AVIATION SAFETY OFFICERS

GUIDE

PREPARED
by
U. S. NAVAL
AVIATION
SAFETY
CENTER

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FOREWORD

The Aviation Safety Officer's Guide is designed primarily to assist the Squadron Aviation Safety Officer in implementing and prosecuting an active aircraft accident prevention program.

The greatest single obstacle to the prevention of aircraft accidents is *complacency* — people become accident conscious *after* an accident happens.

The primary objective and mission of the Aviation Safety Officer in the squadron is to prevent aircraft accidents and thus assist in completion of the squadron's mission. To accomplish this objective, the emphasis must be on preventive measures. In order to be effective, the Safety Officer must have the trust and confidence of all personnel connected with flying operations. **He must be free of other primary responsibilities in order to educate for safety** — no one can successfully legislate against an accident.

Use this Guide as a supplemental outline in planning a sound accident prevention program and in determining the major areas of safety that need local development or emphasis. It is published for the purpose of making active, "how to" suggestions to the Safety Officer, and in no way should it dampen his initiative or aggressiveness. His enthusiasm and ingenuity in keeping abreast of local operating problems can make his prevention program successful.

Education is the most effective tool in the prevention of accidents. Pilots, air crews, and ground personnel must be imbued with aviation safety principles until safety consciousness becomes an integral part of their thinking.

A command program requires the wholehearted support of the Commanding Officer — **the best** *vision* **is super***vision!*

CHAPTER ONE

Organization of the Aviation Safety Officer's Department

0101. THE AVIATION SAFETY OFFICER

1. Before *you,* the Aviation Safety Officer, can get down to the business of preventing aircraft accidents and educating all your people in safe practices, you must organize your "shop." You need complete files of all pertinent information; Instructions, Circular Letters, ACSEBs, Tech Notes, Tech Orders, Sense Pamphlets, training films index, posters, etc. **Your files should contain all the directives and publications needed for your model aircraft, your unit's mission and your area of operations.**

2. The duties and responsibilities of the Aviation Safety Officer's billet are: plan, organize and supervise Flight Safety and aviation ground safety programs; review, analyze and promulgate directives, regulations, accident reports, safety data and local operating conditions associated with safety; monitor policies, standards and procedures to assure integration of accident prevention principles; maintain records on aircraft safety. The Safety Officer should conduct accident prevention surveys and inspections. He must coordinate with the Training, Operations, Maintenance Officers and the Flight Surgeon to insure an active safety program. In addition, he *will be* a member of the Squadron Aircraft Accident Board.

3. A Navy-wide policy has not yet been established as to just what departmental organization the Safety Officer should have. It has become the accepted practice to make the job a primary billet, not subordinate to other departments, and fill it with a University of Southern California Safety Officers School graduate, if available, or a senior and experienced

member of the squadron. **The more the Aviation Safety Officer knows about flying, flight characteristics and maintenance, the better he will be able to do his job.**

0102. ACCIDENT PREVENTION FILE

1. This file should contain all information available for your model plane, especially accident trends for both pilots and aircraft. The information is found in many sources, such as APPROACH, U. S. Navy Aircraft Accident Statistics (confidential quarterly), NASC Crossfeed Sheets, the FUR Digest, the Weekly Summary of Major Aircraft Accidents, the safety of flight and AMPFUR message reports . . . .

2. Basic information to keep on file includes:

a. current survey reports of the air station or ship facilities with recommendations concerning correction of unsafe conditions

b. minutes of all Aviation Safety Council meetings (see paragraph 0417)

c. portions of ORI/AMI inspection reports that pertain to safety of aircraft, shop spaces, working practices and procedures, critical rate shortages, adequacy of technical files, etc.

d. accident studies, reports or summaries for your model of aircraft

e. copies of all squadron instructions covering the subjects

pre-flight briefing
taxiing and takeoff
landing procedures
heavy weather instructions
lost plane procedures
fire bill
aircraft pre-flight inspections
air discipline
filling out the *yellow sheets*
aircraft emergency procedures
lost communications procedures
jettison bill
search and rescue
qualification of new pilots
ordnance and gunnery safety
adherence to SOP
instrument flying qualifications
personal equipment

survival training
ditching bill

f. statistical information for preparation of charts such as "flight time *vs* accident rate", "hours since last accident."

3. Frequently other persons will discover a potential accident situation before you've seen it. This is the advantage of using an Anymouse or informal reporting system: *anyone can apprise you of a potential accident.* These reports belong in your prevention file. Have the Anymouse or other local reporting forms strategically located throughout your squadron's spaces. To take local action on reports, produce your own forms with a space for the *Anymouse* suggestion and another space in which you can indicate the action taken. Promote the form as being strictly between you and the person submitting it. Action taken may include presenting the problem to the Aviation Safety Council. (One word of caution, don't short circuit the Aviation Safety Center with your local Anymouse system — pass along any situations which might have Navy-wide application.)

4. Some units have found another simple form effective in initiating corrective action and providing follow-up:

From: Aviation Safety Officer **Date:** .....

To: ..... **Department**

Subj: Hazardous condition requiring correction; notification of (situation)

1. The following (condition) (mal-practice) was noted as being under your cognizance.

2. This could be the cause of an accident. It is suggested that the following corrective action be taken:

3. It is respectfully requested that corrective action initiated be noted on this form and returned to me. This is not a "report" slip.

.....
(Aviation Safety Officer)

From: ..... **Department** **Date:** .....

To: Aviation Safety Officer

1. The following corrective action has been taken:

.....
(Signature)

0103. PRE-ACCIDENT PLANNING FILE

1. The principal item in your pre-accident planning file will be the Pre-accident Plan, embodying in detail *all* of the contemplated action that will be taken at the time of a crash. (The Pre-accident Plan is discussed in detail in Chapter 7.)

2. The essential element in your pre-accident planning is the *pre-assignment of duties.* Your file should show the names of the persons assigned and the dates they were checked out in their responsibilities. An accident never occurs at a convenient time — have several persons detailed to each duty to avoid

the possibility of the person assigned primary responsibility being absent. The best solution is a thorough understanding of the plan by *all* personnel in your squadron.

Some of the pre-assigned duties include:

a. The Aircraft Accident Board: investigate the wreckage and the records, interview the witnesses and the aircraft crew (as shown in the training movie *Aircraft Accident Investigation,* MN-8270, and described in OpNav Instruction 3750.6B).

b. Commanding Officer: notify next-of-kin as per BuPers instructions and supervise message and written reports.

c. Operations Officer: provide complete information on the type of flight, the clearance involved, the air station or ship facilities figuring in the accident, and the pilot's records. Air Station operations officers should also provide trained crash-rescue crews, helicopter services if available and required, photographic coverage of the crash area.

d. Maintenance Officer: provide complete information on the aircraft from the logs, records, service changes, Tech Orders . . . . Also provide experienced personnel to collect and identify the wreckage.

e. Survival and Equipment Officer: check the operation of all survival gear whether utilized or not.

f. Public Works Officer: provide transportation for the investigation teams to the scene of the crash. Provide heavy equipment for the recovery and removal of the wreckage.

g. Duty Officer: provide notification according to a check-off list, to key personnel. Prepare the rough drafts of the original message reports.

h. First Lieutenant or Station Security Officer: provide personnel suitably equipped to guard the crash scene on a 24 hour basis to prevent disturbance of wreckage.

i. Other officers and enlisted personnel: as necessary for special situations and for coordination with the local civilian organizations such as the press, the police, the coroner, and the Civil Air Patrol.

3. You should have a current listing of sources of special assistance such as the aircraft company representatives (TechReps), the district BuAer Maintenance Representative (BAMR), the local O&R personnel who know your airplane, and the persons in your logistical supporting activity whom you contact for salvage assistance.

4. Two publications which must be in your pre-accident planning file are the Handbook for Aircraft Accident Investigation (NavAer 00-25-538) and OpNav Instruction 3750.6B. Study both of these and when you really know them, study them **with all the members** of the Accident Board. Each member of the Board and each person associated with

an investigation must know **WHAT** he is to do, **HOW** and **WHY** he is to do it, and **WHAT** to do with the information he gathers. *This* is pre-accident planning.

0104. AIRCRAFT ACCIDENT REPORT FILE

1. This file should contain all previous squadron accident reports with endorsements, DIR, FLIGA, FUR and Anymouse reports, and near-miss reports. It should also contain the necessary forms, instructions and information to submit the required reports.

0105. PILOT'S QUALIFICATION FILE

1. Maintaining this file is the full time job *of the* Training or Flight Officer in the Operations Department — you won't be keeping the records. However, you must be aware of weaknesses or areas in which additional training is required, and eliminate any which might result in accidents.

2. Some of the major categories which should be filed in pilots' individual jackets include:

a. results of written examinations given during new pilot check-out phase

b. pilot's signed statement that he has read and understands all the safety information pertinent to the aircraft, including the Pilot's Handbook and syllabus training regulations

c. a similar statement that he is familiar with the area of operations; SAR procedures; local Operations Manual; aerology, communications and survival for the area

d. instrument qualifications

e. record of cross-country or navigational flights with the logs of the flights as actually flown

f. records of low pressure chamber and ejection seat check-outs, night vision tests, ditching and bail-out drills

g. medical flight clearance forms and reports of groundings

h. pilot accident history (available from his log book or from NASC)

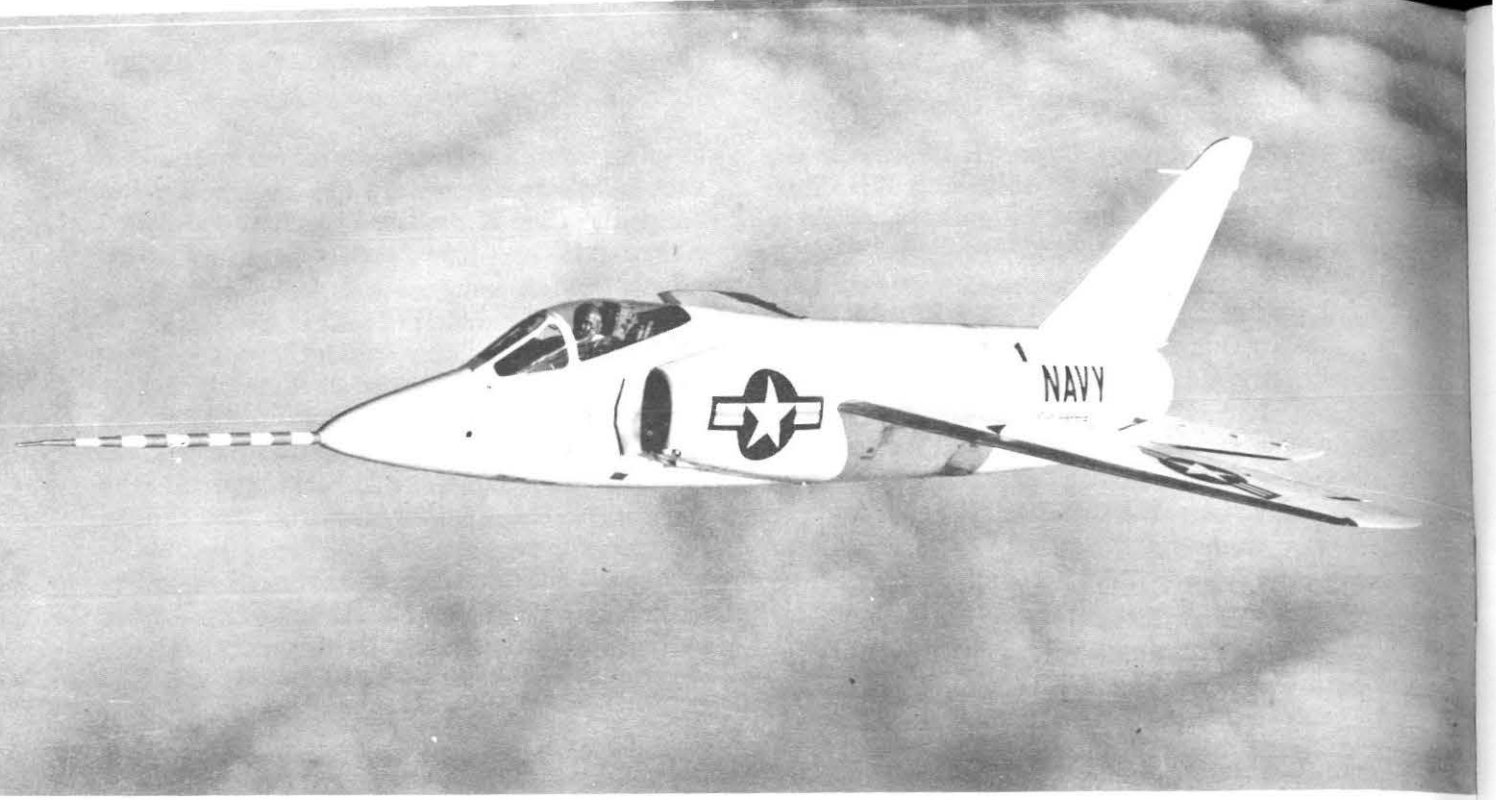
3. You are vitally concerned in determining any pilot whose flying habits or lack of training is indicative of an *accident just waiting to happen.* This man needs your help immediately! **Your squadron needs a record-keeping system that permits recognition of each pilot's trends toward any specific type of accident.** (See *Unknown Quantity,* July 1957 APPROACH)

0106. SAFETY LECTURE FILE

1. In this file, retain written and documented lecture outlines for each safety aspect that may confront your unit in its year-around flight operations. Admittedly, you will not be giving all of these lectures yourself (the Aerologist for weather lectures, the Flight Surgeon for aero-medical subjects, the Maintenance Officer for aircraft systems or emergencies, etc.) but you should have the lecture outline on file together with necessary training aids.

2. As a partial listing of lecture and safety meeting topics, the following titles are suggested:

Arresting Gear and Barriers
Mirror Landing Equipment
Flight Deck Safety
Carrier Operating Characteristics
Air Operations Manual
Airfield Lighting
Survival and Survival Equipment
Physical Fitness
Aircraft Emergency Systems
Aerodynamics of the Aircraft
Oxygen Equipment
Ground Accidents, Causes and Prevention
Torquing Techniques



Shop Safety
Line Safety
GCA (or CCA)
Taxiing and Taxi Signals
Communications Procedures
Navigational Aids
Topography and Terrain Hazards
Sea-Air Rescue
Civil Air Regulations
Performance Limits of the Aircraft
Maintenance Safety
VN/VG Diagrams
Material Failures
Airfield/Seadrome Facilities

3. Circulate an attendance slip at each lecture so that you have a record of who was there. This is important in rescheduling, plus it shows training completed. Use recording equipment if available; a tape recording of the lecture is ideal for reviewing or rescheduling.

0107. SAFETY LITERATURE FILE

1. **Reading material must be located in a space that is conducive to having it read.** Current safety literature should have a read-and-initial sheet attached so that each person responsible for the information can indicate he has read it. Don't put out too much material at one time; urge all hands to read it promptly; and change it as soon as they have. Retain literature removed from current status in a library file, with the initial sheet. This represents a source of material available for future use. Catalog what you think is really good so that when the time is right, you can extract it and put it in front of your people again.

2. APPROACH is your safety review magazine full of the best information available. Each issue is well received and well read, but what about the pilot who just got his wings and didn't see the first 7 issues in 1955? He isn't going to go back and read a two-year-old magazine unless you give him a good explanation of *why* he should. However, the information is still good, and still vital to his longevity. (And this is just as true — *if not more so* — in the case of a new AD3/c who needs to know "Murphy's Law" or other APPROACH maintenance info.)

Take two copies of each back issue of APPROACH, some heavy cardboard cut to file-drawer size — cut the magazines up, article by article, and rubber cement them onto the cards. File the cards by subject, phase of operations, or some "Library of Congress" method that will permit you to find it again without having to thumb through the magazines for a half-day.

Another means of doing the same thing (without cutting up two magazines) is to use a file card box and brief the articles on 3x5 or

5x8 cards, indicating the exact location of the information in the magazines. File the cards by some subject system that can quickly tell you where to look in which issue to find the complete story. **This method permits cross-filing duplicate cards under several subjects.**

3. Locate the training film library that services your squadron (OpNav Instruction 1551.1B); get their catalog and read through the titles for those that sound appropriate. Check out the films you select, review them by yourself first, and then show them to your unit. If the film is old but still contains some very pertinent and timely information, arrange with the projectionist to show the pertinent data and eliminate out-dated portions. **Again, for future use, keep records of who attends the movies and a short epitome of the film.**

4. You can put out a news sheet for your squadron! A single-page mimeographed safety information bulletin will be very helpful in promulgating hints for safe operations, pointing out weaknesses, and educating all hands. In your literature file keep all such sheets you get from other sources; something good from another source can frequently be *lifted* directly into your own sheet, with a credit line. For more details on a periodical handout, see paragraph 0208.

0108. SAFETY BULLETIN BOARDS

1. Arrange for at least two bulletin boards in the squadron spaces; one in or near the ready room which all pilots will see every day, the other in the line/maintenance area where the mechanics will be exposed to it. Keep the information on these boards current and pointed directly to safety. What you post in your efforts to prevent accidents is limited only by your ingenuity and initiative. *Don't let the material — and your program — get stale.*

2. One of the best methods of getting short safety messages to all hands is through safety posters. A good poster displayed in a prominent place will have a greater and longer lasting effect than hundreds of words. But when the impact of the poster has been made, take it down and supplement it with another. Don't throw the old one away — file it for future use. If you can't find *just* the right poster to drive home your point, **construct one** (scissors, paste *and an idea* are the *major* requirements for making a local situation poster).

0109. THE SAFETY OFFICE

1. You must have sufficient space to maintain your files. Idealistically, an office of your own. This space should be identified with you and your job, so that anyone wanting to find you will have a place to start looking. At least, messages can be left for you here. But don't plan to put yourself in your *office* for eight hours a day. **You'll find out how safe an operation your unit has by being on the prowl with your eyes open — looking for situations that need attention.** You are always looking for the accident which might happen if you don't eliminate it first! You want to *prevent* accidents!

2. One thing you should have is your own telephone. Many persons will pick up their phone and call you with a suggestion or information, but they just wouldn't get around to walking down the passageway to give you the same message. Make sure that *everyone* in your unit knows the Safety Officer's phone number even better than he knows his own. Publicize the number; post it through the spaces. It will pay off for you.

3. The Postscript to the Commanding Officer, and this section, should assist you in obtaining the necessary facilities.

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CHAPTER TWO

The Safety Officer as an Educator

0201. YOUR JOB AND YOUR TOOLS

1. The goal in aircraft accident prevention is to continue to prevent accidents and by so doing to preserve life and property, while increasing the state of combat readiness. This is accomplished through education of personnel in safe habits. Education *is not* complete until the "student" *acts* along the lines of the teaching.

2. Your tools are primarily your ability to teach people that "it hurts to get hurt." You'll educate them in groups by presenting talks and discussions, movies, prepared lectures, critiques . . . . You'll teach them individually by displaying posters, using slogans, correcting individual malpractices where you find them . . .

3. First you must know your subject. Next you must know your people — all of them in the squadron. Even more important, they must know you and know that you are the **Safety Officer.** Finally, you must know *how* to teach.

4. **You won't be able to handle the teaching job single-handed!** Organize groups of *disciples* to help you bring the word to all people. (This discipleship must be practical and exist as a steering committee of safety minded persons leading your whole unit.) **Four disciples you need** (who should also be members of the squadron's Aviation Safety Committee) **are:**

Commanding Officer
Executive Officer
Operations Officer
Maintenance Officer

Statistics prove that the accident rate is affected by the degree of command attention — when the Commanding Officer and the senior department heads are safety conscious and carry out a definite safety program, the safety record responds favorably to it.

0202. SELLING SAFETY

1. In order to sell anything, you must have a good product and the ability to convince the prospective customer that the product is worth the price (in this case, his cooperation and participation in the safety program). The actual "sale" is made when you get action. One word of caution: you can conceivably over-use the word "*safety*" until it becomes obnoxious — sugar-coat your product occasionally by referring to it as "professionalism," "education," "pilot-know-how," etc.

2. It pays to advertise. All advertising is designed to create a desire for the product and to keep it in front of the public as much as possible. This is just as true for you as it is for the manufacturers of soft drinks or soap. If you have a particular point you want to get across, hammer away at it. Use such advertising media as signs, posters, newspaper articles and cartoons. Put them in the right places so that people will see them repeatedly. Advertising the "Crew of the Month" or a best safety slogan contest will generate interest. The *best* advertising is by word-of-mouth: one friend recommends the product (*safety*) to another friend.

3. Through the use of Squadron Instructions and directives, you can *require* certain standards of performance. But even though you lead a horse to water, you can't make him drink. **Ascertain that pertinent regulations do exist in your unit, because until your educational efforts are achieved, the fear of punishment may be the only deterrent to accidents.**

0203. MOTIVATION, THE KEY TO THE PROGRAM

1. *You have to motivate people into safe actions.* Motivation determines behavior: the actions a man makes in response to a stimulus. If every stimulation accomplishes the right action at the right time, you'll soon run out of "pilot error" and "error of other personnel" accidents.

2. Certain *physical* conditions are essential to proper motivation. Personnel must be furnished the equipment required to perform their assigned duties. In addition, the necessities such as food and clothing must be available, plus as many comforts as the operating area can provide.

3. Harder to pin down are the *psychological* conditions for motivation. Two of the most important are recognition and security. *Recognition,* the prestige a man enjoys, comes at three levels: the man in his job must seem important to himself; doing his job, he must seem important to his associates; he and his job must seem important in the eyes of his superiors.

Security requires strong and decisive leadership. To keep men motivated to act safely, let them see that you and all of the

responsible officers and CPOs are leading them towards safety.

4. Continuing motivation needs good discipline in the organization. Discipline is that mental attitude and state of training which renders obedience and proper conduct instinctive under all conditions.

0204. PRINCIPLES OF TEACHING

1. To give a skeletonized outline of how to proceed to teach, the following paragraphs are included in this publication. For complete information consult educational books in the station or ship library. Available for reference is NAVPERS 16103B *Manual for Navy Instructors.*

2. Learning must take place in relation to what the student already knows: the new must be built onto the old. It must tie in with the whole and become a part of the entire pattern of a man's knowledge. **Learning should result in being able to use the new knowledge in a practical working manner.** People have little interest in subject matter for which they cannot see an immediate, practical and functional application.

3. There are four basic principles in instructing:

know the subject thoroughly
know the goal or objective
know how learning takes place
know the techniques of teaching

The purpose of all instruction is to give to the student *meaning* about the subject. The function of the instructor is to **get the student to ACT.**

4. There are seven steps in the learning process. In order, they are:

a. **motivation** — arouse interest by what you say or by visual aids, by the suggestion of an incentive or reward, or by an appeal to a deep-seated individual drive such as self-preservation or security

b. **readiness** — begin at the level of the students in an area that they understand and progress to the more complex and unknown

c. **active participation** — provide question and answer periods, quizzes or work projects for student participation

d. **personal satisfaction** — the student requires a feeling of accomplishment, i.e., grades on a quiz, new skills acquired, records indicating lowered accident rates or increased squadron aircraft availability

e. **comprehension** — this reveals to the student the basic reason he is learning and how he can apply this new knowledge to his best advantage

f. **retention** — most knowledge is quickly lost unless continually reviewed and practiced

g. **application** — with this accomplishment, the learning cycle is complete; the student must be able to transfer his learning to his working situation.

As an example, suppose you want to teach weight and balance to a group of pilots. Can you visualize how you would present a lecture that included each of the above steps? "CG beyond limits can be fatal to you . . . you remember the four forces acting on an aircraft in flight . . . today you'll learn how to use the weight and balance slide rule and fill in a form F . . . . etc."

5. The techniques of teaching are many and varied. You should use all of them to add spice to your program. If you were pitching a ball game, how long could you last on the mound throwing only a slow curve ball? By name only, here are some of the methods of teaching; each has its best application (i.e., lecture method is best used for short periods of time and is especially good in the introduction of new material):

Lecture method, formal, informal or illustrated

Discussion method, controlled or free

Special discussions, panels, forums, symposiums, debates, buzz sessions, etc., with several categories under each of these such as debate-panels, lecture-panels, or film panels

Performance instruction method

Training films and visual illustrations

5. Don't try to replace the Training Officer or take over his duties of education and

training, but coordinate your own educational efforts very closely with his. Invite "experts" to talk to your people, put your disciples to work leading meetings and discussion groups, and utilize qualified personnel to provide performance instruction sessions.

0205. AVIATION SAFETY COMMITTEE

1. Within your unit should be a permanent Aviation Safety *Committee* appointed by the Commanding Officer. This committee should meet at least once a month and discuss any accidents, reports of hazardous conditions or deficiencies which might cause accidents.

2. Members of the committee should include:

Commanding Officer
Executive Officer
Operations Officer
Training Officer
Maintenance Officer
Flight Surgeon
Aviation Safety Officer

Other members may be added, or guests may be invited to attend meetings (such as the Public Works Officer or Landing Signal Officer if problems are expected to arise in their departmental areas). Minutes should be taken at each meeting with unsolved problems possibly taken to the Aviation Safety Council meetings.

3. At the Safety Committee meeting, present the lecture program outline to be accomplished prior to the next committee meeting and make assignments to the members who will be conducting safety meetings.

0206. AVIATION SAFETY MEETINGS

1. Interesting and instructive safety meetings are an important part of the accident prevention program. Whenever possible, these meetings should be decentralized so that they occur frequently and involve relatively small groups of persons. This can be done by distributing the responsibility for holding these meetings among the members of the Safety Committee and among your disciples.

2. Meetings can be interesting without resorting to pure entertainment. The subject of each meeting should be *provocative* and lend itself to differences of opinion, *significant* to the accident prevention effort, and *timely,* concerning a problem the personnel are facing at the moment. If the subject can not meet these three requirements, it will probably be better handled in a training session instead of a safety meeting. Secure maximum audience participations to keep the meeting interesting.

0207. AVIATION SAFETY COUNCILS

1. Whenever you are based near other units, you will find an Aviation Safety Council convened by the senior aviation commander or commanding officer of the supporting station. The council is an excellent medium for promoting safety at command level, since it gives staff level personnel, commanding officers of squadrons and air stations an opportunity to meet and discuss mutual problems. It provides for an exchange of ideas between commands and is a method of presenting squadron problems directly to the higher command.

2. The mission, duties, composition and tasks of the Aviation Safety Council are established by OpNav Instruction 3750.11.

0208. PRODUCING A "SAFETY BULLETIN"

1. Distributing a weekly or bi-weekly news sheet will be of great assistance in keeping safety foremost in the minds of your unit's personnel. No matter what method you use to publish it (mimeograph, ditto, multilith) your safety bulletin should be doubled-spaced on a good grade of paper. **Don't try to pack too much information into each issue; better to be convincing with one idea than to suggest inconclusively three or four general safety areas.**

2. Use statistics with caution — they can be dry and fail completely in getting a message across. Wherever possible, present statis-

tics in graphs, charts or illustrations so that they are animated and simple to interpret.

3. Let your headlines tell what your story is about and entice the reader to read what you have to say. *"Too Long, Too Hot, Too Bad"* or *"Don't Burn Rubber When You Could Burn Gas"* introduce a story with a punch. Popular song titles make effective headlines.

4. Show a lot of *white space* in your bulletin. The specific items are more prominent with margins around the copy and space between articles. Pictures and cartoons should be used as much as possible, depending on your supply of them and your means of reproducing.

5. Write with directness, clarity and simplicity. Some rules for effective writing are:

a. **Define your reading audience** — who will be reading what you write? Pilots? Mechanics? Ships cooks? Make it simple enough to be read with ease and understanding by a poor reader and yet interesting enough to hold the attention of good readers

b. **Define your purpose** — get a specific safety message across

c. **Use words that will be understood** — short, easy and common

d. **Use simple sentences** — don't write for the bulletin in the same style you compose letters to the Bureau

e. **Present your ideas in logical order** — each part of your message should prepare the reader for what is to come

f. **Use short paragraphs built around a single idea** — a page of solid print looks too heavy and formidable for the average reader

g. **Make your meaning complete** — your story is not a dispatch message

h. **Personalize your writing** — let the reader know what the message means *to him*. Use personal pronouns

i. **Names make news** — correctly spell names of your personnel. **Don't ridicule or censure people publicly.**

j. Generally get your message across in the first paragraph and supply the details in subsequent paragraphs. Study the opening paragraphs of newspaper stories and see how they pack most of what they have to say into the first few sentences. (They assume that most of the readers will not read the whole story, so they give them the message at the beginning.)

k. **Who, What, When, Where, Why and How** — answer these six questions in your material and you will quite effectively cover the whole story.

l. Use humor when it *fits* the issue — it will keep the reader reading.

6. Don't hesitate to pick up good material from non-copyrighted publications (this includes all USN, USAF and USA magazines). Give credit lines for the source of what you reprint. Since you are probably the only person in your unit reading the safety publications of other commands, what you reprint will be new to your squadron readers. Good information should be shared — exchange your bulletin with other units. Get contributions for the bulletin from the members of your Aviation Safety Committee.

7. Don't pass an aviation safety bulletin out on Friday afternoon when everyone is thinking of liberty — save it for Monday morning and get the week off to a good start. Produce enough copies for all hands (the reader audience you determined in paragraph 0208.5.a., above) and watch to see if the number of copies is enough or too many. If it isn't enough, put out more copies the next issue. If it's too many, something is wrong in what you put into your news sheet — it isn't interesting to everyone and hence your safety message didn't get through.

8. Finally

YOU can write effectively!
You **CAN** write effectively!
You can **WRITE** effectively!
You can write **EFFECTIVELY!**

CHAPTER THREE

Incentives, Contests, Awards and Inventions

0301. GENERAL INFORMATION

1. Psychologists have experimented to determine what makes a man do what he does. They've come up with social motives to explain a person's behavior; and the main reason for most specific behavior is *the desire for prestige.* This is also called the desire for recognition. By either name, it is important that you use this fundamental drive to promote safety and motivate your personnel to want a good safety record.

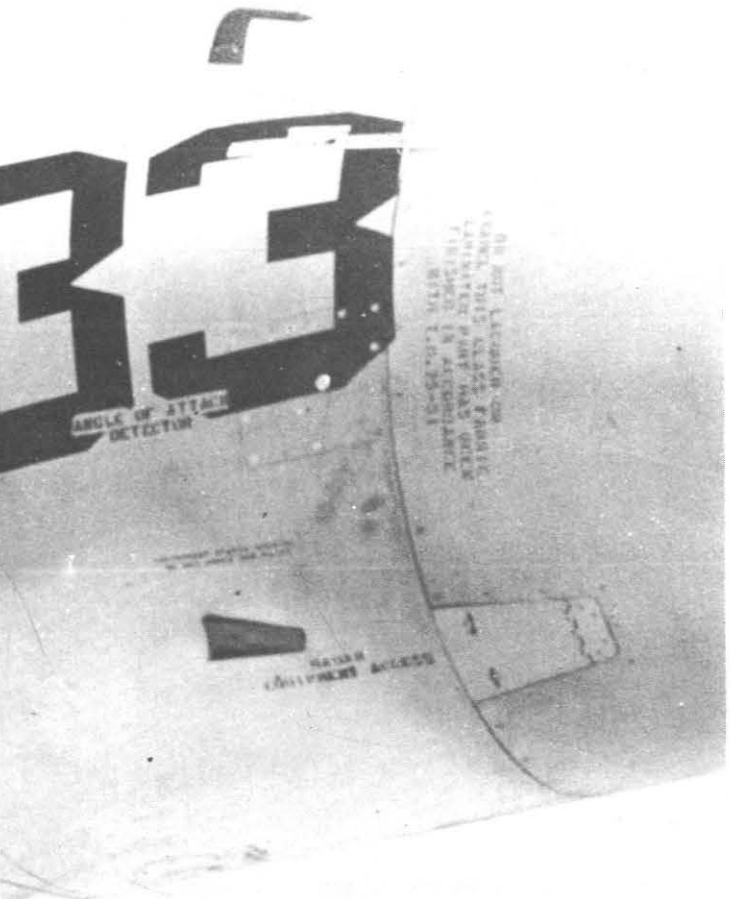
2. In the subsequent paragraphs, some rewards and incentives which provide prestige are discussed.

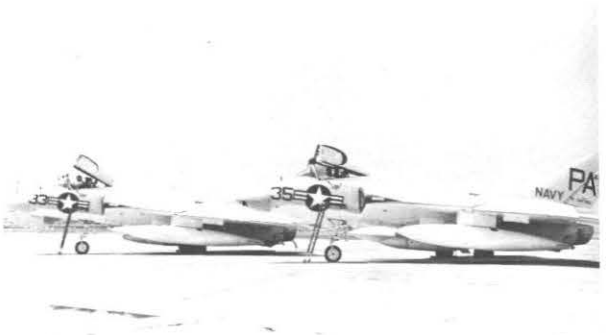
0302. CNO AVIATION SAFETY AWARD

1. Each fiscal year, the Chief of Naval Operations awards plaques in recognition of outstanding achievement in aviation safety and accident prevention. Details on eligibility and basis for award, scoring system, and administration of the awards are set forth in OpNav Instruction 3590.5. This is *the* outstanding award for any squadron.

0303. APPROACH MAGAZINE PUBLICITY

1. The "WELL DONE" section of APPROACH provides Navy-wide recognition of group efforts which have contributed in an outstanding manner to aviation safety by the accomplishment of a specific act. It is made to such units as air stations, ships, squadrons, aircraft crews, GCA or other units, or to civilian organizations. It is not necessary that the recommended ship, unit or group be directly connected with naval aviation. Prepare a brief account of the WELL DONE, including pertinent personal information, and submit it to your commanding officer for forwarding to the Naval Aviation Safety Center.





2. The "OLD PRO" Club was introduced in APPROACH for the purpose of recognizing individual persons who demonstrate exceptional skill and professionalism in aviation. It is not necessarily limited to the pilots of aircraft. **It does emphasize that the professional approach in aviation is the positive approach in aviation safety.** When you have an outstanding example of this professionalism in your unit, submit the name of the individual to your commanding officer for his consideration. He may then forward the nomination, with a brief resume of the incident, to the Naval Aviation Safety Center recommending membership in the "OLD PRO" Club.

0304. PILOT, CREW, MAINTENANCE MAN-OF-THE-MONTH

1. Here is an excellent method for promoting aviation safety at the working level. Properly administered, it can create a keen interest by providing personal recognition. You will find incentives such as special liberty chits to be of value in promoting these programs. One very enterprising Safety Officer worked a three-way "shuffle" to provide one of his unit's monthly winners with an all-expenses-paid weekend in a local hotel: he got the local newspaper to publicize the winner as the guest of the hotel. This gave the newspaper a feature story, the hotel received free advertising, and he got a very desirable incentive to offer his personnel (plus a plug for his safety program in the civilian newspaper).

2. Other promotional features include: displaying the winners' photographs on the bulletin board with a resume of their contributions to the safety program; announcing the winners at the monthly personnel inspection;

having the Personnel Officer make appropriate entries in the service records of enlisted winners; commendatory masts; submission of information to the Fleet Hometown News Service or to the local newspaper.

3. In administering a "man-of-the-month" program, prepare grading sheets of pertinent information on each candidate from which the commanding officer or the next higher command can select the winner.

0305. CONTESTS

1. A "Baby Picture Contest" is one of many fine promotional *gimmicks* which can be used to stimulate your safety program. The details offered here are simply to guide you in this, or in similar contests (best original slogan, best accident hazard picture, best original safety news story, etc.).

2. Publicize the contest and any award established. Promulgate the rules and select a judging committee. For baby pictures, have the contestants submit photographs taken by themselves of a child (establish age limit of the children, if desired) and a safety caption that can be interpreted to fit the child's expression. For example, a baby in the act of toppling over might be captioned "Stall/spins are 'Dis-AS-trous.' " Other captions to fit suitable pictures might include: "Honest, I didn't dive for the deck" or "My flight progressed just like I planned it."

3. Post the winning pictures and captions on the bulletin boards (have reproductions made at the photo lab). A town, ship or station newspaper capable of reproducing photographs will probably be happy to have shots of your winning entries for publication.

0306. HOWGOZIT CHART, TOTEM POLE, ACCIDENT-FREE PERIODS

1. The previous paragraphs have suggested *subjective* means of promoting safety programs. An important *objective* display is some version of a *Howgozit* chart portraying your safety record. Design the chart to show your aircraft accident or incident rate by month. Compare the present rate with the record for the previous month and the previous year. Or compare your rate with the all-Navy rate for your aircraft type.

2. The *Totem Pole* from your type commander is similar to a *Howgozit* chart in its presentation. It should be used to focus attention on your squadron's standing in the safety rating of your chain of command. Unfortunately, it is impossible to obtain accident-free hour standings from the Naval Aviation Safety Center, CNO, or Bureau level activities. Your type commander will be the only source of figures that compare your squadron with similar units in the operating area. All-Navy figures appear in the confidential quarterly statistics report published by the Safety Center.

3. A locally manufactured display board with detachable figures can show the number of days since the last accident. It should also present the flying hours and/or landings completed. Put safety slogans around the board and change them every day when you change the "days since last accident" figure.

0307. INVENTIONS

1. New ideas and concepts are always welcome. A theory, design or idea submitted on NavExos Forms 2374 and 2375 (Invention Form) gets it to the right people. Or a letter to the Chief, Bureau of Aeronautics via appropriate channels will receive proper consideration. Putting your theory in an airplane and letting your buddies "prove" it is a poor way to try to assist with research and development. When a member of your squadron submits an invention on the NavExos forms, give him publicity in the next safety bulletin.

CHAPTER FOUR

Monthly Safety Themes

0401. INTRODUCTION TO MONTHLY THEMES

1. This *Planning Guide* is just exactly what the name implies — *a guide.* In order to achieve a successful aviation safety campaign for the year, it should be supplemented with fresh and original ideas. The program outlined provides a major theme and an alternate theme for each month of your *continuous* safety educational program. An effort has been made to produce an *action* outline for each theme.

0402. JANUARY — Review of Standard Operating Procedures

1. January is one of the highest accident rate months in the year. This phenomena is possibly explained by: 1) the long period of Christmas leaves during which little flying was scheduled, and 2) deteriorating winter weather.

2. Analysis of January aircraft accidents of previous years indicates that failure to follow SOP is a major contributing cause factor in many accidents. Upon return from holiday leave or at the end of long periods of non-flying, schedule a safety meeting to review the squadron's SOP and safety-of-flight principles. **Emphasize that Standard Operating Procedures are based on past experience and sound aviation knowledge.**

3. Among the items to be reviewed are: use of checkoff lists, aircraft operating instructions, fuel management, local operations manual, flight planning, weather briefings, navigation and avigational equipment, taxiing, use of personal flight equipment, instrument letdown and GCA procedure, emergency procedures and standard takeoff and landing practices. Be especially alert to detect malpractices involving any of these items.

4. Publicize the New Year's safety campaign as soon as possible after January first. One method is *signing New Year's Resolutions* by all hands. As a suggested list of resolutions

I will review, know and observe all squadron SOP
I will plan my flight and fly my plan
I will read and know all safety information for my aircraft and my squadron's operations
I will review and know my emergency procedures
I will fly professionally
I will use the checkoff lists each and every time
I will learn more about the mechanical operations of my airplane
I will maintain instrument proficiency
I will keep in shape physically
I will be alert to stop accidents before they happen, to me or to others

0403. JANUARY (alternate): Weather Flying

1. Winter is really tough during January and February, with the number of days of snow, sleet, or freezing rain on the increase. After the Christmas layoff, it is necessary to *reacquaint* flying personnel with the winter weather hazards, and the means available to avoid encountering unexpected deteriorating weather on all flights (i.e., CAA Flash Advisories). At a squadron safety meeting, have the station aerologist discuss the weather hazards, icing conditions and forecasting limitations. Have the head of the instrument check board explain the aircraft IFR restrictions. Review the pitot-static system, so that erratic readings of the flight instruments can be correctly diagnosed as either loss of dynamic pressure causing extremely low airspeed readings (*corrected by use of pitot heat*), or loss of static pressure causing erratic readings of airspeed indicator, altimeter and rate of climb instrument (*corrected by shifting to alternate source*).

2. On local VFR flight clearances, pilots should be alert for rapidly worsening conditions to avoid suddenly finding themselves milling around IFR trying to get back to the field. The freezing level reported by aerology marks the 0° C isotherm; however, icing can occur as much as 1000 feet below to 8000 feet above the freezing level — 9000 feet of icing conditions is not uncommon.

3. Preparing flight plans for extended flights, pilots must take more time selecting altitudes and alternate fields. Winter winds are harder to predict accurately and fuel requirements to destination should be generous. Aerology, when advised sufficiently in advance, will prepare a cross-sectional forecast for the planned route. Pilots should make use of the Pilot-to-Forecaster services (PFSV) listed in the Radio Facility Charts for USAF air bases (UHF frequency 344.6 mc); report unpredicted or severe weather encountered (PIREPS), and turn in a post flight report to the aerologist at the destination.

4. Have the Operations Department schedule instrument training flights and Link trainer hops. *Under closely supervised conditions,* including proper ATC clearances, encourage pilots to fly actual IFR weather training flights. **(Caution in formation flying: wingmen are extremely susceptible to vertigo if forced to rapidly transition to their own instruments.)**

0404. FEBRUARY: Know the Aircraft

1. There will be days during the month of February when bad weather conditions provide "ready room time." **Professional aviation requires pilots and crew members to thoroughly know their aircraft.** Ready room time can be extremely useful in increasing this knowledge. The fact that pilots read and initial a handbook at some early phase of their flight checkout in models is no guarantee that they possess or have retained critically required knowledge. It must be frequently reviewed.

2. Knowledge of aircraft's performance limitations and operating systems (both normal and emergency) will eliminate avoidable aircraft accidents. Once each pilot has been thoroughly indoctrinated in the Pilot's Handbook, he should be introduced to pertinent sections of the Erection and Maintenance Manual and the operating manuals for the equipment he is expected to operate in the cockpit. It is also of importance to educate crewmen in the technical knowledge and capabilities of the equipment for which they are responsible in operation or maintenance. **Experience has proven that aviation safety is no better than the operator's knowledge of the aircraft, its systems and equipment, emergency procedures and SOP.**

3. Safety meetings during the month should include discussion and quiz sessions covering such items as flight limitations, power

plant characteristics, weight and balance, proper preflight inspections, special flying techniques, takeoff and landing data and equipment operation. Introduce *canned* theoretical problems involving emergencies which could arise during flight; review actual accident records.

0405. FEBRUARY (alternate): Flight Planning

1. Although the subject of flight planning is obviously not limited to any seasonal presentation, any margin for error in the conduct of a flight is decreased when weather conditions are unfavorable. **The efficiency of every flight is directly proportional to the quality of the flight planning.** The surest way to eliminate embarrassment and potential accidents is a complete planning procedure geared to the particular needs of the squadron.

2. TAKE TIME TO PLAN A SAFE FLIGHT! There is no substitute for adequate preparation, made without haste. The professional approach demands a complete study of facility charts, NOTAM, climb and cruise charts, letdown and low approach procedures for destination and alternate field, emergency landing fields enroute. . . . Flight logs must be completely filled out. **All anticipated decisions should be made** *and* **recorded before leaving the flight planning room** — flying a high-performance, complex aircraft is a full time job which will not "spare" an unprepared aviator the luxury of studying the letdown plate *after* he's airborne.

3. Continuous safe operation requires:

a. standardized preflight planning procedures both as to form and quality, with essential items made mandatory and with energetic encouragement of all additional items of flight preparation

b. assurance that every facility and necessary item of equipment is available to the pilot in a proper, adequate space for uninterrupted flight planning

c. adequate checkouts (of new pilots) and frequent reviews (for *all* pilots) of the proper methods of complete flight planning

d. establishment of a planning checklist to expedite the mechanics of planning and eliminate omissions or oversights

e. a doctrine of review of flight plans of lesser trained pilots and monitoring of their actual flights by senior, more experienced pilots

4. Special requirements of jet aircraft planning (applying in some cases to propeller aircraft as well) include:

a. the flight log must be filled out for each reporting point

b. check overall distances on a large chart; it is easy to miss critical distances when using only the individual pages of the Radio Facilities charts

c. set fuel counter for fuel on board and check total at every reporting point

d. use a computer to figure fuel consumption and ground speeds on each leg

e. adjust time to next reporting point before giving position report (when it becomes apparent that an IFR ETA is in error in excess of 3 minutes, a revised estimate is required immediately)

f. listen for the regular scheduled weather broadcasts at 15 and 45 minutes past the hour to reduce extra radio transmissions (be alert to changes in weather at destination and alternate)

g. always have an alternate in mind and have the letdown plate handy even though an alternate is not required on the DD-175 at the time of takeoff (the decision to go to an alternate in a jet must usually be made before starting the letdown)

h. unless the flight is extremely short, it should be planned and flown to arrive over destination with as much fuel reserve as possible

i. unless the weather in the area of destination is clear, a jet IFR flight should be planned, figuring holding delay

j. the cruising part of the flight should be planned for maximum range altitudes and speeds; the holding should be flown at maximum endurance speed at cruising altitude.

0406. MARCH: Personal Equipment

1. With the Easter season at hand, squadron wives are thinking in terms of a new personal equipment outfit. It's an equally good time for aviators to give some thought to how they're dressed for flying. All personal equipment is worn or carried for just one reason — **to enable the airman to live through any emergency.** Since the time that an emergency will occur is never known in advance, it is mandatory that personal equipment be maintained in perfect operating conditions at all times! It is also necessary to know how to use it.

2. Some of the items to be stressed:

a. flight crews recently trained in the care and use of parachutes, life rafts, life vests, signal equipment and survival kits

b. scheduled ditching and emergency bailout drills; results recorded. If your aircraft is equipped with an ejection seat, reschedule refresher drills in an ejection seat trainer and show ejection seat training films to the pilots and seat maintenance personnel

c. hard hats are to protect soft heads, but unless the chin straps are snugly in place, protection is not guaranteed

d. is the life vest and the equipment carried on it adequate to the mission and in good working order?

e. is flight clothing properly fireproofed in accordance with Aviation Clothing and Survival Equipment Bulletins and are gloves being worn to protect the hands?

f. are flying personnel able to draw flight clothing in proper sizes required? An official letter from the skipper can do a lot to improve supply bottlenecks

g. are life vests inspected at three-month intervals?

h. is oxygen equipment properly inspected and maintained? Is there an oxygen mask test stand available to pilots? Have all pilots had low pressure chamber checkouts in the past two years and oxygen refresher training in the last 12 months as required by OpNav Instructions?

i. check your squadron instruction covering the flight clothing and equipment mandatory to be worn on flights in squadron aircraft — revise it if necessary. In multi-place aircraft, remember that crew members have a tendency to *shed* protective equipment in order to expedite their movements through the aircraft. Plane commanders must insist that crewmen wear the proper gear at all times —

an emergency never occurs at a *convenient* time!

0407. MARCH (alternate): Survival Training

1. This fits closely with the theme of Personal Equipment — survival is facilitated with the pilot *uninjured and properly equipped.* Movies are available for the study of bailout and survival on land or sea. Since water areas figure so prominently in naval aviation, flying personnel should be qualified swimmers. But proficiency in a swimming pool is not a guarantee of survival in the sea. *At night,* the sea and unfamiliar gear can be both different and strange.

A USAF pilot set up this test *for himself* as a means of providing realism to his survival training. Accompanied by a friend, he walked up to the swimming pool with an armful of gear. His imaginary *(but 100% real)* situation was that he had bailed out, landed in the water at night, was stunned and would only start operating after he had first submerged. He had no raft and didn't know in advance that his Mae West CO_2 bottles were defective. This was to be in a heavy sea, and it was necessary to get out of the parachute harness first.

A blindfold was secured on the trainee and he was tossed into the pool. Beside him in the water was his friend, unencumbered and *sans* blindfold. As the trainee came to the surface, the "friend" shoved him down again (simulating wave action). Up and down, *up and down,* all according to plan but realistically disconcerting to survival routine. Many duckings and dozens of inaccurate and incorrect motions later, the trainee finally got into a survivable condition with lung-supplied air in the Mae West, and a lot of know-how *if* he should ever have to do the real thing!

2. Most air stations supporting squadrons have facilities for survival training under actual conditions. The weather during March can be disagreeable enough to make the training realistic, including enough warm days to provide outdoor swimming opportunities. Statements of pilots who have survived a ditching indicate emphatically that the Dilbert Dunker training has assisted in saving their lives.

3. Items to be included in the survival training program include:

a. testing of exposure suits and flotation gear in some nearby body of water

b. a display of survival equipment applicable to your squadron and area of operations (i.e., desert kits for overland operations)

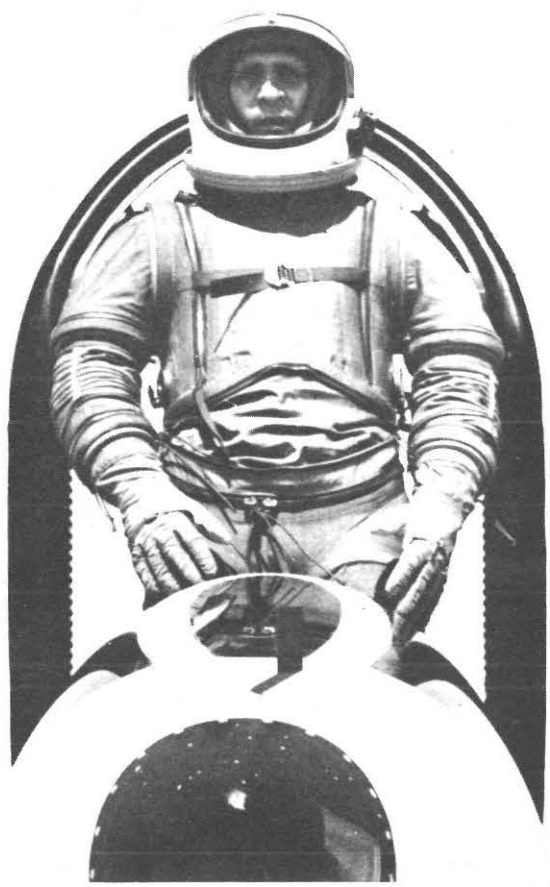
c. weight testing of CO_2 cylinders prior to issue and every 90 days thereafter (or at anytime the trigger seal is broken)

d. practice emergency bailout and ditching with results recorded

e. discussion of parachuting techniques and emergency uses of the chute after landing

f. group review of squadron instructions concerning lost planes, lost communications, survival checkout, etc. Any instructions not up-to-date should be reissued

g. reporting, via the Unsatisfactory Report System, discrepancies in survival equipment.



0408. APRIL: Ground Accidents

1. Spring, and people have a bent to joy ride. Don't let this happen on tractors, mules, NC-5s, or fuel and bomb trucks. **Almost every working day someplace in the Navy, someone will drive a vehicle into an airplane.** This happened 228 times in fiscal year 1956. In addition, taxi collisions, ground crews respotting aircraft and striking an obstacle, and all other causes will boost the ground accident total to *over 500 damaged aircraft per year!* How many happen in your squadron depends in a large measure on how well you do your job.

2. Promulgate your squadron ground safety regulations and make them stick! Help the Line Officer and/or Line Chief organize the experienced ground crew personnel so that all activity on the flight line is closely supervised. Establish the minimum approach distance (or perimeter) for your type of aircraft and do not permit vehicles to enter this *prohibited* area. **Prepare charts or posters showing these prohibited zones and the acceptable safe approach routes to the aircraft for vehicles** (generally tangential — not perpendicular — to the safety perimeter). Provide instruction on attachment of tow bars and safe towing. Require NC-5 drivers to unreel the *full* length of cable so that maximum clearance distances are maintained between the vehicle and the aircraft. Fuel and oil truck drivers must lay out adequate lengths of servicing hoses and not try to bring the truck right up to the filler neck. When moving on after stopping in the proximity of an aircraft, vehicles with 4 or more speeds forward should be shifted into a suitably low gear position such that there is no possibility of the driver mistaking *reverse* for a forward speed.

Some of the more common cause factors of vehicle-aircraft accidents include:

vehicle left in gear
vehicle left unattended
driver losing control of the vehicle
driver given improper guidance
insufficient ground crew operating the vehicle
unauthorized and/or untrained drivers
driver's carelessness, inattention and/or lack of motivation
driver's errors of judgment

3. Because of **carelessness or negligence,** aircraft are frequently *hand-pushed* into accidents. Respotting requires competent supervision and adequate personnel to observe *all* clearances — 22-foot-high rudders just won't clear 20-foot hangar doors. As the understatement of this volume: there just isn't much maneuvering space when respotting aircraft aboard a carrier. But respotting can be a routinely safe procedure by using enough manpower to watch all extremities of the plane and get it stopped before it gets bent up. Standard whistle signals — and enough whistles — will help.

4. There is no logical excuse for a taxi accident; they too result from **carelessness or negligence** of the pilot, taxi signalman or control tower operator. Good taxi directors aren't born such — they have been trained. *Establish a training program.* Lacking clear understanding of the signalman or tower, a pilot is set up for a taxi accident. Failure to utilize tow facilities is another common accident cause; pilots and qualified taxi men who feel that requesting a tow vehicle is a reflection on their ability should have it impressed on them that it is a far more glaring reflection to be involved in an *avoidable* accident. When clearance space is snug, taxi at the walking speed of the wing-walkers; no wing-walkers — don't taxi! Test the brakes before you're in a bind and need them, only to find spongy reaction. Keep taxi areas well marked, clear of work stands and equipment left adrift.

There are other well-known, common-sense requirements such as use of standardized signals; adequate hazard marking for both day and night operations; checking around the air-

craft for extraneous gear before starting; constant alertness for props, jet intakes and exhausts. . . .

5. Produce a good squadron instruction on aircraft ground operations, put teeth in it and promulgate it to everyone. Then demand compliance! As ComAirPac informed AirPac, *"One of the most alarming features of aircraft accidents is the obvious reluctance of unit commanders to recognize the powerful deterrent effect of disciplinary action"* in preventing careless or negligent type accidents.

0409. APRIL (alternate): Gunnery and Tactics Flights

1. The principal hazard in the gunnery and tactics syllabi is *midair collisions.* In gunnery, pilots experience a form of fixation and fly into the tow banner. On both gunnery and tactics flights, losing sight of other aircraft in the flight invites a collision.

2. Review the patterns and safety regulations of the runs before engaging in the gunnery phase. Tow banner collisions result from carrying runs in too close, making poor recoveries, or from attempting to salvage a poorly started run.

3. A gun is a lethal weapon without a conscience — friend or foe in the line of fire gets hurt. Disregarding safe firing angles, foul ranges, inadequate interval between firing planes *borders on criminal negligence* and merits the strictest disciplinary action. Never send out a flight without complete briefing, and don't forgive the transgressions of any pilot who breaks the rules.

4. During gunnery phase, the Ordnance Officer must insure that all arming and dearming operations are conducted with maximum safety. Re-school the ordnancemen in the squadron's ammunition handling regulations.

5. Finally, for tactics flights, a thorough review of the aircraft operating limits is in order. The Vg diagram is more than a graph in the handbook; **flying within the envelope is professionalism.** Stall speeds increase with bank angle; low altitude stall/spins are generally fatal. Rendezvous and join-ups should be made quickly but without dangerous, wing-up slides into the lead planes. Numerous formation accidents are the result of poor judgment on

the part of the lead pilot — re-emphasize his responsibility *to* and *for* his wingmen. The lead pilot must never forget that his wingman is less experienced and unfavorably located for independent action — in other words, **the lead pilot must be thinking all of the time in terms of the wingmen.** A misguided desire to *thrill* a wingman may *kill* him!

0410. MAY: Thunderstorms

1. Remember the old cigarette slogan: "Nature in the raw is seldom mild?" A thunderstorm is nature in the rawest form for pilots en route to their destination. Thunderstorms will be very commonplace during the next several months; they are a major threat to the safe operations of aircraft.

2. Training films are available and much has been written on thunderstorms. The information you will want to put out to the pilots will not be restated here. Specific points to emphasize, however, include:

a. avoid areas of known thunderstorm activity

b. use GCI and storm warning radar stations along the flight path to obtain vectors into clear areas

c. if penetration is unavoidable, slow the aircraft to penetration speed and attempt to obtain an altitude of 5,000 to 6,000 feet above the terrain

d. put aircraft into flight configuration as recommended by the pilot's handbook, and turn the cockpit lights up bright

e. above all, don't lose your head — performing a 180 before trouble starts is still the best way to be safe when encountering

thunderstorms.

3. Summer thunderstorms can be expected to contain hail stones. Even a short encounter with hail can inflict major damage to an aircraft.

0411. MAY (alternate): Landing and Takeoff Accidents

1. It is a statistically supported fact that the highest percentage of all aircraft accidents occur during the landing phase of flight. **Add the takeoff accidents, and it becomes glaringly apparent that 8 of every 10 accidents involve aircraft at or below the traffic pattern altitude.**

2. The specific techniques for your model aircraft should be set forth in squadron doctrine together with the common errors to be avoided. The recommended procedures are in the Pilots Handbook. Utilizing a motion picture camera (gun cameras can be rigged to be hand-held, battery-operated), obtain movies of squadron pilots making normal landings and takeoffs. These can be shown and criticized at pilots' meetings. Your squadron should have a policy providing *close supervision at the runway* of relatively inexperienced pilots during early phases of training.

In terms of dollars, a landing accident prevented by an experienced Runway Watch Officer would probably pay the salaries of the five most senior officers in your squadron for a couple of years, even if they did nothing but sit at the end of the runway and wave off bad approaches.

3. The pilot errors which generally cause takeoff and landing accidents are:

a. failure to use the checklist, or using it without sighting and/or feeling each item

b. failure to waveoff after a poorly planned or executed approach

c. lack of recent slow flight practice

d. faulty crosswind techniques

e. improper computations of takeoff distance requirements, line speed and *"go, no-go"* figures

f. failure to allow sufficient time for all members of a flight to be ready for takeoff

g. using brakes too soon after landing; *locking* the brakes instead of using the *impending skid* method of braking; using emergency brake too early; improper propeller reversing techniques

h. poor speed and/or attitude control

i. failure to account for runway conditions differing from optimum; failing to recognize the skidding potential of *water* on runway

j. improper pilot techniques; attempting flare in swept-wing aircraft; attempting to stretch a glide; diving for deck

k. judgment errors in rate of closure and sink speed.

4. All-pilot discussions of the following specific points of landing patterns should be the essence of the monthly safety meetings:

APPROACHES*	LEVEL OFF	ROLL-OUT
Stall/spin	Stall/spin	Overrun
Angle of bank	Hard landing	Nose-up
Alignment	Attitude	Groundloop
Undershoot	Speed	Brakes
Wheels-up	"Flare"	Wet or icy runway
Landing weight	Ground effect	Porpoise
Night		Collapse of gear
GCA		Barrier
Low visibility		Arresting gear
Instrument		Touchdown speed
Emergency		Turning off runway
Crosswind		Manipulations of controls
Obstruction		

**The value of a waveoff as the only acceptable salvage of a poor approach should always be emphasized.*

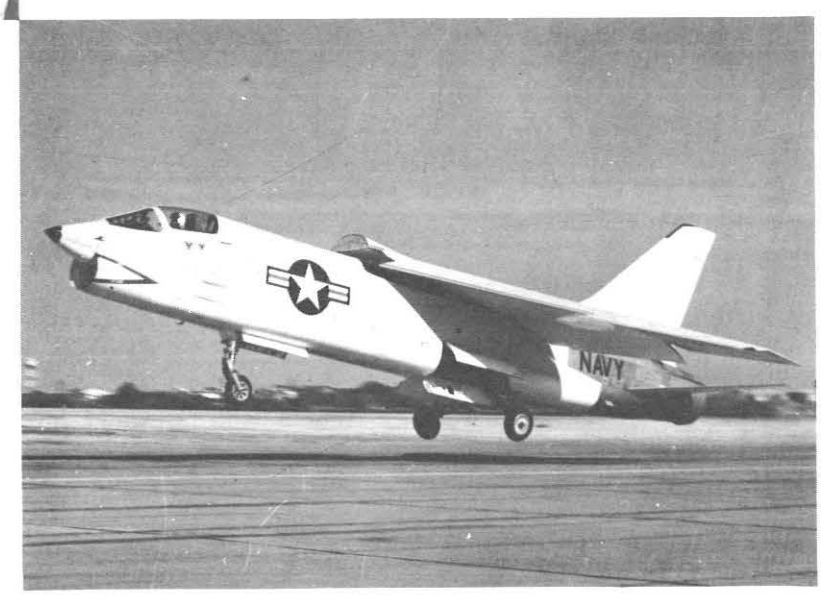
5. A specific point to emphasize: water standing on the runway will reduce the coefficient of friction during braking to almost zero. **Blown tires and uncontrollable skids are as much a summer hazard as during winter months.** On wet runways, use brakes with extreme caution, especially if the water is in puddles with relatively dry surface between.

0412. JUNE: Hot Weather Operations

1. The principal factor in safe hot weather operations is allowing for the increased takeoff distance requirements. However, other factors associated with high temps must also be considered. Flying personnel have an unacceptable tendency to shed survival gear in favor of personal comfort. Thunderstorms and turbulence are encountered on most flights during the summer months. Helicopters experience lower ceiling and are more critical in their close-to-the-ground operations. There is a pilot/crew fatigue factor encountered in climbing into an airplane that has been sitting in the sun and has a cabin temp up to 120°F. For some planes, sunshade kits are available — in other models, a locally designed, removable sunshade might be produced to protect parked aircraft cockpits.

2. As the runway temperatures increase, so does the length of the takeoff run before breaking ground. Decreased density altitude accompanies high temperatures. In *reciprocating engines*, this combination causes a decrease in the maximum amount of air the engine is capable of taking in at the limiting manifold pressures. The carburetor compensates for this by reducing the amount of fuel in order to have the proper burning fuel-air ratio (an engine mixes fuel and air by weight only and not volume). The overall result is a reduction in takeoff power which may be several hundred horsepower for a large power plant.

There is a parallel loss of thrust in a *turbojet engine* due to the high temperature, decreased density air at runway level. The engines have limiting RPM and obtain their



best operating efficiency when the intake air is at very low temperatures. With the slow acceleration of the jet aircraft, the loss of thrust at high runway temperatures can become extremely critical. Thumb rules for jet takeoffs are:

a. 4% to 5% loss in thrust per 10°F rise in ambient air temp above S/L standard,

b. 2% to 3% loss in thrust per 1000 feet elevation

c. for each 10°F ambient air temp above sea level standard of 60°F, increase your takeoff rolling distance by 10%

d. for each 1000 feet elevation above sea level, increase your takeoff rolling distance by 10%

Since lift of a wing depends on density of the air, a greater true airspeed must be attained in order to fly off when the air is less dense due to any combination of temperatures and altitudes above standard sea level conditions.

3. The first and primary decision which must be made concerning a hot weather takeoff is whether your aircraft, *with expert pilot technique,* can become safely airborne. Carefully and precisely compute distance required from the handbook curves. Check the border of the chart to see if the information you are using is flight test or estimated data. Use the selected takeoff curves with the following information:

a. **runway temperature** recorded at the height of the intake ducts of jet aircraft. Insist on *runway* temperature information from aerology since signficant differences will generally exist between runway temps and those normally reported as the daily temperature; *the error is never in favor of the pilot*

b. **pressure altitude**

c. **gross weight** computed accurately since its effect is the greatest single factor affecting runway requirements

d. **effective wind** component of surface wind blowing down the runway. (A 90° crosswind can appreciably increase takeoff distances above that required in calm wind conditions, especially for swept-wing aircraft).

4. When you have determined that the hot runway takeoff is feasible, good pilot technique can facilitate it. As recommendations:

a. start takeoff with maximum possible amount of runway ahead

b. use flaps

c. hold brakes and go to takeoff power before starting roll

d. use rudder for directional control as soon as possible; use brakes an absolute minimum

e. check computed line speed against distance markers and abort promptly if line speed is low

f. have excess flying speed before leaving runway. Do not lift nose of aircraft until close to desired takeoff airspeed and then ease it up slowly to best takeoff angle of attack (too high an angle of attack will result in greatly increased drag and operation in the *region of reverse command*)

g. ease the plane into the air and if airspeed is still marginal, lower the nose to accelerate in level flight or a shallow climb consistent with field obstructions

h. raise gear after becoming solidly airborne when the danger of settling back on to the runway is over. *Do not raise flaps* until sufficient airspeed has been gained to prevent settling.

5. The only basic factor which the pilot can control in determining safe takeoff conditions is the gross weight. This is particularly pertinent to jet aircraft where a reduction in fuel load makes a tremendous difference in gross weight. Remember that high temperatures also mean "short" fuel loads due to fuel expansion — pounds per gallon are down. **When the temperature and altitude are high, plan short hops with lower fuel requirements and decreased gross weight!**

0413. JUNE (alternate): Flight Violations

1. A violation of any established rule invites an accident. **Violations of flying regula-**

tions are generally caused either by a lack of attention or by ignorance of existing directives. The basic reason for air traffic regulations is to provide greater safety.

2. Flight violations should be considered not only as unsafe practices, but also as **a lack of professional pilot ability.** A violation reflects unfavorably on the supervision and training of the pilot concerned, who, by the nature of his duties, must be thoroughly familiar with the written policies of CAA and OpNav, and with the local Station Operations Manual.

3. On an average, 80 allegations are filed against Naval aviators each year. The types of violations are as follows:

a. 26%, careless and/or reckless flying (flathatting, aerobatics in control areas, approaching too closely to other aircraft)

b. 21%, failure to comply with ADIZ and air space restricted area procedures

c. 18%, failure to fly the flight plan as filed and approved

d. 14%, violations of local flying rules

e. 13%, landing or taking off without proper clearance or when the field was below authorized minimums

f. 3%, failure to close out flight plan

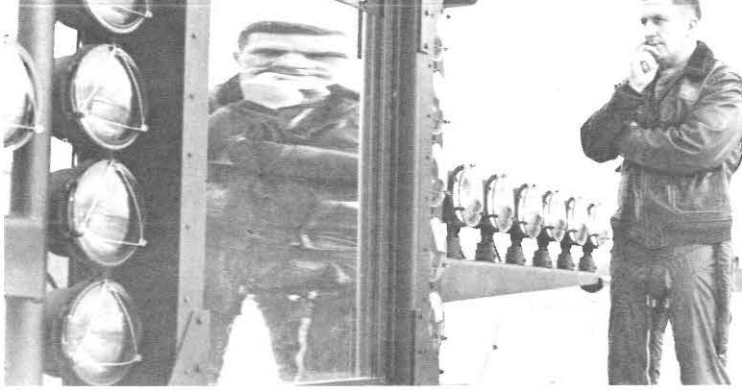
g. 3%, failure to change from VFR to IFR when the situation dictated

h. the remaining 2% involved failure to maintain a continuous listening watch on appropriate radio frequencies and/or make position reports, failure to obtain or comply with ARTC or approach control instructions, landing at an unauthorized airport.

The most common disciplinary measures are letters of censure, unsatisfactory fitness reports and disposition boards with changes of designators and/or loss of pay.

4. Assure in your monthly educational program that all squadron pilots have the required knowledge which will preclude a violation being filed due to ignorance of the following regulations and publications:

Instrument Approach Procedure Charts
Radio Facility Charts and In-flight Data
Supplemental Flight Information Manuals
Naval regulations (the entire 3700 series of OpNav Instructions)



Civil Air Regulations, Part 60
Station Operations Manual

In addition, conduct authoritative and educational discussions of climbout procedures, clearance authority, enroute changes of flight plans, normal and lost communications procedures, limited and modified clearances, ADIZ regulations, local flight rules, availability of GCI and storm warning radar assistance, etc.

5. The problem that constantly exists is two-fold: 1) new pilots are entering the aviation program, and 2) flight regulations are being changed to cope with current aviation needs. Emphasize the seriousness of flight violations; eliminate the careless and *"I didn't know . . ."* violations!

0414. JULY: New Pilot Checkout

1. New pilots coming to your squadron are either newly designated Naval aviators from the training command or more senior officers reporting from other duties which generally haven't provided them much recent experience in your model aircraft. **Close supervision is a requisite during the checkout and familiarization phases.**

2. It should be noted that first-tour pilots (arbitrarily defined as those with less than 800 hours flight experience), as a group, are responsible for *one-third* of all major pilot error accidents. A 1931 report on the analysis of aviation accidents stated: "First tour pilots should take heed not to allow their enthusiasm to carry them beyond their capabilities and should remember that they are undergoing a period of primary education in flying that extends, generally speaking, over a period of at least two years . . . ." This observation is just as true today as it was over twenty-five years ago!

3. The first 150 hours of jet flying in fleet operational aircraft is the most critical

period for first-tour pilots. The occurrence of accidents is greatest in the final phases of individual transition training and the early phases of squadron carrier operations. Specific areas of accident prevention in which first-tour pilots must be instructed include:

a. only the proper combination of speed, power, altitude and attitude will produce an acceptable landing. **They must waveoff for anything less than perfection**

b. avoiding abrupt changes in flight and power plant controls, especially during low altitude operations. **Professional flying demands pre-planned action and smooth application of controls.** A wrapped-up approach and a snappy pull off lead to a sudden ending

c. maintain flying speed at all times. Stalls occur most frequently in banked attitudes of flight as a result of failure of the pilot to appreciate fully the increased stalling speed. **All pilots must be thoroughly familiar with the stall characteristics of the aircraft, and proficient in slow speed flight**

d. anticipation of emergencies and frequent refresher training. **All too frequently a minor emergency situation results in an accident because the pilot failed to utilize the proper emergency procedure in time**

e. extensive indoctrination in aerodynamic fundamentals in order to thoroughly understand performance characteristics of the aircraft, particularly the jet aircraft dangers of slow acceleration and high sink speeds in the landing approaches.

4. The distribution of pilot-error accidents among first-tour and transitional training pilots is in the following approximations:

By Accident Type

Accident Type	Percentage of Accidents
Hard landings	20%
Barrier/barricade crash	20%
Swerve off runway/deck	8%
Stall/spin	8%
Collision with another aircraft	8%
Collision with ground/water	8%
Wheels-up landings	6%
Undershoot	5%
Overshoot	3%
All other types	14%

By Primary Causal Factors

Cause Factor	Percentage of Accidents
Improper level-off in landing	37%
Misjudged distance, altitude, position	10%
Misuse of brakes	10%
Improper response to LSO	8%
Failure to maintain flying speed	8%
Failure to extend landing gear	6%
Misuse of power plant	6%
Failure to see other aircraft	3%
Improper use flight controls	2%
Inadequate flight preparation	2%
Physical state of pilot, failure to compensate for wind, exceeding stress limits, improper fuel management, improper instrument operations, violations of air discipline, exceeding ability or experience, becoming lost, etc.	8%

0415. JULY (alternate): Pre-flight Inspections

1. A number of avoidable aircraft accidents are conceived on the flight line and born

shortly thereafter because of *haste, carelessness or ignorance* on the part of the pilot and/or plane captain during pre-flight inspection. Becoming airborne with the pilot tube covers not removed is one of the most glaring examples of haste and carelessness — few pilots do it twice.

2. **Many pilots do no know what they are looking for on a pre-flight!** They know they should walk around the aircraft, but do they count wingtips or rivet heads? Prepare a pre-flight card, in accordance with the Pilots Handbook and squadron experience, and then have qualified instructors escort the pilots around through a *good* pre-flight.

3. Have the Maintenance Officer review the plane captain's pre- and post-flight forms and conduct instructional sessions for plane crews in the proper performance of their inspections and duties. Don't leave the matter of indoctrination to chance or in the category of incidental learning. Instill this idea: **pre-flight the airplane as if you owned it!**

0416. AUGUST: Heavy Weather Conditions

1. Autumn brings the winds of hurricanes, typhoons, cyclones, williwaws. . . . Examine the hurricane bill for the past season and start a list of items that must be revised. Heavy weather is an all-hands chore, hence all hands must be aware of their individual responsibilities. The monthly safety meetings should feature discussions of the hurricane bill.

2. Preparations are two-fold in nature: evacuation of aircraft, and security of the squadron area. Instructions from your immediate senior authority will guide you in your preparations, but the following items should be included in your squadron doctrine:

a. In the event of an evacuation

(1) determination of the number of aircraft to be evacuated and location of evacuation fields

(2) pre-assignment of pilots and crews (by name) to each aircraft evacuating

(3) preparation of special evacuation flight packet for each aircraft, including best IFR and VFR route plans, purchase forms, DD-175s, etc.

(4) pre-evacuation liaison flights to the designated refuge airfields to determine facilities available and/or unsafe conditions

(5) fly-away kits with chocks, tie-downs, control locks, and other ground handling equipment required to secure aircraft after arrival at refuge field

(6) instructions governing daily routine after arrival at refuge.

b. In the event maximum security without evacuation is ordered determine

(1) hangar space assigned and available for aircraft

(2) tie-down area and availability of extra tie-down cables, spoilers, sand bags, protective covers

(3) assignment of squadron areas by departments responsible for policing and securing

(4) all other measures to be taken to minimize damage from high winds and heavy rains.

0417. AUGUST (alternate): Facilities Survey

1. A facilities survey of the squadron and the supporting station will serve a dual purpose:

a. provide information necessary for drafting squadron safety instructions and a precise pre-accident plan (discussed in Chapter 7), and

b. provide information concerning shortages and/or deficiencies which demand immediate corrective measures via recommendations to the supporting station, the Aviation Safety Council, or the type commander.

The Safety Officer should be the *coordinator* of the squadron efforts in making this survey of the adequacy of facilities, *but squadrons have no jurisdiction in the command functions of the supporting station!* You are **inquiring,** *not* **investigating.** Avoid the "Inspector General" attitude! Your squadron Commanding Officer should make the necessary preliminary arrangements for the survey with appropriate station officers.

2. In preparing a facilities survey check form, the following items should be considered for inclusion:

a. **runways** — lengths and widths, weight limitations, condition of shoulders and overruns, arresting gear, distance markers,

surfacing, approach zones and glide path obstructions, runway and obstruction lighting. . . .

b. **taxiways** — marking, lighting, width, cleaning of foreign objects, obstructions, wing tip clearances, vehicular traffic. . . .

c. **parking areas** — parking density, tie-downs, vehicular traffic, stowage of required auxiliary equipment, fire hazards, clean-up of foreign objects, refueling and reservicing procedures. . . .

d. **operations office** — flight planning facilities, NOTAM files; Operations Duty Officer's scrutiny of clearance forms/flight logs/weight and balance records; facilities or transportation for transient feeding in flight gear; station flying regulations and traffic pattern, field layout display, posting of safety information. . . .

e. **weather office** — understandable briefings, handling of PIREPS and special reports, weather bulletins issued to *inbound* aircraft if changing conditions warrant, runway temperatures, alternate and en route airports included in IFR briefing, aerological officer available for pilot instruction. . . .

f. **crash-fire crews** — proper lifting slings and equipment, knowledge of emergency accesses to aircraft, proper equipment for all types of fires (including dry chemicals for brake fires), communications equipment, ambulance facilities, grid map for crash location and access routes, practice and training schedule. . . .

g. **control tower** — qualification of operators, obstructions to visibility, communications equipment, control of vehicular traffic, availability of emergency operating instructions for pertinent types of aircraft, coordination with runway control and/or watch, crash alarm system, direction finding equipment and lost plane procedures. . . .

h. **aviation equipment** — flight clothing issue, survival equipment inspections, **oxygen systems replenishment in full accordance with all existing directives,** servicing of fire extinguishers. . . .

i. **aviation fuels** — adequate grades clearly identified in refueling trucks or gas pits, observance of precautions in refueling operations, elimination of fire hazards (including operation of aircraft or vehicle engines closer than 50 feet to refueling aircraft). . . .

j. **aircraft operations and instrument approaches** — traffic pattern providing the maximum safety to pilots with a minimum of interference and hazard to civilian populace, GCA utilization and scheduling, adequacy of GCA and instrument letdown minimums, status of GCA and pilot qualifications. . . .

k. **ordnance** — safe loading/unloading area, control of ammunition storage facilities and ready-issue lockers. . . .

C. PARKING AREA (for 16 S2F-1)

1. Area(s) assigned 2 lines west of Hangar 4 (1 bay in hangar)

2. Size of area(s) 200' x 250' Clearances between parked aircraft wings folded - 4' between adjacent prop arcs

3. Number and type of tie downs moored 3/4" cables, occasional eye pads

Spacing of tie downs variable spacing along cables; 60' between cables

4. Parking area surfacing Concrete Condition pitted, chipped, flaking

5. Vehicular traffic in parking area refuelers & oilers, NC-5's, private autos pass within 6' of tails of a/c on back line

Posted speed limits in area none posted. Recommend 5 MPH

Requires corrective action

6. Taxiing clearances 15' each prop tip, wings folded, between lines; 5' each side entering parking spots

7. Markings for parking spots Nose & MLG wheel spots; stbd MLG runner

Danger zones white rectangles under prop arcs, parked posit

3. *Repeating,* the information obtained from a survey is essential to your squadron safety program, *but* most of the items above do come under the command of the station, and you as the squadron safety officer must be diplomatic in announcing any discrepancies you discover! **Tell them to your skipper and let him effect liaison with the station.**

0418. SEPTEMBER: Mid-air Collisions

1. Has the thought ever occurred to you that when you climb into your airplane for a little fancy flying, you're *driving a bullet?* What would happen to you if you scored a bulls-eye? **A mid-air collision can spoil your whole day!**

2. During a 28 month period of 1953-1955, there were 138 mid-air collisions involving naval aviators. Eighty-three percent of these (by count, 115) occurred during formation flying or tactics and gunnery hops. This figures out to be *one mid-air per week.*

Most of the mid-air collisions occur in daylight hours with good visibility. Air space around a naval air station is heavily populated. Rapid closure rates of jet aircraft increases the collision hazard. Under the most favorable conditions with 100% contrast lighting (which usually is not achieved in day-light operations), a jet fighter can be seen at about seven miles and a bomber or large commercial aircraft at about 16 miles *when the pilots are looking in the right direction.*

3. Collision exposure increases:

a. in congested airfield areas

b. when aircraft are maneuvering (climbing, descending or turning)

c. when operating in conjunction with other aircraft (formations, tactics, gunnery).

In the vicinity of airports, pilots are occupied inside the aircraft with checklists and radio transmissions. Visibility is frequently reduced due to smoke or haze and other planes are hard to see, although pilots are usually more *on the ball* and observing.

Maneuvering involves a combination of high speed, changing flight path, moving into blind areas and different climb and descent rates for various types of planes. The solution is the same: **look where you're going and don't point your flying missile in the direction of another airplane.**

Finally, mid-air collisions occur (when two or more planes are operating together) because of the duration of alertness, fatigue, complacency or inattention to other aircraft while observing instrument settings. *Never lose sight of the other planes.* Lead pilots of formation flights must always consider the limitations of the wingmen. Avoid maneuvers beyond their experience level, position them looking away from the sun, observe all squadron formation SOP. **The percentage of fatalities from mid-air collisions is alarmingly high.**

4. Clarification of one point about IFR flight plans will reduce mid-air collision potentials: many pilots do not realize that, when on an IFR flight plan *but* flying through VFR conditions, *Visual Flight Rules apply.* ATC is only concerned with the separation of aircraft when the pilot is flying under instrument weather conditions and cannot see other aircraft. **Under VFR weather conditions, each pilot is on his own, regardless of his type of clearance.**

5. A near miss should be reported on CAB Form 352 (promulgated by OpNav Instruction 3750.10) *and* submitted as an Anymouse. Any reports required by your own command must also be submitted.

0419. SEPTEMBER (alternate): Instrument Flying Techniques

1. The ability to fly instruments *during actual weather* is the most demanding and necessary proficiency needed by a pilot. Proficiency must definitely meet the minimum requirements published in appropriate directives, but more than this, each pilot must be fully capable of safely completing each flight.

Minimum proficiency will not guarantee this objective.

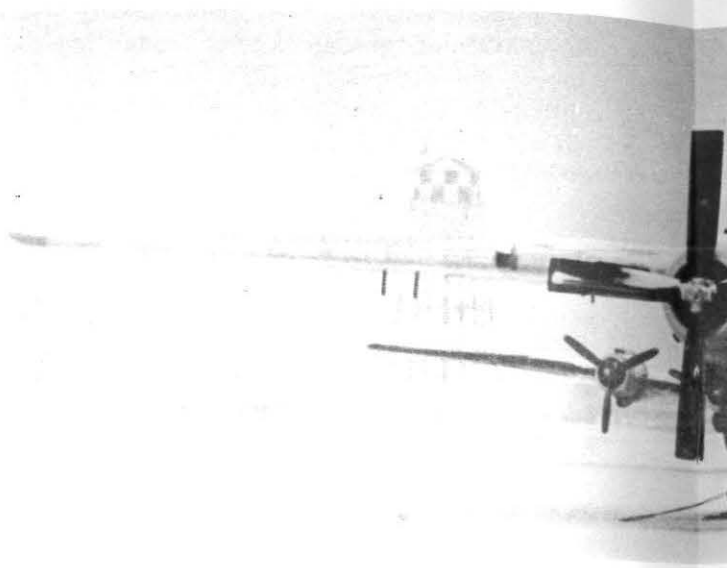
2. The Squadron Instrument Board, appointed by the Commanding Officer, must recognize its prime responsibility for improving the individual pilot training. The program for this month should aim to record a 10% increase in: 1) number of Link hours flown, 2) number of GCA approaches, 3) number of DF steers, and 4) number of letdowns or penetrations accomplished. **In conjunction with this, the board should give spot instrument checks; too often pilots let their proficiency lag throughout the year and then go all out in a short period of time prior to the renewal of their cards.**

3. Make use of *readyroom-hops* where a pilot plans a complete flight and sitting in the readyroom with a member of the instrument board, *flys* the flight, makes all reports, encounters delays and holding, and finally diagrams the letdown for the instrument board member who acts as ATC. This is a fine way of learning standard phraseology and appreciating the emphasis to be placed on radio procedures, flight planning, selection of alternates and altitudes, use of RadFacs. . . .

4. The best source of instrument information is the All-Weather Flight Manual (NavAer 00-80T-37). Use it as your text book. Pilots require motivation to want to learn instrument flying — you can provide it through your selection of posters, announcements in safety bulletins, planning and scheduling so that they get the most out of the training available to them.

0420. OCTOBER: Winter Operational Hazards

1. This program should have been planned during September and ready to go on the first day of October. Break out the winter manuals and hold an inspection of equipment (noting operating condition and/or shortages). List for detailed study all functions connected with winter flying, winterizing equipment, cold weather gear, snow removal machinery, protective clothing, pilot and maintenance personnel reading files for winter operations. . . The best *packages* of cold weather information are Tech Note 88-52 and the annual winter issues of APPROACH.



2. Location in a tropical area does not eliminate the need for winter preparations. Squadrons and/or detachments may be deployed into cold weather zones; point-to-point flights may terminate at snow and ice covered airfields. Maintenance personnel must be indoctrinated in winterization of aircraft which perform these deployments or flights.

3. Suggested topics for lectures and safety meetings include:

a. pilot techniques when landing on snow or ice

b. the heating, anti-icing and de-icing system of your aircraft

c. detecting of and combatting carburetor icing or jet engine icing

d. pre-flight preparations and warm-ups (use of covers, removal of snow/ice/frost, use of safety lines for personnel cleaning wings and tails, engine and cockpit heater operations, control restrictions because of ice deposits. . . .)

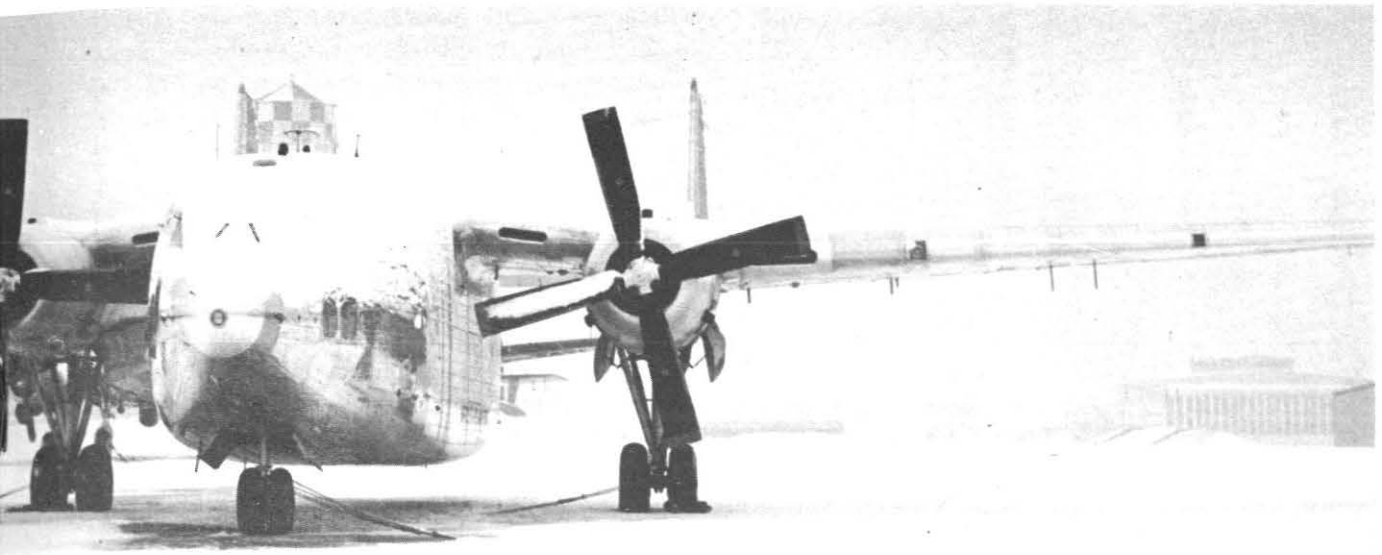
e. post-flight requirements (oil dilution, anti-frost preparations, tie-down. . . .)

f. a complete aerological review of winter climatology, icing conditions, and weather hazards (presented by Aerological Officer's lecture and by adequate reading files)

g. problems of line maintenance in cold weather

h. personal equipment and cold weather survival

i. ground accident hazards (vehicular *and* aircraft).



0421. OCTOBER (alternate): Navigational Aids and Communications

1. It's no secret that there exists a vast government-maintained network to facilitate aerial navigation — it may come as news to your squadron mates as to what this net is capable of and will do for a pilot in the air. In addition to knowing the equipment involved in this network, its limitations and range, it is necessary for pilots to know how to contact these stations.

2. Review at the safety meeting the uses and limitations of:

a. low frequency ranges and homers
b. VOR and VAR equipment
c. localizers and markers
d. VHF/UHF direction finders, DME
e. GCA, ILS
f. TACAN, RACON, YE/YG
g. civil and military ground link-up communications nets
h. GCI, RATCC, Air Defense and storm warning radar installations.

3. To improve air-to-ground radio procedures, emphasis should be made on eliminating unnecessary transmissions: **communications discipline.** Tower, route and emergency frequencies are overburdened. Frequent transmissions are improperly made on the emergency frequencies. Review and *practice* standard approved radio-telephone voice procedures (by practicing reports in the readyroom). Know what needs to be said and say it concisely. Listen for (instead of transmitting a request for) information, especially scheduled weather broadcasts.

4. Control tower personnel may be invited to talk to your squadron on their side of the problem of communication overloads. With the proper approval, schedule your pilots for tower visits — much can be learned by observing in the tower. Establish contact with any local CAA personnel; request them to give your pilots a description of the workings of the network range stations, reporting points, control centers. . . .

0422. NOVEMBER: Search and Rescue Facilities/Procedures

1. Whenever an aircraft is lost, a large organization springs into action to try and locate the missing personnel. This search and rescue net is maintained by the senior commands in your region. Your exposure to it will be from one to two directions: 1) you will be

providing search planes to look for crash survivors, or 2) some of your squadron mates will be down and the organization will be trying to find them. In either case, direction of your efforts will come from the SAR center, but the more your people know about the net and its operations, the better they will be able to facilitate the rescue.

2. The National SAR Plan for the United States and the Command SAR plan for overseas areas are contained in the senior command operations orders and 3130 series Instructions (see OpNav Instruction 3130.1B). Augmenting these instructions is NWP-37. Review these instructions and invite the local SAR Coordinator to address your squadron on the details of the plan for your area.

3. Lost plane procedures should be reviewed — the most successful searches are those where the exact location of the survivors is known. Four *"C's"* procedure should be drilled into the pilots:

Confess that you're lost, in trouble, or need help and do it while the aircraft is still controllable; use emergency IFF

Climb up to an altitude where the emergency IFF can be picked up and triangulated, D/F steers given, and where an ejection or bailout will permit a safe landing under the silk

Communicate on the guard or SAR frequency and contact the stations that can help you. DON'T switch frequencies after original contact unless ordered to do so; much time is lost *chasing* the pilot who switches from channel to channel. Any frequency on which a distress message is transmitted and acknowledged **automatically becomes a distress frequency** — all other persons stay off!

Comply with the instructions given you by a recognized SAR net station. DON'T try to outguess the experts and get yourself really fouled up.

4. The Survival Officer should demonstrate proper use of survival equipment carried by the pilots — how to get the most effective use from lights, flares and mirrors both day and night; use of tracer ammunition; operations of the Gibson Girl and radar reflectors. . . . Set up some blindfold practice sessions so that darkness will not make familiar pieces of equip-

ment seem foreign and strange (see paragraph 0407.1).

0423. NOVEMBER (alternate): Confidential Supplements to Pilots Handbook

1. From the three-combination safe, extract the red covered Supplement to Pilots Handbook for your aircraft. Read the bottom statements on the cover: *"This publication shall not be carried in aircraft on* **combat** *missions or when there is a reasonable chance of its falling into hands of an unfriendly nation. . . ."* On the top of the second page it states that the policy for use of this publication is established in Navy Regs, Art 1509 ("Confidential matter shall be disclosed to persons in the naval service whose official duties require or make advisable such action or when such disclosure is to the best interests of the naval service. . .")

2. What isn't stated (but you **KNOW** it to be true) is that the information in these supplements *is vital to all pilots* immediately after adding power for any takeoff! It *is* in the best interest of the naval service (and his own future) that each pilot know the operating characteristics and limitations of his aircraft! Lock this information up in a safe and it's worthless.

3. Establish a *required reading* program for the confidential supplement. At the safety meetings after the reading sessions, schedule short quizzes (either open or closed book type) on the supplement.

4. Have graphs or more technical aspects of the supplement explained as safety meeting lectures. One hint here: it's sometimes profitable to select the person who knows the least about a subject for which there is a source of printed information and have him research the topic and present the lecture — this subtly forces him to become an expert.

0424. DECEMBER: Cockpit Procedures Standardization

1. Standardization in the business world is a keystone of economical operations; in the military, it provides the leader with absolute knowledge of what a subordinate's reaction will be to a given situation. In the cockpit, it provides advanced information of the action a

co-pilot will take to an order from the pilot. **Lack of standardization will result in a variety of actions to the same command.**

2. The squadron's policy for each anticipated requirement in the cockpit must be set forth at some length in writing. Review the squadron's doctrine during the month's safety meetings until it becomes *standard* practice. Examples of this in single place aircraft are the hand signals to be used in formation flying — imagine the confusion that could result if each lead pilot used his own set of signals and a new wingman dropped the landing gear in response to an unstandardized speedbrake sign.

3. With assistance from the Aviation Safety Committee, develop this theme to cover all *communications* (pilot-to-pilot or pilot-to-crew) that occur during flight. Also include standardized use of checklists, operations of auxiliary equipment, crew duties, manipulation of controls, voice reports, emergency drills and procedures. . . .

0425. DECEMBER (alternate): Anymouse, FUR and Murphy's Law

1. Incident reporting is a vital means of reducing subsequent accident reporting: *a stitch in time* . . . Unfortunately many incidents containing valuable information are unreported. Avenues are available to an *individual* to make such reports, and as the theme of the month, special emphasis should be given to the reporting programs. We must learn from the mistakes of others; we may not live long enough to make them all ourselves.

2. Check to see that Anymouse forms and envelopes are available and posted in conspicuous places. **These forms do not have to be signed or identified in any manner.** When submitted to the Naval Aviation Safety Center, they are reviewed and compared with similar reports and selected ones are published in APPROACH. Also when appropriate, Anymouse reports are forwarded, over the signature of the Director of NASC, to the responsible Bureau or authority for corrective action. Encourage reports of specific situation considered by *any person* to be of potential danger to flight or ground operations.

3. Many safety of flight items and improved design features result from FUR reports submitted by the squadron maintenance departments. The FUR system is not a function of the Naval Aviation Safety Center; it is controlled entirely by BuAer (Aer-MA-61). FUR reports are machine processed and published for all operating commands in the BuAer Reliability Digest. Emphasize the value of submitting these reports, and in gleaning information on your own operations from the Digest.

4. Murphy's Law (as defined in APPROACH magazine) states: *"If an aircraft part can be installed incorrectly, someone will install it that way!"* Any part installed incorrectly may cause a serious accident. For example: cross connection of control cables; improper installation of ejection seat firing mechanisms so that no amount of effort on the pilot's part will fire it; routing of lines or cables causing failure or restriction of operation. . . . Give wide local publicity to all Murphys — report them at Safety Council meetings and notify your type commander and your Tech Rep. A speed letter report to the Naval Aviation Safety Center (with photographs) will enable publication in APPROACH so that all operating personnel are apprised of the dangerous situation and corrective action or design changes can be initiated.

5. **Report an incident** — *prevent an accident.*

CHAPTER FIVE

Aero-Medical Safety

0501. Medical Aspects of Aviation Safety

SUB-SECTION I — PHYSIOLOGICAL

0502. Physical Stresses in Flight
0503. Fatigue
0504. Personal Habits
0505. Illnesses, Drugs and Medications
0506. Sensory Organs, Vertigo and Illusions
0507. Physical Fitness
0508. Survival Training

SUB-SECTION II — PSYCHOLOGICAL

0509. Aviation Psychology
0510. Man-machine Relationship
0511. Accident Proneness vs Exposure
0512. Experience and Knowledge
0513. Psycho-motor Skills and Errors
0514. Attention and Errors of Attention
0515. Perception and Errors of Perception
0516. Judgment and Errors of Judgment
0517. Planning and Discipline
0518. Emotions

SUB-SECTION III — SOCIOLOGICAL

0519. Group Unity
0520. Leadership and Disciplinary Action
0521. Family Problems

SUB-SECTION IV — PATHOLOGICAL

0522. Autopsies

0501. MEDICAL ASPECTS OF AVIATION SAFETY

1. An important phase of an accident prevention program that too often receives little attention is the role of physiology, psychology and sociology in pilot-caused aircraft accidents. **Nearly 65% of all accidents involve pilot factors.** This should convince you that *here* is *the most* profitable area for an accident prevention program! Of course, all accidents can not be explained by the physical or mental "condition" of the pilot, but a large percentage of pilot error accidents could be traced to the physiology of the pilot and/or his psychological behavior.

2. People plus Hardware equals Accidents (P+H=A). With unceasing efforts being made to improve the *hardware,* what can you do about the *people?* You are a Safety Officer, not a psychologist or a doctor; but one member of your squadron has had specific training on the subject of the body and the mind . . . the FLIGHT SURGEON. Make him an active member of your accident prevention team.

3. *This chapter is an outline of what you should know in order to discuss with the Flight Surgeon his contributions to the prevention program.* Get him to lecture, show movies and explain aero-medical topics at safety meeting or training sessions. **Help him become personally acquainted with every member of the squadron.** Aero-medicine has a very personal significance to everyone associated with flight.

4. OpNav Instruction 3740.7 of 25 June 1957 defines the responsibility of Commanding Officers for an effective physical fitness program.

SUB-SECTION I — PHYSIOLOGICAL

0502. PHYSICAL STRESSES IN FLIGHT

1. Physiology of flight involves the multiple stresses imposed on the pilot by modern flying. In order to combat stresses, knowledge of their nature and number is necessary.

Some of the more common stresses are:

a. **exposure to altitude** — hypoxia is the immediate source of some pilot-caused accidents. As extreme altitudes are reached, respiration ceases to be habitual and must become a conscious action. Hyperventilation can then be more dangerous than hypoxia. The formation of nitrogen bubbles in the body (aeroembolism) and the expansion of gases in the intestines, ears and sinuses imposes stresses on personnel which can seriously limit their capabilities or cause acute pains. These stresses have physical causes which can be explained by the Flight Surgeon. He can also recommend actions to take to reduce the seriousness or to eliminate the occurrence.

b. **exposure to acceleration** (*g* forces) — there are four kinds of acceleration that impose stresses on a pilot. (1) Moderate positive *g* lasting for some time, encountered in pulling out of a dive or making a steeply banked turn, causing the blood to be pooled into the lower portion of the body. (2) High *g* of short duration, as in the firing of an ejection seat; a threat to the body's skeletal system. Incorrect body positioning to receive this *g* load can result in spinal injuries. (3) Sudden forward deceleration encountered in crash landings. To prevent smashing into the instrument panel, the use of proper restraining harness and protective equipment is necessary. (4) Tangential *g* of short radius, encountered in tumbling and buffeting generally associated with a high altitude bailout.

c. **exposure to noise and vibration** — this is a physiological and psychological fatigue factor. Research indicates a noise level of 116 decibles sustained for a period of six hours on eight successive days might be sufficient to cause irreparable hearing loss. Training films available on the *"Medical Aspects of High Intensity Noise"* are MN 9318 a and b. From evidence available, it does not appear that any permanent injury results from vibration patterns present in aircraft, although there is no doubt that vibration contributes to fatigue.

d. **exposure to toxic gases** — there is little need to alert pilots to the danger of carbon monoxide — they know that it can kill them. There *is* a need for them to be able to recognize the early symptoms of this poisoning, and to know that repeated small (non-fatal) doses are *accumulative*. It takes hours to eliminate CO from the body. A small amount of CO added to a slight hypoxic condition can result in the pilot becoming incapacitated more rapidly than from either condition alone.

There is also the need for flying personnel to be able to recognize other poisonous fumes which may be present in aircraft: aviation fuels, alcohols, gunsmoke, carbon dioxide, aldehydes, hydrocarbons and esters. At least one fatality has been traced to ester fumes released by high temperature cracking of engine oil when lubrication of the main bearing of a jet engine failed. Diluter-demand oxygen systems can permit safe breathing in the presence of toxic gases *only* if set on 100% oxygen or emergency pressure.

e. **exposure to temperature extremes** — high temperatures are fatiguing and can cause fainting. Manning an aircraft which has been parked in the summer sun can expose the crew to temperatures up to 120°F until airborne. Low temperatures prevent efficient operations. The Flight Surgeon can explain the reaction of the body to temperature stresses, the effect on flight performance, and the requirement for proper clothing including the necessity for exposure suits.

f. **visual interference stress** — this is generally built-in as a characteristic of the aircraft. However, dirty canopies, inoperative illumination equipment and to some extent, sun glare can be corrected by the pilot. Since the eyes are undoubtedly the most important sensory organ used in flying, a Flight Surgeon's lecture which provides a more thorough understanding of the eye can help avoid or reduce visual stress. Regular night vision training is essential for all flying personnel.

They should be informed on the relative effects of hypoxia, carbon monoxide (including cigarette smoke) and extraneous lighting on night vision. *All* red lights do not provide dark adaptation, and colors other than red are practically worthless. Line and flight deck personnel need to be told the facts on night vision; it is senseless for pilots to sit under red lighting for 1 to 2 hours during briefing only to have non-flying personnel use a white light around them just before takeoff.

0503. FATIGUE

1. This is a self-induced stress that is complained of most frequently and is the least understood. It comes in two varieties: *active* and *static*. Active fatigue follows exercise, which in moderation provides a pleasant feeling of general well-being and lethargy conducive to sleep. **Static fatigue is more common, more insidious and has a specific effect on mental processes which active fatigue does not produce.** Principal causes of static fatigue are boredom, prolonged concentration, attention to detail (especially when associated with great responsibility or apprehension) and sitting in one place for a prolonged time. Static fatigue is magnified by physical stresses of cold, vibration, noise, acceleration, hypoxia and sun glare.

2. The greatest effect of static fatigue is on the mental processes and leads to stupid *little* mistakes quite inexplicable to a man who is not fatigued. These *little* mistakes can cause *big* accidents!

3. Preventive factors of fatigue include good physical and mental health, adequate exercise and rest, moderation in use of tobacco and alcohol, and a healthful diet. One system of combating the onset of fatigue is in-flight exercise of antagonistic muscle groups. Everyone is capable learning this system — the Flight Surgeon can explain and demonstrate it.

0504. PERSONAL HABITS

1. How an aviator lives can very definitely influence how he dies — a crash victim at 22 or from over-indulgence at 102. **Personal habits are personal as long as they are not detrimental to the squadron's accident rate.** The pilots' personal habits that may affect aviation safety are: eating, sleep, recreation, use of alcohol and use of tobacco. Chronic carelessness, immature judgment, emotional instability and other characteristics may have specific application to some individuals in your squadron, but are not general to all.

2. **Food and diet.** We'll all agree a "secretary's breakfast" of a cup of coffee and a cigarette is bad — and a "farmer's breakfast" might be a little heavy for an aviator. But someplace in between is the optimum. The point to make is that **no one should fly when not properly fed!** This is determined by blood sugar figures that require the expert explana-

tion of your Flight Surgeon. An everyday diet must contain a balance of all the necessary food elements. A flight should not be started by a hungry pilot.

To lift a slogan from the BSA handbook, "Eat to live, don't live to eat." Losing excess weight is feasible, but preventing weight gain is easier. **The cause of obesity under all circumstances is excessive caloric intake!** Summing up, you've got to eat properly to be fit to fly. Pilots expend tremendous amounts of energy in flight, especially if the ride gets a little hairy. But fat on the waistline can be troublesome at altitudes and be the cause of other physical stresses. The Flight Surgeon will not consider himself overworked and underpaid just because you ask him to personally interview over-weight pilots and aircrewmen for the purpose of suggesting proper eating habits.

3. **Sleep.** There's no precise answer in hours — individuals differ in their requirements, but in general, 8 hours sleep a night is an acceptable figure. The important fact is that each individual should get the amount *he* requires. **Inadequate sleep makes any task more difficult.** The longer the interval between awakening and the start of a task, the earlier the onset of fatigue. People who have been kept awake for long periods (3 to 4 days) demonstrate very little real deterioration of most body functions, but there is a marked effect on their mental ability. Loss of memory, inability to concentrate, irritability, hallucinations and delusions occur. The loss of memory includes events that occurred *only a few minutes before.* Even a slight lack of sleep — four hours during the night instead of eight — lowers a man's tolerance to altitude and induces a significant mental impairment.

4. **Recreation.** "Play" periods enhance subsequent work periods as per the old adage about "Jack, the dull boy." Recreation should be planned for two purposes: (1) to divert the mind and (2) to provide physical activity for the body. Flying is a sedentary occupation that requires numerous minute decisions. The relaxation from flying should approach the opposite; something active like swimming, golf, woodworking, or even walking — diversions that do not require great mental activity. Stamp collecting is a fine hobby, but not recommended for Naval aviators.

5. **Use of alcohol.** A blood concentration of 0.05% alcohol is usually produced by two ounces of whiskey. **Even this small a concentration has a definite effect on the higher mental faculties.** Anyone with the maturity of a pilot knows about the effects of alcohol. Not always appreciated are the facts that 1) alcohol works like an oxygen deficiency, 2) it is a depressant *vice* a stimulant, 3) it impairs judgment and 4) it provides release from normal inhibitions. **The person who is doing the drinking is the worst judge of its effects upon himself and his fitness to fly.** Ask the Flight Surgeon to set up guide-line figures on *how much/how long* before flight time is reason to stay on the deck.

6. **Use of Tobacco.** Two principal active ingredients of tobacco smoke are nicotine, and carbon monoxide. Nicotine absorbed into the body has multiple effects, chief of which are a rise in pulse rate, a rise in blood pressure, and a decrease in the amount of blood flowing to the skin of the hands and feet. To overcome these effects, the heart is forced to work harder. It is usually assumed that if the smoke is not inhaled, nicotine will not be absorbed. **WRONG!** Absorption occurs through the mucous membrane lining of the mouth and tongue, and 2/3 of the nicotine absorbed in an inhaled puff of smoke is absorbed via the mouth tissues.

Carbon monoxide present in cigarette smoke runs 1.0 to 2.5%, and 5 to 8% in cigar smoke. Any carbon monoxide inhaled into the lungs combines with the hemoglobin of the blood and reduces its oxygen carrying capacity. A moderate to heavy smoker who gets 10% of his hemoglobin combined with carbon monoxide

by puffing three cigarettes in the ready room during the half hour before a hop is in the same condition as a non-smoker flying at 12,000 feet without oxygen equipment. That's a real handicap to give yourself when you walk out to fly — **hypoxia in the traffic pattern!**

0505. ILLNESSES, DRUGS AND MEDICATIONS

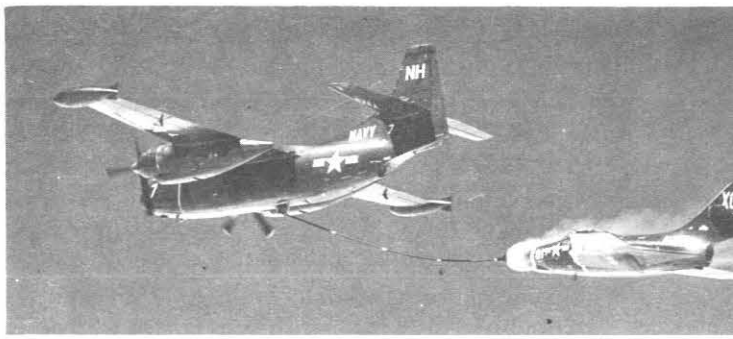
1. Remember the old adage: "The man who treats himself has a *fool* for his doctor?" Do your pilots see the Flight Surgeon when they have only a *slight* cold? Or do they grab a handful of antihistamines, unaware of their associated effects? The *reason* the Navy *keeps* Flight Surgeons on duty in peacetime is to help you *stay alive.* **Your Flight Surgeon is as much a member of your squadron as the Exec.** If everyone in the squadron knows the Doctor, and if the Doctor knows the squadron personnel, *little* illnesses that might otherwise go unattended right into an accident may be caught in time to help keep the "pilot/other personnel error" accidents down to zero.

2. Self-medication of any unprescribed drug commonly found in a bathroom medicine cabinet should *not* be indulged in before flying. This includes the easily obtained antihistamines, sulfas, nose drops, anti-biotics, barbiturates, laxatives or diarrhea mixes, and benzadrines (used either to stay awake or curb appetite). When new drugs receive popular acclaim in periodicals, it is absolutely necessary that all flying personnel be thoroughly indoctrinated with respect to their use. Schedule the Flight Surgeon to discuss their effects immediately!

An aspirin taken for a headache may relieve the pain, *but not the cause.* Your Flight Surgeon will never regard any symptom you have as too trivial for investigation — his responsibility is to keep you healthy, fit for flying and in the best condition to avoid accidents! That's his business and he's the "Old Pro." Don't be a dope and dope yourself!

0506. SENSORY ORGANS, VERTIGO AND ILLUSIONS

1. Knowledge of the organs of sight, hearing, touch and smell has real value in preventing accidents. Pilots are frequently forced to *fly blind* but no blind man has ever qualified



as a pilot. However, at high altitudes, pilots suffer from a sort of optical self-hypnosis (empty field myopia) wherein the eyes, with nothing to look at but sky, become glazed and fix on a focal point only three feet away. This increases the mid-air collision possibility.

The ear houses both hearing and balance senses. Two sets of organs in the inner ear play an important part in equilibrium; the *otolith* organs sense the direction of gravity and the *semicircular canals* sense rotational movement. **More flying hours are lost because of ear trouble than for any other single factor in aviation medicine.**

The tension of the muscles, position of the joints, and skin pressures assist in determining a person's position within a frame of reference, as well as any motion with respect to the reference frame. This is called *kinesthetic sense.* However, compared to the eyes and equilibrium senses, kinesthetic sense plays a very small part in flying an aircraft — the seat of the pants method is *passe'*.

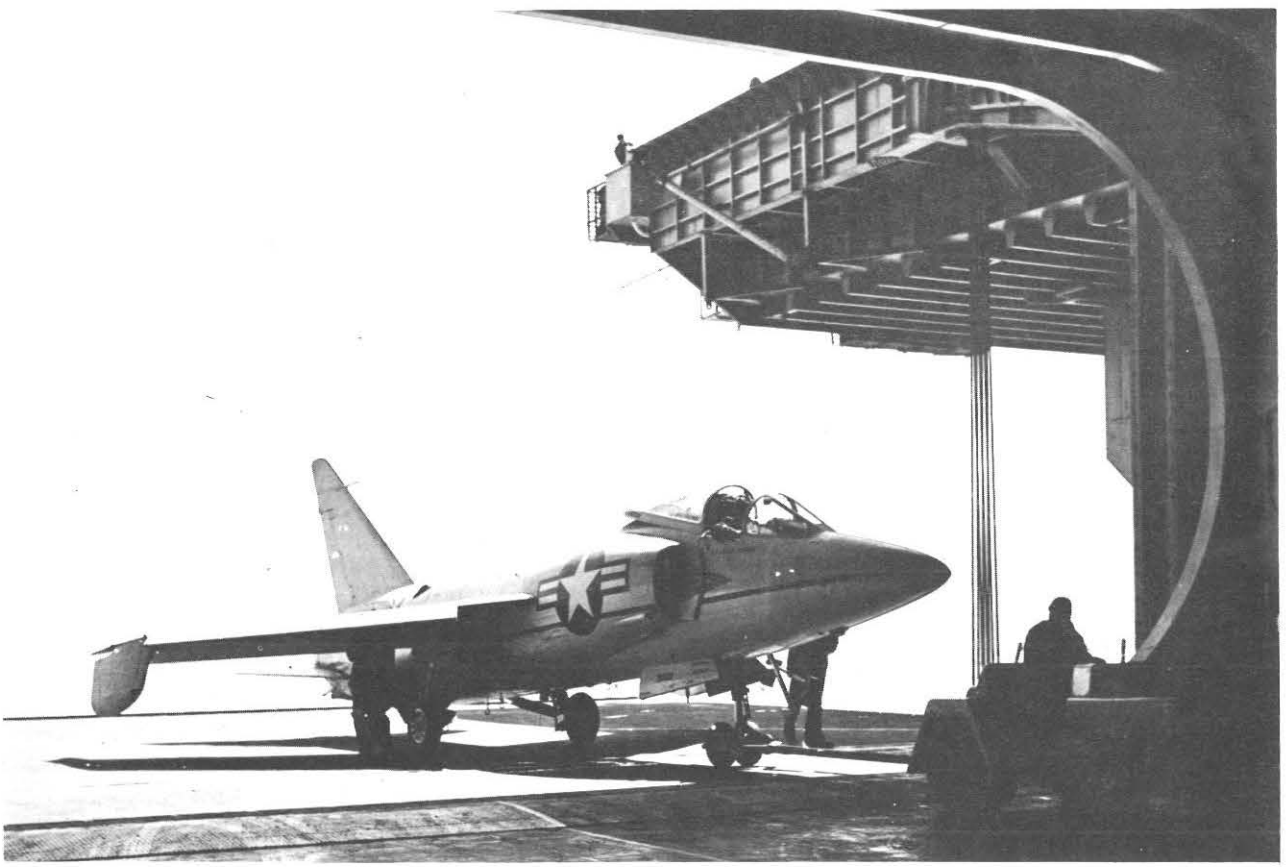
2. A person with his feet on the ground generally knows where he is and which way is up. Put him in an aircraft in flight and he is out of his natural element and can become confused. *Vertigo* is a state of disorientation. Any time you think your position or motion in space is different from what it actually is, you have vertigo. You get it for one of two reasons: 1) your senses play tricks on you and give your brain incorrect or conflicting information, or 2) your senses give your brain information but your brain interprets that information incorrectly. **Vertigo usually occurs when visibility is restricted; the eyes aren't able to orient you in space.** Any normal person will experience vertigo when the conditions are right.

3. Emotional upset and the stresses of flight (fatigue, noise, etc.) increase susceptibility to vertigo and illusions. Actually, experiencing vertigo is relatively a rare sensation *and this can be disadvantageous.* **The only way to get through an illusionary session is to ignore it and confidently fly the dials; the feeling won't last long.** But this is something that must be learned and a couple of *practice* vertigo illusions under favorable conditions might help in handling the real situation, avoid a feeling of panic, and eliminate the graveyard spiral type accident.

4. With a few tricks of his trade, your Flight Surgeon can actually produce vertigo in the pilots while they are sitting in the ready room. A simple vertigo training device which can be profitably utilized can be constructed from a free swiveling chair, a bulls-eye target and a mock control stick mounting a penlight on top. The trainee sits in the swivel chair, puts his head over onto his shoulder, closes his eyes and is revolved approximately ten turns by the demonstrator. He is stopped, facing the bulkhead on which is mounted a large bulls-eye target, three feet above the deck and about five feet from the chair. Immediately in front of the trainee is the "control stick", a two foot section of a broom handle which is pivoted at the bottom to provide the range of movement found in an aircraft control stick. Secured horizontally on the top of the stick, pointing in the general direction of the target, is the spot-beam penlight.

The trainee's instructions are to open his eyes when the demonstrator stops revolving the chair, reach out and grasp the control stick and hold the spotlight steady on the bullseye.

The trainee will experience vertigo, will have difficulty in directing his hand to the control stick (the direction of error dependent upon the direction of revolving), but with conscious effort should be able to hold the beam of light on the bullseye until the feeling of vertigo has passed. **The important lessons are: 1) he can do it, and 2) the feeling is transient.**



0507. PHYSICAL FITNESS

1. On this controversial subject, you may really lose friends in your outfit. **But it just isn't acceptable for people to be flying costly airplanes if they aren't physically fit!** And let's face it, they won't stay physically fit if someone in authority doesn't force them to! The answer: physical training: supervised exercise! Probably the easiest to administer — one which requires no equipment — is "Double-time, March!" A ten minute squadron run on the ramp may be scheduled at a convenient time each day.

2. Exercise should be taken regularly in amounts suited to one's physique. The individual who walks two brisk miles a day is probably in far better physical shape for flying duties than one who plays a couple of games of handball once a week. **It has been proven that regular, moderate exercise is a valuable method of combating mental fatigue associated with long flights.**

3. With the Flight Surgeon to assist you, request the Commanding Officer to order a compulsory physical training program (which should be administered by the Survival Officer or Welfare and Rec Officer). Your CO must do more than simply order the program — he must *actively participate* in it as the leader. **It's a cold hard fact — the better the physical conditioning of the pilots and crewmen, the better their performance in driving the airplanes!**

0508. SURVIVAL TRAINING

1. There are specific areas of knowledge required to improve the chances of survival after a bailout or forced landing. However, by helping the Survival Officer sell his program, he'll be helping you promote better physical fitness for fliers.

SUB-SECTION II — PSYCHOLOGICAL

0509. AVIATION PSYCHOLOGY

1. People design, construct, maintain and fly airplanes. Psychologists study people. It is a natural step to realize that some of the keys to aviation safety can be found in a study of psychology. What is psychology? It is the *science* of human behavior; the study of relationships between the human and his environment.

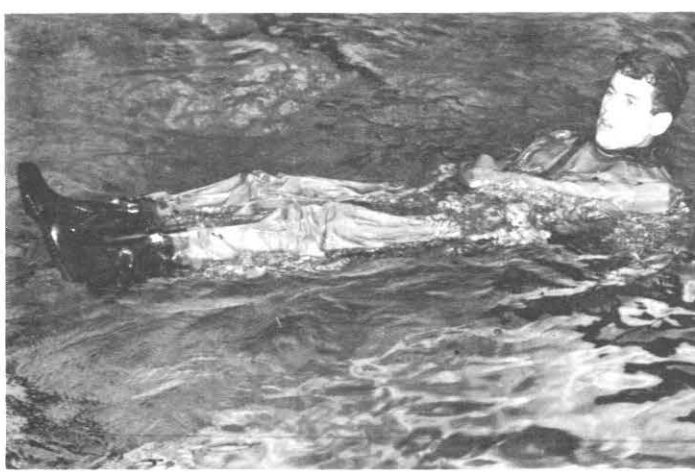
2. Aviation psychology studies the adjustment of pilots to the special and highly complex environment of the airplane. When that environment is capable of moving at Mach 1.0 and at high altitudes, the adjustments which the pilot must make begin to reach his limits of performance and can be the cause or contributing factor of accidents.

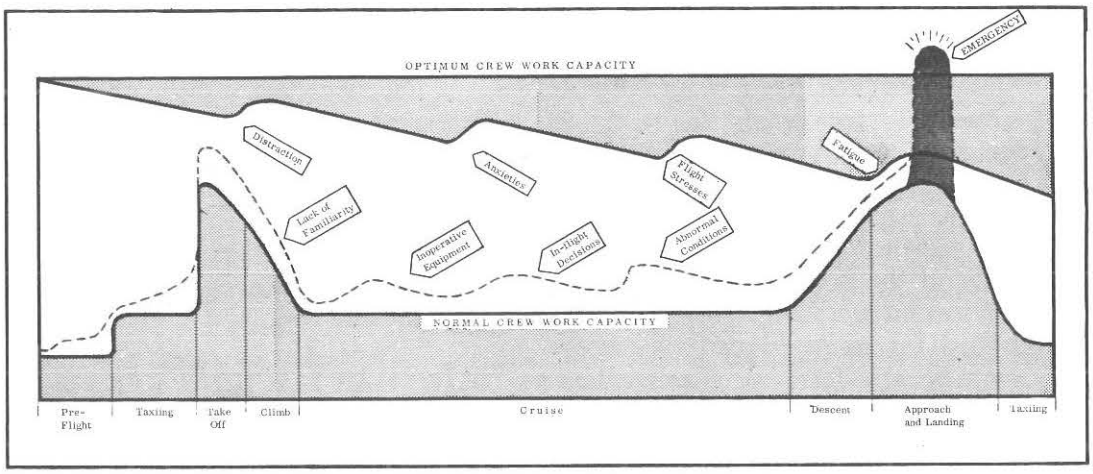
0510. MAN-MACHINE RELATIONSHIP

1. Accidents result from inadequacies in the airplane, its design, its structure or its condition of maintenance. They also result from inadequacies in the pilot, his skills and knowledge, his inherent or temporary capabilities or mental state, or some abnormal behavior. They may also result from inadequacies in the man-machine relationship.

2. The basic reason for a pilot in an airplane is that he acts as a highly complex *computer* which can do a better job than any *black box* as yet designed. He possesses flexibility which cannot be built into a machine. Man's memory permits him to make decisions and therein he excells a machine.

3. A man is a poor monitor of a machine. This is equally true of a pilot riding along on the auto pilot, a radar or ECM operator watching a scope, or a wheels-watch during periods of inactivity in the landing pattern — *it's hard to stay awake.* Automation produces boredom in the human monitor. **Lack of alertness will cause an accident in any moving situation.**





0511. ACCIDENT PRONENESS VERSUS EXPOSURE

1. Even though some people have repeated accidents, clinical evidence proves that accidents recur to individuals because of traits such as carelessness, slowness, ignorance, exposure to dangerous situations, etc., *but* that a common trait of "accident proneness" *does not* exist!

2. Accidents don't just happen—they're caused. There are high exposure areas where a pilot's behavior can cause them more easily than in other or safer situations. Where do most pilot caused accidents occur?—**in the landing of the airplane.** And yet the landing phase is only a very small portion of the total time of the flight.

3. Some of the factors of accident exposure while flying are:

hours per flight
landings per flight
mission of flight
weather conditions
type aircraft
visibility (day and night)
physical condition of pilot
terrain in the vicinity of flight
available communications and navigation facilities
status of maintenance
age and experience of pilot
air traffic density or local flight rules

Recognition of your own local exposure factors and elimination of hazards peculiar to them is the essence of an accident prevention program.

0512. EXPERIENCE AND KNOWLEDGE

1. Lack of experience is a basic accident cause. This lack can be occasioned by deficiencies in training, being confronted with an entirely new situation, or being in a different environment such as a new model airplane. **Pilots who do not have a thorough understanding of the equipment they are required to operate are potential accidents.** Inadequate transitional training can cause an increase in human error accidents. The "safest" pilots are those who fly frequently, but in only one model airplane in which they are currently qualified. Pilots with administrative assignments which permit only minimum "maintenance of proficiency" flying time are generally lacking in *recent* experience.

2. As a pilot grows older, the effects of age are generally two-fold: 1) the slowing down of perceptual-motor skills, and 2) the decline in perceptual speed. However, these are generally compensated for by an increase in knowledge. Greatest physical declines with age (after the age of 25) occur first in strength and endurance and next in vision.

0513. PSYCHO-MOTOR SKILLS AND ERRORS

1. Psycho-motor skills are learned or acquired movements. They generally become a habitual action. Proficiency is measurable by speed, accuracy, strength and coordination in accomplishment of the act. Maneuvering an airplane is a psycho-motor skill, and accidents result from *psycho-motor errors.*

2. These errors are largely due to a

person's tendency to behave in habit *patterns*. If fatigue is present, the errors are compounded. Some of the more common psychomotor errors are:

a. **confusion error** — habit interference when old habits interfere with new ones. (Habits permit a pilot to do several things at once if all but one of these actions are habitual.)

b. **adjustment errors** — the degree and accuracy of a movement is impaired by hurry, stress or a non-functional arrangement of controls

c. **forgetting errors** — if a pattern of movements is habitual, an interruption of a *partially completed* pattern can cause a person **to forget and fail to complete the pattern.** He remembers starting the activity and *believes* he has completed the entire pattern. (Recognize this as the reason for pilot-induced, unintentional wheels-up landings?)

d. **reversal errors** — operating a control in the wrong direction or operating the wrong control because of a relocation of the desired control after the habit pattern has been established.

3. Speed in accomplishment of the skill or act requires two definite periods of time: 1) reaction time during which a pilot is stimulated, makes a decision and commences a response, and 2) movement time which depends on the extent and direction of movement and the part of the body required to move. Movements toward and near the body are faster and more accurate. Movements of the hand to the side or behind the body are relatively slow and inaccurate. Accuracy depends on position and direction of movement. Strength is of lesser importance to the control of an aircraft, but coordination (the skilled movements of more than one muscle or section of the body) is of paramount importance.

0514. ATTENTION AND ERRORS OF ATTENTION

1. A variety of stimuli surround and impinge upon you at all times. *Attention* is selecting one stimulus and ignoring all others. General muscular tension is necessary for an individual to be alert and attentive. It requires specific focusing of the sense organs and creating a readiness of the mind — a *re-organization* of the brain.

2. There are three types of attention:

a. **voluntary** — always of relatively short duration and limited to a single stimulus. A pilot can be voluntarily attentive to only one stimulus at a time, but that stimulus can be a complex pattern of movements

b. **involuntary** — you are *forced* to heed a stimulus because of loud noise, large size, changing position or color (the criteria for determining the effectiveness of a warning device), or an appeal to basic appetites, biological drives or social motives

c. **habitual** — the learned processes of paying attention. This is more commonplace than voluntary or involuntary and is the most important type while flying an airplane. Habitual attention permits the movement of controls, scanning instruments, and listening to radio transmissions simultaneously.

3. *Errors* of attention are generally of three types:

a. **"inattention"** — which is a misleading term because if you're awake, you're paying attention to something, although it may not be the situation at hand

b. **distraction** — when your attention is forcibly diverted to something not associated with what you're doing

c. **fascination** (or fixation) — which is a condition wherein the pilot fails to respond adequately to a clearly defined stimulus in spite of the fact that all of the necessary clues or cues are present and the response is well known to the pilot. Because of overtenseness, fear, preoccupation or fatigue, a pilot sometimes fixates on one instrument of the panel during instrument flight. Correction is relatively simple — shift attention to something else and reduce the tension. Collision with gunnery targets is frequently the result of fixation (due to tension) which might be reduced if the techniques of gunnery training were emphasized and results were made of lesser importance.

0515. PERCEPTION AND ERRORS OF PERCEPTION

1. The process of giving organization and meaning to a pattern of stimuli is perception. By interpreting and giving meaning, the *whole* is equal to *more* than the sum of all of the *parts*. An example of this is Morse code — if you can read the code, you perceive a message instead of a series of *dits and das*.

2. The four categories of perception are:

a. objects in the environment, apparent to the sensory organs, whose meaning depends on a person's past experiences

b. spatial relationship of one object to another

c. perception of movement

d. perception of time.

3. Perceptual errors which can cause accidents are: inadequate stimulation, confusion or false recognition when the differences between stimuli are not great; and illusions which are distortions or misinterpretations of the stimulating cue. **Failure to perceive closing rates and sink speeds accounts for many landing accidents.**

0516. JUDGMENT AND ERRORS OF JUDGMENT

1. Accident reports repeatedly use the phrase: *the cause of the accident was an error in judgment*. What is judgment? **It is making a decision and taking appropriate action based upon the decision.** There are three elements in judgment: 1) ability for intellectual reasoning, 2) knowledge upon which to base the decision, and 3) motivation to make the decision. Excessive motivation can also distort judgment (i.e., the pilot with *destination-fixation* or *get-home-itis* that cracks up enroute has committed an error in judgment). A nebulous point which is sometimes hard to determine is: did the pilot make an error of judgment or an error of perception?

2. **A *wrong* or a *too late* decision is always an error of judgment.**

0517. PLANNING AND DISCIPLINE

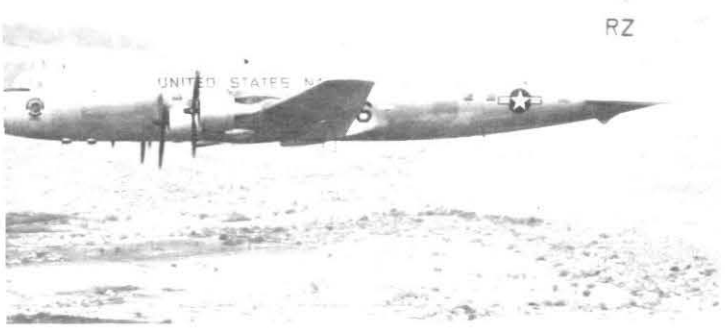
1. Planning is the preparation of a *series of decisions* in advance. It can also be considered as an elaborate pattern of judgments. Both routine and emergency planning are much required in flying high speed, high performance aircraft.

2. Discipline is accepting implicitly the *decisions made by seniors*. This frequently requires unthinking action on the part of the individual. Such automatic decisions and actions are extremely important in aircraft emergency situations.

0518. EMOTIONS

1. Emotions play an important part in everyday life — they grow up with the individual. Physiologically, emotions stir up the body and causes certain reorganizations to take place. The more *gentle* emotions generally do not figure in aircraft accidents. The violent emotions (fear, anger, hate, etc.) prepare the body for increased efforts. Extra energy, endurance and strength is unleashed. The autonomic (*automatic*) nervous system takes charge; large muscles prepare to flee or fight and the small muscles, which facilitate skills such as flying, have their coordination reduced and hence movements become jerky.

2. There is no evidence to prove that thought processes speed up during periods of high emotions. However, there is a decrease in perception including sensations of pain or fatigue. The sensory organs narrow their range of perception and attention is focused to such an extent that poor judgment is the frequent result. A fatigued person is more susceptible to emotional behavior.



SUB-SECTION III — SOCIOLOGICAL

0519. GROUP UNITY

1. The squadron safety record is a group record, hence the safety effort must be a group effort. When new personnel report into the squadron, there is an adjustment period until they gain the acceptance of the group and feel that the squadron is *their* unit. This is equally as true of a new enlisted man as a new pilot. Anything your unit can do to shorten the acceptance period increases efficiency and reduces the possibility of personnel type accidents *to* or *by* the new member. A dangerous situation can develop if factions or cliques spring up within an organization.

2. Every unit is made up of individuals, but in the *safe* squadron, individualism is subordinated to the group. There must be strict acceptance of Standard Operating Procedures. If the reasoning behind the SOP is understood, individual variations will be curbed. *They must be!* Individual infractions should be recorded to eliminate potential personal accident trends (see paragraph 0105.3).

0520. LEADERSHIP AND DISCIPLINARY ACTION

1. Leadership is a requirement in any group. In military groups, the leader is assigned by seniority. Enough has been published on this subject to eliminate repeating the leader's qualities — this point only: **a squadron's safety record reflects directly the squadron commander's interest and attitude toward safety!** If your skipper is interested in a good safety record (and he *is*) everyone in the unit will become aware of his interest and assist in promoting safety. Your job then is to *invite* the skipper's attention to breaches of safe procedure. Remember, accident causes include "error of supervisory personnel." You can do much to eliminate supervisory personnel error accidents. There is no vision like super*vision!*

2. **Accidents due to negligence, deliberate violations of sound practice or doctrine, and lack of proper supervision can be minimized by the squadron commander insisting upon highest standards of performance and promptly applying adequate disciplinary measures when such standards are not met.** There is unfortunately a history of reluctance on the part of squadron commanders to utilize the powerful deterrent effect of disciplinary action.

0521. FAMILY PROBLEMS

1. It's easy to preach *don't fly when you have family worries* — it's harder to practice this doctrine. This much can be done: instill in all squadron personnel the desirability of being **grounded during periods of mental**

stress. Publicize the channels to go through when requesting temporary grounding, and emphasize that everyone in these channels is vitally interested in the *pilot's* welfare. Family problems may be bad, but not nearly as disastrous as they would be if worry, anxiety, or frustration caused a crippling or fatal accident to the head of the family. Let it be well known that the Safety Officer, the Operations Officer, the Executive and Commanding Officers or the Flight Surgeon can be approached *confidentially* for help in solving personal problems — and when it is in the best interest of the person, he will be left off the flight schedule until such time as he can devote his whole mind to the business of flying the airplane!

2. Squadron wives will be 100% in back of your safety program. They spend twice as much time with your squadron mates as you do — if you can assign the wives a specific safety topic to promote, you can reasonably expect *"hubby"* will learn the lesson. Through the media of informal talks at wives luncheons, form letters mailed to the wives, Ladies Day at the squadron, etc., you can enlist their sympathetic aid in elimination of family worries that are distracting to your aviation personnel. Obtain the approval of your Commanding Officer for any *wives-supporting-safety* program you contemplate.

SUB-SECTION IV — PATHOLOGICAL

0522. AUTOPSIES

1. Even with the best prevention program, there will continue to be fatal accidents. Much time and talent will go into the investigation of the wreckage to determine the cause and isolate the mechanical factors. Unfortunately, and far too often, crash evidence is buried with the remains of the pilot and the *true* cause of the accident is in reality "undetermined."

2. The Navy Department is attempting to promulgate an order requiring autopsies in all fatal accidents. Commanding Officers have been reluctant to order them under the provisions of paragraph 0725 of Naval Regulations, due in part to a misconception of the visible evidence of an autopsy on the body of the deceased. Yet during a routine embalming, the undertaker may remove more from a cadaver than a pathologist needs for his examination. The Armed Forces Institute of Pathology brochure entitled *The Autopsy* pictures the specimens needed to determine the *true* (vice the *apparent*) cause of death.

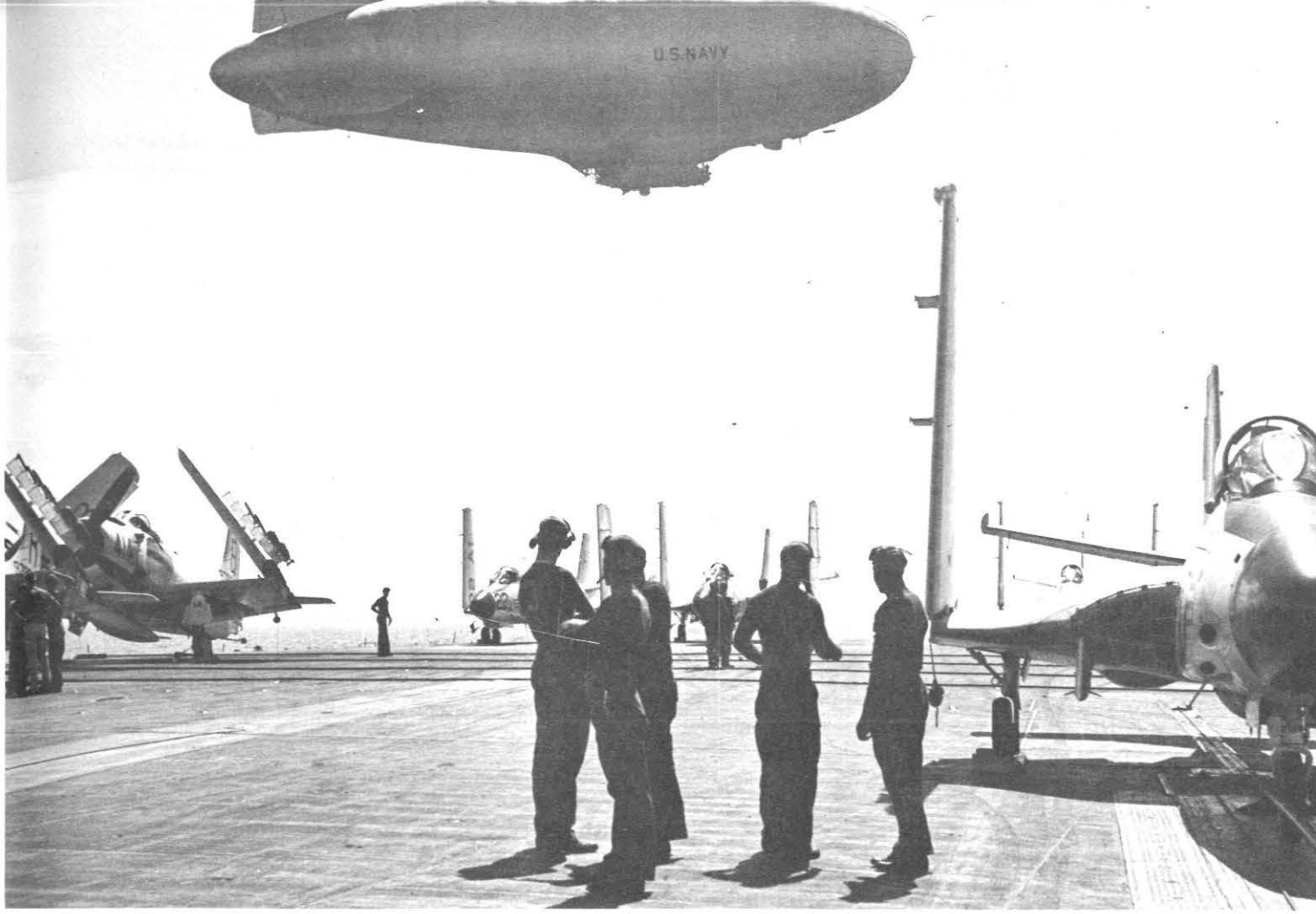
3. Your Flight Surgeon is not a pathologist capable of performing an autopsy, but he has the forms which require the CO's signature in ordering the examination to be made. Further, he knows what tissues and specimens to forward to a laboratory for the examination. Finally, he can discuss autopsies with the flying personnel of your command and enlist their aid in exploring this neglected frontier of accident investigation. **An autopsy can produce evidence which is unforeseen and unsuspected.**

4. The Flight Surgeon should have a crash kit containing all of the utensils and clearance forms for immediately collecting pathological samples. He should have the address of the nearest pathological lab (generally a Public Health Hospital), and know the proper means of packaging specimens for shipment.

5. Each pilot has filled in a Confidential data sheet which is to be opened in the event of his death. Urge all flying personnel to indicate in this letter that they, while alive, are agreeable (or not agreeable) to an autopsy in the event they are killed in a crash. This *will not* meet the legal requirements for performing an autopsy, or preclude the Commanding Officer from ordering the examination, but may be of assistance in overcoming the resistance to autopsies.

CHAPTER SIX

Maintenance Safety



0601. BASIC REQUIREMENT

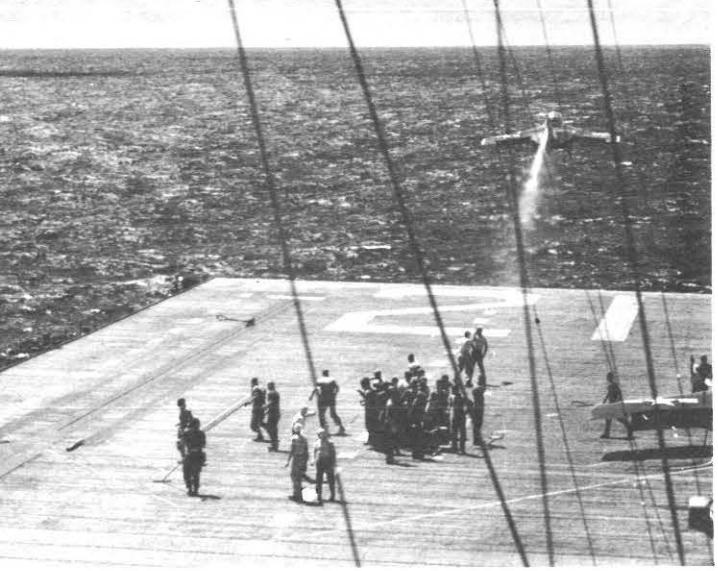
1. Safety in maintenance must be an *everyday, all hands* effort to prevent accidents or incidents. It depends upon a multitude of closely related factors: organization, personnel, training, equipment, intra-unit communications and logistic support. There is a constant requirement for dissemination of information, compliance with directives and adherence to promulgated safety precautions. This requires the cooperation of everyone in your organization from the newest apprentice airman to the commanding officer!

2. **Material failure** is the primary cause of *one-fourth* of all major aircraft accidents. **Maintenance personnel error** accounts for an additional 2½%.

3. In fiscal year 1956, 228 aircraft were damaged in ground accidents which involved an aircraft and a vehicle.

4. What can you do to improve this situation? First, familiarize yourself with the status of your own organization and its existing practices or malpractices. Next, establish procedures so that recognized safety problems may be discussed without reticence or hesitancy. The correction of any unsafe conditions should be achieved through mutual understanding of the problem and solution.

5. It is the responsibility of the Maintenance Officer to provide safe airplanes in sufficient numbers to meet the operational requirements of the squadron. Needless to say, he cannot achieve this without proper organization and management of his department. *Management* of the maintenance section is his primary job: keeping his assistants and the senior petty officers informed of what must be accomplished and why, monitoring job performance and training, insisting on quality workmanship, and maintaining a high morale among the oftentimes overworked maintenance men. **Disorganization, poor housekeeping, unsafe practices and shoddy maintenance lead to**



ground accidents, flight incidents and AARs.

6. The maintenance safety program requires positive control over:

a. the inspection, maintenance and repair work on all planes and equipment

b. the receipt, dissemination of and compliance with all applicable technical and safety directives; **there must be some means of passing the latest word to everyone**

c. accurate aircraft record keeping systems

d. systematic education and training of personnel in the proper operating procedures and techniques to be employed in their airborne and ground duties

e. indoctrination of all hands in *their* individual responsibility to support and promote the safety program.

7. Remember the case of *Typhoid Mary?* Should you suddenly develop recurring, common-type failures in your squadron, by all means consider the possibility that one person may be inducing these failures through some malpractice *of which he isn't even aware.* **Should a trend develop, check back through the records to try and isolate any single man who, during the period preceding the failures, has worked on or flown all the planes involved.**

0602. TECHNICAL TRAINING OF PERSONNEL

1. Additional formal training is required for maintenance personnel of modern complex aircraft. From a review of accidents, it is too frequently determined that the primary cause is attributable to a mechanic's lack of knowledge and training.

With the large number of semi-skilled maintenance men in the Navy today, the value of training is obvious! Also, due to the rapid turnover of personnel, the requirement to educate and *re-educate* is constantly with you.

2. On-the-job training must be augmented by a planned program of lectures, demonstrations and training films. The *U. S. Navy Film Catalogs* (NavPers 10000 and NavPers 10001) may be consulted to select desired films; the *Naval Aeronautic Publication Index* (NavAer 00-500) lists training manuals which should be available in your squadron.

3. A variety of formal training sources is available to your command. There are five classifications of NATTC schools for which you can obtain quotas listed in *Official Bulletin of Schools and Courses.*

4. Aviation contractor representative (the Tech Reps) are available for discussions about your airplane, its powerplant and component systems. Naval Air Mobile Trainers bring the training to the squadron. Complete with instructors, necessary mockups, cut-aways, films and technical literature, these vans travel from activity to activity as needed. You obtain services of an NAMTD trainer by submitting a letter request via the chain of command.

5. As Safety Officer, you will not be conducting technical training, but you must insure that the training is in effect since it materially influences the safety program. From a survey conducted by the Safety Center of representative fleet squadrons, it has been determined that:

28% of the maintenance personnel never receive lectures on aviation safety

30% never see safety or technical training films

84% are not currently informed of reported unsafe conditions applicable to their type planes

91% are not given lectures about ground accidents

96% do not receive information about aircraft accidents.

0603. TECHNICAL PUBLICATIONS AND SAFETY LITERATURE

1. Much information is disseminated to

the squadrons each day in the program for safer maintenance. But no matter how much good information is distributed to the command, it is valueless until *the word* finally gets into the hands of the maintenance personnel. Any breakdown of *intra-squadron* communications creates a dangerous situation: a **man** has a problem and needs an answer . . . the answer is in some file cabinet, having been routed to a representative number of **department heads.** Does this happen in your squadron?

2. The proper dissemination and timely compliance with technical directives, manuals, and safety-of-flight dispatches issued by the Bureau or major commands is of utmost importance. **You must get the information to the man with the wrench in his hand.**

3. The following references contain allowances, procurement and indexing information:

BuAer Allowance List for Naval Aeronautic Publications and forms, Section K (NavAer 00-35QK-1)

BuAer Manual Chapter 15 (NavAer 00-25-500)

BuAer Instruction 5605.1B

Naval Aeronautic Publication Numerical Index (NavAer 00-500)

Naval Aeronautic Publication Equipment Applicability Index (NavAer 00-500A)

Naval Aeronautic Publication Aircraft Application List (NavAer 00-500B). *This section has been revised and now contains listings (by model of aircraft) of technical publications applicable to each model of aircraft. The new arrangement greatly facilitates a rapid check of publications on hand in the squadron versus publications available.*

4. From the survey the Safety Center conducted, it was learned that 70% of the enlisted men in the squadrons read APPROACH magazine; 43% read the Maintenance Safety Notes in the Weekly Summary of Aircraft Accidents; 56% see most incoming messages concerning maintenance and material factors applicable to their aircraft; and 58% participate in the FUR report system. *Are these average figures good enough for your squadron?*

0604. UTILIZATION OF AIRCRAFT

1. Proper scheduling and utilization of assigned aircraft by the Operations Department is a prerequisite of a safe maintenance program. An acceptable balance must be established between the maintenance and training man-hours *vs* flight hours.

2. This is the joint responsibility of the Operations and Maintenance departments, but you as Safety Officer should be ready to assist in squelching any unfounded desire of *hours-for-hours-sake.* Equate airborne training with on-the-ground training; pilot concentration factors are reduced when the responsibility of flying an airplane is added to the burden of learning something new.

3. **Any maintenance requirements beyond normal schedules must embrace overtime working rather than a decrease in allotted time for each job.** A two hour job completed in one hour can result in a major accident. Don't *force* the maintenance crews into doing slipshod work!

0605. GROUND ACCIDENTS: TYPES, CAUSES AND CORRECTION

1. **A ground accident is a needless extravagance!** Every day, you observe examples of recklessness, carelessness or improper indoctrination in the performance of jobs in the shops and on the line. There are no Navy-wide figures for the number of persons injured in shop accidents, but the records do show those 228 aircraft damaged by ground vehicles during one fiscal year.

2. The vehicle drivers involved in ground accidents are generally *non-rated and non-career* men who have been assigned driving duties because they are not well qualified in aircraft maintenance. **Many do not have valid state driver's licenses!** You must start a Safe Driver Campaign immediately. Deal firmly with violators. Establish safe approach angles and minimum safe approach distances. Keep vehicle speeds below 10 MPH on the flight line.

3. Aircraft fuels provide highly explosive mixtures that require only a spark to ignite. Your safety program can not be how to put out a fire — it should eliminate completely the dangerous practices which could start the fire. The heavy fuel vapors spread

far beyond the airplane being fueled. **Smoking, operation of motor vehicles, radar emissions, smudge pots, aircraft turning up, or any other source of ignition in the spreading area of the vapors can cause a disastrous fire.** An excellent movie on the subject has been produced by the USAF: TF-15047 *Ground Safety on the Flight Line.* Navy publications include: Technical Orders 56-45, 47-50, 56-52, 49-54, 29-55 and 10-56; Technical Notes 6-50 and 10-54; BuAer Instruction 10300.2A; BuAer Manual (NavAer 00-25-500); U. S. Navy Safety Precautions (OpNav) 34P1, Handbook on Aircraft Refueling (NavAer 06-5-502), and U. S. Navy Aircraft Fire Fighting and Rescue Manual (NavAer 00-80R-14).

4. **Towing accidents are caused by inadequately trained personnel and unauthorized vehicle operators.** In almost every case where wing tips or tail sections are damaged, *wing-walkers* have not been used. Whistles are not being provided for ground handling crews. OpNav 34P1, Chapter 3, Section 2, para 03205 deals with towing aircraft. You should republicize *Muscles or Missiles* (December 1955 APPROACH) and *Of Mules and Men* (May 1957 APPROACH).

5. Nearly *one-third* of all jet engines fail to live out a normal life expectancy because of foreign object damage. In addition to increasing operating costs, there is the ever present threat of fire and explosion in flight. This requires a continuous *Clean Up for Safety* campaign in order to reduce maintenance loads, increase morale and save lives and airplanes.

6. **The three vehicles most frequently involved in ground accidents are the NC-5, tractors and trucks.** Chief cause factors of NC-5/aircraft collisions are: driving too close to *save* unwinding and rewinding the cable length provided; intentionally or unintentionally leaving the NC-5 in gear while headed toward the plane; failure to set brakes or chock the wheels of the vehicle, and a single man attempting a two man job.

7. Oxygen is an inherent danger in aircraft operations. Although the parachute riggers are responsible for oxygen equipment, all maintenance personnel must understand the safety precautions to be observed. **The use of oxygen as a substitute for compressed air is prohibited.**

8. Ejection seats and powered canopies have caused serious injuries when operated or discharged accidentally. The cause of these accidents has been insufficient knowledge of the operations or maintenance. **Treat ejection seats and powered canopies with the same respect paid a loaded gun!** Information on operation and maintenance is contained in Technical Orders 21-50, 27-52, 107-52 and 19-55. Shoot Seat Sense (NavAer 00-80Q-37), should be read by all squadron personnel.

9. Improper jacks, wrong jackpads, not enough or defective jacks have caused numerous accidents. Don't jack aircraft when exposed to high wind forces or aboard a carrier that is maneuvering or riding in heavy seas. No one should be inside or riding on the exterior of a plane being jacked. **Personnel not essential to the jacking must stand clear until the operation is completed.** Keep mechanical stops on hydraulic jacks properly adjusted as jacking progresses. Where several jacks are used simultaneously to raise an aircraft, one man should act as director to insure that all points are raised evenly.

10. Accidents due to failure to observe proper aircraft security are usually caused by improperly installed tiedowns or no chocks

under the wheels. Tie down instructions are contained in handbooks of maintenance instructions . . . . *Require compliance.*

11. Personal safety is dependent upon *elimination* of environmental hazards and dangerous individual work habits. **The taking of calculated risks is not a requirement for rating of maintenance men; any chance-taking is anti-safety.** Factors such as lighting, ventilation, humidity and cleanliness throughout working areas must be maintained at proper levels to assure the best possible health and efficiency for personnel. Post safety signs, place safety posters on the bulkheads, paint sharp corners yellow, have safety goggles/masks/guards placed where needed. **A man injured is a member of your working force out of commission.** Assure the health and welfare of your shop personnel.

12. You never have enough *good* men, but as suggestion of a means of spreading talent around, select one of your best CPOs and for a period of at least a week, free him of all routine duties. Give him, as his only responsibility, the task of roaming all of the squadron spaces observing safety precautions. Have him report all areas wherein improvement can be attained. He might even come up with some recommendations for design changes in the aircraft from watching people work and operate. A man intent on doing his daily work doesn't have the opportunity to step back and see how it might be better accomplished. You'll get some good suggestions from a CPO whose only task is to look for good suggestions.

0606. TOOLS, GROUND HANDLING EQUIPMENT AND LOGISTIC SUPPORT

1. The *quality* of maintenance depends on the availability of proper tools, adequate ground handling equipment and spare parts. Local shortages of supplies should be brought to the attention of seniors in the chain of command. Tools required should be ordered by the squadron.

2. It is important that the ground handling equipment assigned the squadron is properly operated, cared for and maintained so that it will be available and in good working order when needed. **Equipment damaged by misuse or abuse is not available.** Excessive delays for preventive and routine maintenance on ground handling equipment may be brought to the attention of the Aviation Safety Council.

0607. RECURRING MAINTENANCE ERRORS RESULTING IN UNSAFE CONDITIONS

1. Some of the common recurring causes of faulty maintenance that are apparent in FLIGA reports and AARs are:

a. failure to perform proper preflight inspections resulting in loss of hatches, compartment doors, fuel and oil caps in flight

b. failure to remove control battens, pitot tube covers, etc., before attempting takeoff

c. failure to properly torque bolts and fittings, install nuts, bolts, cotter pins and safety wire when required

d. inadequate inspections or nondetection of material deficiencies and progressive-type material failures

e. inadequate inspection of completed maintenance and repair work resulting in release for flight of aircraft in an unsatisfactory or dangerous condition

f. failure to perform required maintenance due to poor understanding between pilots and maintenance crews; inadequate write-ups on *yellow sheets*

g. failure, as a result of non-compliance or ignorance of existing directives, to perform required functional checks on systems after repair work

h. failure to properly indoctrinate or educate personnel in the proper operation, care and use of their tools and equipment

i. failure to indoctrinate line personnel in safety precautions for ground run-ups

j. failure to educate drivers in the exercise of proper precautions when driving in the vicinity of aircraft.

k. misuse of high pressure air in tire and strut inflations

2. **Don't learn the hard way; profit from the mistakes of others. Each of the failures or deficiencies above has caused repeated accidents. Emphasize in your squadron the absolute necessity of maintenance discipline. Insist on greater alertness on the part of the supervisory personnel.**

7

CHAPTER SEVEN

Pre-Accident Plan

0701. REQUIREMENT FOR PLANNING

1. Should an accident occur, the initial concern is to save the lives of personnel involved. A pre-accident plan will insure efficient handling of crash-fire-rescue operations. It will also provide orderly procedures for notification; for location, examination and preservation of wreckage; for interviewing witnesses, soliciting expert opinion, obtaining adequate photographic coverage, and all of the many other details involved in the *early* stages of the investigation. It pre-plans the details, hence minimizing peak work loads and shock reactions when the accident occurs.

0702. RESPONSIBILITY

1. The U. S. Navy Aircraft Fire Fighting and Rescue Manual (NavAer 00-80R-14) and BuAer Instruction 11320.13 establish the basic preparatory measures for emergency crash rescue and fire fighting services.

2. OpNav Instruction 3750.6B establishes the procedures of accident investigation and reporting. Implementing this instruction is the Handbook for Aircraft Accident Investigation (NavAer 00-25-538), and the training movie *Aircraft Accident Investigation* (MN-8270), available from film libraries designated in OpNav Instruction 1551.1B.

3. To tailor these basic directives for your local situation, you will issue your own instruction which contains your pre-accident plan. It is a prime responsibility of the Safety Officer, with the cooperation of *all* other departments, to prepare such a plan and insure that it is maintained current.

0703. SAMPLE INSTRUCTION FORMAT

1. The instruction which promulgates your pre-accident plan may be short. It is then possible to re-issue the instruction without major clerical efforts of reproducing the plan which is attached as the enclosure. The use of appendices in the enclosure (for providing the detailed breakdown of personnel or departmental duties) facilitates changes to the duties based on experience.

2. A *sample* instruction follows:

PATROL SQUADRON 69 INSTRUCTION 3750.1

From: Commanding Officer

To: PATRON 69

Subj: Pre-accident Activities and Initial Investigative Procedures

Ref: (a) BuAer Instruction 11320.13
(b) OpNav INST 3750.6B
(c) Handbook for Aircraft Accident Investigation (NavAer 00-25-538)
(d) U. S. Navy Aircraft Fire Fighting & Rescue Manual (NavAer 00-80R-14)
(e) CFAW 16 INST 3750.1 *(pre-accident plan of next senior or supporting command)*

Encl: (1) VP-69 Pre-accident Plan

1. **Purpose:** This instruction promulgates enclosure (1) containing the procedures and responsibilities of personnel in this command in the event of an accident to aircraft assigned the command.

2. **Cancellation:** *(if applicable)*

3. **Assignment of Personnel:** Responsibilities and assignments to details implementing the pre-accident plan will be in accordance with enclosure (1) which delineates the responsibilities by organizational title. VP-69 Notice 3750 bearing the effective date augments this instruction and lists BY NAME squadron personnel who are detailed to the duties assigned by organizational title in enclosure (1).

4. **Action:**

a. All personnel detailed to responsibilities as per this Instruction and supporting Notices will familiarize themselves with all facets of references (a) through (e).

b. The Aviation Safety Officer will insure that this instruction and its supporting Notices are maintained current. He will further assist all personnel in this command in complying with paragraph 4.a., above.

5. **Reports:** When required by reference (b) and other pertinent directives, reports will be submitted promptly.

6. **Effective date:** This instruction is effective upon receipt.

0704. CHECK LIST OF ITEMS FOR INCLUSION IN AIR STATION PRE-ACCIDENT PLAN

1. Make reference to parallel or supporting directives, and provide an index to plan (paragraph numbers, sub-titles, appendices)

2. **Crash notification and communications**

a. Policy statement on the procedures of notification, use of equipment and daily testing, handling of initial crash reports, information to be reported, when notification will be given, etc. (If desirable for the air station, the policy for notification in the case of ground accidents should be included.)

b. **Primary crash alarm system,** reserved for the sole purpose of reporting accidents or deferred emergencies and alerting rescue and fire-fighting details. Primary circuit should include:

(1) Control tower

(2) Operations Duty Officer (who will place the secondary alarm system into operation)

(3) Medical department

(4) All crash crew stations (including boat house and helicopter/liaison aircraft alert stations when applicable)

(5) Officer of the Day (this particularly facilitates his notifying other primary stations should he receive an incoming phone call report of an off-station crash).

c. **Secondary crash alarm system** may function through the station telephone switchboard if a closed circuit of communications is not available. In this case, detailed instructions should be given to the switchboard operator *in advance* — listing the phone calls to be made — so that she can expedite connections. The Operations Duty Officer should

immediately notify as applicable:

Medical department (as a back-up on the Primary system)
Fire department
Duty Officer of the aircraft's reporting custodian
Photographer
Security office
Public Works department
Transportation department (if vehicles are required)
Public Information office
Legal office
Commanding Officer/Executive Officer
Ordnance Disposal office
Chaplains office
Aerology (for special weather report)
In the event of an off-station crash, law enforcement and fire departments, hospitals, coroner, Civil Air Patrol, etc., in the neighboring community.

d. In the proximity of the crash communications equipment, post the established sequence of reporting *known* information (consider the probability of an aircraft reporting an off-station crash and the information desired and/or available in this event).

e. **Audible alarm** (distinctive siren); some station on the primary crash circuit should be able to sound a siren-type general alarm signal to

(1) bring normal vehicular traffic to a stop and provide unimpeded rights-of-way to rescue vehicles.

(2) alert personnel who receive notification and crash information via telephone to clear their phones for the incoming call

(3) expedite personnel, away from fixed sources of communications, in proceeding to their crash stations.

f. **Crash radio network;** communications between aircraft and ground vehicles, or between moving vehicles and stationary control points require equipment and common frequencies to be provided and tested frequently.

3. **Crash locator systems**

a. Grid maps

(1) large scale of the Air Station and its immediate vicinity

(2) smaller scale with a radius of 30-40 miles from the station

b. Distribution of grid maps

(1) at *all* primary and secondary crash phones

(2) in *all* crash rescue vehicles, including helicopter and liaison aircraft

(3) available for *all* vehicles in any convoy or caravan transporting investigation personnel to the crash site

(4) available to *all* possibly participating civil organizations (state and local police, hospitals . . . .)

c. Civilian locater systems and county maps

(1) copies of any grid locator used by local authorities

(2) in rural areas, a farm locater listing (both alphabetically and graphically on county maps).

d. Aerial mosaic photo-maps.

4. **Crash response**

(To provide adequate details on assignments, it is a better practice to affix this portion as a series of appendices, one for each departmental organization elected from paragraphs 0704.2.b and 0704.2.c.)

a. On-station deferred emergencies

(1) crash crew duties

(2) medical department duties

(3) control tower duties

(4) ground maintenance-to-pilot technical assistance policy

(5) photographic coverage requirements

b. On-station crash

State policy and procedural rules for:

(1-5) all stations on the primary crash alarm system (para 0704.2.b.)

(6-15) all stations on secondary crash alarm system (para 0704.2.c.)

(16) general policy as to who

becomes the Officer-in-Control at the crash site

(17) general policy as to removal of wreckage *vs* preservation of evidence

(18) general policy as to personnel admitted to the proximity of the crash and the elimination of spectators

c. Off-station crash

(1-18) repeat as required from paragraph 0704.4.b., policies and procedures, indicating variations due to the additional factor of civilians being involved.

(19) general policy on security requirements

(20) procedures for requesting civilian participation in the search for missing parts (radio, TV, newspaper cooperation)

(21) procedure for formation of a convoy or caravan to transport required personnel to the crash scene.

5. **Training and material readiness conditions** for crash-fire-rescue personnel and salvage units.

a. State policies, requirements and inspections responsibilities

6. **SAR plan**

a. Reference may be made to other applicable existing instructions, but pertinent details should be presented herein to make this pre-accident plan self-sufficient.

7. **Initial investigation procedures**

a. Detailed explanation of what must be done, and who is responsible for doing it, during the period of 6-8 hours after the crash.

(1) survivor treatment (or coroner's report)

(2) notification of reporting custodian

(3) preservation of (or search for) wreckage

(4) submission of message reports and/or phone calls

(5) convening of Aircraft Accident Board

(6) location of witness and obtaining their statements while details are fresh and unaltered in their minds.

8. **Safety Council Meetings and Hazard Reports**

a. OpNav Instruction 3750.11 requires safety councils on a command basis to promote the naval aviation safety program in all its elements. This merits attention in the pre-accident plan.

b. Elimination of hazardous conditions before they result in accidents is the ultimate in pre-accident planning. A policy statement on the use of hazard reports should be contained in the pre-accident plan.

9. **Supporting plans**

a. The Air Station pre-accident plan should logically point the way for units based aboard to prepare supplemental and supporting pre-accident plans.

0705. CHECK LIST OF ITEMS FOR INCLUSION IN SQUADRON PRE-ACCIDENT PLAN

(As indicated in paragraph 0704.9, squadron pre-accident plans should be based on the parent station's plan. Use policy statements whenever

appropriate and describe procedures in detail. The items suggested in the subsequent paragraphs are to call attention to some *but by no means* all *procedures required.)*

1. **Index to the plan**
2. **Crash notification and communications**

a. The Squadron Duty Officer should have a pre-accident folder which contains all the materials required by him to promptly notify systematically all squadron personnel connected with the investigation. This folder should include:

(1) a telephone check-off list containing phone numbers of the CO, XO, ASO, AAR Board members, Maintenance Officer, Survival and/or Parachute Officer, photographer, Operations Officer, Technical Representative . . . .

(2) the accepted sequence of reporting known information: plane, pilot, type flight, time and location, type crash, known injuries and damage . . . .

(3) message blanks, message drafting instructions and long distance telephone authorization chits.

3. **Response to notification**

(As suggested for Air Station plan in paragraph 0704.4, it is recommended that you prepare a separate appendix for each squadron department, listing their assignments and responsibility for detailed duties in each of the four categories of accident/incident situations. See also paragraph 0103.2.)

a. Ground accident/incident

(1) Squadron Duty Officer notify personnel as per check-off list; prepare rough drafts of message reports

(2) Commanding Officer order the necessary investigations required by OpNav Instruction 3750.6B and/or by the Navy Supplement to MCM

(3) Safety Officer conduct or assist in investigations to determine means of eliminating recurrances. Supervise photos that may accompany FLIGA or other reports

(4) Flight Surgeon interrogate personnel involved (checking for motivation, interest, carelessness, etc.) and perform physical examinations as required

(5) other officers or departments perform required duties.

b. On-station deferred emergency

(1) SDO notify personnel as per check-off list

(2) Maintenance Officer proceed immediately (with reference books and experienced personnel) to the control tower or other radio to assist the pilot with technical information

(3) other airborne aircraft of squadron assist distressed pilot as feasible, *without blocking communications channels*

(4) other officers or departments perform required duties to minimize the crash potential.

c. On-and off-station crashes

(1) SDO notify personnel as per check-off list and prepare rough drafts of message reports

(2) AAR Board

(a) Senior member to crash site to act as squadron Officer-in-Charge at the scene; conduct wreckage investigation

(b) one member commence obtaining witness statements

(c) one member prepare wreckage diagram and investigate flight and aircraft records

(d) Flight Surgeon care for survivors or prepare for autopsies; interrogate survivors and squadron mates for human factors involved

(3) photographer obtain standard and special pictures required

(a) cockpit photos showing control locations before any changes have been introduced

(b) impact point and wreckage arrangement

(c) damage to aircraft

(d) shots of specific components as directed by AAR Board.

(4) Maintenance Officer detail personnel to collect wreckage and identify parts (prohibit the manipulation or disassembly of components)

(5) First Lieutenant provide security details and transportation equipment (insure that security detail is properly dressed and equipped)

(6) Survival Officer investigate the use of personal equipment and its functioning

(7) Commanding Officer release message reports, notify local relatives, order required investigations or inventories of personal effects

(8) policy and procedures for other officers or departments as required (i.e., ordnance, weight and balance, PIO . . . .).

4. **Convoy formation, assembly points;** authorized personnel and pertinent details from station plan.

5. **Training requirements and material readiness**

a. Policy for training line crew personnel to avoid accident situations

b. Policy for training maintenance and shop crew personnel

c. Policy for safety training of pilots and flight crews

d. Investigative kit requirements

e. Protective clothing requirements

6. **Safety Councils and Safety meetings**

a. Participation in the Council meetings as directed

b. Safety meetings devoted to explaining the pre-accident plan and eliminating accident exposure areas

7. **Hazard reports**

a. Policy on submission of Anymouse or local hazard reports

b. Policy on action to be taken when notified of a hazardous situation (Safety Officer's memoranda, safety meeting suggestions, etc.)

8. **Periodic safety inspections**

a. Policy for conducting such inspections to determine unsafe situations.

Postscript to the

Commanding Officer

Inherent in your selection as the Commanding Officer of your unit are many responsibilities; safety is definitely not the least of these. Your unit's mission cannot be accomplished without safe and reliable aircraft. Safety and morale are directly related: a low morale standard in the maintenance section of your command will result in sub-standard maintenance which will hazard aircraft operations. In addition, aircraft accidents will definitely lower the morale among the pilots.

The perpetuation of the combat potential of Naval Aviation, through the preservation of its men and materials, is mandatory! One of the greatest threats to the conservation of combat potential is the continued drain resulting from accidents. Aviation safety is the elimination of preventable mishaps which would result in the destruction or impairment of equipment or personnel.

An effective accident prevention program is an absolute requirement in the exercise of your command. Assisting you in promoting a successful prevention program is your Aviation Safety Officer. It is of paramount importance that you consider the qualities of the officer you so designate; he must be experienced in aviation, have the rank and departmental organization to insure implementation of your command program, and be provided with the necessary authority, space, tools and personnel to discharge the responsibilities you delegate to him. Above all, he must have your whole-hearted support in his efforts.

You must provide the positive leadership toward aviation safety that will be an inspiration to the saving of lives and equipment that will make yours the outstanding aviation command.

ALLEN SMITH, JR.
Rear Admiral, United States Navy
Director, U. S. Naval Aviation Safety Center

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U. S. Navy
Publications and Printing Office
Fifth Naval District
Norfolk 11, Virginia
November 1957

AVIATION SAFETY OFFICERS GUIDE

U. S. NAVAL AVIATION SAFETY CENTER