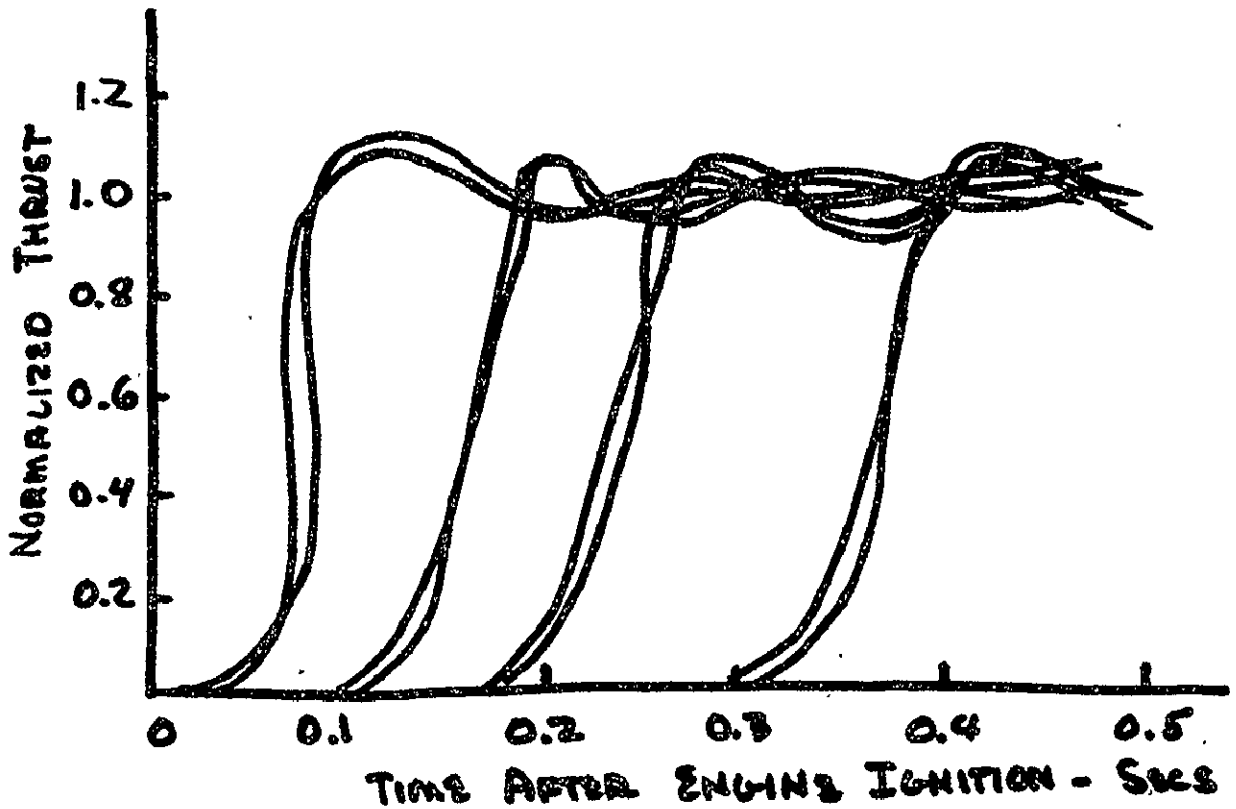


FIG 5 – TYPICAL – 8 ENGINE THRUST BUILDUP CURVES – LIQUID PROPELLANT ENGINES – IGNITION IN DIAGONAL PAIRS

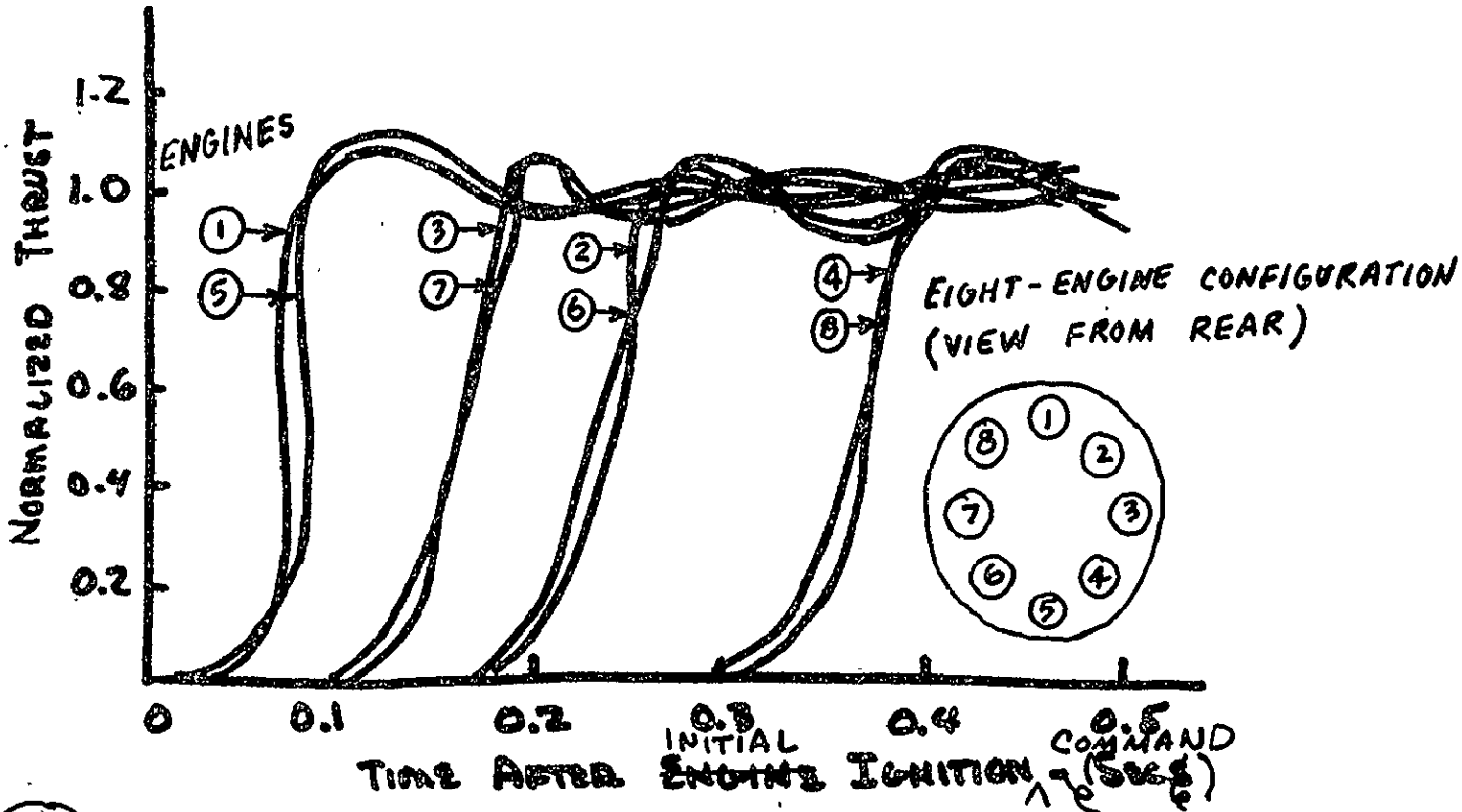


FIG 5 – TYPICAL 8-ENGINE THRUST-BUILDUP CURVES – LIQUID PROPELLANT ENGINES IGNITED IN DIAGONAL PAIRS

EXHIBIT 8

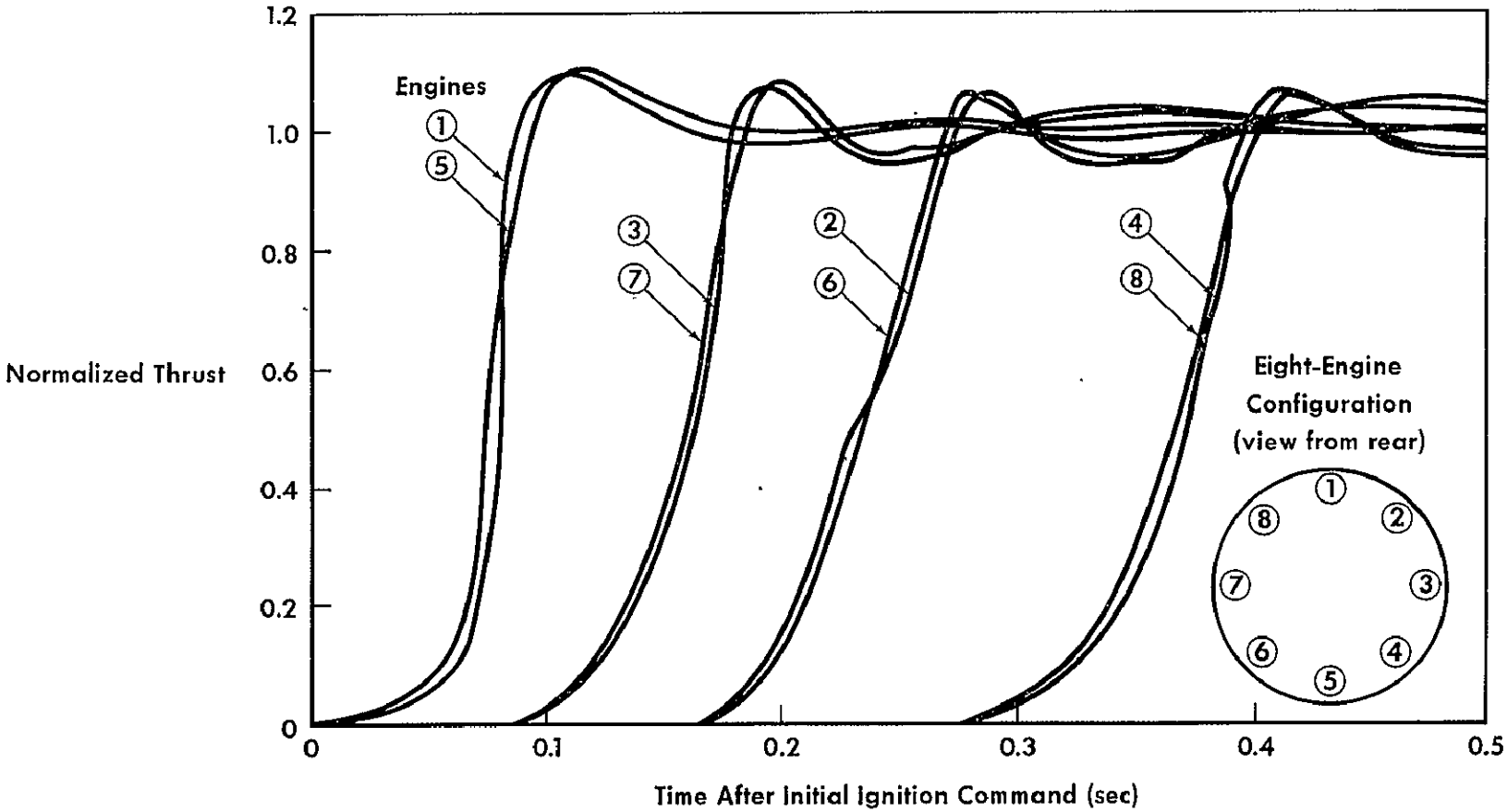
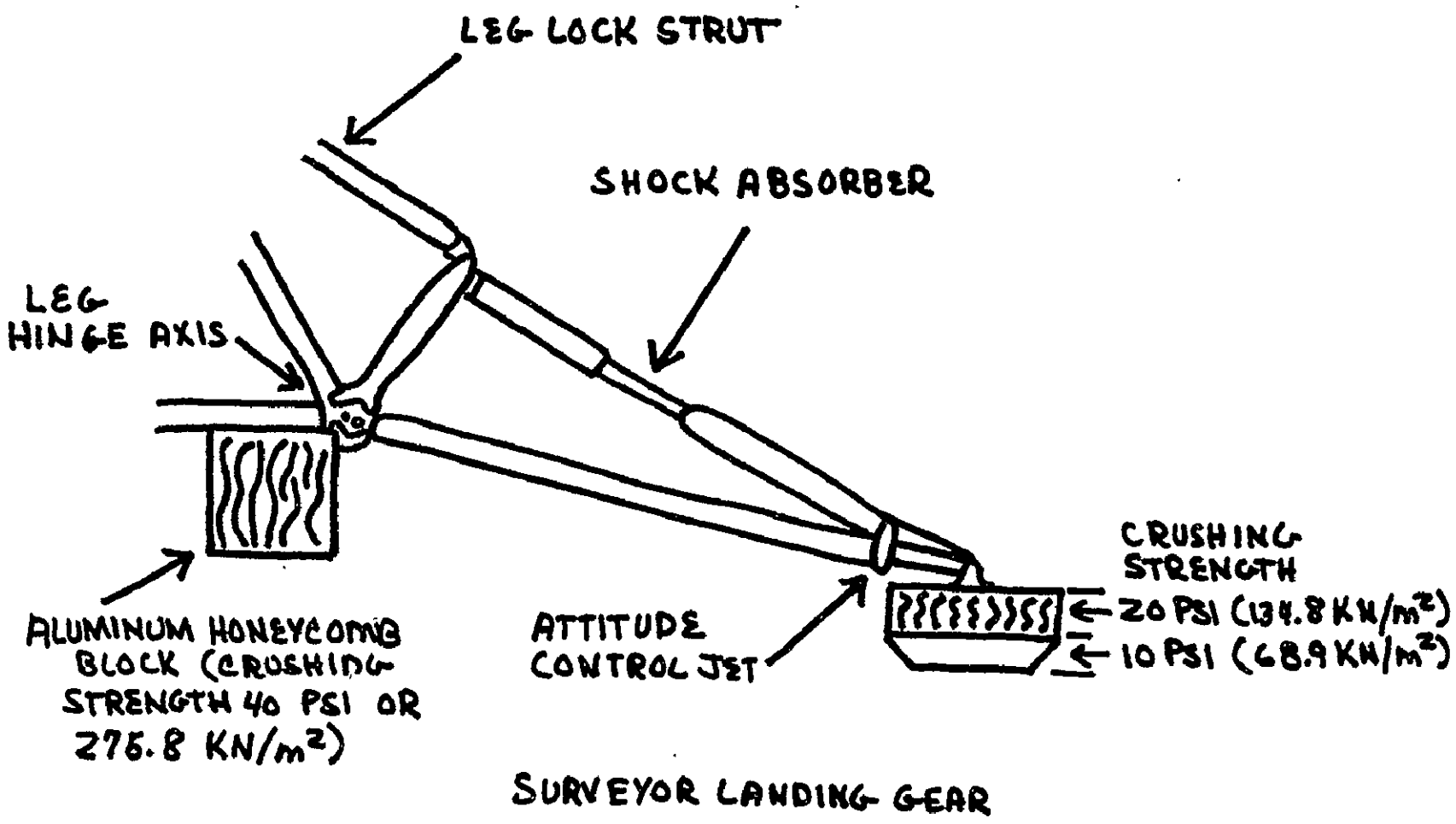


Figure 5

Typical Eight-Engine Thrust-Buildup Curves
Liquid-Propellant Engines Ignited in Diagonal Pairs

EXHIBIT 9



SURVEYOR LANDING GEAR

EXHIBIT 10

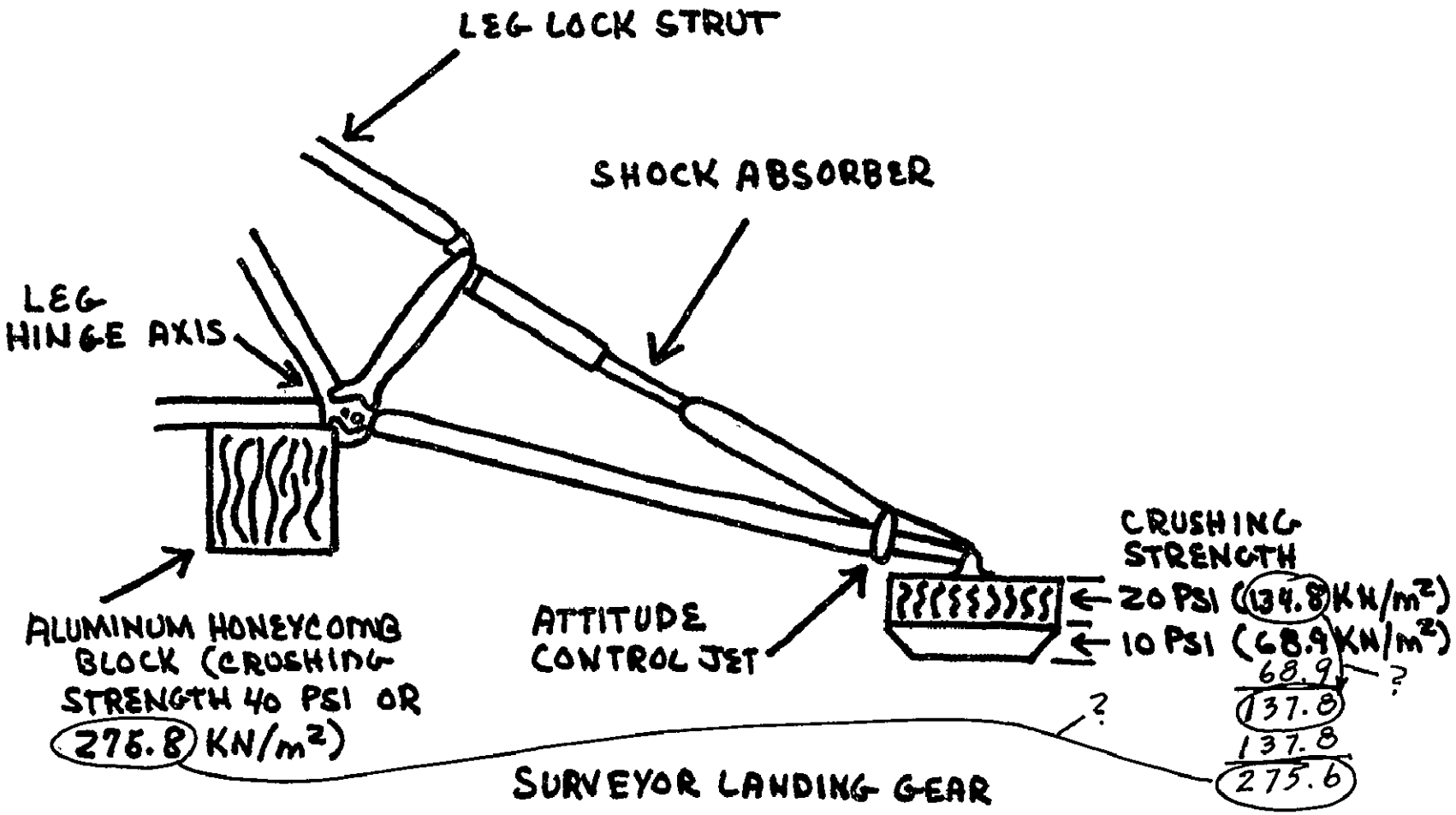
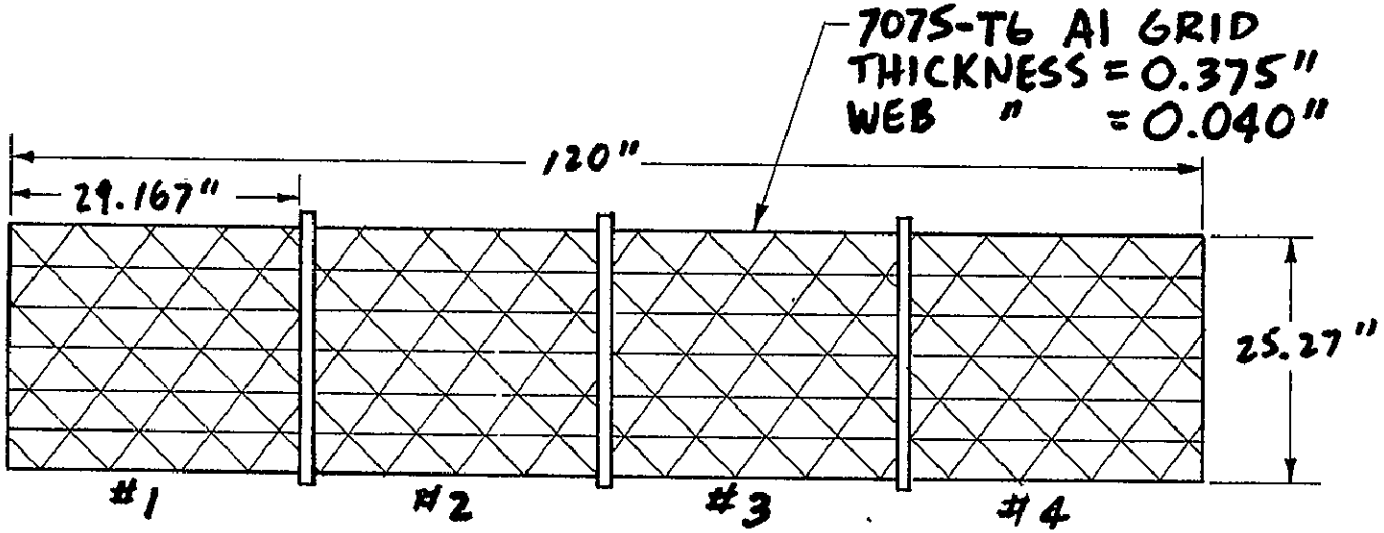

LEG LOCK STRUT
SHOCK ABSORBER
LEG HINGE AXIS
ALUMINUM HONEYCOMB BLOCK (CRUSHING STRENGTH 40 PSI OR 275.8 KN/m²)
ATTITUDE CONTROL JET
CRUSHING STRENGTH
20 PSI (134.8 KN/m²)
10 PSI (68.9 KN/m²)
68.9
137.8
137.8
275.6
?
?
SURVEYOR LANDING GEAR

EXHIBIT 11

RIGID ACOUSTICAL TEST PANELS

TEST - ACOUSTICAL CHAMBER - S.M.

0 - 156 DB.



PANEL	PART NO.	SKIN
1	IT 39651	INTEGRAL
2	IT 39652	.002 GLASS CLOTH - BONDED TO GRID
3	IT 39653	.002 KAPTON " " "
4	IT 39654	.002 COMPOSITE " " "

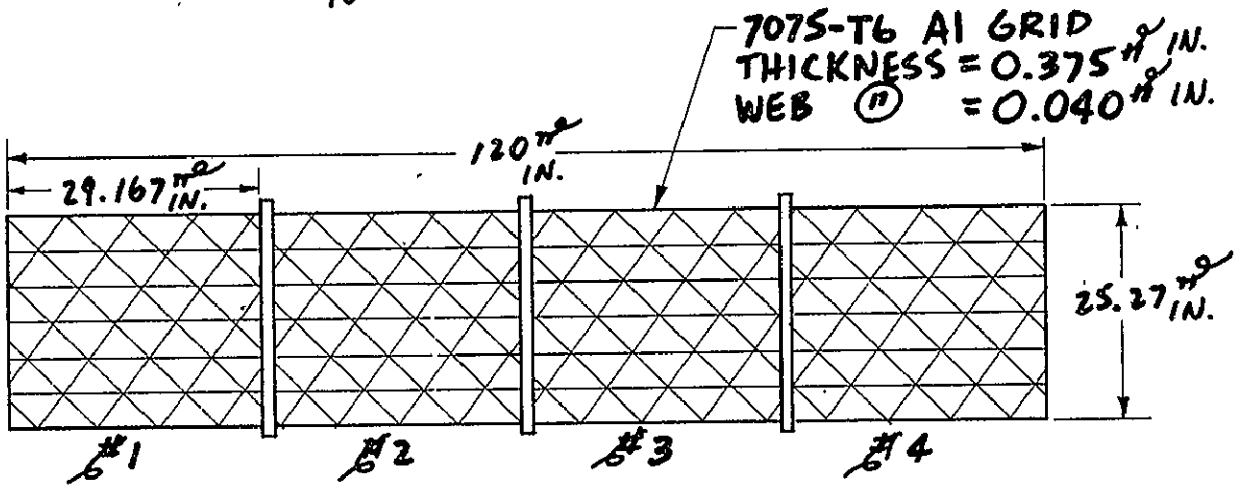
ALUMINUM CHIPS .79" X .79" X .015" BONDED TO SKIN

EXHIBIT 12

RIGID ACOUSTICAL TEST PANELS

TITLE

TEST: ACOUSTICAL CHAMBER, S.M.
(0 TO 156 dB)



PANEL	PART NO.	SKIN
1	IT 34651	INTEGRAL
2	IT 34652	0.002 GLASS CLOTH BONDED TO GRID (10) (10) (10)
3	IT 34653	0.002 KAPTON (11) (11) (11)
4	IT 34654	0.002 COMPOSITE

ALUMINUM CHIPS .79 IN. X .79 IN. X .015 IN. BONDED TO SKIN

EXHIBIT 13

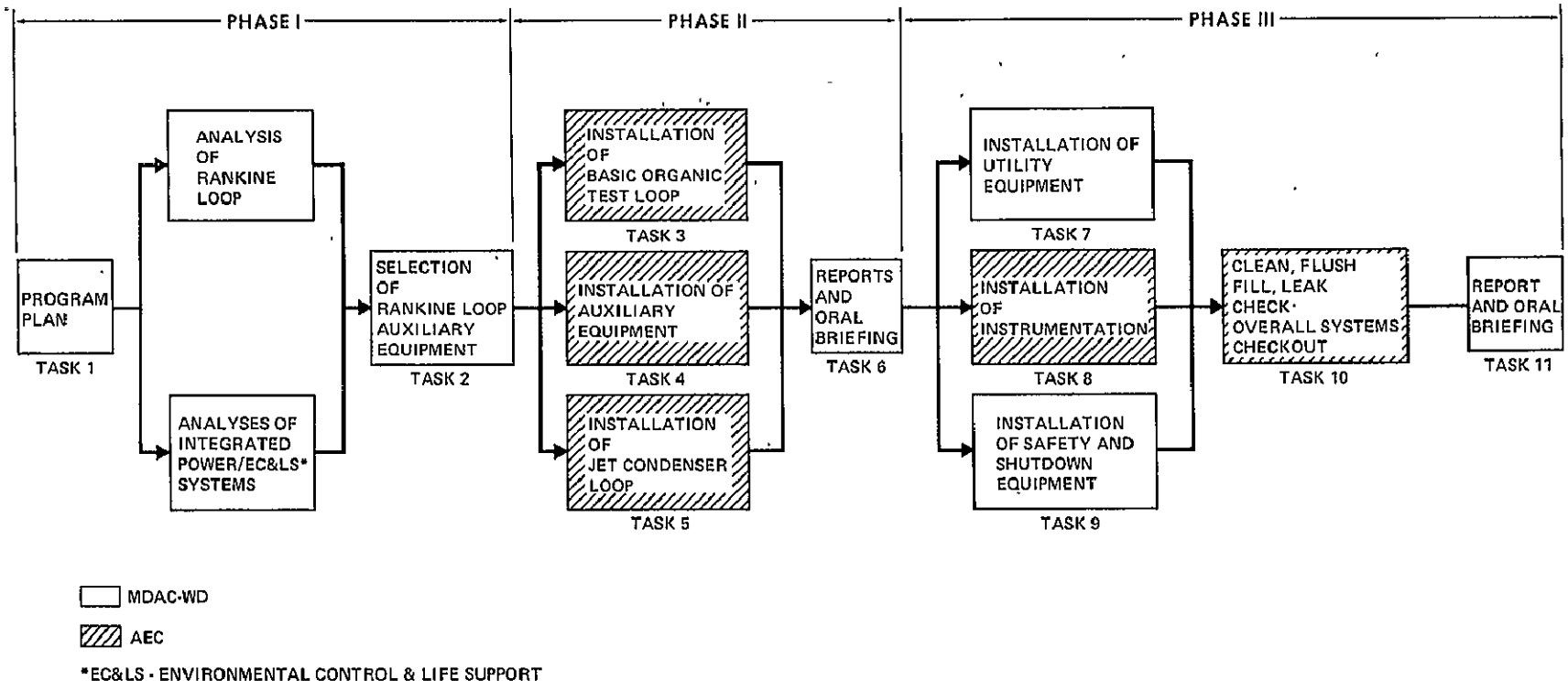


Figure 2-3

Test Program Flow Diagram

EXHIBIT 14

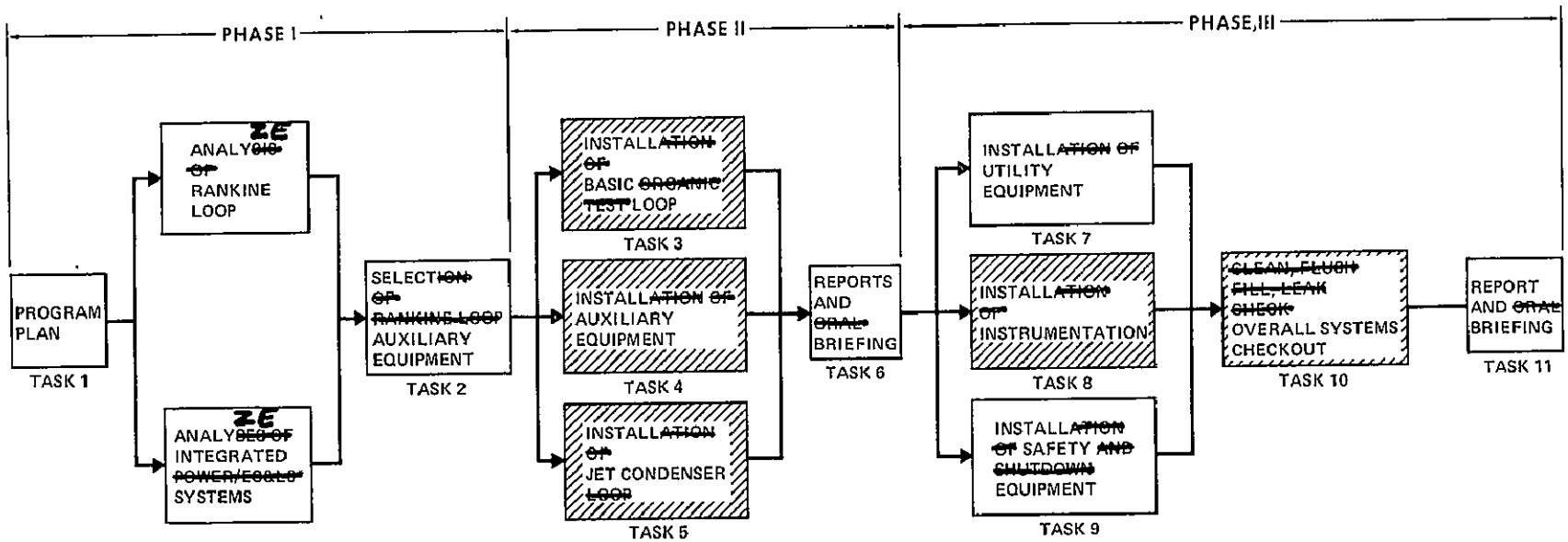
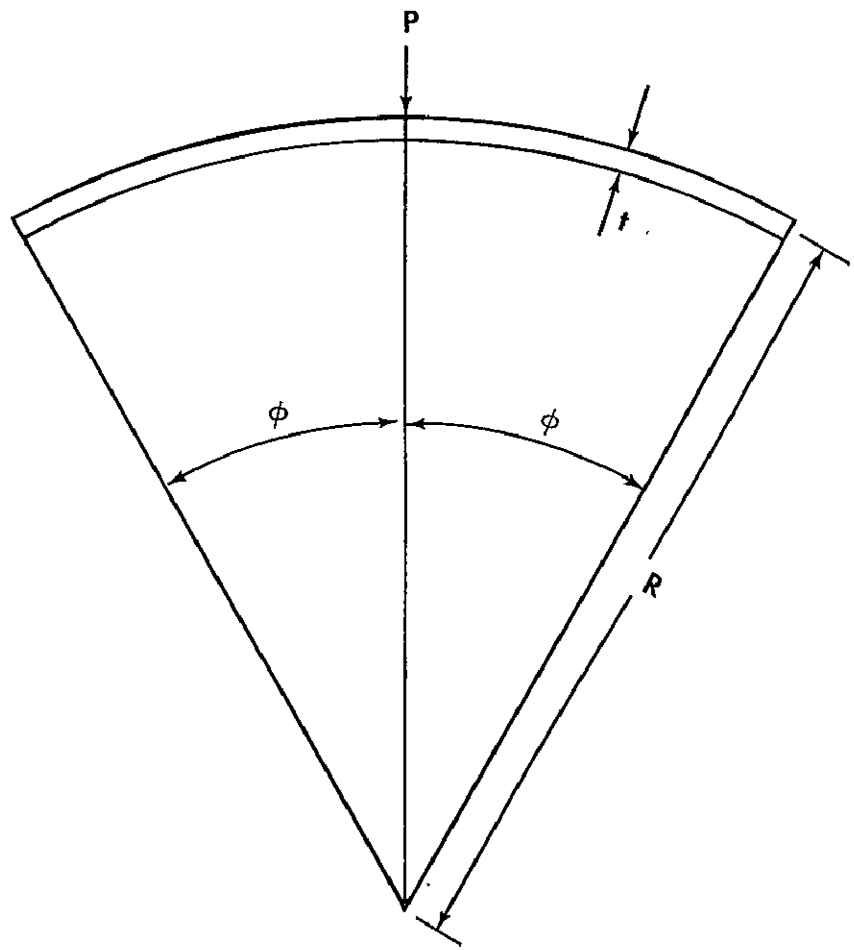


Figure 2-3

Test Program Flow Diagram

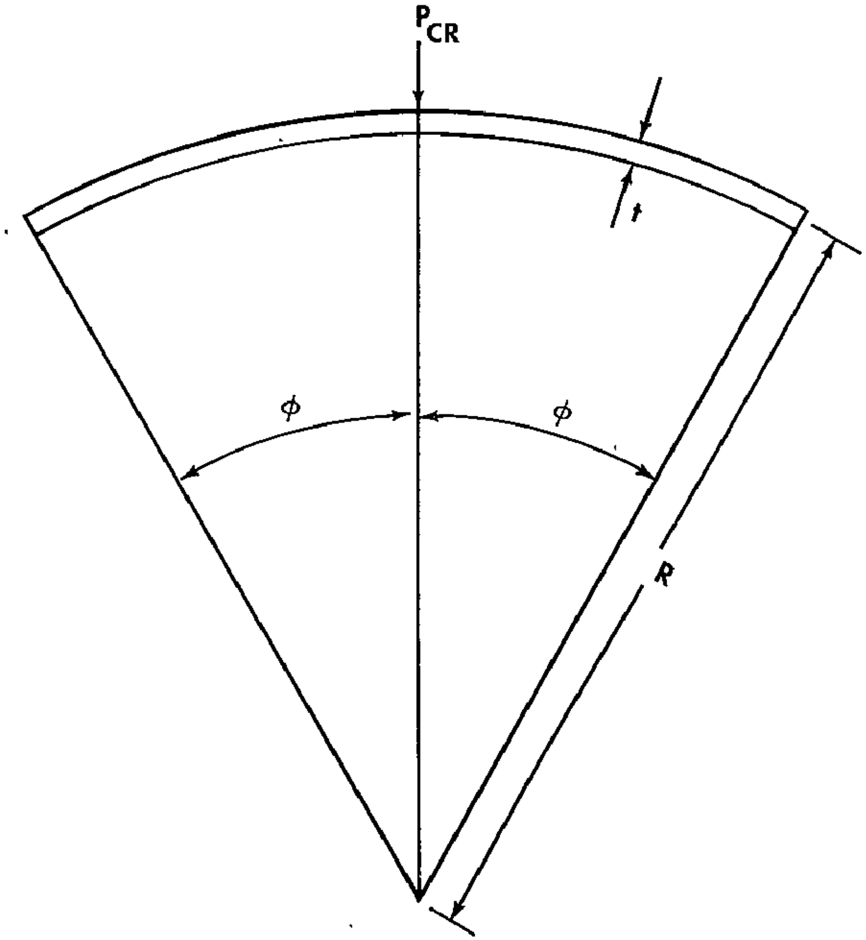
EXHIBIT 15

EXHIBIT 16



GEOMETRY OF SPHERICAL CAP UNDER CONCENTRATED LOAD AT THE APEX

EXHIBIT 17



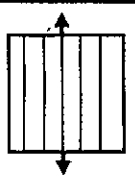
GEOMETRY OF SPHERICAL CAP UNDER CONCENTRATED LOAD AT THE APEX

STRENGTH AND MODULUS DATA ON METAL MATRIX COMPOSITES REINFORCED WITH VARIOUS TYPES OF CONTINUOUS FILAMENTS

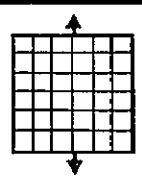
MATRIX	FIBER	FIBER V/O	*CONST	COMPOSITE TENSILE STRENGTH (1,000 psi)	COMPOSITE TENSILE MODULUS (10^6 psi)	COMPOSITE SPECIFIC STRENGTH (10^4 in.)	COMPOSITE SPECIFIC MODULUS (10^6 in.)	SOURCE
Al	B	81	U	208	37.3	208	---	GEN TECH
	B	50	U	205	---	---	---	HARVEY
	B	33	B	38	19.0	41	206	N AMERICAN
	B	50	B	85	24.0	94	267	HARVEY
Al	Be	92	U	116	---	165	---	TRW
	Be	33	B	58	18.0	67	207	N AMERICAN
Al^+	S STEEL	25	U	173	---	121	---	HARVEY
	S STEEL	50	B	88	---	44		HARVEY
	S STEEL	50	T	106	---	55		HARVEY

* CONSTRUCTION

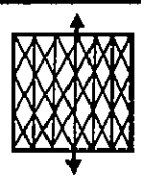
\+ DIFFERENT ALUMINUM ALLOYS ROOM TEMPERATURE DATA



UNIDIRECTIONAL (U)



1:1 BIDIRECTIONAL (B)

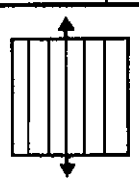


TRIDIRECTIONAL (T)

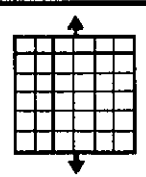
EXHIBIT 18

STRENGTH AND MODULUS DATA ON METAL MATRIX COMPOSITES REINFORCED WITH VARIOUS TYPES OF CONTINUOUS FILAMENTS

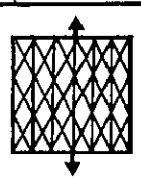
MATRIX	FIBER	FIBER V/O	*CONST	COMPOSITE → TENSILE STRENGTH (~~1,000~~ 10^3 psi)	COMPOSITE → TENSILE MODULUS (10^6 psi)	← COMPOSITE SPECIFIC STRENGTH (10^4 in.)	← COMPOSITE SPECIFIC MODULUS (10^6 in.)	SOURCE
Al	B	81	U	208	37.3	208	---	GEN TECH
	B	50	U	205	---	---	---	HARVEY
	B	33	B	38	19.0	41	206	N AMERICAN
	B	50	B	85	24.0	94	267	HARVEY
Al	Be	92	U	116	---	165	---	TRW
	Be	33	B	58	18.0	67	207	N AMERICAN
Al+	S STEEL	25	U	173	---	121	---	HARVEY
	S STEEL	50	B	88	---	44		HARVEY
	S STEEL	50	T	106	---	55		HARVEY



UNIDIRECTIONAL (U)



1:1 BIDIRECTIONAL (B)



TRIDIRECTIONAL (T)

* CONSTRUCTION
\+ DIFFERENT ALUMINUM ALLOYS
ROOM TEMPERATURE DATA

EXHIBIT 19

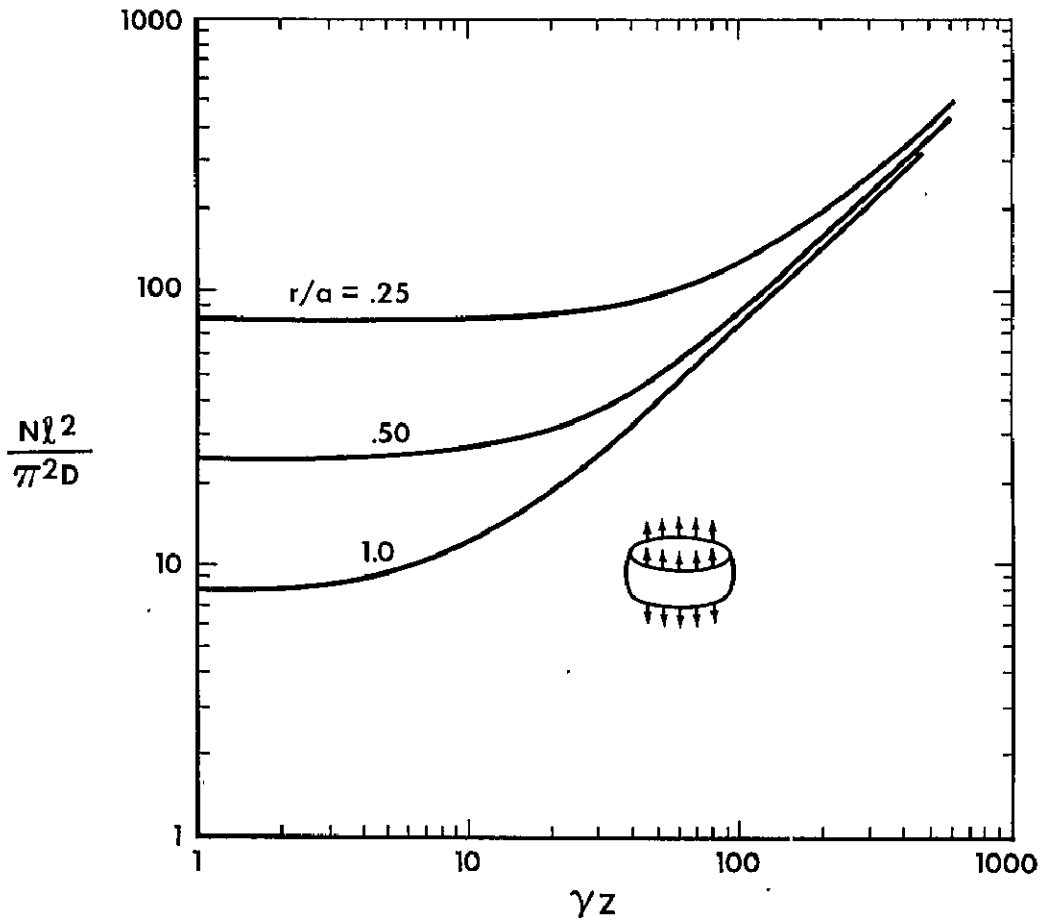


Figure 15

Classical Buckling Of Bowed-out Toroidal Segments Under Axial Tension

EXHIBIT 20

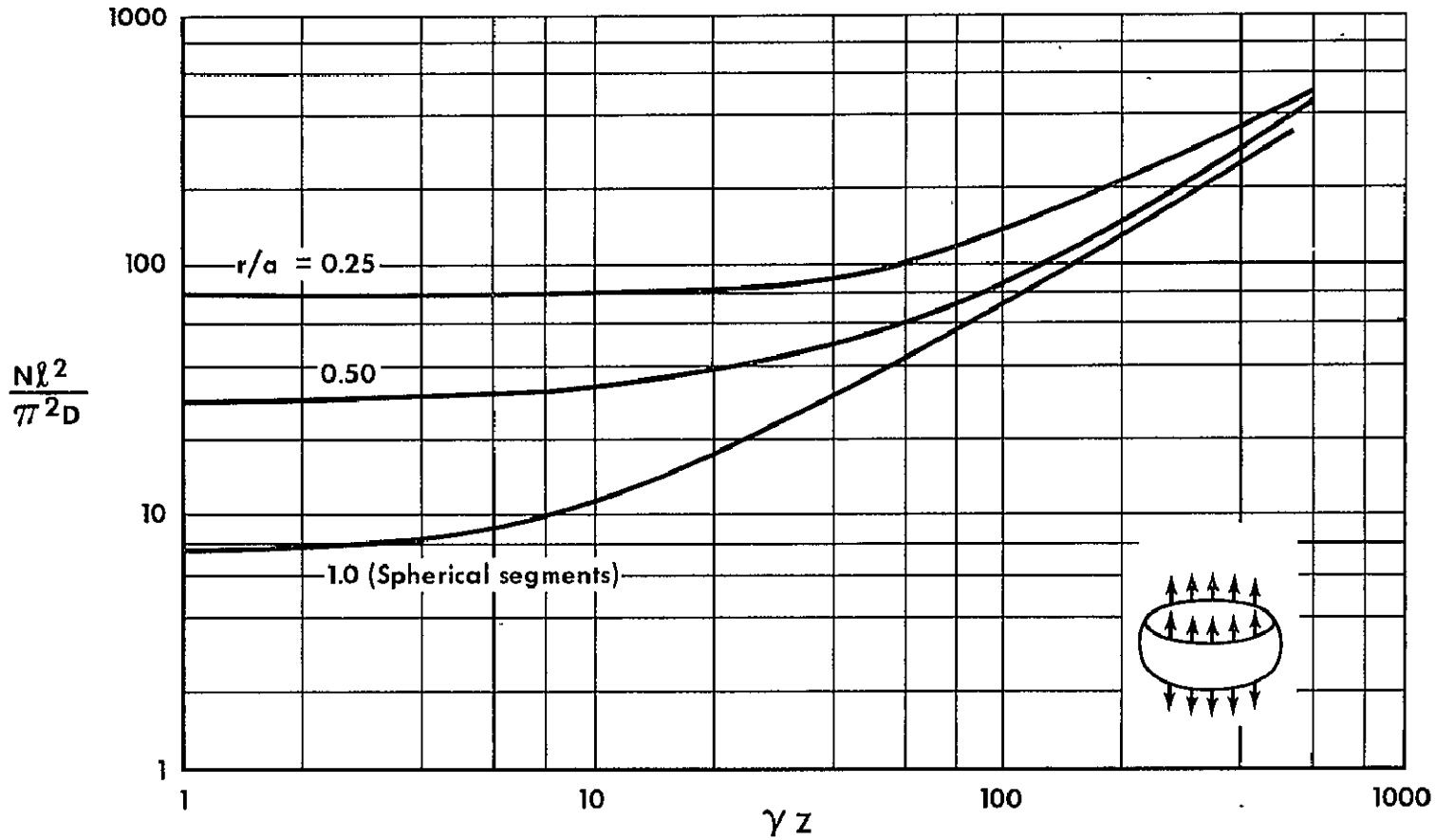
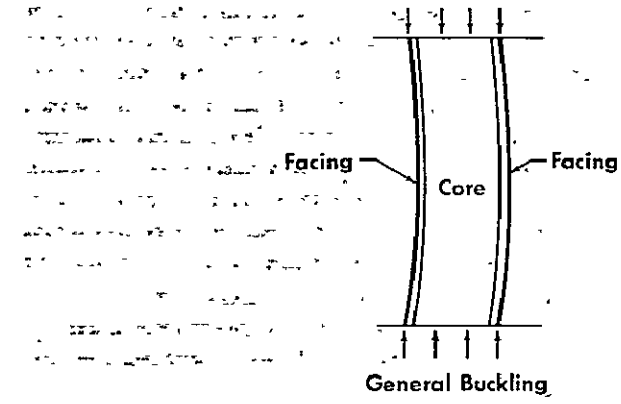


Figure 15

Classical Buckling Of Bowed-out Toroidal Segments Under Axial Tension



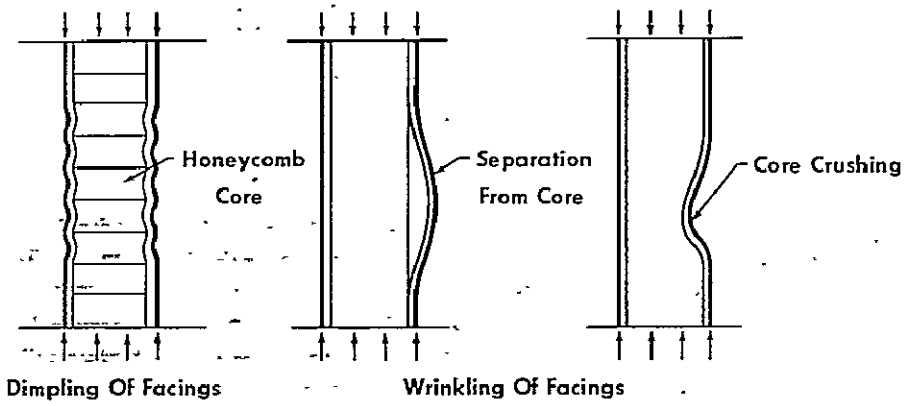


Figure 17
Types Of Failure Of Sandwich Shells

EXHIBIT 22

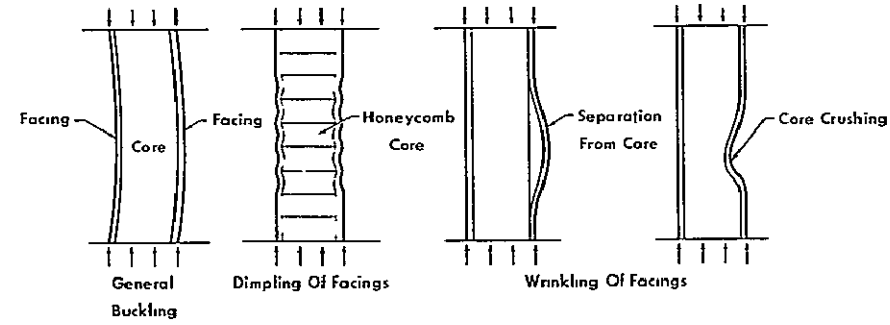
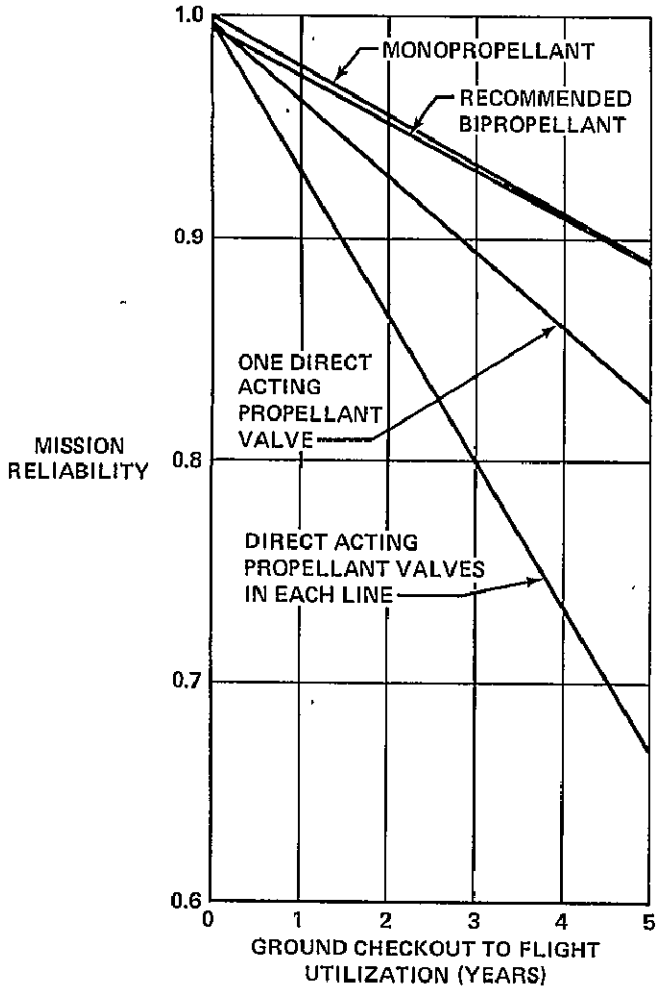


Figure 17
Types Of Failure Of Sandwich Shells

EXHIBIT 23

TRW IMPROVED SPARTAN

CONTROL ENGINE MISSION RELIABILITY VERSUS TIME FROM GROUND CHECKOUT TO FLIGHT UTILIZATION



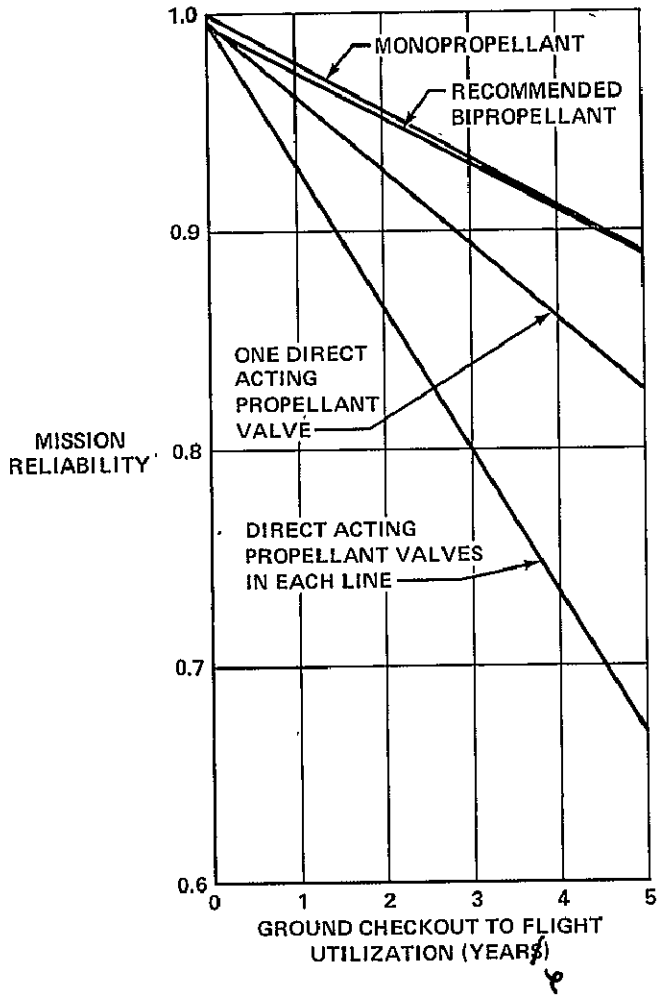
IMPROVED SPARTAN CONTROL ENGINES RELIABILITY

ENGINE ARRANGEMENT	RELIABILITY AFTER 0 YEAR STORAGE	RELIABILITY AFTER 5 YEAR STORAGE
MONOPROPELLANT	0.9996	0.887
RECOMMENDED BIPROPELLANT	0.9956	0.878
BIPROPELLANT, ONE DIRECT ACTING VALVE WITH PILOT VALVE	0.9956	0.826
BIPROPELLANT, DIRECT ACTING VALVES IN EACH LINE, WITH PILOT VALVES	0.9961	0.668

EXHIBIT 24

TRW IMPROVED SPARTAN

CONTROL ENGINE MISSION RELIABILITY VERSUS TIME FROM GROUND CHECKOUT TO FLIGHT UTILIZATION



IMPROVED SPARTAN CONTROL ENGINES RELIABILITY

ENGINE ARRANGEMENT	RELIABILITY ~~AFTER 0 YEAR~~ STORAGE	RELIABILITY AFTER 5-YEAR STORAGE
MONOPROPELLANT	0.9996	0.887
RECOMMENDED BIPROPELLANT	0.9956	0.878
BIPROPELLANT, ONE DIRECT ACTING VALVE WITH PILOT VALVE	0.9956	0.826
BIPROPELLANT, DIRECT ACTING VALVES IN EACH LINE WITH PILOT VALVES	0.9961	0.668

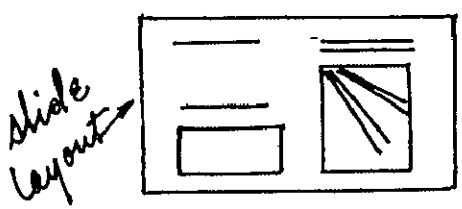
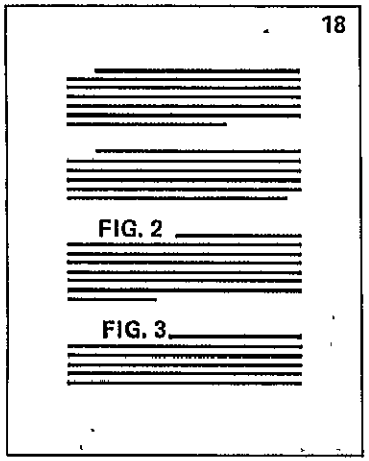
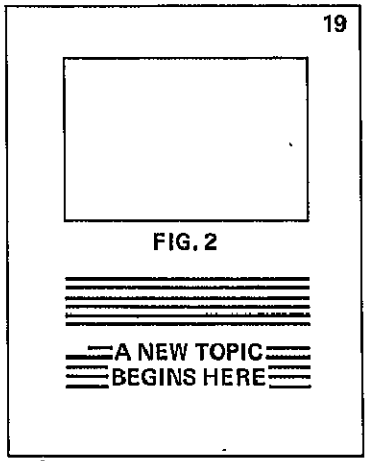
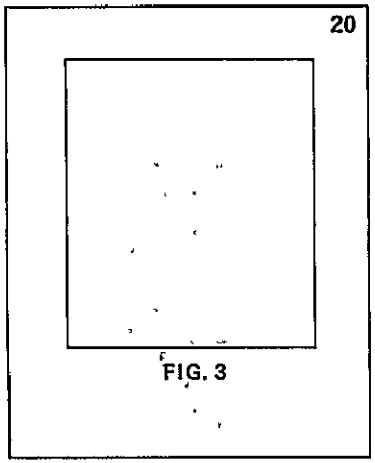


EXHIBIT 25

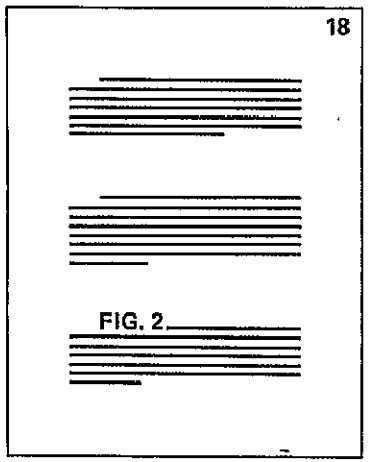
ORIGINAL LAYOUT

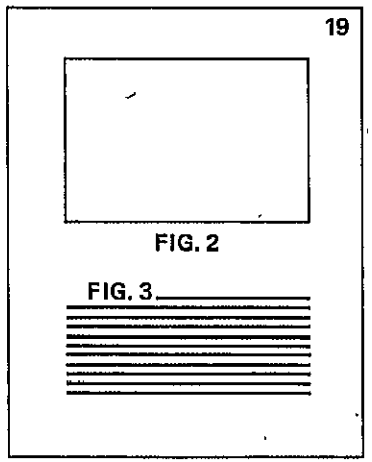






REVISED LAYOUT





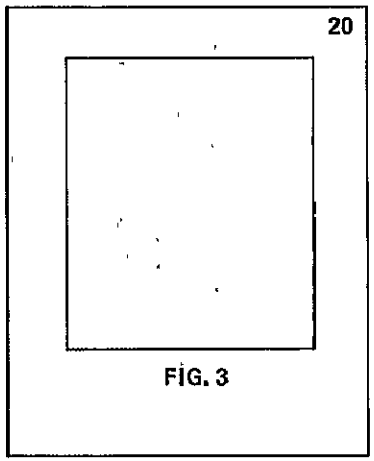


EXHIBIT 26

Figure 1 is a plot of

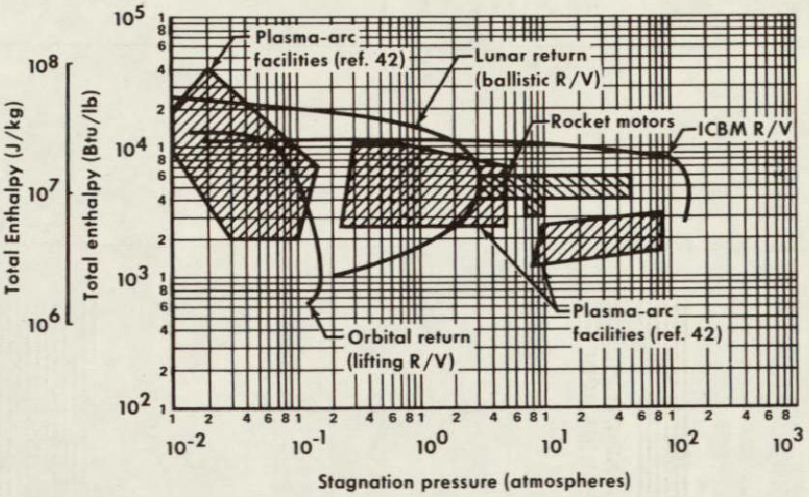


Figure 1. Comparison of flight and ablation test facility performance parameters

Two important conclusions can be immediately discerned:

1. Although large portions of some lifting-body trajectories can be closely approximated, no one facility can duplicate a complete flight environment.

2. High-pressure and high-enthalpy effects cannot be duplicated simultaneously.

EXHIBIT 27

A NEW ROLE FOR THE TECHNICAL WRITER: MOTIVATION

By

Mitchell R. Sharpe
Marshall Space Flight Center
Huntsville, Alabama

The purpose of my talk today is really two-fold. I want to talk about a new role for the technical writer, of course; but I also want to answer a question that is in the minds of several people here today: Whatever happened to Mitch Sharpe, one-time technical writer for the defunct U.S. Army Rocket and Guided Missile Agency? If you remember, he and Ed Hart, Lee Cropp, Everett Robinson, Paul Cachukas, and several others helped organize the Huntsville Chapter of the Society of Technical Writers in 1958. And he has been rarely seen in at STWP meetings since then.

A few of these fellow technical writers are still around, having weathered the RIF's and layoffs of the past decade. To those I would like to answer the question of whatever happened to me. Back in 1960, the National Aeronautics and Space Administration preempted part of the U.S. Army Ballistic Missile Agency and renamed it the Marshall Space Flight Center. I, like many others, was lured to a job with it and became a part of Disneyland on the Tennessee, that fabulous government agency where Civil Servants are all GS-15's and the work is done by support service contractors.

It was then that I dropped from sight of old friends in STW, later STWE, and still later STWP. I might add parenthetically that the myth of NASA was soon shattered. I entered it a GS-13 and here we are a decade later with men on the Moon just like President Kennedy projected, and I am still a GS-13.

During the formative days of our national Manned Spaceflight Program we adapted the Army's Redstone ballistic missile as a launch vehicle for our first two astronauts, Al Shepard and Gus Grissom. In the process, a program evolved that was known as the Mercury Awareness Program. In a crude form, it was what is today known as Zero Defects. It consisted simply of tagging hardware and documentation destined for manned vehicles with a distinctive symbol. As parts came down the assembly line with this device upon them, people immediately became aware of the fact that they were to go on a vehicle

that our astronauts would ride. Errors went down; reliability and quality shot upward. Workers were identifying with the astronauts.

From these beginnings, the NASA Manned Flight Awareness program evolved. It began here in Huntsville in 1963.

In that year, Dr. Brainard Holmes, the Director of NASA's Office of Manned Space Flight, suggested that an employee motivation program would be helpful during the formative years of the development of our nation's space flight hardware. The formulation and management of the program devolved upon Dr. Preston T. Farish, an Auburn University alumnus, who quickly saw that the task could be handled only by a fellow Auburn University alumnus. He called upon me to help him. It was a choice that showed a rarely displayed perspicacity on his part and one that boded well for the success of the embryonic program. The man and the task had met, and the man ultimately proved equal to the task. (You would think that it would have merited at least a GS-14!)

In this age of specialization, you might wonder what a technical writer would know about quality control, reliability, systems safety, and employee motivation. More than you think. First of all, the technical writer is an employee. By virtue of this fact, he has an insight into the problems of employees in general. He is a member of the team, and he knows what other members of the team feel and think. This position gives him a psychological insight into the problem that management doesn't have. It occurs because he is usually not in the management structure of the organization. He also is probably more cognizant of the overall structure of the company than the average employee.

Because of the nature of his job, he usually has some degree of mobility within the organization. He has to call upon engineers and technicians in order to accomplish his job. During this intercourse, he meets many other people in the company — another point in his favor as a potential employee motivational man.

Finally, he possesses a quality that is unique in the organization. He is one of the few employees that is skilled in the art of communications. He knows how to talk to people.

These qualifications stand the technical writer in good stead when the company decides to institute an employee motivation program of the type generally known as Zero Defects.

Zero Defects is based upon the concept that it is better to prevent errors than to detect them and then correct them. It is a wise philosophy. Human errors prevented mean savings in money and time. These mean savings, increased profits, and higher reliability. I am not going to be sidetracked here into the worth of Zero Defects. But I would like to leave one thing for you to cogitate upon. The Japanese several years ago brought suit into a U. S. Court because a U.S. manufacturer of transistor radios was labeling his product "Made in Japan." The Japanese resented the fact because the American product did not measure up in quality to the average Japanese product.

NASA's approach to Zero Defects is known as Manned Flight Awareness. In NASA, we take a slightly different approach to Zero Defects. We want to reduce defects to zero not to lower costs but to insure that our astronauts have a better chance of coming back alive. Costs are reduced in the process, but these are bonuses. We do not consider cost reduction a goal in Manned Flight Awareness — only a byproduct.

How do we approach Zero Defects in NASA? We seek to establish communications with the machinist, the floor-sweeper, the secretary, the computer programmer, the design engineer, the welder, and the fork-lift driver by identifying them with the men in the spacecraft. We ask them to keep in mind the fact that our American astronauts are trusting their lives to the products produced by American workmen in more than 20,000 companies across the nation.

We do this through the usual means of communications. NASA produces posters, TV and tape messages, newsletters, films, and special displays to keep the individual constantly aware that he is working on manned spaceflight hardware. This is the information approach to motivation. It tells the man on the floor what he is producing and why it is important to our national space program.

Not only do we tell the employee that he is an important member of the team, we prove it to him through recognition.

For the industrial as well as civil service employee we have several means of recognizing individual and group contributions to a safer, more reliable Apollo and Saturn. Let me mention just two. One day he receives a letter from a NASA astronaut thanking him for a job well done. This is followed up by an award that consists of a sterling silver lapel pin. It features Snoopy, the first Beagle on the Moon. Snoopy is the astronauts' special emblem for a job well done. He is given out sparingly by them to fellow

members of the space team that make them a little more secure in their job as they sit upon the Saturn V, ready for launch to the Moon.

Another form of recognition is a personal invitation from NASA to be present at Kennedy Space Center for a launching. Men and women from space industries all over the nation gather at Kennedy Space Center to watch the product of their handicraft leave for the Moon. They sit in the viewing stands with such VIPs as former President Johnson, Johnny Carson, Jack Benny, Bill Dana, Vice President Agnew, and other comedians.

The Manned Flight Awareness program is managed through the three field centers of NASA's Office of Manned Space Flight in Washington. These are located in Huntsville, Houston, and Cape Kennedy. Managers at these centers coordinate the program with counterparts in some 20 aerospace industries that are involved in the manufacture, test, and launch of the Apollo spacecraft and the Saturn V booster. NASA supplies specialized program material to these company managers for use in their company-sponsored employee motivation programs. These materials include posters, films, displays, exhibits, and the all-important trip to Cape Kennedy.

Since the emphasis in Manned Flight Awareness is upon establishing and maintaining communications with a wide variety of industrial personnel through information and motivation, there is an obvious opening for the technical writer in the program. Specifically he can put his skills to use in several ways.

1. Script writing for films and film strips that contain technical content that must be made understandable by people with very specialized, limited, or no technical background.

2. Writing copy for brochures that explain the space program in terms easily understood by a wide variety of industrial personnel.

3. Assisting illustrators in preparing posters and special displays for use in motivational programs.

4. Planning and coordinating seminars and conferences that periodically are needed to up-date and motivate the motivators themselves.

5. Making presentations to higher levels of management on the status and future directions for the program.

6. Making personal appearances in plants and talking directly with a variety of personnel to inform and motivate them.

Each of these areas calls for an individual skilled in both written and verbal communications. With a minimum of preparation, the technical writer can adapt himself to such a career. Since the concept of Zero Defects is not limited to aerospace industries today, the opportunities for the technical writer in this new role should be wide-spread in American industry. In closing, I urge you to look into the possibilities if you feel like you are in a dead-end job now.

THE EFFECT OF SCIENCE AND TECHNOLOGY ON OUR LANGUAGE

By

W. Earl Britton
The University of Michigan
Ann Arbor, Michigan

A language must be stable to be a reliable means of precise communication, yet dynamic in order to accomodate itself to change. But these are contradictory requirements which cannot easily be brought into phase. Yet that is our situation today.

Among the varied influences such as business, advertising, journalism, industry, and even slang which are currently altering our language, science and technology are the most telling. The result has been an expanded diction in both scientific and general fields, and a syntax that serves more adequately the exacting communication needs of science. We shall consider these two matters in order.

Changes in our diction have been extensive. Even the Little Oxford Dictionary of Current English introduced into its 1941 edition 25 two-columned, closely packed pages of new words that were not there in 1937. Among these were numerous technical terms like A-bomb, acronym, aerosol, aileron, air-borne, air-conditioning, air-cooled, air-lift, air-speed, Angstrom, antibiotic, aqualung, astronaut, atomic (number, energy), automation, beachhead, blacklist, bloc, bulldozer, bump (off, a passenger, a job holder), candid (camera), caterpillar (tractor), ceiling, centrifuge, chain-reaction, coolant, crash dive, cyclotron, detergent, diesel, electronics, fibreglass, fission, frogman, gasket, geophysics, geriatrics, ground speed, hair trigger, heavy water, heliport, hovercraft, ionosphere, isotope, jet (propulsion), maser, megaton, microwave, neon, photofinish, photogenic, photosynthesis, pick-up, pile (atomic), pinpoint, pipeline, plastic, ploughback, plywood, precast, prefabricate, prop, remote control, satellite, scan, scramble, screen (oscillation damper), skindiver, smog, sound barrier, space ship, stagger, supersonic, take-off, technicolor, tractor, trailing edge, trailer, transistor, wheel base, and zip (up). In the same year Webster's Collegiate Dictionary carried, in addition to the foregoing terms, panel discussion, motorcade, microfilm, mesotron, loss leader, knee action, ground loop, G-man, fiberboard, extrasensory, escalator clause, dogfight, cornering, racism, preview, and monitor.

Since 1941 the rate of accretions to our vocabulary has risen to an unprecedented level. Long declares, "The combination of advances in technology and the communications media has wrought a greater change in the lexicon of the English language in the past 25 years than in any similar period in its history. In fact, it is said that more new words have come into being during the past 50 years than in the 900 years preceding the 20th century." [1] Many of the scientific terms adhere closely to their own fields, as one can see by examining any specialized glossary such as the Atomic Energy Commission's Nuclear Terms, which defines 640 expressions, and NASA's Dictionary of Technical Terms for Aerospace Use. But the amazing fact is the extent to which scientific terms have been breaking over into the general vocabulary. We speak of input and output, though only vaguely acquainted with computers. A recent nontechnical article on methods of learning contained off-target, capsule description, pay-off, level out, payload, and feedback. An English professor will say, "Our Committee is not locked in on this program," though he knows nothing of electronics. But this phenomenon is not new; it has been going on for a long time as demonstrated by the fact that widely used terms like eliminate, acid test, potential, and ultimate analysis, were originally technical words in the vocabulary of physics and astronomy [1].

In science, new words normally emerge in response to the need for precise and especially economical communication. The expressions, "experimentally doable" and "capsulate," are evidently such responses. Recently our office received a call from industry for a generic term to cover all types of machines like forklifts and hydraulic excavators which multiply and manipulate the power of man. Although I know of no such word, one will develop if the demand is sufficient.

Just how words emerge is of endless interest to linguistic scholars. Although the sources in many instances are apparent, in other they are shrouded in mystery. The source of jalopy is obscure. And I have not discovered an accepted explanation for the origin of bulldozer. The dictionaries are vague about its beginnings, though a caterpillar engineer says that it stems from the old practice of placing a board in front of a bull, which then pushed it in order to move earth. Brown bag may derive from carrying one's lunch in a paper sack, although there is another use that describes a Naval officer's practice of taking his laundry home in a brown case. Hang-up may come from the canine world, but we cannot be sure.

If one knows the origins of his words, he will enjoy them more. Hocus pocus is said to be uneducated parishioners' misunderstanding in medieval

times of the Latin wods, hoc est corpus, pronounced by the priest as he passed his hands over the host. Jimminy crickets, may be a corruption of Dominus Christus, meaning Christ the King. Even our terms boys' and girls' cloakrooms go back to the middle ages when furs were stored during the summer in privies, where moths were not inclined to go. Even the word necking may stem from the middle ages, for I once read of the king and queen halsing and kissing. And you know what a halter is.

Of the numerous means by which technical terms develop, several are obvious to any observer. The simplest is the extension or alteration of the meaning of an extant word, as seen in the examples jet, beachhead, ceiling, cornering, and take-off. The original meanings of these words have not been obliterated by the new uses, but they are certainly subordinated. This phenomenon is particularly evident in the public's use of space terms like missile and the word space itself. Indeed, a recent ad of the Central Illinois Light Company depicted a young lady dressed in a space suit standing by her overloaded refrigerator, above which appeared the printed question, "Are you out of space?" The final line of the ad read, "Blast off to your favorite appliance dealer. He has launched a special no-frost campaign with down-to-earth prices [2]." Yet not one of the space terms was italicized.

A second, and surely the earliest source of scientific terms, is the Greek and Latin languages. The older sciences like mathematics, biology, and medicine still rely heavily upon this source. Indeed, the assistance of professors of the classical languages is regularly sought today by scientists in need of words to meet certain specifications. But the newer sciences rarely depend upon Greek and Latin, though space may borrow proper names like Mercury, Saturn, and Apollo.

Instead, as Long has observed, they create terms out of what we already have in our language. Most of these are combinations, and of several types. One is the combination of available, well-established forms, even if not of English origin, like cyclotron, television, automobile, astronaut, insecticide, telephone, antibiotic, and supersonic.

A second type results from combining words, which by themselves have no technical meaning but together do. Examples are waterproof, airtight, take-off, throughway, underpass, fiberglass, countdown, input, output, and feedback.

Other terms are produced by adding prefixes such as mini- in minicar, and minicircuit, and suffixes like -ize in optimize and ruggedize, -wise in weatherwise and dollarwise, -ate in capsulate, -able in doable, and -ity in weldability, reactivity, criticality, hardenability, and machinability. I must say, though, that I was stumped recently when the word newspaperability appeared on the front page of the Ann Arbor News.

And there are words from proper names like Masonite and Sanforize, and terms suggested by action or appearance such as miniaturization, blow by, break through, back order, and solid state. Some words develop from abbreviation or the shortening of two words in a compound, like costimate, mascon, conbud, and comsat. Especially interesting is black box because it is the scientist's means of by-passing, at least momentarily, the necessity of describing in detail a highly technical and intricate piece of equipment.

But for pure interest, nothing surpasses the modern acronym. Obviously the result of the need for economy of expression, it is created by its definition. The acronym has not been common in business, though Nabisco has been around a good while, and numerous oil companies like Texaco, Sunoco, and Conoco derive their names from abbreviation and initials. In science and technology, however, the acronym is ubiquitous. Radar, NASA, sonar, and napalm are common examples. Sometimes they are the products of careful planning; sometimes they result from mere accident. Some have very strange histories, like streetcar. Sears and Smith explain that testing and checking a Saturn rocket booster before delivery to NASA require 30 to 40 separate and combined tests, all of which must be reported. These were called system test and checkout reports in the original contract, but this description was soon abbreviated to STCR, which was phonetically clumsy: "It then became redundantly an STCR report. Eventually, just as if STCR were a Hebrew tetragrammaton, the engineers added vowel points, and the word streetcar emerged as a reference for system test and checkout report [3]."

This sort of difficulty is avoided today by much more careful planning on the part of those who are developing phrases that will become acronyms. Some of the latest are failure effect analysis report (FEAR), special materials and handling, which turns out, delightfully, as SMASH, and the electronic ground automatic destruct sequencer button is, amusingly enough, the EGADS button.

Familiarity with acronymns can mislead the reader, though, as an editor was misled by the term POGO program, where all the letters of POGO were capitalized. He could not recognize the components and had to be told

that the word referred to a Pogo stick, which resembled the "accordian-like squeeze and stretch oscillation that occurs along the central axis of a launch vehicle during lift-off and flight [3]."

All this naturally leads us to the problem of how far one should go in accepting the new combinations and creations. Change of any sort immediately produces conservatives and liberals, and these two groups are regularly engaged in a confrontation over language developments. The English teacher is caught in this crossfire, which is a particularly difficult position when he is asked to pass judgment on usage.

Oddly enough, these difficulties have been with us for centuries. As long ago as 1619 an Englishman by the name of Alexander Gill cried out:

> O harsh lips, I now hear all around me such words as common, vice, envy, malice; even virtue, study, justice, pity, mercy, compassion, profit, commodity, colour, grace, favor, acceptance. But whither, I pray in all the world, have you banished those words which our forefathers used for these new-fangled ones? Are our words to be exiled like our citizens? Is the new barbaric invasion to extirpate the English tongue [4]?

This British fear of linguistic invasion from outside is still evident. A purist as recently as 1959 objected to the use of meaningless prepositions in the American manner, citing cases like "Meeting up with one's girl" and "Testing out a car [5]." Indeed, I heard an engineer in a class in London inquire of the professor, "What shall we do about Americanisms in our reports?" This nationalistic view I also encountered in Italy, where a Fiat engineer proudly explained the obvious superiority of Italian over other languages; but then, with a twinkle, admitted that Italy had had to import the word automotive because Italian neither had nor could create its equivalent. Even the French, so committed to preserving the purity of their language, have found their Academy unable to stem the inroads from other languages, and, for that matter, to block the changes within. In 1959 a member of their Office of French Vocabulary explained that they did not seek to ostracize foreign words, but merely to regulate their entry — a kind of vocabulary immigration service. "The object," he continued, "is to guard against words that are used through ignorance and snobbishness when the French could say un hommes d'affaires. An American observer wondered whether a French business woman would care to be called une femme d'affaires, especially if she had one [6].

All this historical resistance to linguistic change might seem absurd were it not for the outcries that greeted Webster III from such eminent publications as The New York Times and The New Yorker Magazine, and for E. B. White's denunciation of words like finalize and accessorize. Even today the battle of usage between the liberals and the conservatives rages merrily on. And whether we like it or not, we as editors, writers, teachers, professional people of all kinds are compelled to take sides in this dispute. The question is: Which side?

This is not an easy decision, yet daily we are required to judge usage, to judge without much assistance from rule books, national academies, and other regulatory bodies. Even if we could agree on general principles, we should differ in applications to specific cases. All of us carry a heavy load of tradition, convention, and prejudice, and what we have learned from rhetoric texts, style guides, and dictionaries. At the same time, we know there is no absolute authority in diction and syntax. If we proceed by strict adherence to the traditional rules, we shall be just as ridiculous as if we accept unquestioningly any and all usage developments.

E. B. White, admitting the current state of confusion, has suggested that:

> The young writer will be drawn at every turn toward eccentricities in language. He will hear the best of the new vocabularies, the exciting rhythms of special segments of his society, each speaking a language of its own. All of us come under the spell of these unsettling drums; the problem for the beginner is to listen to them, learn the words, feel the excitement, and not be carried away [7].

To the mature writer, on the other hand, Kapp says, "You have a responsibility to your language," which is:

> A national heritage of which we may be justly proud. We must not allow it to become as drab and uninteresting as our industrial towns. We must do more than merely preserve its grammar and syntax. We must not permit ugly, tortuous, meaningless turns of phrase to become second nature, to be treated as ideal. We must guard against the operation of a Gresham's law that would cause such turns of phrase to become common currency. And it is such turns of phrase that often characterize the poor expositor [8].

Kapp has offered a helpful suggestion in this passage. Faced with a vocabulary explosion and a dynamic syntax, the scientific writer and editor can still choose rationally. He may be subjective in his definition of ugly, somewhat less so when he defines tortuous, but he can be quite objective about meaningless turns of phrase. That is, his decisions about usage can be based on the criteria of need, clarity, and efficiency. There is little point to a new coinage if an existing one is already available; there is little point in adopting a word or phrase unless it is clear and meaningful; and certainly there is no point in using either the word or the phrase if there are more efficient ways of communicating the same information.

Appraisal of a new coinage like ruggedize by these criteria would lead to acceptance because it is a useful, clear, and efficient word. To object to it as crude is to ignore parallel forms like summarize and minimize, though I admit the danger of such reasoning. Do these differ from ruggedize except in age? On the other hand, finalize, which has bothered many observers, does have the defect E. B. White complained of: One is not always sure whether it means terminate or put into final form. When I expressed to B. C. Brookes my amazement at discovering this word in an official British publication, he said he had understood that the word originated in Britain and then jumped the Atlantic. In any event, a word of doubtful definition is of little use, especially in scientific writing. Weatherwise and dollarwise I avoid because they seem tautological. Why does the radio announcer say, "Weatherwise, it's going to rain" or the businessman, "Dollarwise, it's expensive?" These words are simply redundant and thrown into a sentence as thoughtless extras. But what of equipments in the plural? Isn't the engineer seeking brevity and directness by employing equipments in place of the various pieces of equipment? Whatever our sensibilities may register, our logic, I should think, will agree with the engineer's. Our prejudices — only, we call them judgment — create real obstacles to rational decisions in such cases; but judge we must, and I repeat: need, clarity, and efficiency seem to be rather good criteria by which to form our judgments.

Now in spite of the exciting contributions of science to our diction, with all the fresh terseness and even fascination of the new terms, the effect of science on our syntax may have been even more significant. The changes in diction we can readily observe; the changes in syntax often elude our notice. And that may be the reason we are unaware of the consequences. They become more apparent when we recall the chief characteristics of scientific writing.

We are well aware of the scientists' preference for the short, simple sentence, in which the subject usually precedes the verb. One study has found the simple sentence to be a six-to-one favorite over compounded forms, the subject-verb-object order to be far more common than in general writing, and the mean sentence length to be 26 words [9].

Even more characteristic of scientific writing is the heavy dependence upon nouns. Engineers are sometimes accused of abhorring verbs because they require that the writer say something, which can be avoided with nouns. Simpson found nouns to be 25 percent more common in scientific than in general writing [10]. They appear most often as modifiers, either adjectival as in car heater, or adverbial as in large in size. Frequently the nouns accumulate in clusters ahead of the word they modify in an arrangement like a pipeline transport feasibility study. This preference for nouns may be responsible for the common expression of verb ideas in noun form in phrases like he has a dislike for rather than he dislikes; and perhaps for the conversion of nouns into verbs like regulationed.

Other familiar features of scientific writing are the infrequent use of the adverb; the frequent use of the impersonal it and the vague this; preference for the passive voice, dependence upon phrasal constructions, especially the prepositional; and the loosely attached participle.

These characteristics sound bland enough; then why the wholesale criticism of scientific writing, both here and abroad? I am sure that I do not have all the answers, but I do feel that one cause of objection is a needlessly complex style that produces ambiguity and inefficiency. Much of this complexity results primarily from overdoing an otherwise good thing.

I do not have to remind you that modern technology and science have made enormous and trying demands upon our facilities for communicating with one another. There are intricacies of meaning and of relationships that almost defy expression. That is one reason, of course, that the scientist turns to mathematical expression wherever possible. It is a fixed and reliable signal system. Words are not. And in syntactical assemblies, they are even less satisfactory.

In trying, therefore, to describe or narrate the complex, the scientist is often driven to overdesign. He may try to compress into a single statement too many relationships for easy comprehension. Such overdesign is evident in an example from a NASA report cited by Sears and Smith: "The reliable

acquisition of accurate biomedical data on animals has become increasingly important with the use of animals in space flight programs [11]." Such redundancy becomes so natural to the ears of engineers that eventually they regard this style as professional, and imitate it where there is no need.

I repeat, then, that overdoing what otherwise may be acceptable is a principal flaw in the writing of the scientist. That doesn't mean that he has not done good things. I, for one, admire the contribution of the scientist to the development of the adverbial principle, a construction we have long needed. Insistence upon detachment has led the scientist to omit the personal pronoun or noun after participial phrases, thereby arousing the ire of the grammarian, who denounces him for dangling a participle. But in a sentence like "Assuming that the meter is reliable, the computation can be based on its reading," modern linguists generally accept the participle as an adverb modifying the main clause and therefore not requiring a head word. Anyone who has ever tried to edit out of a scientific manuscript all such adverbial participles is well aware of the resulting absurdities. In this construction, then, though he did not originate it, the scientist by extensive use has contributed notably to our syntax.

But he goes to excess, and there lies the trouble. He doesn't always differentiate between an adverbial participle and a true dangler, and consequently leaves the reader unsure of the meaning. Even worse, he depends unduly upon the participial phrase that is loosely attached to the end of a sentence: Though it does not dangle, the phrase is obscure because the reader has no way of knowing whether it expresses cause, result, or simply additional information. In the sentence, "Then the casting is cooled rapidly, preventing primary graphite from forming," only the reader who already understands the process knows whether the cooling is intended to prevent the formation of graphite, or produces the result incidentally. If purpose is intended here, the infinitive obviously would be more precise. And how would you interpret the statement, "The film can be fabricated on bag machines using glue type seals?" The careless reader can easily miss entirely the two potentially different interpretations of this sentence.

I should also commend the scientist for his intelligent exploitation of the noun to meet his communcation needs. But again the excesses are disturbing. When he allows nouns to replace verbs and makes decisions rather than decides, he wastes words and sacrifices the force and vigor of the single-word verb. When he lines up numerous nouns and other modifiers before a head word in an effort to be clear, he often improves the communication. In fact, the complexity of certain scientific conceptions required such a construction.

But again, it's the excesses that bother. Why pile up modifiers where they are not required. Professor Baker has observed that "it would never enter anyone's head to say a 'tea-containing cup'; one would naturally say a 'cup containing tea.' Yet in scientific journals one will find 'iron-containing globules' when what is meant is 'globules containing iron.' [12]"

When numerous modifiers accumulate ahead of a noun, a careful writer will try to find another way of phrasing the information. A sentence like, "All the training equipment analysis contains data directly relevant to realistic technical manual preparation" disturbs some readers because the arrangement of the modifiers is contrary to normal sentence patterns. What is more disturbing is the fact that the reader is presented with several modifiers which he must hold onto in mid-air until he finally is given a head word to which to attach them. The ultimate in this sort of thing is a sentence like "The engine front support stiffening bolt retaining nut attaching self fractured." Such sentences are not easily comprehended. Just as bad is the pile-up composed of several pairs of modifiers which are not joined by hyphens to guide the reader, as in the statement, "Fuel, selected on the basis of the best metallurgical information available in 1953, was unalloyed alpha rolled, beta heat treated, metallic uranium slugs enriched to 2.778 a/0 (atom percent) U^{235}."

These constructions may well result from the scientists' effort to be brief. Yet the same scientists, ironically enough, often resort to phrases after nouns that are wordy and needless. Simpson cites specimens in the form of sheet as an instance of the wordy way of saying specimens in sheet form. The scientist also violates his own principle of terseness in his use of phrasel modifiers like by a factor of and of the order of, each of which usually can be expressed more simply, and in phrases like large in size where large would be adequate. Even worse, he often injects these expressions into general writing.

Much more could be said, but must wait until another time. In conclusion, I repeat my thesis in a slightly altered form: despite some unfortunate effects, science has done extremely well by our diction; but despite some good effects, science has not been too kind to our syntax.

1. Long, Thomas: Tek-nol'o-ji and Its Effect on Language. Space Digest, March 1969, p. 87.

2. Peoria Journal Star. June 14, 1969, p. C-9.

3. Sears, Donald A; and Smith, Henry A: A Linguistic Look at Aerospace English. Word Study, April 1969, p. 2.

4. Gill, Alexander: Logonomia Anglica. Cited in English as Language, ed. by Charlton Laird and Robert M. Gorrell, N.Y., 1961, p. 2.

5. Reuter's Dispatch From London. Cited in English as Language, August 10, 1959, p. 4.

6. Wechsberg, Joseph: New York Times Magazines. Cited in English as Language, June 28, 1959, p. 3.

7. White, E. B.: An Approach to Style. Elements of Style, William Strunk, Jr., New York, 1959, pp. 68-69.

8. Kapp, R. G.: The Presentation of Technical Information. London, 1948, p. 3.

9. Simpson, Harold B.: A Descriptive Analysis of Scientific Writing. University of Michigan PhD Dissertation, 1965, p. 34.

10. Ibid., p. 40.

11. Op. cit., p. 4.

12. Baker, John R.: English Prose Style in Scientific Papers. Nature, 176, 1955, p. 851.

ILS, LCC, AND STWP

or

SCRABBLE FOR FUN AND PROFIT

By

John Goodrum
George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama

It is a special pleasure for me to be here today. Special in the sense that it gives me an opportunity to sound off, before a reasonably captive audience, on several related subjects about which I feel very strongly. I won't pretend to pose as an expert — whatever that is. But I do lay claim to having obtained considerable experience, both as the producer and as the user of technical support documentation. And I contend that this alone gives me the right to speak on the subject.

When your Program Chairman, Mr. Thompson, first talked to me about speaking to your group, I was frankly concerned that I would be talking to you in general terms about a subject you must know in far more intimate detail than do I. But we decided that I would try to talk to you about ILS, Integrated Logistics Support. This gives me an "edge," for I understand that you look on this as a fairly recent concept. We also decided that I would talk about this subject from the Government viewpoint, and this also helps me. But especially, we decided that I should try to tell you what ILS means to the professional technical writer.

I would like especially for you to note that I was careful to use the term "Professional Technical Writer." I do this intentionally, with no flattery intended. Let me tell you what I mean and why this was used.

Professional is defined as "manifesting fine artistry or workmanship based on sound knowledge and conscientiousness, reflecting the results of education, training, and experience." As members of the Society of Technical Writers and Publishers, you make a concerted and conscientious attempt to elevate your chosen profession through increased training, education, and experience. And if the work I have seen resulting from the efforts of some of you in the room today are any indication, your output certainly can be classified as fine artistry or workmanship.

I must confess that I know very little about your society, except through conversations with several of your members who are also members of the Society of Logistics Engineers. From these conversations it is apparent to me that your aims and those of the Logistics Engineers are quite similar. I conclude that we are working toward the same end and that we are both accomplishing a great deal.

Not too long ago, my fellow logisticians and I spent a considerable amount of time lamenting the fact that nobody really appreciated us. We were the great fraternity of the unloved. Designers paid no attention to us; they went right on designing gadgets no one could maintain even if they could get to them, which they couldn't. They gave us no help when it came time to prepare operations and maintenance instructions, but were quick to censure us when they were late in delivery or incorrect in content. Program managers eliminated logistics funds when the budget got tight, and operational personnel made ridiculous demands, both on our time and on our talent.

No amount of weeping and wailing improved our plight. But now two things have happened to brighten this picture.

The first of these has been happening for a long time, but only recently attracted sufficient notice to alarm management.

One fine day, logistics became as important as we had always said it was. On that morning, a General in command of a large combat group suddenly discovered that he had more equipment in the repair shops than he had available for combat duty. And although he gave any number of authoritative commands, not a thing happened, because the equipment was designed to require excessive repair.

That same morning, an airline Board of Directors met to find out why they were losing money, even though they had only recently replaced their entire fleet with brand new airplanes. It didn't take long to find out. The planes they had purchased were spending more time on the ground than in the air. Parts which failed were located where no one but a contortionist could reach them; spares had not been provided in sufficient quantity; and in their rush to get the plane into the field, technical manuals had not been validated. As a result, flights were cancelled, or seriously delayed, and customers rushed over to the nearest competitor who could provide the required service.

What else happened that day? A lot of people who owned highly complex electronic equipment began to take stock. They learned, to their chagrin, that they were spending anywhere from 200 to 500 percent of the original cost just to keep the equipment operational. And they, too, learned that their operating instructions were, to say the least, unreliable. When they plugged pin B into receptacle R, instead of light M going on, the entire gadget did a slow and expensive burn.

What I've been saying in a roundabout way is that logistics has finally assumed such great importance that managers are having to pay attention to it. Once, a product was designed and developed and put on the market — or, in the case of a weapons system, put in the field. Then, someone began to worry about keeping it operating. Today, no one in a competitive position can afford to do this; he must, if he is to survive in today's competition, design his product so that it can be kept serviceable.

If you don't believe this statement, just leaf through any magazine today and read the ads. You'll be surprised to see how many companies are now stressing not just the beauty or the utility of their product, but the fact that it is reliable and can be serviced easily. Witness the ads by Ford Motor Company, Sears, and others.

But I said that two things happened, and I've only mentioned one. The other is that logisticians stopped feeling sorry for themselves and began to do something about improving their lot. Instead of waiting for the designer to come ask their advice, they went to the designer with constructive suggestions — and they found a receptive audience. Instead of waiting for a product to be fielded, complete with faults, they pointed out deficiencies to the designer, the developer, the manufacturer, and the transporter. The result was a greatly improved product from the standpoint of serviceability. At the same time, they set up courses, seminars, held symposia; they delivered papers at meetings where the designers were; they invited the designers in to talk to them. In short, they began to communicate with the people they had always considered natural enemies. And the result was a happier life for all.

Those of us who helped found the Society of Logistics Engineers feel that we played a major role in this evolution which has carried us from a "support the design" concept to a "design for support" concept. And there is no doubt at all that your society, through concerted effort, has played the same important role.

What I have said so far is by way of introduction to my subject. So let me now turn my attention, and yours, to the subject of Integrated Logistics Support, what it is, what it means to you. And from now on, I'll refer to it by the popular acronym, ILS.

ILS is a simple and quite reasonable concept which I fear has been portrayed as complex, and often incomprehensible, by builders in search of an empire. Really, nothing could be much simpler. It means taking a good look at all the pieces of the logistics jigsaw puzzle, arranging them in their proper order, and assembling them right side up.

ILS means giving the right attention to the right thing at the right time. It means making economic tradeoffs between the various elements of logistics so that the optimum logistics result is obtained. It means planning, and then executing according to the plan. And it means work on the part of the manager to make the plan operate as it should.

There is certainly nothing new and nothing very fancy about the concept. It is intended to formalize a concept that a few good managers have been trying, mostly unsuccessfully, to do for years. Their problem was that they had no catch phrase to sell their efforts. Fortunately, ILS is an attention getter; it rolls off the tongue nicely, and since it has an aura of mystery about it, it attracts the attention of management.

Now please do not get the impression that I am degrading the importance of ILS. Far from it. I'm very grateful that someone took the time and expended the effort required to put down on paper a complete description of the elements of logistics, justified their importance to the overall program, and demonstrated the interrelationship of the logistics elements to each other and to other program elements such as quality, reliability, and design.

Now let's talk about a related acronym, LCC. This stands for Life Cycle Costing. This, too, has become popular. It means determining the total cost of a program over its entire life. I realize that this sounds rather obvious, but a little thought will convince all of you that this has not always been the way costs were tabulated. Previously, program costs were equated with hardware acquisition costs, and the successful competitor was the one who could build the product the cheapest. The fact that it could not be supported without excessive effort — and in many cases, complete redesign — went unnoticed.

In the Life Cycle Costing concept, program costs include hardware acquisition cost, the cost of delivery of the product to its use point, and the cost of keeping the program, system, or product in serviceable condition.

Obviously, then, a competitor can gain a significant advantage by lowering his support costs, even if other costs remain the same. And one of the most fruitful areas for support costs reduction is in the area of support documentation.

I'm afraid that many of us in Government and industry still do things the way we did them 20 years ago simply because we haven't applied cost reduction analysis to them. In almost every instance in which someone really tried to lower costs in the documentation area, he has been successful, and he has not damaged the program by doing so. Let me give you two recent examples I know about.

On one major program with which I happen to be familiar, the contractor was being required to submit to the customer 132 separate pieces of documentation, much of it in the support area. The customer and the contractor got together and made a careful analysis of these data requirements. When they finished, through eliminating some documents no longer needed and by combining others into single documents, only 17 documents remained on their list. The savings amounted to $ 600, 000.

On another program, a study revealed that more than 50 planned, and in preparation, manuals were not required. No one planned to use them. So they were eliminated, and the technical writers were turned to other, more profitable pursuits.

Logistics is made up of many elements, and I certainly have no intention of singling out any one as the most important. But the technical writer very obviously plays a major role in assuring that the logistics program is carried out properly. To do this, he must become involved early, and he must be involved in areas other than the production of technical data.

No one disputes the fact that the technical writer plays the leading role in the generation of operations and maintenance instructions. Early in the program, plans must be formulated as to how the system is to be supported from a technical data standpoint. An important consideration in this area is the data retrieval system. Trade-off studies must be performed to arrive at the optimum method. For example, for space stations in orbit, such things

as system redundancy, backup systems, and in-flight maintenance will influence the degree and amount of data required. In turn, this influences the type of storage/retrieval system needed.

The technical writer should become involved with the early planning of maintenance concepts and maintainability considerations. For example, the technical writer makes a good member of a maintainability analysis group because he understands the problems of the technicians who must replace, repair, and calibrate the product in the extreme environments normally encountered in the field. Here, the technical writer can make a meaningful contribution. He can influence the design and hopefully the result will be a system that can be maintained at a reasonable cost, with minimum down-time and with technicians requiring minimum training.

It is very obvious to me, and I hope it is obvious to you, that the technical writer has an opportunity to play an important role in the program if he chooses to do so. He cannot do this if he sits back and waits. He must be aggressive. He has a lot to offer, but he must offer it.

ILS gives him this opportunity, for through this concept, the logistician and his team become important, even indispensable, members of the program development team.

At Marshall Space Flight Center, we are writing requirements into Phase B study contracts for the generation of a support plan concurrent with the generation of the manufacturing, design, and development plans. We have every intention of keeping the logistician deeply involved in every phase of the program. And since, when I say logistician I also include technical writing, I am really saying that the technical writer's requirements are receiving equal consideration with all other requirements. We think this will produce better programs.

In closing, I'd like to return to a point I attempted to make earlier. You have established yourself as a professional group, largely through your own program of self-improvement. I believe this to be the only sound way to achieve the goals you have set. I commend you for the obviously great effort you have expended and for having achieved as much as you have, and I wish you much success in your future endeavors.

TECHNICAL DATA: THE KEY TO A SUCCESSFUL SUPPORT PROGRAM

By

James L. Carpenter, Jr.
Director – Logistics Support
Martin Marietta Corporation
Baltimore, Maryland

Communications has for generations been a most popular subject for virtually any segment of our population. Academics, school teachers, scientists, and management specialists, among a host of others, constantly stress the essential need for better communications. Thus, the theme of this 9th Annual Technical Art Show and Seminar is well chosen. Even so, it raises once again the question: "Why is the simple act of transferring information such a major problem?" Charles Poore wrote, "There is nothing quite so complicated as simplicity." Perhaps in his wisdom he foresaw how we would manage to complicate the process or to overlook its most critical aspects.

I am pleased that you invited me to participate in this annual event. You asked that I share with you my thoughts on "ILS" and the relationship of technical data to the success of this concept. Naturally, I'm an expert — that is why I am here. But your invitation places me in the role of predicting. Of that I am somewhat chary. So I must add some caveats.

1. Staggering technological growth in the past two decades has resulted in an equivalent growth in the complexity of finished goods evident in commercial products. This is especially true for military materiel and similar hardware. There is little evidence that the equipment of the 70's will be any less complex.

2. Industry has exploited this technology to improve and speed up the transmission of data and to reduce the size of the data handling package. Exploitation of rapid reading techniques, programmed instruction, and infiltration methods which border on ESP have enhanced the consumption of information. Yet there is evidence that we have a major problem in comprehension. The user of data is too often unable to apply it usefully.

3. Over the past 5 years the acronym "ILS" has grown in popularity. A significant mass of regulatory paper has been issued to foster the application of ILS concepts, generally stemming from DoD Directive 4100.35. To me ILS means Integrated Logistics Support. However, at least one of the military departments advertises and promotes Integrated Logistics Systems. Today's seminar program uses the latter terminology and so it is to it that I will speak.

At the risk of being accused of being pedantic I will define my terms. "Integrated" means "to form into a whole." "Logistics" embraces "all aspects of support." A "system" is "an assemblage of objects united to form some form of regular interaction or interdependence — an organized whole." Thus, to me an Integrated Logistics System is the total support effort, organized in a fashion so that there is regular interaction among all of the interdependent elements of support.

4. Finally, we live in a very dynamic time. A key manifestation of this is the high rate of creation and digestion of knowledge and the contribution it has made to the technological explosion to which I referred earlier. Our technical progress to date is most easily understood in logarithmic terms. The prospect is that the 70's or at least the next generation, may see technical changes that equal all the advances of past history. Hence, simple projections of trend lines are hazardous and the opinions I offer today are the product of my own judgments, based upon observation and the counsel available to me. Now to the forecast.

Whatever the nature of the future, technical data will be the glue which assures the creation and the manipulation of a successful support program. It is so in the beginning and the end. Specifics change with the type of hardware, the type of maintenance concept employed, the knowledge and skill of the user, and the type and volume of the data required. But the data are always there and it is critical.

Let us look at the specifics.

All hardware in the next decade will include both current and updated versions of existing systems and new equipment which today may only be in conceptual development.

Commercial aircraft will invade the supersonic regime and the airbus will be commonplace. To the military aircraft inventory we will add the F-14, F-15, STOL, VTOL, and additional versions of combat and cargo aircraft.

Rapid, mass ground transportation will become a reality as a result of population pressures. Personal automobiles could change dramatically in response to economic pressures and the esthetic demands of the owner. Army ground equipment will change to reflect lessons learned in Southeast Asia and to capitalize on the emerging technology in fields such as metals and fire control.

In the field of electronics, packaging will get novel attention and equipment will become more complex. A key contributor to complexity will be the demand for more self-checking and BITE.

Outside of the atmosphere, interplanetary exploration systems will be introduced and extraterrestrial colonies will be in final stages of evolution. Beneath the ocean's surface, man will open a whole new world of challenge and exploration.

These are but generalized highlights of the road ahead in the immediate future. In each case it will be the task of the data analyst, the artist, and the writer to envision the whole and to reduce the essential facts to a form suitable for exact and positive communication.

No hardware system can exist without an appropriate support component, and maintenance is the heart of support. Concepts of maintenance will probably continue to vary (as they do today) depending upon design constraints, operating requirements, and the availability of support facilities. Each of these bear heavily on the nature of the data requirement.

For example: The question of whether it is more efficient to design equipment with built-in redundancy or to carry replaceable plug-in modules is a major factor in determining the optimum "technical manual" package to support manned spacecraft. NASA adopted a redundancy concept for the Apollo spacecraft only after determining that inflight modular replacement would have increased the avionics size and weight up to 50 percent. There is already evidence that the redundancy concept will be used more often in long-range military missions. The cost of services may also force its application in a broad range of consumer goods. Obviously, the data package for redundancy versus replacement differs dramatically; 33 k pages in 3 ft^3.

Redundancy is neither necessary nor desirable in most maintenance concepts. One relatively new concept in airborne support is onboard maintenance. Large aircraft, such as the C-5A, permit the installation of computer controlled, self-test and troubleshooting equipment, and replacement modules. In this case,

spare parts are immediately available to correct malfunctions. Similar philosophy can apply to long-duration space missions, underseas missions, or perhaps even to some surface and commercial air transportation.

Technology also offers us the concept of "no maintenance." The advent of "LSI" (Large Scale Integrated Circuits) and the advances in microelectronics alone promise to radically change traditional maintenance concepts. On the battlefield there will be particular emphasis on "no maintenance," especially where the expected "fighting-life time" of hardware is less than the expected operation-before-first-failure time. In general, the throw-away level may be much higher than that envisioned to date.

In spite of these new concepts of maintenance, traditional practices will continue to be exercised at both field level and depot level. Automation can improve the lot of the mechanic or technician but it will not replace him.

It is essential that the data specialist, be he analyst, artist, or writer, understand the concept of maintenance to be employed and that he actively participate in the evolution of the maintenance concept. By doing so, he assures an adequate description of the maintenance environment and a proper description of the maintenance task.

The third major area of concern to the ILS planner and the data specialist is the knowledge and skill of the intended user. Here I would like to describe the military user though aspects of the problem have broader application.

Few hardware systems are operated and maintained by people who have more than a high school education. This fact is historically true and will continue to plague us in the years ahead. Most of the equipment which I listed earlier will require higher levels of education, skill training, and actual experience than that generally available today.

It is forecast that the young male element of our 1975 population will consist of men with a median education level of grade 12. By contrast, the 1960 to 1965 period median education level for the same group was grade level 10 to 11. These men are the heart of the military maintenance team just as they are the promise for our future commercial maintenance services.

Educators predict that the 1975 high school graduate will be more knowledgeable and better grounded in the fields of science and mathematics than today's graduates. They further state that these skills will be enhanced

by exposure to audiovisual aids, closed-circuit television, and programmed instruction concepts of learning. It is implied that expanded use of these and similar techniques will tend to accelerate attainment of higher skill levels in technical fields and that this, in turn, will improve our support posture.

It is fact that the mid-70's will see a larger number of males available for military service. If we assume that the military manpower requirement decreases as has been indicated, then the armed forces could recruit from a larger manpower pool. The process of selection alone could result in a higher education and skill level among military personnel. A key question is to what degree, in fact, will the armed forces be permitted to be so selective? Equally important is the validity of the estimate of improved educational attainment.

It is already 1970, and the increase in equipment complexity is measurable for next year and even for 5 years to follow. Because of the increase in equipment complexity, I personally doubt that the predicted general rise in formal educational levels will produce any appreciable advantage over our current situation for the average maintenance environment. I have even greater doubts that an "average increase" in formal education, due to larger pool of manpower, will have a commensurate effect upon basic reading and comprehension skills.

Today's high school students have an impressive array of basic skills when compared to their parents, or even a brother or sister who is a few years older. These students are also impressive if one samples the scope of their knowledge but doesn't pry for details in depth. This is a significant side effect of television, an education medium regularly available to 96 percent of the total U.S. population. One significant shortcoming is their basic reading skill and comprehension level.

Thus, I believe that the problem ahead for the technical writer and artist will be no less difficult than that which he faces today. The challenge is still readability and beyond that "appealability." Technical data, be it in the form of hard copy manuals or otherwise, must be clear enough to transfer information to the intended user. It must also be written in a fashion that encourages the reader to stick with it until he has all the facts. In essence there must be communications (a good sender and a good receiver). Both must be tuned in on the proper frequency.

Our fourth specific is the type and volume of data required. Earlier, in listing a number of caveats, I indicated my attitude in this area.

The three primary considerations in the preparation of technical data, including technical manuals, are content, format, and the display medium. Content relates to the type and extent of technical coverage. Format relates to the arrangement and presentation technique. The display medium is the physical package for transmitting, storing, or retrieving data to be used by the equipment operator. This can be the printed page, microfilm, an audiovisual system, automated storage and retrieval systems, or combinations of these.

Recently most of our attention has been directed toward display media, though content and format have been influenced by display decisions. Today there is an over-population of automatic, computerized data storage, retrieval, and display equipment. We are all familiar with the various microforms and with programmed formats such as SIMS, MAINTRAIN, and FORECAST. There has also been wide advertisement of storage and retrieval techniques such as PIMO and "built-in" data handling systems such as AVIS, ADMIRE, FIST, and MADAR. In September, Nortronics publicized an Integrated Status Reporting System which combined the characteristics of MADAR with an audible alarm and tape recorder so that a pilot can preserve an on-the-spot description of a malfunction. Maintenance crews are alerted ahead and are prepared to cope with a problem with a minimum of delay.

Thus, the trend has been to capitalize on a breakthrough in technology to provide faster and more compact data transmission. The general proliferation of competing approaches is normal under the circumstances and it will continue. At some stage, economics will surface the best display medium and this in turn will dictate ideal formats.

Content, though affected, has not received an equivalent amount of attention. There is considerable evidence that our attempts to compress data, or to reduce it to "yes-no" step-by-step procedures, have degraded both the appeal and readability of operating and maintenance information. Thus, the writer and the artist, in responding to specifications, have ignored too often the natural inquisitiveness of the user to the point of deterring his interest. This cannot help but degrade performance. It reduces his understanding. There is also evidence that many users cannot comprehend the language that is used. This means no communications. It is good to provide information in split-second intervals, packaged to reduce time and space to a minimum. However, all such effort is a waste if the content of the material is not tailored to the user's needs.

Now to summarize.

An integrated logistics system works or fails as a result of the data that bind it together. The quality and intelligibility of the data is critical. This is true during the compilation and synthesis of the initial operations and maintenance analysis. It continues to be so in the preparation of technical manuals, provisioning documentation, training materials, and maintenance reporting.

There will be additional technological changes in the future which will impinge upon the role of the data analyst, the technical writer, and the technical artist. Many of these will require a new look at traditional and current approaches to the presentation of data. Thus, the analyst, writer, and artist are challenged to be constantly alert to such changes and to the reasons for them.

Equally important is the challenge to have full knowledge of the capability and limitations of the data user. He must be the focus of content considerations just as he is the focus for the mechanization of data handling. To reiterate, technical data are the glue to hold the support system together. However, the data must be readable and capable of being understood. The receiver must get the message — all of it — if he is to do his thing.

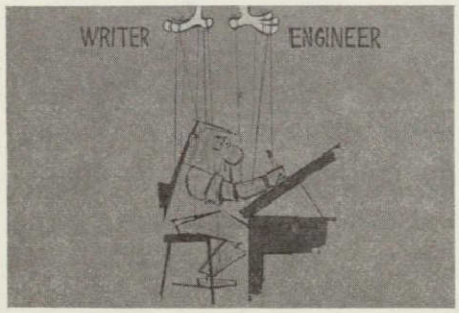
THE TECHNICAL ILLUSTRATOR – PUBLICATIONS FRIEND OR FOE

By

Albert O. Pardoe
Graphic Arts Director
Raytheon Company
Wayland, Massachusetts

A theme based on the premise that if a technical illustrator is not helping to produce better and more effective publications, he may be hindering technical communication.

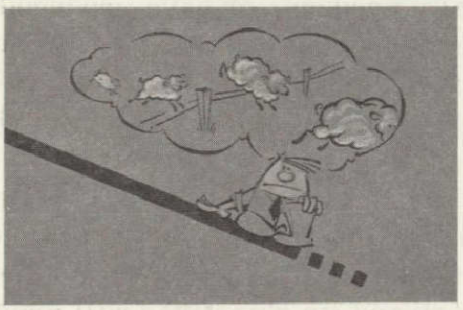
The technical illustrator of today is a person who is well qualified to make major contributions in the technical communications field; but, we are not taking full advantage of his talents. In other words, although the illustrator has been a vital link in the preparation of publications during the past decade, he can do more. First, however, we must permit him the opportunity and the challenge.



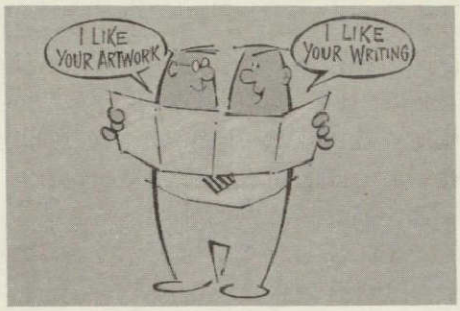
I see the technical illustrator at the present time as what I'll describe as a passive performer who, through no fault of his own, is working in an environment where he must follow the dictates of the technical writer and the applicable specifications. Now, I don't mean to imply that he lacks enthusiasm for his job, on the contrary, he has a lot of spirit and pride in his work. The real problem, it appears, is that very often the illustrator doesn't know enough about the overall task in which he is involved. Items such as costs, schedules, and the purpose of the end product are generally foreign to him.

In this respect, things haven't changed very much since the early days when technical writers first began to generate instruction books. Admittedly, in those days we didn't have technical writers and illustrators per se. What we did have were technicians who learned to write and fine arts illustrators who joined the ranks because the thought of eating regularly had a great amount of appeal to them. Since that time the illustrator has made rapid strides in his contributions toward effective technical publications.

As equipment and publications requirements became more sophisticated or complex, we found a need for more diversified skills in the illustrating field. The artist rose to the occasion. It was here that we witnessed a definite rise in the "enthusiasm curve" as the illustrator began to utilize some of his untapped skills in the creation of artist concepts, three dimensional and cutaway drawings, exploded views, airbrush renderings, and photo retouching.

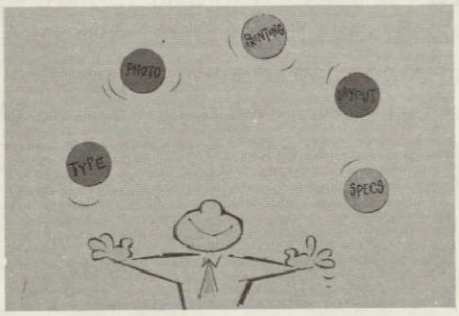


There is an old saying that, "If you don't move forward, you are slipping backward," and it can be applied here to the illustrator and his "enthusiasm curve," because this indeed is what is happening. The work that once inspired him is now routine and he is still playing the role of follow the leader in technical publication preparation. What can we do about it? For what I think is the answer, let us look at TODAY and some of the trends developing that are having positive results in effectivity.



A major breakthrough, I think, is a reorganization within the publications department. A reorganization that places the illustrator in the same working environment as the technical writer. In fact, if they can share the same office, so much the better. There are many advantages in moving in this direction, but uppermost is the gain to be made in a writer/illustrator rapport, a rapport incidentally that actually fosters many other benefits. Let's look at some of them:

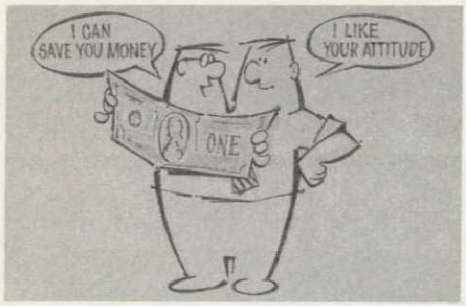
JOB KNOWLEDGE – Living with a project, as outlined above, permits the illustrator to learn first hand everything he should know about a given task and its scope. He will know the customer, the engineers, the writers, and the schedule. It is important, however, to point out here that all will be in vain if the illustrator does not have a deep interest (or is untrainable) to rise to the occasion and become a full-fledged team member on a project or projects. His first and foremost objective, of course, must be to produce, or have produced, the most effective illustrations that are on time and at the right price. He must be ready to suggest new techniques and methods that will be beneficial to his company and the user. Only then can he begin to cut the strings that bind him.



JOB OBJECTIVE – An understanding, on the part of the illustrator, of the entire publication task and its objectives will provide the incentive so badly needed for the upgrading of our illustrating effort. Specifically, this means complete know-how of the customer requirement; the specification to be followed, the grade level of the end user of the product, the photographic applications, the method of composition, layout (format), the printing method to be used, and how it will be handled.

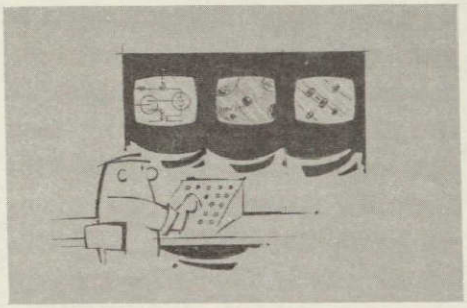
SPECIFICATION INTERPRETATION

— Interpreting art and format specification details is, of course, one of the most important elements of the new illustrator's tasks. It is in this area that a thorough understanding of the detailed customer requirements will help to eliminate confusion, artwork inconsistency, and costly revisions or changes necessitated by nonspec compliance. In addition, this is where the illustrator is qualified, with his broad knowledge of graphics, to make suggestions for specification waivers if he feels that the work can be done more effectively, or at lower cost. An additional advantage here, of course, is that while the illustrator is overseeing this important phase of the project, he is relieving the technical writer who can now channel his efforts 100 percent in the right direction — writing the book.

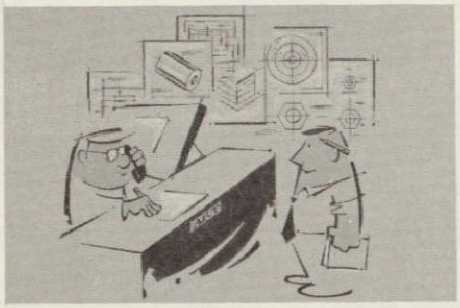


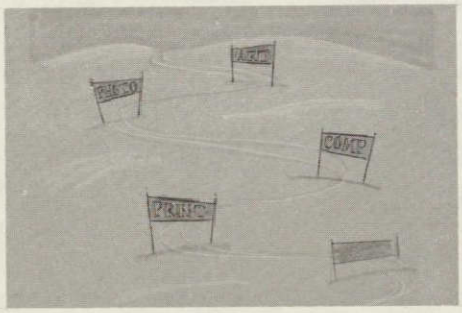
COST AWARENESS —

Illustrator participation at the writer level will introduce more meaningful cost estimates and cost control. Cost control can be effective when, and only when, the illustrator is consulted during the estimating stage of a program. Not only is he more qualified to realistically translate a given task into hours and dollars required; but psychologically there is another big advantage — the illustrator is now committed to produce the work at his quoted cost. This technique is working very successfully in some publications departments today. As a matter of fact, I know some technical writers who wouldn't dream of submitting cost estimates for artwork without first consulting the illustrator. This also has been a big step toward building illustrator maturity and security.



ART CONSISTENCY – The technical illustrator, armed with a sound knowledge of the project artwork requirements, is now in a position to create and monitor all illustrations, including photographs, with a high degree of consistency. The idea of illustrator responsibility for a complete artwork package, whether the work is done inside the company or by subcontracting, is sound and practical. He knows the need, he is familiar with techniques, and speaks the language of the people with whom he will be dealing. As an adjunct to this philosophy, the illustrator can and often does indicate to the writer how the roughs should be prepared. This is especially important when many writers are working on a single project. It is also advisable to have the illustrator monitor the shooting of equipment photographs, whenever possible, instead of the practice of having the writer involved in picture-taking expeditions.

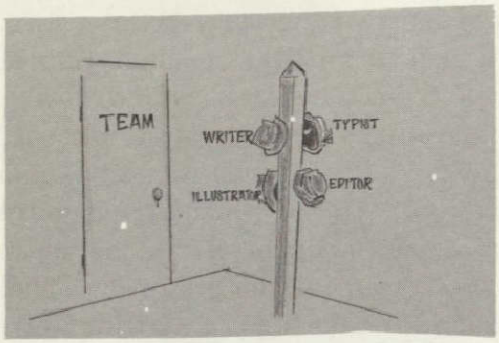




ART MANAGEMENT – Last, but by no means least, in the list of advantages we can find in the writer/illustrator team approach is the illustrator's responsibility for complete art management during the course of a project. This includes, along with the items described above, a responsibility for estimating, scheduling, generating, and controlling all of the illustrations involved. The illustrator of today is capable of performing all these functions because he has broadened his knowledge in all phases of graphic arts. He is well equipped to make decisions on photography, composition, and printing. As a matter of fact, the illustrator has had to keep

abreast of new techniques in other areas in order to perform in some of the new and more sophisticated communications media.

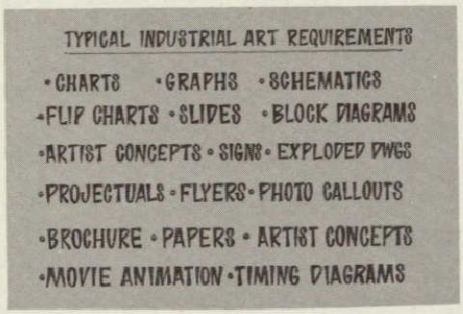
WHAT CAN WE LOOK FOR TOMORROW? — Tomorrow we will see the illustrator who has traded obscurity for maturity. He will no longer be the puppet, but a major contributor in technical communications effectiveness. This will be accomplished by an expansion of the progressive trends that I have outlined above. We will see a discontinuance of the antiquated, ineffective, and uninspiring methods that we have lived with so long. A coordinated effort on the part of the writer and the illustrator, together with management support, will provide the impetus to produce more effective publications. Here is how it will be done.

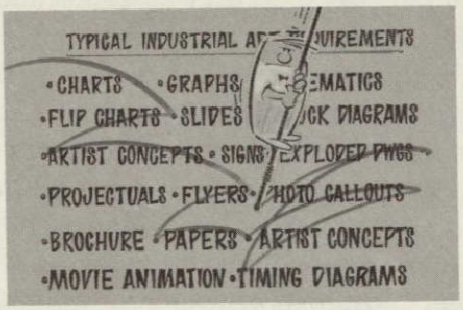


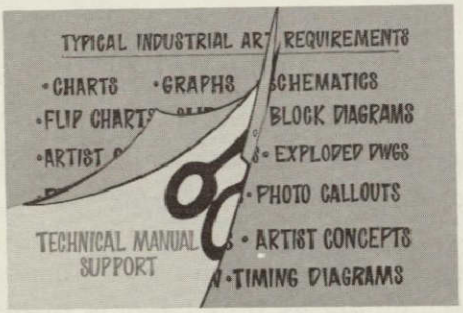
A Solidified Team Effort — I am firmly convinced that a reorganization of publication skills is the only way in which we can achieve complete technical manual effectiveness. Tomorrow will see this readjustment in philosophy and organization. I predict that every writing group will have within its walls all the know-how to put together the best product that money can buy. The team will be made up of writers, editors, illustrators, and technical typists. Each talent will work closely with the others in almost every phase of the effort in order to obtain optimum results. I anticipate also that this cross-pollination of publications skills will lead to new and improved concepts.

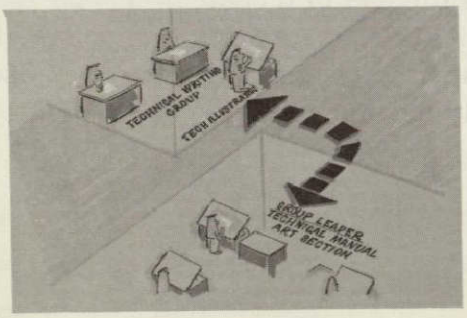
New Ideas and Techniques — The technical illustrator, ever mindful of the technological advances that are taking place within his sphere of interest, will be ready to take advantage of new techniques and equipment as they become practical for use in technical manual applications. As a matter of fact, the illustrator is utilizing some of these newly developed methods now, but

more importantly I think is his constant awareness of new ideas and what they can do to meet the demands of tomorrow. He looks at computorized graphics, audiovisuals, sophisticated composing machines, and constantly improving methods in photography and printing as tools that will vastly improve our capability to communicate technical information. The new techniques of tomorrow will enable the illustrator to lower costs and shorten schedules. He will also see a reduction of the repetitive and mundane portions of his task to a bare minimum. It is then that the illustrator can concentrate his efforts in playing a more meaningful role in the overall job concept.





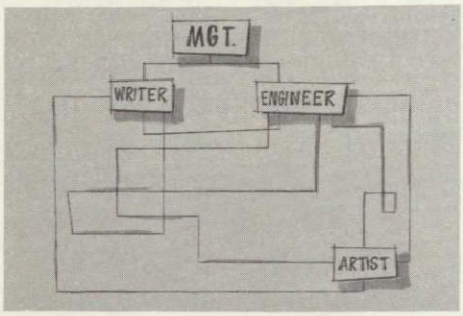


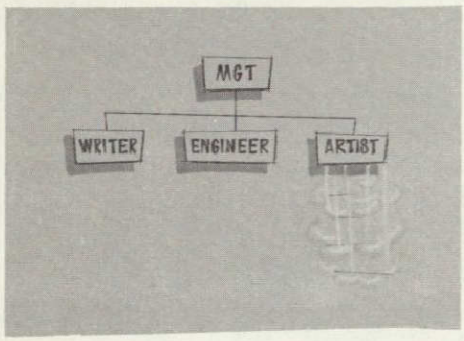


A New Art Department

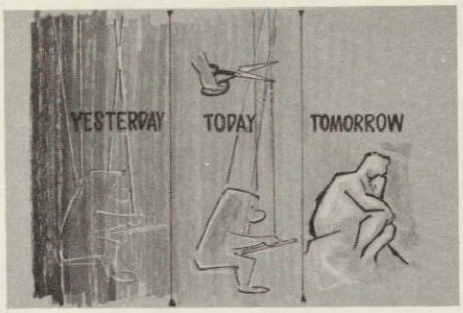
Concept — The typical industrial art department, as we know it today, is generally staffed with illustrators who represent varying degrees of skills. The different skills or specialists range from the person who draws simple block diagrams to the creative artist who has a capability to assume complete responsiblity for brochures, audiovisual presentations, and artwork for animated motion pictures. The reason for this kind of staffing, of course, is due to the many demands by management, marketing, and engineering for visual materials. The art department has had to be prepared to satisfy the overall needs of the company and, more often than not, on a crash basis. As it turns out, technical art for publications is only one facet of this kind of activity, and as such very often suffers by taking second place to other things that are needed. Not only does this adversely affect quality and schedules, but this kind of organization, or disorganization, is very disconcerting to the illustrator. He becomes confused and disheartened when he is continually asked to hop from one job to another. Tomorrow, I see a cure for this problem. The cure will be in the form of a

separate illustrating group within the art section, whose sole responsibility will be the support of publications requirements. The group, however, will still need varying degrees of skill. I see the leader of this new group as one who works closely with the illustrators who are physically located in, and working with, the technical writing sections. The purpose here will be to generate artwork which is beyond the scope of the writing groups. When this happens, we will see an end to the mass confusion now prevalent when we try to mix book illustration efforts with the hundreds of other jobs that are needed by industrial plants.





The Illustrator as a Communicator — When the artist of tomorrow is no longer bound by the organization ties that restrict him, we will see a growth potential that is unlimited. It is my firm belief that a mature attitude on the part of the artist and a progressive change in management policy will encourage the development of artistic talents to a point never before believed possible. We will witness a transformation in the illustrator where his interests, and sometimes his skills, will project beyond the bounds of graphics. At least to a degree, the illustrator of tomorrow can be a part of every element that goes into the preparation of technical materials. If, as years go by, more sophisticated methods are devised to serve our communications needs, the illustrator will be in a strong position to contribute to their implementation. His new environment will make him more conscious of the part he must play in compiling and transmitting technical information. He will no longer be satisfied with anything less than an overall view of the project and its ultimate purpose. It is then that we will see the emergence of a new face on the publications horizon — the transformation of the illustrator to that of a communicator.



IN SUMMARY – I have talked about the history of technical illustrating and the problems related to it. I have discussed the new organizational trends and the futuristic hopes for the illustrator and what he can do to help, not hinder, our publications efforts. Idealistically, I know, and you do too, that not all illustrators will aspire, nor achieve these goals. I am confident, however, that many will develop leadership capabilities that we need to fulfill these new requirements. Others will be content to contribute meaningfully, but not aggressively, to the tasks to which they are assigned. This is not necessarily bad, however, because we will not have room at the top for everyone. There will always be a need for illustrators who are willing to conscientiously follow instructions and be content while doing it. Of tremendous importance here is the fact that the instructions will be coming from the upper echelon illustrator who is aware of the overall job concept. In addition, a policy of illustrator growth, at the writer level, will also provide a target for other illustrators to shoot for in the quest for greater and more meaningful graphics participation.

IMPROVING THE VALUE OF INFORMATION AND COMMUNICATIONS

By

Carlos Fallon*
RCA Corporate Staff
Camden, New Jersey

THE PRINCIPLE OF ADEQUATE INFORMATION

This principle derives from a clearcut pattern in nature. Motion into danger leads to destruction; motion away from danger and toward the sources of life leads to continuing life. The cycle consists of sensing, remembering, screening, and comparing thousands of inputs to select meaningful information. There is seldom enough of the right kind of information and always too much of the wrong kind. This signal-to-noise ratio yields an inadequate image which must be completed by imagination and memory.

We do not have to see all four legs of a table to know that it is a table nor all the stars of the Great Dipper to find the North Star. We see a part and imagine the whole. Such creative visualization is the key to pattern-recognition but, alas! it is also a source of self-deception.

Perhaps the most difficult obstacle to the proper use of information is the screening of self-deception and emotional bias. The information necessary for successful value analysis must be gathered to include the information that we do not like and to question the information that we do like. All data must be graded for authenticity, up-to-dateness, accuracy, completeness, and availability in a form usable by the task group.

We used to say, "Get all the facts." You can't get all the facts. If you waited to get them you would miss the boat. "Get as much as you can" will not do either. It sets no limits.

We all live between the horns of an information dilemma, between the dangerous consequences of inadequate information on one hand and the sad consequences of waiting for complete information on the other.

Coping with the Information Dilemma

One way to avoid damage from the horns of a dilemma is to locate the point of each horn with precision. One point of our dilemma is the one where the risk from acting in the dark begins to outweigh the benefits of early action. We can move safely away from this point toward the other which is the one where the losses from delay begin to outweigh the benefits of additional knowledge. Getting all the facts really means getting all the facts within these bounds. Setting the bounds of adequate information is as important a task as getting the information itself.

Turning Information into Gold

In mathematics, we cannot maximize two variables at one time. To improve value, we have to provide greater benefits for a given cost, or the same benefits for less cost, not greater benefits for less cost—unless we can find a mine which yields resources at no cost.

Such a gold mine does exist, and by systematically developing the right kind of information, we can home in on it. This is a dynamic gold mine in which gold flows down the hidden rat hole of waste. Very real wealth can be rescued from this fate.

In product design, eliminating friction, heat losses, and electrical losses releases all the power these baddies were using up. Eliminating needless parts releases materials for better use, cuts down weight, and releases shipping space.

Beauty, Truth, and Information

The turquoise-blue sea between Florida and the Bahamas is particularly beautiful in January and February. Its white caps progress gently, in orderly array, under a clear-blue sky. At this season, far to the north, the weather is ugly. Skies are overcast and sullen; dark-gray swells conceal dangerous shoals. The beautiful caribbean, on the other hand, tells us the truth, shows us the

shoals in light green and the clear channel in deep blue. If beauty provides an intuitive measure of truth, truth itself is a measure of the quality of information.

THE PRINCIPLE OF EFFECTIVE COMMUNICATION

Get two design engineers, a cost estimator, a buyer, and a manufacturing engineer together, and the conversation will flow easily about such matters as cream and sugar in the coffee, the recent ball game, and crab grass. Then the electrical engineer explains why he cannot change a special part for a standard one. Pointing to a chart on the table, he says, "You can see that even a slight change will depress this parameter by a whole order of magnitude. Besides, we have to have the best Q we can get."

"The best Q?" asks the Buyer. "That brings to mind what I called this meeting for. If you specify a 'special,' we will drop below the EOQ."

There is a moment of bewildered silence, then the manufacturing engineer tries to clarify the matter, "EOQ is purchasing's version of our ELS. And we are in the same boat. If you don't use a standard item, we go below the ELS. PC will have to make two pulls instead of one. We may have to restationize and even refacilitate:"

Overawed, the design engineers look helplessly at the chart, then at each other. "Perhaps," suggests the electrical man, "we could—."

But the mechanical engineer is shaking his head. "I am afraid not," he declares, spreading out another chart. "It would take us beyond the bounds of permissible parts density—actually beyond the asymptotic line of the parts density curve."

Of course, if it does that, the whole project is abandoned. These people may as well not have met at all. But this hypothetical meeting does illustrate how the secondary functions of language can nullify the primary function as a means of general communication.

One of these secondary functions is to present the social and educational background of the speaker, as illustrated in Shaw's Pygmalion and the theatrical hit, My Fair Lady. A closely related one is to establish the speaker as a knowledgeable member of a craft or profession. A third and more important

function is that of specialized communication within a craft or profession. But this can become a habit—a costly habit when general communication is important.

An early task of the value analysis workshop is to achieve effective communication by encouraging all specialists to use as much plain English as possible. For this reason, the value analyst himself must learn and practice the art of plain talk.

The Art of Listening

A sure way to lose information is to interrupt a speaker and question his premises before he arrives at the conclusion. By doing so, we immediately reverse the flow of information. We give him the information that his logic is faulty or his facts are wrong, but we lose the information he was making available to us. A classical example is the story of the foreign ambassador who was kicked over the Army goal posts in the Philadelphia stadium. His chauffeur tried to warn him, but instead of listening, the ambassador growled, "You fool, there are no mules on football fields. You are thinking of polo, and polo is played on . . . "

He chose to give information rather than receive it, telling his chauffeur that he was a fool; that, as a rule, there are no mules on football fields, and that polo is played on horses, not mules. But he lost the useful information that he was backing into the business end of West Point's mascot, the Army mule.

Similarly, in industry, many people are kicked over the goal posts into less rewarding jobs because they never got the message—they interrupted to show how much they knew. On the other side of the goal posts these brilliant folks find others whose specialty is the question that hinders instead of helping.

The Art of Inquiry

If what we want is information, our questions should not give the speaker a hard time. They should help him make his point, in his own way, and at his own rate of progress. If listening is to our advantage, we should work just as hard at understanding as we do sometime at not understanding.

A mother training a child or a theologian converting an heretic may use questions to prove or refute a point. Such questions are answered with the wariness of an animal skirting a trap, or with the unwillingness of a bull being led by a nose ring. The child or the heretic may acknowledge his errors and agree to change, but the questioner has gained little information.

A girl on-the-hunt should not ask, "When are you going to propose?" Her directed questions should follow a pattern such as: "Do you like good home cooking? Do your feet get cold at night?" and then she adds tid-bits of information such as, "I have nice warm feet," or "I can sew buttons." In extreme cases, she could say, "I even wash windows!"

Love, after all starts with flirting, and flirting is an exchange of information.

HOLLYWOOD – MYTH OR FACT?

By

Henry N. Ehrlich
Director of Special Projects
Commonwealth United Corporation
Beverly Hills, California

The myths and facts surrounding the community called Hollywood have been the subject of endless speculation for decades; books, speeches, seminars, serious collegiate studies, special projects, to say nothing of the movies themselves about Hollywood and its stars.

For those of us deeply involved in the day-to-day activities of show business, films and film-related activities are still the most secretive, most glamorous, most misunderstood, and often the most abused. The exact reasons for this varied array are questionable, but please believe me, the image makers in Hollywood prefer it that way. As one of these image makers for the motion picture industry, I'll try to cover several aspects of our industry that may, perhaps, in some small measure, give you an inkling as to the Myth and Fact of "our" town called Hollywood.

At the outset let me say that Hollywood is really only a geographical area within the county of Los Angeles, but without a mayor or council or its own police and fire departments. Hollywood is a section of the City of the Angels, a very ideal and centrally located section, high above the smog of the Los Angeles basin, where you can look down at night from Sunset Strip and gaze upon the twinkling lights of downtown Los Angeles far below.

Here, for almost 50 years, films have been produced and the thousands connected with the making have found refuge from the "outside" world.

As Los Angeles grew, Hollywood though remained that same small segment of space within the larger area. Studios, in order to find more space, relocated and built massive outdoor locations in the suburban areas or in nearby communities such as adjacent cities like Burbank, Studio City, and Culver City. However, Hollywood today still has its Columbia Studios, Paramount Pictures, General Service Studios (which produce mostly for television

shows), and Samuel Goldwyn Studios, where United Artists and the Mirisch Company headquarter.

Burbank, aside from the saying of "beautiful downtown Burbank" as they say in the "trade," became famous many years ago (even before Laugh-In) when Warner Brothers built their magnificent studios, in what was then a far-away suburb. Today Burbank is about 10 minutes from Hollywood via the Hollywood Freeway.

Just over the hill from Burbank and around the bend, is Universal City, a community named for its number one industry, Universal Studios. This tremendous studio has helped make that area a thriving center for conventions, tours, rapid growth apartment and hotel building programs, etc. And just to the east of all this, both Burbank and Universal City, are the handsome studios of Walt Disney, also known as Buena Vista.

There are, of course, several independent motion picture companies located in the "valley" areas (any location north of Los Angeles and on the other side of the Hollywood Hills is The Valley, San Fernando Valley, that is). Among these is the Columbia Ranch Studio Center which produces films for CBS; and NBC television city complex.

Just outside the Hollywood locale but still very much in Los Angeles, actually the next door neighbor of Beverly Hills, is Century City where 20th Century-Fox resides. Once a sprawling area for film-making, Century City is now a cosmopolitan cement city with countless smart shops and boutiques, banking areas, fashionable supper clubs, and hotels. Its gay flags and sparkling fountains are a facade for the many conventions and myriad financial transactions underway there day and night. It is in this area that visiting dignitaries (heads of State) most often are introduced from the podium, "It now gives me great pleasure----." It is here too that our Presidents maintain a home away from home.

These, ladies and gentlemen, are some of the facts surrounding the land known as Hollywood. Now let's explore some of the not-so-factual stories of our town, the myths which have arisen and are not likely to be soon dispelled.

One of the most interesting aspects of the mythology of Hollywood is that so much of it, in spite of what you might have heard, was not engendered by the press agents, but actually sprang up, full grown like Topsy, out of the public's curious need for idolatry, hero worship, call it what you will, of its cinema gods and goddesses. This is attested to by the fact that, despite the

many years which have come and gone, a number of the dead stars from the distant past are still mourned and idolized today just as they were in their heydeys.

For instance, Rudy Valentino today is still almost as well known as when he was alive and pouring out his passionate love from the screen. Even today his fans still remember him and pay homage on the anniversaries of his death. When you consider that he was still a young man at his death, and really had been a star for just a few short years, it is interesting to speculate about the psychological quirks harbored in the breasts of his feminine adorers—who are they and what need does this fixation 43 years after his death satisfy?

The same may be said of Marilyn Monroe on the distaff side. We are all familiar with the story of Joe DiMaggio's devotion to his ex-wife, with the perpetual delivery of yellow roses to her crypt in Westwood Memorial Park, yet such was the quality of adoration which she inspired in her fans that stories, books, pictures about her today are still almost as numerous as when she lived, and her fans also pay homage to her memory on anniversaries of her death.

Going back a little further in time, we remember the glamorous bombshell, Jean Harlow. How many of you remember the dazzling platinum blonde actress who became a myth in her own short-lived time? When she was alive and a very hot property of MGM Studios, the myth was that she was a real sexual hunk of dynamite, melting men's hearts and seizing the imagination of the entire world as she made passionate (in those not too distant days) love on the silver screen. Yet there has been much debunking going on recently which would seek to destroy this illusion, if that's what is was; pointing out that she was really a very ordinary, friendly little girl-next-door type whose real rise to fame came only after an all out bleach job and some frenzied press agentry.

Another myth which I've often been asked about concerns the legendary Garbo. Was her silence really a part of her natural makeup, or just another gimmick invented by some enterprising press agent to make the gloomy Swede more interesting and appealing to her public? She, incidentally, is alive and well and living in New York City, close to Central Park, where she often strolls about, still silent, still glamorous, still wealthy!

And whatever happened to Marlene Dietrich's husband, or did he ever exist? When she first began to rise to fame, back in the early 30's, we read much about her husband, a German director named Rudolf Sieber who was Pygmalion to her Galatea. Almost every article which mentioned the lovely Marlene spoke about his influence on her career. Gradually, he dropped from

sight and the last time I heard anything about him, he was off on some chicken ranch in California, where he directs his Rhode Island reds into their coops at night.

Of course, the myth to end all myths revolves around that other blonde, a little more on the Diamond Lil type, who invites one and all to "come up and see her sometime," Miss Mae West. Even today, at 75, she still manages to lure film makers to her door, and on her own terms. Through her early ventures in the film industry, she was intelligent enough to invest her earnings and now is a very wealthy woman—through her own achievements and business acumen. One of her outstanding traits is her rapport with young people; she surrounds herself with youth, and they appreciate her innate honesty and dislike of sham. Odd though it may seem, for those who associate this actress with turn-of-the-century type roles, she is extremely contemporary. As a matter of fact, she has recently been signed to play the role of the Hollywood agent in "Myra Brackenridge," Gore Vidal's runaway best seller of the man-woman dilemma.

A measure of this woman is revealed by her reason in undertaking this role—she disclosed in a recent press interview that she has owed 20th Century Fox a picture for the last 20 years, so when they offered, she accepted.

Then, and most recently of all, is the Sharon Tate murder case. Hollywood has always had its share of violent deaths, and murder at times has stalked through the shadowy soundstages. In retrospect, Sharon would certainly seem to fit the bill for the classic "who done it?" Billed as one of the most beautiful girls in the world, married to one of the most debonair and sought-after directors on the Continent, pregnant with her first child, living in a luxurious Bel Air mansion—apparently the world was her oyster. We may never learn the true story behind this heinous tragedy, but it undoubtedly will add still another statistic to the many other homicides involving well-known personalities, among them that other recent victim, Ramon Navarro.

It is somewhat intriguing to try to analyze the quality of the public's devotion to its favorite stars. Why some of them are still idolized and worshipped decades after their deaths, yet for some, many of the biggest stars in their primes are virtually forgotten in the passage of time and are carrying out various mundane jobs around the city of Los Angeles, many of them on the fringes of show business, but many also in more prosaic spots. Antiques, for instance, have attracted many of the show business greats of bygone years. That in itself would make an interesting thesis for a study; could it be that they

acquired a knowledge of and appreciation for antiques from the furniture and props used for some of their old films, perhaps? Ben Blue, one of the real old-time greats, whom I'm sure all of you remember, just recently took a flyer in this business when he opened a shop on Melrose in Hollywood last year. On a more contemporary plane is Liberace of the crystal chandeliers and pianos; this very astute businessman owns a beautiful antique shop on LaCienega in West Hollywood. It boasts an elaborate golden door, and houses a tremendous stock of unusual and exotic wares gathered from all over the world, a suitable backdrop for its flamboyant owner.

Of course I'm jumping around a bit, but there have been so very many changes within the last 10 years in "our town" that were brought about by outside influences. For instance, today many of the major studios are almost ghost towns; their vast sound stages are silent, their commissaries like some once prosperous restuarant by-passed by the freeway and left to linger and die. It's all a product of the changing times, when the trend is "to go where the action is." Instead of building sets and making pictures on the lots, now the casts and crews go around the world in their search for authenticity and local color, to say nothing of lower budgets. This whole picture of the industry is debatable, and everywhere you go in the movie capital the question is debated: the pros and cons of domestic versus foreign production units. I personally believe that we have long since passed the stage when the public would be satisfied with second best. We are all concerned with quality now in spite of what you might hear, and one of the ways to produce quality pictures is to shoot on location as the script demands. The advent of television and the inroads made by this new medium into the movie industry brought about many changes, a great many of them for the better, in forcing filmdom to meet this new competition. If we look back over the years to the beginning of motion pictures, we find that its founders were not men of the theater, but predominantly merchants, men like Adolph Zukor, Marcus Loew, Sam Goldwyn, Harry Warner, Harry Cohn, etc. Most of these early moguls were from the New York east side, making their living in the garment or fur industries, or peddling wares from a push-cart.

One of the really fascinating aspects of Hollywood is a profession peculiar to this trade—the gossip columnist. In the early days, Louella Parsons was one of the most powerful tycoons, for journalistic tycoon she was. Backed by the legendary multimillionaire, William Randolph Hearst, she displayed an uncanny eye for spotting movie fledglings, digging into their private lives, and gaining absolute power over their destinies. Both she and Hedda Hopper wielded absolute power over the careers of their victims (or protegees). How did they achieve this power? In Louella's case, she became friendly with Hearst (which in turn led to her job with the L. A. Herald Examiner) through

her friendship with Marion Davies. Which brings up another interesting point, a story which has been making the rounds for years: was Simone Simone really the illegitimate daughter of the Marion Davies-Randolph Hearst liaison, as so many of Hollywood's gossip mongers would have it?

Today, there are no more of this ilk around. Dorothy Manners writes a similar column, but she does not have the power; neither does Sheilah Graham, who of course, gained a certain prominence through her association with Scott Fitzgerald. Rona Barrett is a johnny-come-lately to this side of the Hollywood news game, but she is really only a muckraker without style, merely out to make a buck from the passing parade. My theory about all this is that never again will the columnists enjoy the same prestige as they did when Hedda and Louella were alive, not because they were so great as individuals, but because we, the public, have lost the capacity to be shocked. We have become so blase about so many things, through our exposure to current literature and movies, and to real life, for that matter, that the sins of omission or commission of Hollywood and its starlets scarcely cause lifted eyebrows. Certainly, the latest gossip on who might be entertaining thoughts of divorce wouldn't even rate a line or two in a society where free love abounds and marriage itself might very well become obsolete.

Apropos of the tangled relationships and overlapping domestic skeins, two Hollywood kids were fighting and as is usually the case sooner or later, one said to the other, "My dad can lick your dad, I betcha;" the other kid replied, "Yeh, well listen, I got news for you, my dad is your dad!"

As most of you know, though, this town also has its fair share of the solid-citizen types and so-called normal marriages. By far the large majority of the people who call Hollywood "home" carry on normal, hard-working lives, many of them rearing children, participating in civic, cultural, and philanthropic organizations, even in politics. You may remember an ex-actor named Ronald Reagan, or possibly Senator George Murphy. If you stay up late enough, you may have seen one of them just recently on the boob tube or dream machine. Or perhaps Shirley Black, nee Temple, of "The Good Ship Lollypop" fame, now ironing out diplomatic problems for us in the United Nations. I could go on and on, enumerating couples like Paul Newman and Joan Woodward, very much in the "now generation," Gregory Peck and his lovely wife, Veronique, John Wayne and Pia, Bob Hope and his Dolores, Jim and Gloria Stewart, who just recently lost a son in action in Vietnam, Jack Benny and Mary Livingston, or for that matter, George Burns and the late Gracie Allen, his real-life partner for many years before her death. Going back a little in years, don't forget those radio greats who made Hollywood their headquarters, Fibber McGee and Molly,

or Mr. and Mrs. Jim Jordan. All of these couples have racked up pretty solid marriages and careers behind them, incidentally most of whom also put in many, many hours gratis for various charitable or civic or national works.

Here's another side to the glamorous Hollywood scene which few people pause to think about—just to illustrate what an actor or actress undertakes when a picture is being shot on location. He must frequently get up as early as four or five in the morning (especially if the actress must have her hair styled for her role). They must be on the set, ready to go to work, having perhaps worked late the night before, studied their lines, maybe, if lucky, getting in around 6 hours sleep. With all this, on the set they may be forced to sit or stand around for hours until the director is ready for them, or doing retakes, etc., often working far into the night. It can be a very frustrating job, similar in many respects to that of a farmer, at least so far as the hours go. Bet you had never thought of that angle, had you? Not only are the hours similar, but there are periods of just waiting around, for something to turn (come) up. They have seasons of inactivity, and they also gamble that their roles will be good ones, as a farmer with his crops, that they will be effective in them so that other jobs can be landed and they can go on working. All in all, pretty much of a gamble on both sides of the coin.

Another thing, a lot of people seem to think that Hollywood itself, and by extension, the movie studios seek publicity for their actors, and if the stories are sensational, so much the better. This is simply not the case. Often a studio will move heaven and earth to squash a sensational story involving one of its own players, for today as always even in our more liberal society when almost anything goes, bad publicity hurts a star. It's the same as for you and me. Most people would not deliberately seek bad publicity. When this happens, you can rest assured that the average star is not a party to this type of writing; sometimes, but not often. This type of press agent's nightmare can usually be traced back either to a second-rate hack, or to someone out to make a fast buck and with no scruples about how he does it. The point is, the average, every-day newspaperman will not stoop to such tactics, nor will the stars or studios.

Summing it all up though, I think that the role which communications has played, and will continue to play, in the town we call Hollywood, is that we must all work to keep the mystique alive. Through communications, the world is drawing closer together, and what was once exotic has now become common place. But without our myths, the romance of our industry would be lost. It was for awhile, you know, when the early founders of our colony were replaced

by the businessmen with computers and financial forecasts. That cycle, too, has come and gone I believe, for our business simply must have its mystery and romance, its glamour and its illusions; without it, we lose much of the magic excitement which sells tickets, and unless we have an audience, why put on a play? Notwithstanding a few of the low budget, hominy and grits, family next door pictures and TV shows, it is a fact that the public is becoming far more sophisticated and demanding in its screen and television fare. I have seen this happening in the past few years, and feel that the 70's will undoubtedly emphasize this trend.

For whatever reasons, this nation is maturing at a far more rapid pace than in its first 200 years, and our culture will reflect this. But we can't allow our movies to become mere documentaries of the "scene." This can be done much better and more topically on the TV screen. Motion pictures is an art form, and to survive must maintain its creativity, its illusion, and reflection of reality as well as its mystique. It cannot survive if crass commercialism is the end goal. I am an optimist. Already I see signs in Hollywood that our movie makers do recognize this and will heed the call.

A movie like "The Russians Are Coming" is one which pops up just now; certainly nothing earth shattering in the way of a story line, but done tastefully and with consummate skill in directing and acting, it won the hearts of millions all over the world, incidentally reaping astonishingly vast rewards financially, while improving our national cultural prestige immeasurably. Why? Because it was funny, because it showed the human side of the Russians as well as Americans. It was something that people the whole world over could identify with (communicate, that is) and laugh at together.

I think that this is something which none of us can lose sight of in the approaching new era, the 1970's, regardless of how many new planets we explore, or new directions we conquer. Our creator made us as people with all our foibles and varying hangups. Thank God, we will never be machines, or at least not in our time, and as long as this is true, it is my belief that we will need entertainment, and that to me spells movies and Hollywood, the land of myth and money!

COMMUNICATION FOR THE 70'S

Compiled by
Scientific and Technical Information Division

The information in this report has been reviewed for security classification. Review of any information concerning Department of Defense or Atomic Energy Commission programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

This document has also been reviewed and approved for technical accuracy.

IRA REMER
Chief, Scientific and
Technical Information Division

MSFC—RSA, Ala

DISTRIBUTION

INTERNAL

DIR
DEP-T
AD-S
A&TS-PAT
Mr. L. D. Wofferd, Jr.

PM-PR-M
A&TS-MS-H
A&TS-MS-IP (2)
A&TS-MS-IL (8)
A&TS-TU (6)
S&E-SSL-C
Mrs. Christopher

S&E-R-R
Mr. Hofues

S&E-QUAL-OCP
Mr. Krone

A&TS-MA/PT
Mr. Hightower

S&E-AERO-RM
Mrs. Hightower
Mrs. Dolin

S&E-ME-RE
Mr. Vardaman

PD-DO-DIR
Mrs. Andrews

S&E-ASTN-RM
Wanda Scott

A&TS-MA-MC
Mr. Wiesman

PM-SS
Mr. Sharpe

EXTERNAL

John F. Kennedy Space Center, NASA
Kennedy Space Center, Florida 32899

National Aeronautics and Space Admin.
Langley Research Center
Langley Station
Hampton, Va. 23365

National Aeronautics and Space Admin.
Lewis Research Center
21000 Brookpark Road
Cleveland, Ohio 44135

Lewis Research Center
Plum Brook Station
Sandusky, Ohio 44870

NASA/DOD Representative
Air Force Contract Management Div.
Air Force Unit Post Office
Los Angeles, California 90045

NASA/LePlant Representative
Aerojet General Corporation
Liquid Rocket Plant
P.O. Box 15847
Sacramento, California 95813

DISTRIBUTION (Continued)

EXTERNAL (Continued)

NASA-LRC/Resident Office
General Dynamics/Convair
Box 1128
San Diego, California 92112

NASA/LePlant Representative
Lockheed Missiles & Space Company
P.O. Box 504
Sunnyvale, California 94088

NASA Representative
RCA Laboratories
RCA Corporation
Princeton, New Jersey 03540

Headquarters
National Aeronautics and Space Admin.
Washington, D. C. 20546

National Aeronautics and Space Admin.
Ames Research Center
Moffett Field, Calif. 94035

NASA Resident Manager
NASA Daytona Beach Operation
P.O. Box 2500
Daytona Beach, Fla. 32015

NASA Office - Downey
North American Rockwell, Corp.
12214 Lakewood Boulevard
Downey, Calif. 90241

National Aeronautics and Space Admin.
Electronics Research Center
575 Technology Square
Cambridge, Mass. 02139

National Aeronautics and Space Admin.
Flight Research Center
P.O. Box 273
Edwards, Calif. 93523

National Aeronautics and Space Admin.
Goddard Space Flight Center
Greenbelt, Md. 20771

National Aeronautics and Space Admin.
Goddard Institute for Space Studies
2880 Broadway
New York, N. Y. 10025

Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, Calif. 91103

National Aeronautics and Space Admin.
Manned Spacecraft Center
Houston, Texas 77058

National Aeronautics and Space Admin.
Michoud Assembly Facility
P.O. Box 29300
New Orleans, La. 70129

National Aeronautics and Space Admin.
Mississippi Test Facility
Bay St. Louis, Mississippi 39520

National Aeronautics and Space Admin.
KSC Unmanned Launch Operation
Western Test Range Operations Div.
P. O. Box 425
Lompoc, California 93436

DISTRIBUTION (Continued)

EXTERNAL (Continued)

AEC-NASA Space Nuclear Prop. Ofc.
U. S. Atomic Energy Commission
Washington, D.C. 20545

National Aeronautics and Space Admin.
Space Nuclear Prop. Ofc-Albuquerque
P.O. Box 5400
Albuquerque, New Mexico 87115

National Aeronautics and Space Admin.
Space Nuclear Prop. Ofc - Cleveland
Lewis Research Center
21000 Brookpark Road
Cleveland, Ohio 44135

National Aeronautics and Space Admin.
Space Nuclear Prop. Ofc-Nevada
Nuclear Rocket Development Station
P.O. Box 1
Jackass Flats, Nevada 89023

National Aeronautics and Space Admin.
Wallops Station
Wallops Island, Virginia 23337

National Aeronautics and Space Admin.
MSC White Sands Test Facility
P.O. Drawer MM
Las Cruces, New Mexico 88001

NASA Pasadena Office
4800 Oak Grove Drive
Pasadena, California 91103

NASA Senior Scientific Rep. to Australia
c/o Mr. Wilson Hunter
Department of Supply
Anzac Park West
Reid, ACT

Scientific and Technical Information
Facility (25)
P.O. Box 33
College Park, Maryland 20740
Attn: NASA Representative (S-AK/RKT)

Mr. Sam S. Bagley
Route #7
Fayetteville, Tenn. 37334

Mr. I. A. Bankowski
4618 W. 61st Street
Shawnee Mission, Kan. 66205

Miss Joan W. Barnett
1000 Airport Road
Huntsville, Ala. 35802

Mr. C. J. Bartkoviak
3714 Ashland Drive SW
Huntsville, Ala. 35805

Miss Cece Bibby
1735 Ashley Hall Road
Charleston, S.C. 29407

Mr. Frederic F. Bigio
132 Navajo Trail
Medford Lakes, N.J. 08055

Miss E. Melita Black
972 Parkwood Drive
Montgomery, Ala. 36109

Mr. Dave Bourland
Maxson-Macon Div.
Maxson Electronics Corp.
600 Guy Paine Road
Macon, Ga. 31206

DISTRIBUTION (Continued)

EXTERNAL (Continued)

Dr. W. Earl Britton
1580 Alexandra Blvd.
Ann Arbor, Mich. 48103

Mr. Don Brown, Sr.
2817 Beverly Blvd.
Los Angeles, Calif. 90057

Mr. Henry R. Brukardt
1674 Prescott Road
Memphis, Tenn. 38111

Mr. Richard W. Buckstone
213 Unity Terrace
Rutledge, Pa. 19070

Mr. James L. Carpenter, Jr. (2)
Director of Logistics
Martin-Marietta Corp.
Friendship Airport
Baltimore, Md. 21218

Mr. Warren K. Clark
Clark Associates, Inc.
904 Bob Wallace Avenue SW
Huntsville, Ala. 35801

Mr. Wayne S. Cluck
2725 Butler Street
Harrisburg, Pa. 17103

Mr. Ron L. Cook
7801 Michael Circle SW
Huntsville, Ala. 35802

Mr. Colin Cross
Green Blvd. RR #3
Peterborough, Ontario
Canada

Mrs. Anita M. Daly
1604 North Street, SE
Decatur, Ala. 35601

Mr. Don Davis
417 Edgement Drive
Huntsville, Ala. 35811

Miss Marian Dembosky
1937 S. 61st Court
Cicero, Ill. 60650

Robert Doak
3217 Meridian St.
Huntsville, Ala. 35811

Mr. R. Doug Dupree
3913 Timbercrest Drive NW
Huntsville, Ala. 35810

Mr. Henry N. Ehrlich
Commonwealth United Corp.
8920 Wilshire Blvd.
Beverly Hills, Calif. 90211

Mr. John L. Ericks
1355 East 93rd Street
Chicago, Ill. 60619

Mr. Carlos Fallon
RCA Service Co.
Bldg. 2-6
Camden, N.J. 08101

Mr. Ralph J. Ferragina
918 W. 51st Street
Anniston, Ala. 36201

DISTRIBUTION (Continued)

EXTERNAL (Continued)

Miss Jeanene Flowers
Route 4, Box 884-A
Huntsville, Ala. 35803

Mr. H. Herren Floyd
414 Warner Street
Huntsville, Ala. 35805

Mr. Erik Fris
2108 Basel Drive NE
Huntsville, Ala. 35811

Mr. Jack Richardson Frye
2956 Osborne Road, NE
Atlanta, Ga. 30319

Mrs. Ruth E. Giller
108 Sunset Drive
Cocoa Beach, Fla. 32931

Col. John C. Goodrum
5736 Jones Valley Drive, SE
Huntsville, Ala. 35802

Mr. Calvin R. Gould
MP 331
Martin-Marietta Corp.
Orlando Division
Orlando, Fla. 32805

Mr. William F. Graves
1502 Mont Dale Road SE
Huntsville, Ala. 35801

Mr. Keith T. Grey
2005 Kildare St. Apt A1
Huntsville, Ala. 35811

Mr. Gordon Hall
809 - 6th Street, SE
Rochester, Minn. 55901

Mr. Lawton H. Hall
1812 Shades Crest Road
Huntsville, Ala. 35801

Mr. Robert W. Hamill
44 Burbank Street
Johnson City, N.Y. 13790

Mr. Edwin A. Haugh, Jr.
5209 Dalton Road
Springfield, Va. 22151

Mrs. Mary Jane Hearn
513 Four Mile Post Road SE
Huntsville, Ala. 35802

Mr. William S. Higgins
1122 Mahan Drive
Madison, Ala. 35758

Mr. Russell Hill
6142 Karen Davi Drive NW
Huntsville, Ala. 35806

Mr. Robert Q. Hiser
3110 Kilkenny Street
Silver Spring, Md. 20904

Mr. Lionel J. Holcomb
Route 2, Box 335
Harvest, Ala. 35749

DISTRIBUTION (Continued)

EXTERNAL (Continued)

Mr. James N. Holt
Box 3191
Oak Ridge, Tenn. 37830

Mr. Doug R. Hufnagle
Box 1279
Lafayette, Ind. 47902

Mr. Dennis P. Hundsdorfer
1651 Langholm Drive
Florissant, Mo. 63031

Mr. Albert A. Johnson
6105 Trent Drive, NW
Huntsville, Ala. 35810

Mr. Nat Johnson
Box 62
Oak Ridge, Tenn. 37830

Mr. Sam F. Kennedy
8132 Hillside Lane
Huntsville, Ala. 35802

Dolores M. Killion
1100 Tunlaw Road
Huntsville, Ala. 35801

Dr. Julian S. Kobler
7700 Cadillac Dr. SE
Huntsville, Ala. 35803

Mr. Kermit D. Kramer
857 Oriole Drive
Rosemount, Minn. 55068

Mr. James Kritz
630 S. Pine Creek Road
Fairfield, Conn. 06430

Mr. C. A. Lane
8037 Navios Drive
Huntsville, Ala. 35802

Mr. James D. Ledbetter
7622 Fleming Hills Dr.
Huntsville, Ala. 35802

Mr. Bruce A. Lengel
332 W. Main Street
Palmyra, Pa. 17178

Miss Thelma Leonard
Redding Apt. #14
1130 Christine Avenue
Anniston, Ala 36201

Mrs. Beatrice B. Lofink
6826 Georgetown Pike
McLean, Va. 22101

Mr. Rex Luna
2101 Chambers Drive
Huntsville, Ala. 35811

Mr. Joe F. Maddox
4007 Telstar Circle SW
Huntsville, Ala. 35805

Mr. Charles A. Mayer
2881 Chantilly Avenue
Winter Park, Fla. 32789

DISTRIBUTION (Continued)

EXTERNAL (Continued)

Mr. John Mercier
333 Strawberry Road
Warwick, R. I. 02887

Mrs. Beverly D. Miller
3012 Johnson Rd Lot #14
Huntsville, Ala. 35805

Mr. David E. Miller
1123 Sandusky
Lynchburg, Va. 24502

Mr. Michael Mogilevsky
560 Gardenia Circle
Titusville, Fla. 32780

Miss Juliet C. Moore
3003 Morgan Street SW
Huntsville, Ala. 35801

Mr. Miles H. Moore
515 Traverse Drive
Costa Mesa, Calif. 92626

Mr. Don Morris
1550 Blvd. Lorrain SW
Atlanta, Ga. 30311

Mr. Clarence Neal
1709 Main Street
Stratford, Conn. 06497

Mr. James Neal
112 Westchester Ave. SW
Huntsville, Ala 35801

Mr. Malcolm H. Osborne
307 Royal Oak Avenue
Cherry Hill, N.J. 08034

Mr. Ron Otwell
Martin Theaters
Columbus, Ga. 31901

Mr. Albert Pardoe
28 Briar Patch Lane
Sudbury, Mass. 01776

Mr. Dave Parrish
303 Cruse Ave. SE
Huntsville, Ala. 35801

Mr. Robert D. Peterson
815 10th Street SW
Cedar Rapids, Iowa 52404

Mr. Merle G. Pietz
1415 Hillside Drive
Cherry Hill, N.J. 08034

John Polston
Route I
Brookville, Ohio 45309

Mr. Bob Redman
3708 Oakdale Court
Huntsville, Ala. 35810

Mr. Ira Remer
1207 Governors Drive SE
Huntsville, Ala. 35801

DISTRIBUTION (Continued)

EXTERNAL (Continued)

Mr. Peter L. Robinson, Jr.
Visual Information Officer
Ofc. of Manned Space Flight
FOB 6, Room 426
600 Independence Avenue, NW
Washington, D.C. 20003

Mrs. Jimmie L. Romine
4022 Talwell Drive SW
Huntsville, Ala. 35805

Mr. George B. Rudd, Jr.
3904 Broadmor Rd. NW
Huntsville, Ala. 35810

Mr. Bernard Salchow
P.O. Box 1441
Minneapolis, Minn. 55440

Mr. Robert R. Salo
215 E. Bloomfield
Royal Oak, Minn. 48073

Mr. Harry B. Schlossberg
3421 Lansing St.
Philadelphia, Pa. 19136

Mr. & Mrs. Meryl B. Seals
2108 Stanhope Drive NE
Huntsville, Ala. 35811

Mr. Mitchell R. Sharpe
7302 Chadwell Road SW
Huntsville, Ala. 35802

Mr. Sam H. D. Sims
4237 Eastland Dr. NW
Huntsville, Ala. 35810

Dr. Frank R. Smith
910 Milldale Drive
Ballwin, Mo. 63011

Mr. Steve J. Soto
3902 Eagle Lane
Rolling Meadows, Ill. 60008

Mr. Thomas E. Spencer
Route #2, Box 20
Huntsville, Ala. 35811

Mr. Herman B. Spiegel
1751 Mayland Street
Philadelphia, Pa. 19138

Mr. Kenneth T. Staley
1187 Hillside Avenue
Bldg. 1, Apt. B3
Schenectady, N.Y. 12309

Mr. Richard K. Strome
1409 Georgia Avenue NE
Albuquerque, N.M. 87110

Mr. Joe H. Thomas
Route 2
Union Grove, Ala. 35175

Mr. Fagan Thompson, Jr.
4234 Nolen Avenue SE
Huntsville, Ala. 35801

DISTRIBUTION (Continued)

EXTERNAL (Continued)

Mr. Jerome G. Tisdale
206-2 Rockledge Place
Huntsville, Ala. 35806

Mr. John H. Turner
1205 Briar Hollow Trail SE
Huntsville, Ala. 35802

Mr. Louis L. Ullman
429 Newman Ave. SE
Huntsville, Ala. 35801

Mr. Royal Vreeland
413 Radcliffe Street
Wyckoff, N.J. 07481

Mr. James D. Walker
3511 Panorama Drive SE
Huntsville, Ala. 35801

Mr. Clyde R. Ward
310 Rosemont Road
Huntsville, Ala. 35802

Mr. George M. Ward, Jr.
5627 Woodridge Drive SE
Huntsville, Ala. 35802

William T. Weissinger, III
3004 Barcody Rd.
Huntsville, Ala. 35807

Mrs. Eleanor J. Werden
P.O. Box 4046
Huntsville, Ala. 35802

Mr. Merle Weygandt
2700 Lullington Drive
Winston-Salem, N.C. 27103

Miss Dollie Wiginton
408 Eustis Avenue SE
Huntsville, Ala. 35801

Miss Dudley Williams
2501 Redmont Road NW
Huntsville, Ala. 35810

Mr. Daniel E. Wise
1612 Sebring Street NW
Huntsville, Ala. 35805

Mr. William T. Wolfe
Academy Hill Road
Red Hook, N.Y. 12571

Mr. Leon L. Wozniak
1704 Bluebonnet Tr.
Arlington, Tex. 76010

William J. Ziak
1607 Cagle Ave.
Decatur, Ala. 35601

Mr. John Zacharias
John Hopkins Road
Laurel, Md. 20810

Mr. Ladd Yuhash
4109½ - 14th Avenue
Rock Island, Ill. 61201

DISTRIBUTION (Continued)

EXTERNAL (Continued)

Mr. E. N. White
Griffin House
High Street
Bracknell, Berkshire
RG12 1LF
England

American-Standard
Corporate Research Center
P.O. Box 2003
New Brunswick, N.J. 08903
Attn: Gunther Marx

Applied Physics Laboratory
8621 Georgia Avenue
Silver Spring, Maryland 20910
Attn: Mary M. Schaefer

Robert F. Eillis
209 N. Cuyler
Oak Park, Illinois 60302

Gertrude T. Smith
Dorothy Heights
Wappingers Falls, N.Y. 12590

American Hospital Association
840 N. Lake Shore Drive
Chicago, Illinois 60611
Attn: Dorothy Saxner

Sundstrand Corporation
4747 Harrison Avenue
Rockford, Illinois 61100
Attn: Ronald L. Carr

Helen G. Caird
3573 Yorkshire Road
Pasadena, Calif. 91107

Earl E. Keathley
9241 Meldar
Downey, Calif. 90240

Ruth L. Terry
140 Belcoda Drive
Rochester, N.Y. 14617

Alton E. O'Banion
P.O. Box 554
Bettendorf, Iowa 52722

Westinghouse Research Laboratories
Churchill Borough
Pittsburgh, Pa. 15235
Attn: A. Stanley Higgins

Climax Molybdenum Co.
1600 Huron Parkway
Ann Arbor, Michigan 48105

Society of Technical Writers and Publishers
1010 Vermont Avenue NW, Suite 421
Washington, D.C. 20005
Attn: Paul Andrews

Edmund L. Stoddard, Jr.
122 New Estate Road
Littleton, Mass. 01460

DISTRIBUTION (Concluded)

EXTERNAL (Continued)

Charles H. Zatsick
82 Northcutt Street SW
Marietta, Georgia 30060

Chester S. Sullivan
2237 W. Warwick Drive
Peoria, Illinois 61614

J. W. Rickerson
5302 Quincy Avenue
Gulfport, Miss. 39501

A. Gene Cramer
412 W. 96th Terrace
Kansas City, Mo. 64114

Wm. F. Funderburk, Jr.
10408 St. Ann Lane
St. Ann, Mo. 63074

MSFC—RSA, Ala