AUGUST 1958

FLYING SAFETY

UNITED STATES AIR FORCE

THE FLIGHT SAFETY OFFICER'S RESPONSIBILITIES

•

COVER STORY
PAGE TWENTY SIX

contents

Volume Fourteen • Number Eight

USAF PERIODICAL 62-1

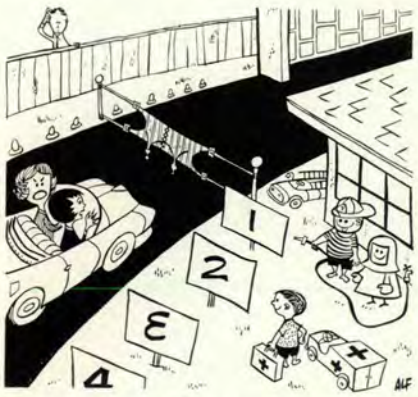
the editor's view . . . . . .

There is general agreement among good drivers today that the safe approach to modern high speed motoring is to drive a well kept machine on good safe tires. The wise motorist buys the best engineered tires available, keeps them properly inflated and rotates wheels and tires to assure even wear. He keeps his tires balanced and makes sure that the spare tire takes its turn on the road. Neglect of this spare, or fifth wheel, can lead to serious accidents. The careless motorist leaves the pretty spare tire in the trunk, doesn't check it for inflation and drives on the other four until one fails. When he goes for the spare he may find it under-inflated, or flat, from lack of care.

Too many commanders use their Flying Safety Officer in the same manner that the careless motorist uses his "spare tire." The FSO to this type of commander is truly a fifth wheel. When an accident occurs this commander calls loudly for the FSO, demanding an answer to the latest smouldering heap at the end of the runway. Higher headquarters is understandably concerned, and the commander feels the heat of pressure building up in top echelons.

The wise commander, like the wise motorist, has had all of his wheels on the road. He has used his FSO primarily for accident-prevention, not accident-investigation. He has kept his FSO busy in the day-to-day hard work of looking for accident potentials within his organization. And when these factors are found, he backs up the FSO in action toward correction. The wise commander uses his FSO on the first team—not as a fifth wheel!

Vernon R Stutts



It's that smart kid next door—says his father's an FSO, whatever that is.

•

SUBSCRIPTIONS—FLYING SAFETY is available on subscription for $2.50 per year domestic; $3.50 foreign; 25c per copy, through the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Changes in subscription mailings should be sent to the above address. No back copies of the magazines can be furnished. Use of funds for printing this publication has been approved by the Secretary of the Air Force and the Director of the Bureau of the Budget, 18 July 1956. Facts, testimony and conclusions of aircraft accidents printed herein have been extracted from USAF Forms 14, and may not be construed as incriminating under Article 31 of the Uniform Code of Military Justice. All names used in accident stories are fictitious. No payment can be made for manuscripts submitted for publication in the Flying Safety Magazine. Contributions are welcome as are comments and criticism. Address all correspondence to Editor, Flying Safety Magazine, Deputy Inspector General, USAF, Norton Air Force Base, San Bernardino, California. The Editor reserves the right to make any editorial changes in manuscripts which he believes will improve the material without altering the intended meaning. Air Force organizations may reprint articles from FLYING SAFETY without further authorization. Prior to reprinting by non-Air Force organizations, it is requested that the Editor be queried, advising the intended use of material. Such action will insure complete accuracy of material, amended in light of most recent developments. The contents of this magazine are informational and should not be construed as regulations, technical orders or directives unless so stated.

Landing Techniques

I enjoyed your May articles on landing techniques; however I feel that Mr. Sydney Berman's article, "The Shortest Distance," is guilty of over-generalization. The specific point to which I refer is that Mr. Berman categorically states that the shortest landing roll will result when upon touchdown a three-point attitude is assumed, flaps pulled up and maximum braking started.

This seems to be standard procedure for the F-100 but may not apply for the other types coming into service today. The '100, in landing attitude, is a relatively clean airplane with no flaps, or only token flaps in the case of the "D" and "F" models. Further, the nose cannot be raised very high after touchdown for fear of dragging the tailpipe. Many outfits do not use the dive brake in the landing pattern at all.

On the F-101, on the other hand, tire landing configuration approximates a flying barn. Large flaps stick down 50 degrees, two huge dive brakes protrude from the fuselage, the drag chute can be popped with no tendency to bang the nose on the runway and finally the nose can be held off at an angle of some 10-11 degrees.

Mr. Don Stuck, McDonnell test pilot, has written a fine article on landing and roll-out; it goes into more detail than the one he wrote for the May issue of FLYING SAFETY. In it he brings out that aerodynamic braking forces average some 8900 pounds from a 155-knot touchdown to 110 knots with the nose held about 10 degrees high, as compared to only an average 4800 pounds from all sources with the nosewheel on the ground. At 109 knots the wheel braking force will exceed the aerodynamic braking forces and the nosewheel should be on the ground at that time to utilize this phenomenon. He points out that if this technique is used, a drag chute failure will result in an increase of only 500 to 750 feet in the ground roll.

In contrast, if the nose is lowered after touchdown, the braking agencies are the drag chute and wheel brakes alone, and the drag chute may fail.

Mr. Stuck's summary is worth a quote: "Use everything the aircraft has to offer. Don't rely on one piece of equipment (such as the drag chute) so heavily that when it fails, you are automatically an accident."

I believe that the Dash Ones of each new aircraft should include a detailed description of the effect on landing of every item the pilot has at his command. Particularly, in the case of aircraft like the '101 which make money with a nose-high landing roll, the exact speed should be called out where the transfer should be made from aerodynamic to wheel braking. It seems to me that each new model aircraft is unique and should be operated according to its own peculiarities.

1st Lt. Garvin McCurdy
523d Fighter-Bomber Sq
Bergstrom AFB, Texas

★ ★ ★

To help make good its motto of "First Class or Not At All," the 190th FIS of Idaho ANG uses the equipment pictured here to electrically test the P-3 and P-4 helmets. Many otherwise aborted missions have been prevented by detection of malfunctions in headsets and microphones.

CROSS FEED

LETTERS TO THE EDITOR

Are You Ready?

The article entitled "Are You Ready?" by Jess Sutton of CONVAIR, appeals to the editorial staff of the U. S. Army Aviation Digest. This article appeared in FLYING SAFETY in August, 1957. We'd like permission to reprint it.

We appreciate the fine work you're doing out there and look forward to receiving your publication each month.

Lt. Col. Thomas J. Sabiston, CE
Director, U. S. Army Aviation School
Ft. Rucker, Alabama

★ ★ ★

Century Types

I wish to congratulate you on an exceptionally fine series of articles titled, "Landing the Century Series Fighter." You state that they are primarily for the use of the fighter pilot.

Another fine—even outstanding—use of these articles is for the training of young minds in what is taking place behind the stick in one of these aircraft. There are too many young men in the Air Traffic Control field with little or no knowledge of flying. The GCA NCOIC here at HIF has made these articles required reading for all of his controllers, and we can see a marked difference in their handling of these type birds. The controllers are much more aware of the extremes involved in the safe direction of the aircraft on final approach.

From this observation I suggest that Air Traffic Controllers everywhere read, study and heed these articles. By so doing, we move a step closer to the "8 rate for '58."

John W. Vermillion
Hill RAPCON

★ ★ ★

A Plug for the 450th

The 723d Fighter Day Squadron of the 450th FD Wing, TAC, at Foster, was one of the participants in operation MOBILE ZEBRA. Also of interest to us was that part about the 386th Fighter Bomber Squadron from Cannon.

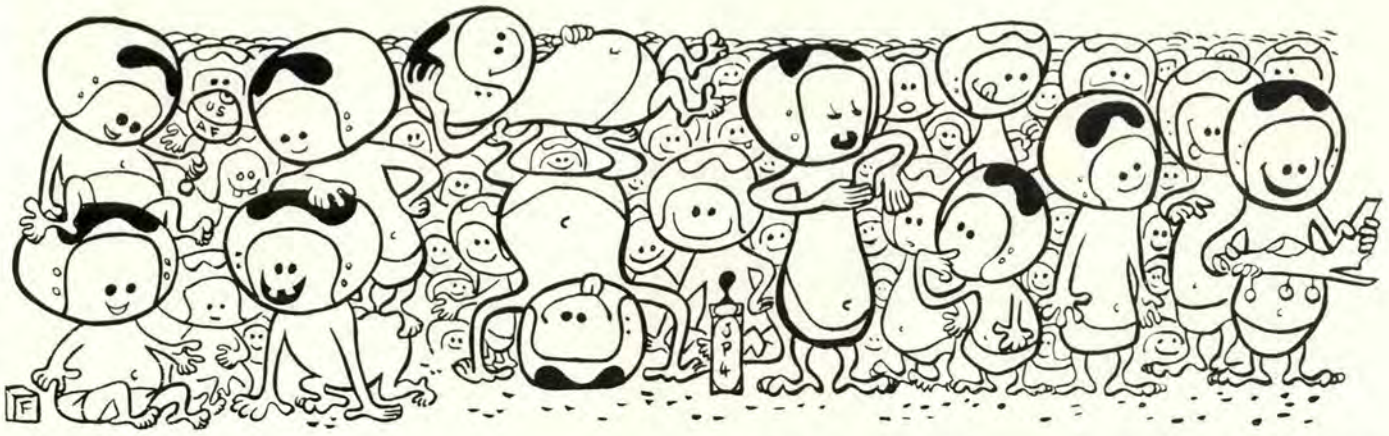
Our Wing has a lot of pride, as do all, in its accomplishments so I would like to put in a plug for the 450th. Aside from operation MOBILE ZEBRA, various squadrons from the 450th have participated in operations MOBILE BAKER, SUN STAR, CAREBEX, SEA TRAIN and flights from London nonstop to Jamestown and Los Angeles. All of these were long, overwater refueling flights with several records being broken and an impressive flying safety record.

1st Lt. Robert V. Baird
Asst. FSO, 723d FD Sq
Foster AFB, Texas.

Essentially, the Flying Safety Officer is a salesman with a product to sell — life insurance. Given the proper tools and atmosphere, he can assist in reducing aircraft accidents. Customer resistance can break his campaign. Is the flying safety program in your unit . . .

Fact or Fantasy?

Lt. Col. Albert T. Ward, Cargo Br., Investigation & Field Operations Div.



Twenty-five of my pilots are young, rather inexperienced lieutenants.

Dreams and flights of fancy are an obsession of mine. Almost four years in the aircraft accident prevention and investigation business have no doubt brought me to this sorry state. Not long ago, such a confession could not have been dragged out of me by two J-57s turning up a hundred per cent. Now, with the recent public acclaim for hypnosis, the rage for psychoanalysis, and the decadence of Freudian theories, I feel free to tell my secret.

In fact, just the other day I took this problem to the local "headshrinker" and told him my story. His response was, "Son, you're going to need the full treatment. The underlying causes of psychoses such as yours are often deep-rooted and difficult to ferret out."

Since then we've had several sessions but as yet he hasn't come up with a conclusion as to what my dreams mean.

There are two fantasies that haunt me. One is a pleasant one that occurs when things are going well on the job; the little woman is in a good mood, the houseapes are on their good behavior and tranquility rests upon the land.

In this dream I am the Squadron Commander of the dashing 999th Fighter Squadron, leading my lads into battle high over Korea. Our slashing "Sabres" make mincemeat out of MIGs. Sure, we lose an occasional aircraft, but only to enemy action. The overall Air Force ratio of kills is 13 to one, but ours is 30 to one. Never have we been defeated in aerial combat. My pilots are the most skillful, best trained, and most eager "Tigers" ever to don a G-suit. At the end of every mission, our crew chiefs are standing by with pails of red paint—brushes in hand—eagerly waiting to paint fresh red stars on our gleaming, though sometimes battle-damaged, steeds.

We are truly a mission-oriented outfit. We know we're good and we're proud of it. From the Operations Officer right down to the newest Airman 3rd Class in the squadron, we know our function and how to perform it. If, as occasionally happens, someone starts to fall down on the job, his supervisor is aware of it and immediately takes action to correct the discrepancy. When someone has difficulty mastering his duties he is given additional training and is closely supervised on the job until his skill improves.

My Flying Safety Officer is an old head: the most experienced, the best qualified pilot in the outfit. He's got a real sense of responsibility. He's curious, tenacious and tactful. I selected him for the job for these reasons. He's enthusiastic about his duties. Who wouldn't be, in a squadron such as ours? Each individual is imbued with the proper spirit and takes professional pride in his work.

Because of the superlative efficiency of all the other members of our squadron team, the Flying Safety Officer's job is primarily one of keeping everyone informed. As safety is integrally planned into every operation, he really has very few problems. Certainly he makes periodic aircraft accident prevention surveys, checks on operational hazards, spot checks pilot proficiency, training programs, maintenance, personal equipment and all the innumerable other details.

Yes, he uncovers occasional discrepancies and when he does, corrective action follows. On his rechecks, he does not find that same mistake.

This is not to say that we don't have problems, because we do. A squadron just doesn't operate under field combat conditions without plenty of hazards. Weather conditions are lousy most of the year. There are several other busy combat airfields in the near vicinity, resulting in flight hazards, air saturation and delays for instrument traffic.

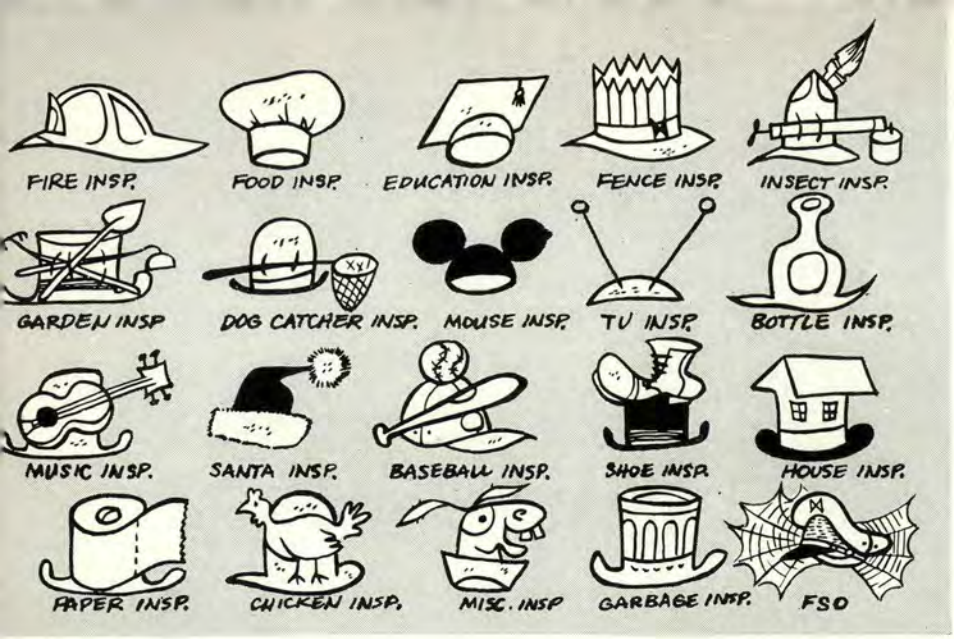
Aids to navigation are far from adequate. Airfield construction is constantly in progress. We have PSP taxiways. congested parking conditions and an 8000-foot runway, if you can call it a runway! After touchdown we get a roller coaster thrill—up hill, down dale, shake, rattle and roll.

Personal problems are a constant worry. Twenty-five of my pilots are young, rather inexperienced lieutenants, twenty of whom have less than 500 hours of flying time. The rest have less than a thousand. As soon as we get them qualified, they rotate Stateside. A comparable picture can be drawn for the rest of my people in maintenance, armament, communications, supply and all the other vital activities that make an outfit tick.

Despite all this, morale is high. We have a professional approach and motivation in our squadron. Everyone is a member of the team and he knows it. Knowing what to do and when to do it has really made each person, in effect, an assistant to the Flying Safety Officer. With all this help and attention to the little things, we just don't have accidents.

That, in essence, is a summary of the pleasant part of my dreams.

At other times when I am afflicted with acid indigestion which none of the patent nostrums seems to help, a night-



Guess which hat he uses occasionally—maybe every Feb. 29th—when it's 100 degrees?

mare comes to plague my sleep. Invariably, it involves the same subject with minor differences in succeeding versions. The subject? Flying Safety, of course!

In this phantasy, I am always the Wing Flying Safety Officer. On one occasion my outfit is an F-100 unit, another time it may be B-47s in SAC, or B-57s in TAC. By now I've run the gamut of the various types of wing in the Air Force.

Last night this miasma appeared again and this time the unit involved was—well I won't tell who it involves. The details might injure someone's sensibilities. This would never do, or would it?

Frustration is at the heart of this story—sheer, unadulterated frustration. We have a high and rising accident rate on our outfit. In the course of performing my duties I've become painfully aware of the existence of many shortcomings. Recommendations for correction have been submitted time and again but somehow the deficiencies never seem to get corrected.

In the last two years we've had almost one accident a month, twenty-two of them, to be exact. Nineteen of these accidents could have been avoided. Mud, rain, sleet and snow have been my frequent companions. Sunbaked desert and mountain fastnesses have felt the tired tread of my aching feet while I poked and prodded in piles of rubble to find the cause of the latest tragedy. Yet, all the while I knew that the cause was not there before my eyes. The source was miles behind me at the base. Let me show you why.

The nerve rasping jangle of the telephone in the quiet of the night roused me from my slumber.

"This is the Airdrome Officer. There's been a mid-air collision in the traffic pattern. Get up here right away."

These are the words that hurtled me into the maelstrom of activity that surrounds a crash. Five fatalities, one seriously injured airman and two destroyed aircraft. This is our second mid-air in a year. The first occurred during a formation flight and this one happened at the end of a nine-hour mission. The primary cause of each accident is officially listed as "operator error." With both accidents happening in clear weather, what else could it be? Contributing factors? Of course. Supervisory error entered the picture without a doubt. It was clear that crew training had been deficient. And of course, flight planning and crew briefings had been inadequate.

But there was one underlying factor that wasn't brought out in the accident reports.

My Wing Commander and his staff are capable, conscientious men. They are much concerned with the administrative problems of the wing and they stay busy. Those in positions requiring pilot ratings haven't had time to qualify in our primary mission aircraft. For this reason, they are not really capable of evaluating operational limitations of the equipment or the people.

They know the capabilities of our aircrews to some extent, sure. But because they don't fly with them, they cannot evaluate the proficiency of the average aircrew. Planned missions frequently push our aircraft and aircrews beyond the limits of their capabilities. Did this fact have any bearing on the mid-air collisions?

Another time I was sent into action when one of our aircraft crashed on an instrument approach to a field strange to the pilot. The weather was bad, but not too rough for a competent pilot. When the wreckage had cooled down enough for an examination we began our usual routine, minute inspection of the rubble. After 24 weary hours, we found the cause. This pilot had attempted an instrument approach at one airfield using the letdown plate for another with a similar name. The two bases were hundreds of miles apart. Operator error again? Let's look a little further.

At our base, the instrument training school is practically non-existent. For annual instrument proficiency examinations, pilots are given short briefings on new material, coached on the answers to tough questions and then allowed to take the written test. Instrument check flights are frequently given under the "buddy system," where the old "You check me and I'll check you" routine prevails.

I can show you several Air Force Forms 5 that report instrument flight checks completed in flights of 40 minutes and even less. All told, nobody actually knows what the instrument flight proficiency of our pilots really is. I know it leaves much to be desired. It's a pretty short step between this situation and that accident.

I'll admit that Flying Safety doesn't get the emphasis it should because my duties also include aircraft accident investigation. We are short on qualified personnel in our wing; therefore, my requests for assistance have been turned down. We have so many accidents that most of my time is taken up in after-the-fact investigations, rather than accident prevention. Additional duties that have also been superimposed further detract from the time available for accident prevention. As a matter of fact, I have just been directed to spend the next two months supervising construction of the new golf course.

Deficiencies exist almost everywhere. One of the best—or worst—examples is personal equipment. Many items are in short supply. And what we do have is often improperly stored and inspected. Our airmen "specialists" are not qualified and neither are the "Personal Equipment" Officers.

One of our support aircraft crashed on takeoff a few weeks back when one engine failed. The flight engineer feathered one propeller, while the pilot was busy feathering the other one. The silence was piercing!

We don't have a Flight Standardization Board. We don't even have an authorization for one. With no standards, non-standard checklists are used; everybody uses his own procedures for operating aircraft systems and these do not necessarily agree with the handbook requirements. Needless to say, laxity prevails.

Not long ago I decided to run a check on the qualifications of our aircrews. You wouldn't believe their knowledge of emergency procedures could be so inadequate, but here is what happened right at the same time. One of our pilots encountered an uncontrollable engine fire in flight. He tried to eject, but didn't make it. When we investigated the accident we found the seat with the safety pins still installed.

Improper care of personal equipment is one of the worst offenders.

In fact, just recently I took some problems to the local headshrinker.

In the course of my duties, these and many more deficiencies have been uncovered. Every action I have taken to eliminate them has met a blank wall. Written recommendations are concurred in and indications are given that action will be taken, but somehow—weeks later—the deficiencies still exist.

Flying Safety Meetings are sparsely attended, with the excuse that the mission and other duties come first. On visits to our three separate squadron operations I have found that flying safety publications sent down through channels are not around. My attempts to establish an operational hazard reporting system have resulted in exactly two reports being submitted in the last year.

With head bloodied and bowed, I finally fall into a state of apathetic frustration and a feeling of utter futility.

Awakened now and reflecting on the unpleasantness of last night's miseries, I can't help but try to rationalize. What is the relationship of one dream to the other? What do both of them mean?

Logic tells me that certain conclusions can be drawn from all this. No matter how sharp your Flying Safety Officer is, he is just another tool the commander and his staff have to assist them. He is only as good as the support he receives. Commanders, supervisors and each individual are equally responsible for flight safety. It's a product of joint effort. It's there, or it isn't.

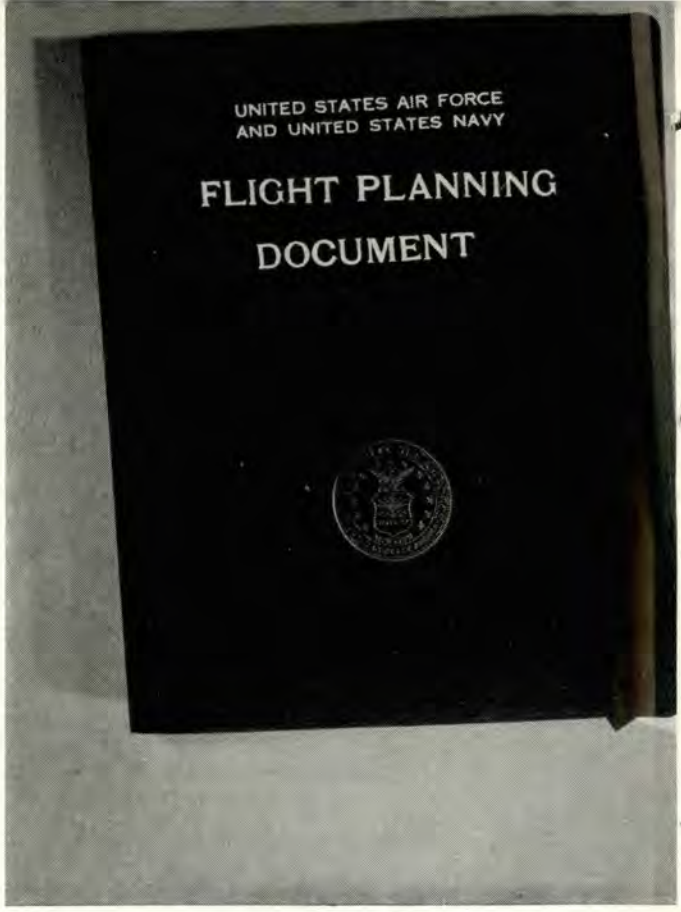
Essentially, the Flying Safety Officer is a salesman with a product to sell—life assurance. Customer reception or resistance will make or break his campaign. If a commander and his subordinates have built safety into an organization, the Flying Safety Officer's job is simplified. Given the proper tools and atmosphere, he can assist in reducing aircraft accidents. Placed in an impossible position, and with his recommendations ignored, all of his efforts—no matter how good—avail not a thing.

Which of my fantasies does your organization resemble? ▲

On 1 July an old friend was grounded, and we meet a new one. Step up and take a look at the . . .

New Leaves To Turn

Major G. D. Leighton
F. H. Redmond, ACIC



"If it isn't needed in the air . . . . . .

Early in May, all commands received a message from Headquarters USAF which stated that the Flight Planning Document, North American Area, would be implemented in July of this year. The immediate impact of this message has been the grounding of the SFID (Supplementary Flight Information Document) and the transfer of most of the SFID information to the Flight Planning Document.

The July implementation acted as the "kick-off" of the new aeronautical information publications program. The new program provides initially that you will have one less publication to carry with you in the aircraft. Elimination of one publication may not constitute an outstanding improvement when you consider the cockpit expanse of some aircraft, but in others it will represent a greater achievement.

The SFID has been discontinued, but not for the sole purpose of getting rid of a publication. A new look at an old program revealed that a lot of material which is seldom used during a flight, has crept into the SFID.

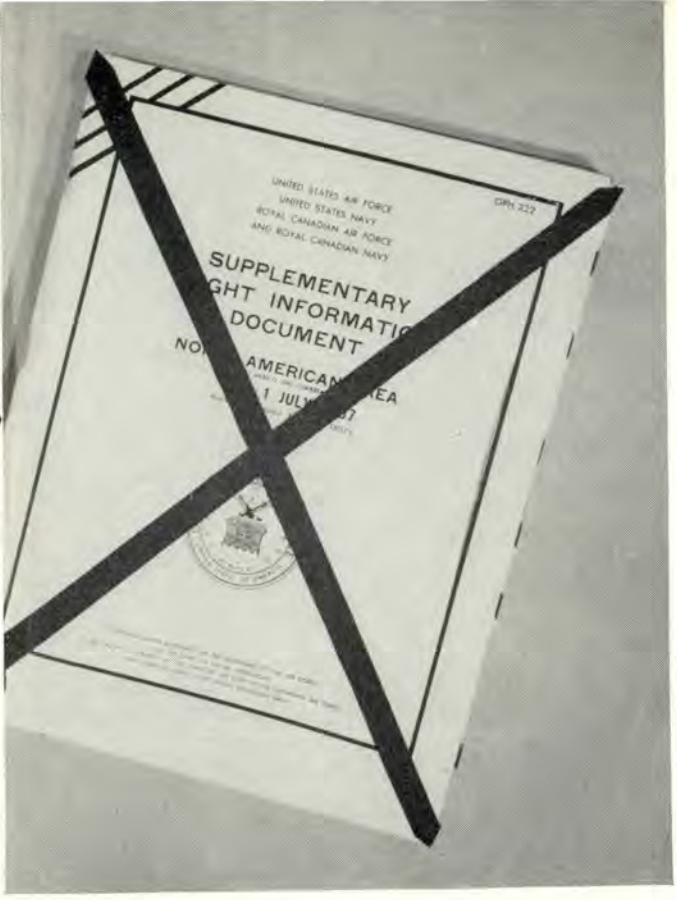
It wasn't a "Mama needs a new dress" idea, either. It was more like this Air Information Publications "Mama" had put on some weight in the wrong places. So a conditioning program redistributes this weight in some cases, eliminates surplus fat in others, and then new binding is necessary (Natch!) to cover the streamlined body.

This brings us to the introduction of the new look in Air Information Publications, the FLIGHT PLANNING DOCUMENT. The action phase is upon us. Too long have the flyers in cramped cockpits complained of too much bulk in their limited elbow-room. No one suggests cutting out necessary information, but our theses is "If it isn't needed in the air, keep it on the ground."

The Flight Planning Document provides the ground receptacle for this much needed realignment. It has now been implemented first of all in the North American Area. In overseas areas, it will be a little later. Temporary binders have been used for the first issue. The new binding of the FPD will be looseleaf, Air Force Blue (of course); and the streamlined body or bodies it covers will be several booklets, each booklet to be reissued as required by normal change in information.

Upon opening this blue-bound base operations publication, you find a white separator card which describes the content of the first proposed insert. (The following comments apply to the North American Area version—the overseas versions may be slightly different.) Subtitles under the heading of Flight Planning, U. S. are "Special Notices, Directory of Aerodromes, Radar, ILS, Airspace Restricted Areas," and so on.

Section I was not included when the FPD was issued. It had been the original intent to transfer certain data including the Directory of Aerodromes—which is, after all, planning data from the RFC to the Flight Planning Document. Concurrent with this, limited data covering the same items was to be published in the RFC for en route use. But many units and commands wanted complete documents for use inflight, primarily because they feared there would not be enough information in the RFC. In view of this, a new "look see" is being given to this problem. There have been opinions advanced too, that much of this information should go into the terminal area publications, the PHB. So it adds up to this: Section I wasn't included in the initial issue of the FPD. We think that when first issued, it will be comprised mainly of permanent notices and an abbreviated listing which gives



. . . keep it on the ground."

. . .

you a quick reference to the aerodromes you can use, with a general rundown on the facilities at same aerodromes. This section should be available soon.

Section II, Air Traffic Control Procedures, is the next booklet. Any new system needs more explaining than one with which you are familiar. This section, therefore, gives you a rundown on the latest procedures. It throws in for your added reading pleasure (?) ADIZ Rules and Regulations, and a mountainous area chart.

Flipping past all this, you find a pink separator which identifies and also fronts similar content for Alaska, Canada and the North Atlantic Areas.

Another Section, III, International Rules and Procedures, appears in some of the Flight Planning Documents. This contains material which are excerpts primarily from the SFID such as ICAO Annex 2, position reporting procedures for the North Atlantic, Pacific, and other regions, worldwide altimeter setting data, and international emergency procedures. This will be of special interest, for example, on runs from McGuire via Azores to Europe.

Also, if there is a chance you may be diverted to a foreign base, you should be a bit concerned with these procedures. Because of these factors, copies of this section will be issued for use on international flights, as required. Foreign clearing bases will get documents covering all foreign areas and so will aircrews when a definite requirement exists for flight planning when away from home base.

Another separator card has been provided in this document for Regulations. It is planned that the Base Operations Officer will insert the copies of AFR 60-16 and 60-22, of which you've previously seen excerpts in the SFID. Also, there are the usual copies of local flying regulations and related pertinent information that can find a home here.

A Temporary Addendum is contained in the Flight Planning Document. This is a little booklet which contains all of that information previously published in the SFID but not proposed to be continued in any aeronautical information publication. It may be that some of this information is really required by the user, although there exists a reasonable doubt. So it's for that reason that the General Information Page says in effect, "If you need this, say so. These are the reasons why this information is presently omitted from the standard publication. If you need it, tell us, but also tell us when, where and why you use it so that we will have a definitely stipulated requirement. Then we will be justified in placing it in some aeronautical information publication for your use."

As for distribution, it is planned that one or two copies will be available in flight planning rooms at all Air Force bases, with one additional copy for the flight clearance desk and possibly another for the base operations officer. One or two copies have been made available for use by separate squadrons or units with planning and clearance responsibilities. The intent has been to furnish one for the personnel doing the flight planning and one for the reviewing or clearance officer. And if you have a few free moments and have finished your review of "Playboy," may we suggest a peek at the flying procedures outlined in an unbusy FPD. Copies have, of course, been provided the major air commands, the subordinate air commands, and Navy activities involved in planning or clearance. The CAA Air Traffic Communications Stations also have been allowed a copy.

And so what does the new program and the new FPD do for you? For one thing, it cleans out the cockpit. If you're a jet jockey, this is a definite advantage. If you're in a transport, you no longer have to decide which of the three white-back documents looking at you is the SFID and which is the RFC. You'll be reaching for and getting the RFC.

A more satisfactory planning service will be available. Thought is being given to the possibility of providing a new planning chart for base operations use. But that is for the future. Now, it is planned that the new Flight Planning Document will be used with the RFC and PHB for planning a flight. It will be a refresher on air traffic control procedures and consequently will continue to be an assist on anyone's instrument examination. It will have the meat of the SFID served up with other planning data.

And so, at last we believe the first step has been taken to put all current planning data in one place. This isn't nearly as revolutionary as it is convenient, especially to the pilot who is required to do all of his own flight planning. He has one place to go, not so many books to use and has a lot less running around to find information formerly spread around ops.

We believe you're going to like this idea of a Flight Planning Document. There will be other minor changes as time goes by and as you help us improve the Document to meet your needs. Naturally, we will remain open-minded and eagerly receptive to constructive criticism, but we hope that after a time the comments we get will read like anything from, "You're making real progress," to "Why didn't you do this before?" ▲

• TIPS FOR T-BIRD DRIVERS •

During the week 11-19 June of this year, the annual T-33 Flight Handbook Review Conference was held at the Lockheed plant in Burbank, Calif. Several changes and improvements were recommended and agreed upon by the conferees. The most significant of these changes are set down here in the interest of getting them before the eyes of T-Bird pilots in the least possible time. Some of these changes will be noted in Safety of Flight Supplements which should be forthcoming in a matter of several days or weeks. Others might not come to the attention of pilots until the revised Flight Handbook is published six months from now.

A major problem which was considered at the conference was that of determining a low altitude airstart procedure. It was agreed that a restart was not advisable after turbine assembly failure because of the explosions and severe vibrations that often accompany such failures. A restart is not possible after accessory section failure such as upper idler gear and fuel pump drive. The areas of malfunction where restarts are possible and desired were determined to be fuselage tank depletion, fuel system icing and main fuel control failure.

Where the latter items are determined by the pilot to be the cause of the flameout at low altitude, he should follow the procedure below:

- Throttle to idle if time permits.
- Gangload fuel switches.
- Actuate airstart ignition switch.
- Switch to emergency fuel system.
- Advance throttle and adjust to maintain RPM within limits.
- If restart is not accomplished, the pilot should eject immediately or prepare to crash land.

The conferees next revised the Flight Handbook to include gang-loading of fuel switches as follows:

- During takeoff in aircraft equipped with Santa Anita Cap.
- During descent in all aircraft at or prior to reaching 5000 feet above terrain. Tanks will be used in sequence above 5000 feet of terrain clearance.

In the past the Flight Handbook has included the Go-No-Go Speed and distance check for takeoff. This system was considered impracticable and hazardous by the conferees. Therefore the acceleration check speed method was adopted for use at the 2000-foot mark down the runway. This system is considered much safer and more practicable for T-33 aircraft. It will permit a safe abort on all runways presently being used. In this connection, the following paragraph was also added as a Warning in the Hankbook:

"Ambient air temperatures are extremely important in determining takeoff performance. It is imperative that the pilot consult Section IX for takeoff technique and Appendix I for performance information. Minimum EGT varies with each engine. Therefore, the acceleration check speed must be computed for each takeoff."

The Flight Handbook has heretofore recommended gear-up landings on prepared surfaces when extension of the gear was not possible. A survey by the D/FSR of partial gear and gear-up landings on prepared surfaces indicates that the possibility of injury to the aircraft occupants is extremely remote regardless of the configuration used. However, landings with only one main gear extended have often ended with aircraft veering off the runways, resulting in bodily injury, more extensive aircraft damage, and damage to objects adjacent to the runway.

The handbook therefore will read as follows: "A landing may be accomplished with gear down whenever both main gears can be extended and locked in the down position. However, in the event that both main gears cannot be fully extended, a gear-up landing should be made. (If all gears cannot be retracted, landing with asymmetrical gear configuration may be made.)"

Significant changes were made in the Fuel System De-icing procedures to emphasize the importance of using the de-ice system as a preventive icing system instead of an anti-icing system. Particulars of these changes are not available as the magazine goes to press, however it is hoped the changes that are given above will serve to alert all T-Bird pilots for the period required for publication of the new handbook. ▲

I would formulate a plan of operation, one that couldn't possibly be beat . . .

IF I WERE THE FSO....

Robert H. Shaw,
Research & Analysis Division, D/FSR

The FSO on any Air Force Base has a tremendous job to do. It takes a real go-getter to accomplish the job successfully.

With the advent of faster and more complicated aircraft, and more complex organizational structures, his job likewise becomes more complicated and complex.

To do his job the FSO must have a secure position and full support. The thin veneer of "yessing" his pleas and rendering tired lip service to his suggestions will not save a single airplane or its crew. His problems are the problems of all, and must be constructively faced. Give him the job and the materials and where-with-all to do it, and we take a giant step toward realizing an effective accident prevention program.

The other evening at the club, this lower space jockey starts a conversation with me. Eventually we get around to flying safety. This bird claims he's safe and says he doesn't need to know all that jazz about runway takeoff distance, just as though he was ready to astrogate through translunar space. It makes me see red and I get highly ionized. I suggest rather strongly that he have a long talk with his Flying Safety Officer, or his psychiatrist.

My first thought was that this guy needs guidance and the FSO is just the man to give it to him. The more I thought about it, though, the more I decided that the FSO was the one that really needed the help—help in straightening out these accident potential pushers.

Aside from not letting the space jockeys and the "know-it-alls" walk all over me (if I were the FSO), I'd get my responsibilities straight with the "old man" and take a personal interest in this business of accident prevention. I would keep in mind that commanders and staff personnel at all levels are responsible for accident prevention. But as the FSO, I am responsible to my commander to assure each unit's readiness to perform its mission by preventing aircraft accidents.

It has been said that any preventible accident must, by definition, stem in large measure from the failures of the FSO. Failing to spot a potential accident, to correct a dangerous attitude or to forcibly reveal a dangerous aspect in the design, maintenance or operation of an aircraft are examples. Since I am a direct descendent in a hierarchy of necessity and a specialist in a highly technical field I must assume many responsibilities and function in many capacities.

Primarily, I must insure that at no time will there be a lack of personal attention and responsibility to accident prevention down through the chain of command.

After much controversy over the years, the best approach to the proper functioning of the FSO appears in the criteria stated in the report of the 1957 Worldwide USAF Flying Safety Officers Conference.

- Flying safety and accident prevention are the direct responsibility of command.
- The FSO must be established in an impartial staff position.
- The FSO must be able to devote full time to accident prevention.
- The FSO must have direct access to all action agencies.
- The FSO must be able to obtain action quickly because of the inherent urgency of safety matters. The placement of the FSO directly under the commander best meets the criteria.

While getting my responsibilities squared away with the "old gentlemen," I would get the point across that I meant to "do business" and expected 100 per cent backing from him. While getting points across, I'd make sure that he okays my keeping current in his "hottest" and "best" flying machines. I can't show the boys how to prevent accidents if I don't fly the machines and I would probably get the low-tide respect treatment.

After leaving the "inner sanctum" and after I've said to myself, "what do I do now," I would go through my little empire and shake out the bugs. Then, with great fervor, I would shape it into a going concern.

After the bug-shaking process and a strenuous review of my responsibilities, I would formulate a plan of operation, one that couldn't be beat. A sort of "I cover the waterfront" to include the what I'm going to do, where I'm going to do it, to whom, how I'm going to do it and why. Then I would gather up my know-how, muster up my courage, fire up my ambition and get started.

First of all I'd let everybody know who I was and what I stood for. This is always a good start and answers the questions "Who are you and what are you?" This would give me my first opportunity for publicity—an important aspect from here on out.

Might as well admit that I can't do everything myself. I'd have to organize committees and teams, through the commander, of course. A squadron safety committee is not only useful, but almost mandatory. If I am to insure that my information will be received by the men on the line and if I am to insure that each man shares in the total accident prevention effort, then this committee must exist. The squadron commander, the operations officer, the maintenance officer and the supply officer are all good men for this committee.

Another helpful group is the Human Factors Team. Working together, the Flight Surgeon, the Chaplain, the Physiological Training Officer and the Personal Equipment Officer can accomplish results not otherwise attainable.

Other assistance groups should be formed and utilized wherever a situation demands a common cooperative effort. It is easy to see that I should have more than a speaking acquaintance with the fire chief, engineering officers, refueling officers and line chiefs.

Getting the Flight Surgeon to work with me may be a special problem. He is a busy man, sometimes hard to pin down, but he is a valuable man and can do a lot. He can't enter into accident prevention too much. For instance, there is a need for education of pilots and crews with respect to physiological and psychological aspects of flying.

These aspects have not been properly presented to pilots, particularly with respect to the various types of fatigue. As a matter of fact, some of the basics, such as biochemical structure of the body, should be explained to pilots and crews.

Flight line safety must be organized before we allow the first aircraft to break ground.

Before proceeding any further in my plan of operations I would consider accident prevention in the light of direct and indirect action. I would enumerate the various ways that I can apply action, consistent with the organizational structure and the mission to be performed. In the total scheme of accident prevention I know it will take both types of action to succeed.

I would consider several common denominators in constructing a plan of operation for application of direct accident prevention action. However, one that easily comes to mind is the personal responsibility approach. The responsibilities of the commander, the supervisor, the pilot and the maintenance man, for instance, when broken down and explained, will provide a pattern for the proper application of direct action.

In considering areas for direct accident prevention action, I would select cross-country flying as the most important. In this area all of the accident-producing factors operate, and in this area all of the personal responsibilities participate. Here the commander, the supervisor, the pilot and the maintenance man can apply the highest standards of qualification,

The FSO should insure that each man shares in the total accident prevention effort. Here three instructor pilots receive safety slogan awards from C.O., Maj. Fred Shriner, Reese AFB.

training and techniques and insure conditions that will eliminate accident-producing factors.

Indirect accident prevention is just as important as direct accident prevention. The difference is mainly one of time and systems. Crews must be properly indoctrinated in ejection, particularly low-altitude ejection. Safety must become a part of the mission. There must be early detection of problem areas and a complete and frank exchange of ideas. To assist in accomplishing accident prevention there must be non-acceptance of deficiencies and standardization of methods and procedures.

My plan of operations, of necessity, must take into account the special problems of personnel and conditions. Some of them acute, others continual —few insurmountable. Jet engine—fuel icing, fuel contamination, loss of airframe parts in flight; these are a few which dictate immediate attention. Others, such as weather education, landing and braking techniques, attitude — power pattern flying, and preflight planning are never-ending and time-consuming.

The flight surgeon can't enter into accident prevention too much. There is a need for education of pilots and crews with respect to physiological, psychological aspects of flying.

Flight line safety must be organized. Here is where the personnel-caused and materiel failure-caused accidents start. Refueling and defueling standardization, liquid oxygen handling, flight line transit of personnel and parts, fire prevention, and maintenance procedures are only the beginning.

I would not consider my operation complete until a safety control of supervisors was in effect. Aside from promoting individual motivation of accident prevention, safety indoctrination of all supervisors is probably the most important individual task that I must accomplish. Since any one supervisor can break the chain of accident prevention, and considering the personnel turnover, the importance of all supervisors becomes paramount. These supervisors must not only be properly indoctrinated, but must maintain individual standards of performance.

I would be remiss if I did not provide a system of checks to insure the proper standards of qualification and performance. Such a system will prevent the lowering of standards and will provide a sound basis for accident prevention.

The system of checks should operate continually with respect to preflight and inflight planning. Those are subjects which must be frequently discussed and researched in detail. This area is a breeding ground for accidents—one which, if handled properly, can be the very basis of accident prevention.

Proper qualification of pilots and crews is without doubt the better half of accident prevention. To insure this qualification I would insist that education and training be provided, and monitor the full utilization of such education and training.

Among the other things that I must do, I would encourage an aggressive standardization program and a professional approach to flying. Without either one, we cannot succeed in our mission. And to assist in the success of my mission I would provide other programs such as air discipline indoctrination, an emergency procedures program, and a workable physical fitness program.

Above all else, *if I were the FSO*, I would make myself aware of what is going on around me. It is this awareness that generates action, provides the courage to face up to the task and fuels the fire of ambition. ▲

Forgiven Errors

Maj. Thomas W. Greenwood, Jr., Bomber Branch, DFSR.

A two and a quarter million dollar airplane slowed to a crawl at the end of the runway and turned cautiously onto the taxi strip. Major Conrad, a veteran of more than 5000 hours—1000 of 'em in B-47s—called almost mechanically over the interphone, "Okay, jettison the chute." As he taxied into the parking ramp, varied thoughts skittered through his mind. "Man I'm starved, wonder what's for dinner tonight. Hope Cathy got the automobile fixed today."

A KC-97 taxied by in the opposite direction, navigation lights blinking in the dusk. "I'm sure glad we're coming in instead of going out," he remarked to his copilot. "Yeah," was the non-committal reply.

Easing the aircraft to a stop in its normal parking space, Conrad called mechanically into the interphone, "Checklist." The copilot read off the items and Conrad performed the functions. "Parking brakes, set." "Windshield defrost."

The challenge came in rapid syllables from the copilot. "Off," Conrad responded through long habit. But what's this? The windshield defrost switch is already off. Uneasily Conrad came back to reality. Had he unconsciously turned the switch off or had he failed to turn it on during the "before descent" check? "Well, no matter now, it turned out all right anyway."

But when he removed his helmet, his brow was furrowed in concentration. No, he had never turned that switch on. He remembered now, before descending from altitude, the copilot had read off the checklist. When he came to "Windshield defrost," Conrad had said, "I'll get it later." But he'd never turned that defrost switch on. He recalled the time once before when almost the same thing had happened. That time frost on the windshield and canopy had almost completely obscurred his outside vision. Luckily, he'd managed to land all right—a little rough, perhaps, but a passable landing.

Mentally he berated himself but made no mention of his oversight to the copilot. How could be insist on meticulous use of the checklist if his copilot discovered that he, a combat veteran, was delinquent in its use? These were disturbing thoughts. Putting them aside, he busied himself with after-flight activities.

Colonel Hendricks, the most respected officer on the staff of General Weston, settled comfortably into the pilot's seat of the plush C-47. "That was the kind of takeoff I like to make when the General's aboard," he thought. "I reckon he will be impressed with my night IFR takeoff and climbout."

"Copilot, let me have the VOR facility chart. Can't find it? Why didn't you check to see that it was aboard? Well, then, give me the LF chart. Whatsa matter, man, don't you know it's the copilot's job to check those things before takeoff?"

"Yes, Sir, but I had to get the inflight lunches and I didn't have time, Sir. But I used to be a navigator, Sir, and I can get us there without the Fac Charts, Sir."

"No, we'll go back in and land. Can't take a chance." Angrily, he reached for the mike to call for clearance back to base. Later, reinforced with adequate maps and charts, a disgruntled Colonel, an abashed copilot and an apoplectic General returned to the air.

Lt. Colonel Ray Bradley reached for another handful of salted peanuts from the bowl in the center of the table, took a sip of his beer and resumed, "Well, the tower called me just as I broke ground, 'T-Bird taking off, you are siphoning fuel.' "

"I looked out and sure enough fuel was streaming out of both wingtanks on the left side. So I called back right quick for an immediate landing. Got in okay, of course, but by then I'd lost so much fuel I had to refuel again. And I was late already. I'd told that transient crew to fasten down all caps but there's always some troop who doesn't get the word, I guess."

"Always," his companion agreed, "But you know it's the pilot's responsibility to check the fuel caps on a T-Bird before he takes off. Let me tell you what happened to me one time . . . "

All three of the above illustrations are based on actual happenings. The pilots involved in each case were highly experienced, old hands at the flying game. True, their oversights were forgiven. Forgiven errors—those little mistakes—those little errors of omission or commission that are little only because circumstances were such that no serious consequences resulted. Yet any one, under a different set of conditions, could have been fatal. Forgiven errors are insidious, they breed carelessness for the very reason that they don't demand immediate payment of consequences. What is your forgiven error quotient?

Think back. Have you ever taxied into the parking ramp, started to remove your helmet and found the chin strap unbuttoned? Have you ever landed and found the mixture controls in auto lean at the end of the landing roll? Ever find the pins in the ejection seat when you landed? Ever take off without flaps or with the engine screens closed? Ever feather the wrong prop? How about the old classic: "Wheels down and checked" before the down-lock check is completed? Did you ever commit an error that you recognized as a "forgiven" error?

There is no such thing as the perfect pilot. Human frailty is evidenced by the many accidents on record which were caused by simple mistakes or oversights by the pilot. Is there something that we can do to overcome these human shortcomings? Yes, indeed there is.

We, as pilots, have a *duty* to do something about it. We owe it to ourselves, our families and our nation. It is not sufficient that we simply say to ourselves, "Well now, I was lucky that time. I surely won't do *that* again."

A mental determination not to commit a forgiven mis-

take a second time certainly is a step in the right direction. Of course, the perfect pilot will not commit the error in the first place. But we've already decided there are no perfect pilots. Is not the next best thing perhaps, to recognize that we are subject to human frailty and try to compensate for it?

There are measures which we can take to insure that we, as well as others, learn and profit by our errors.

First, and very important, we must swallow our pride and admit that we made an error. Not just to ourselves, but to anyone who is interested and willing to listen. There is no room here for excuses. Free admission is necessary.

When we have discovered a specific oversight, let us, without rationalization, analyze it as best we can. The analysis might go something like this:

"Dammit, my windshield sure did fog up on that landing. Oh, Oh! I forgot to turn on the defroster."

We have now recognized that a mistake was committed, and that's usually the easiest part. But don't stop there; think about it. Ask yourself, "Why did I forget an item like that? I remember the copilot called it off the checklist. Oh, yes, I told him I'd get it later but I clean forgot about it. What happened to make me forget an important item like that. Guess I just plain goofed."

That might be pretty hard to admit, even to ourselves. We likely can think of many valid sounding reasons for the omission. And possibly they are good ones. But chances are that most of the time they are simply excuses; rationalization, born of the human reluctance to admit that we've made a mistake in some phase of a job in which we consider ourselves experts. So, if we are candid, we'll have to admit, "I just plain goofed."

Perhaps one of the best ways to remember a specific occurrence is to discuss it with our friends. This method can be especially valid in this instance. And, incidentally, it pays a bonus. Not only do we cause our own mind to retain a lasting impression but it's entirely possible that we will instill in the persons with whom we are talking, a determination not to fall victim to the same error.

All pilots enjoy hangar flying and, human nature being what it is, we get a certain satisfaction out of learning about the shortcomings of others. But it is a sobering sort of satisfaction that brings home the realization that we must continually be on guard against our own weaknesses.

Some individuals find it helpful to carry on their person a small notebook in which to jot down items of importance for future reference. This admittedly is in the nature of a memory crutch.

But, if we have made a mistake once because we forgot, does not that indicate that perhaps a crutch might be needed? Let's emphasize at this point that this is in no way intended to be a replacement for the checklist nor do we mean to imply that one should rely on his memory to accomplish checklist items. The checklist should always be used.

If, however, we find that even though we do use the checklist and still occassionally overlook some item, then here's how a notebook might be a help:

If, during a flight, we discover one or more of these forgiven errors with which this discussion is concerned, let us make a note of it in our little notebook. Write down what it was and why or how it occurred. Then, just prior to each future flight, review the entries in the notebook. With your memory refreshed and armed with the knowledge that it *could* happen to us because it *did* once before, let's resolve that it will not happen again.

If you are a Major Conrad, Colonel Hendricks or Ray Bradley—if you commit forgiven errors occasionally—try this plan:

Recognize the error, admit it to yourself, admit it to others, analyze it, write it down, review it and above all, *do* something about it! ▲

Keep Current

LOW LEVEL EJECTION CHUTE —Newer and faster aircraft in the USAF inventory have dictated the development of a parachute that would open faster, yet slow down the pilot's fall after ejection. As in most research, trial and error brought forth improvements to the ejection seat, lap belt release and to the chute itself.

ARDC then fabricated a quarter bag deployment system, strengthened the chute bridle and main canopy, and then incorporated an automatic time delay release to slow the pilot's fall prior to parachute opening. The lower edge of the canopy was scalloped to give the pilot greater control over his descent.

ARDC's research revealed that most jet pilot fatalities occurred during low altitude emergency bailouts. Many of these were recorded as runway emergency ejections. Tests conducted by ARDC proved that pilots could eject in perfect safety from jets even while streaking down a runway.

SAFE FLIGHT SHAKER — This new gadget, developed by the Safe Flight Instrument Corporation, is designed to provide pilot warning in critical speed or flight areas to meet requirements of Century Series fighter types now in production and all aircraft with power-boost flight control systems. It is pivoted below its drive motor. The inner bore dimension is made larger than the control stick diameter, in order to provide a sharp, effective rapping on a rigid power-boosted stick.

It weighs less than a pound and operates on 28V DC. Here's a picture of the Shaker in both fore and aft positions. Lockheed has one at its Palmdale plant, known as the "Mighty Midget."

Missile safety is a special breed of cat. New problems must be met and solved. To do this job in the Air Force a new specialist is born.

•

Major William F. Green
Guided Missiles Branch, I&FO Div., DFSR

•

Missile Range Safety Officer

The basic concept of missile flight safety was discussed in last month's issue, in an article entitled "Of Missiles and Men." Since many flights have been made and a great deal of experience gained with the Matador, let's take a look at the flight safety aspects of one in flight.

Reliability is the primary factor determining the degree of missile flight safety which can be achieved with any missile. Although it is practically impossible to obtain 100 per cent reliability with missiles, the designer, manufacturer and operating units must set their sights on that goal.

Other factors affecting missile flight safety are as follows:

- The missile—capabilities, design features and type of guidance system.
- Operations—planning, range safety policies and regulations, qualifications of personnel and type of operation.
- Facilities—range or flight area (size, location), climate and terrain.

Missile flight safety does not start on the day or the hour that the launch is scheduled. It must start back on the drawing board. Actually, flight safety must be considered during missile production, operational or test mission planning, personnel training, scheduling, checkout, launch, flight—all of the steps until missile impact.

Now let's proceed to the Matador launch area to see what the Missile Range Safety Officer (MRSO) is doing to insure flight safety. During the countdown the MRSO and his assistants have monitored the checkout, confirmed the operation of flight termination devices (command destruct and fail-safe systems) and assured themselves that the flight area is clear. A few minutes before launch time, two armed fighter chase aircraft take off, check their guns and check in with the MRSO by radio.

They will follow the Matador throughout its flight and be prepared to shoot it down if necessary. In addition, these fighters will provide the MRSO with back-up data on missile position and behavior. This will be especially valuable to the MRSO in the event that the radars lose the Matador plot. As the countdown approaches "zero" the fighters are in position to join up behind the missile soon after launch (the Matador is subsonic).

Suspense builds up as the Matador engine is started and run up a few seconds before the rocket assists take-off (RATO) booster is fired for launch. At this point we might observe an MRSO making a last quick check while lighting another cigarette and saying to himself, "Is this going to be a one pack (cigarette) or a two pack mission."

Although he knows from past experience that this will probably be a successful and uneventful mission, his knowledge of possible mishaps serve as a reminder that he is a key figure in this operation.

As the booster bottle fires, the missile is launched and starts its climb. If missile control is not established within a few seconds after launch, the fail-safe system will be automatically activated and blow the wing off. Once positive missile control has been successfully established—after launch—the first critical period of the flight is over. The visitor too will sense this as missile personnel slowly relax from the built-up tension.

Now that the Matador is climbing on course toward its target the MRSO will monitor the operations for any possible malfunction. Indications of control failure, course deviation, weather, unidentified aircraft near the flight path, and many other factors will be provided the MRSO by the many channels of communications, radar and visual observers.

For the purpose of illustration, let's assume that the Matador has left its programmed course. What action will the MRSO take and why?

With the radar plotting board indicating that the missile is off-course more than the amount allowable for normal course corrections, the MRSO will check with the controller and determine if he has initiated corrective action. If the controller is unable to bring the missile back on course, he may make a control check. The pilot of the fighter chase aircraft may be requested to notify the controller and the MRSO if the missile responds to the control check (this would be quicker than watching for control response on the plotting board).

Since the missile has not crossed the pre-determined destruct lines (imaginary lines on the range that outline the safe area for this missile operation on impact), the guidance crew will have a few seconds to attempt to regain control of the missile. As the missile approaches the destruct line the MRSO alerts the chase aircraft that

Reilability is the primary factor determining the degree of flight safety which can be achieved with any missile. One hundred per cent reliability is the acceptable goal of designer, maker and operator.

he is going to terminate the missile flight. When the missile crosses the destruct line, he orders the controller to activate the command destruct.

In the event that the command destruct system fails, the Missile Range Safety Officer will order the fail-safe system activated. This will be accomplished by turning the radar control carrier off. After a built-in delay time of a few seconds, the Matador's wing will be blown off. Should this fail to destroy the missile, the MRSO would direct the fighter chase aircraft to shoot it down.

The MRSO will usually use this method as a last resort since it is less positive than command destruct or fail-safe. Unless the fighters cause the missile to explode or shoot off major sections of it, the missile may travel many miles before impact.

Although the impact of the missile has ended the need for instantaneous decisions and actions by the MRSO, the job is not complete. He must now see that a complete investigation is made, and this is one of the most important phases of his duties. A thorough job here can help prevent such mishaps during future missile operations. In missile flight safety, as in aircraft flight safety, the primary objective is accident prevention.

The first step in missile accident investigation will be to gather all possible data and reconstruct the mission from missile checkout to impact. Operating personnel and other eye witnesses can help by recounting everything they observed or know about the mission. Information will be obtained from recorders used on the ground control van, telemetry and so on.

Next, with the aid of expert missile technicians, the MRSO will examine the missile wreckage. Although impact usually results in complete missile destruction, there is always a possibility of uncovering a vital clue to the malfunction.

What will the investigators look for in the missile wreckage? In order to answer this question, let's go back and look at the flight history of this missile. Since the trouble was first detected when the missile failed to respond to course correction and control check indicated the missile was out of control, the guidance and control system must be suspected.

With this to go on the investigating team can direct its main effort toward all components of the guidance and control system. Since most of this equipment is composed of electronic components, it will be examined for failures that could not have resulted from the missile impact.

For example, let us take one of the mutilated "black boxes" from the missile debris. Assuming that this "black box" was not damaged by fire (which is a good possibility since parts may be widely scattered), the presence of a burned resistor or any other component within the box may determine what caused the failure.

Naturally the investigators will not overlook the possibility of malfunction in the ground portion of the guidance system. Since this equipment is still intact, actual equipment failures are relatively easy to locate. However, possible controller or other personnel errors may be harder to reconstruct.

In this hypothetical missile accident, we had the unusual failure of both missile destruct systems. These failures also will interest the investigators and all recoverable components of these systems must be examined.

Armed with the information obtained from the missile accident investigation, the MRSO can now follow through and see that necessary corrective action is taken to prevent a similar failure in future Matador flights.

To summarize, let's briefly outline the Missile Range Safety Officer's problem:

- He must take necessary action to prevent missiles from impacting outside the range or other designated safe area.
- He must help prevent missile flight mishaps which cause expenditure of missiles without mission accomplishment.
- All missile mishaps must be investigated in order to prevent similar mishaps in the future.

The efforts of the Missile Range Safety Officer can help to increase missile reliability. This increase in reliability will not only make missile safer and prevent accidents, it can help to increase the over-all effectiveness of our missiles. ▲

This article, written by Capt. G. R. Evans, Commander, 5th U.S. Coast Guard District, has appeared in other publications promoting flight safety. By now some of you may have read it in the July issue of "APPROACH" Magazine. Several readings of this fine piece will pay off for the AF pilot.

if lost

Early one Sunday afternoon, a young jet pilot took off from his home base up north on a training flight to a southern base. His was one of a flight of several jet aircraft. He never did quite catch up with his flight leader but continually advised by radio that he was 30 seconds behind. When his ETE was up and he still hadn't sighted his flight leader, he figured he should be over his destination. He was on top at 38,000. He was neither sure of his position nor of his compass, and his fuel remaining was about 50 minutes. Actual weather at his destination was CAVU, and at his actual position, six thousand and six.

He declared an emergency. The DF-Radar Net came to his assistance, passed steers, fixed his position and dispatched an escort. Things should have proceeded to a logical, simple successful conclusion. But they didn't.

For the next 46 minutes this young pilot shifted frequency four times, worked four different ground stations, changed course six times. He seemed unable to decide on any plan of action. The escort aircraft, after closing to within a few miles of the distressed aircraft, lost pressurization, and returned to base without advising of this fact until in the landing pattern.

Our young pilot exhausted his fuel in position 85 miles inland, followed by loss of radio and radar contact. He glided through the overcast, broke out near the coastline and headed for an emergency landing field. He came within one mile of making it.

Three days later search aircraft located him—crashed and dead in the cockpit. The cost? A priceless life and a million dollar aircraft. The errors? There were many, but let's concern ourselves with the "lost aircraft" procedures.

Fortunately, this type of accident does not happen every day. But it does happen frequently. In many cases the pilot can save the day by the use of simple, commonsense "lost aircraft" procedures—one of the important parts of flying safety. The pilot may know his aircraft perfectly. He may be an expert airways and instrument pilot, and a fearless combat man, but these qualifications may all be for nothing if he doesn't know "lost aircraft" procedures.

Even the "expert" can become disoriented at times. With today's high performance aircraft, high altitudes, high speeds and high fuel consumption, the pilot doesn't have time for guess work, or hit and miss procedures to get his aircraft aimed at the nearest airfield. He must automatically and instinctively know correct procedures, and then he must calmly and deliberately carry them out.

In distress cases involving lost aircraft or critical fuel situations, the record clearly shows that there are two basic causes for those accidents which *should* have been safe landings:

- Incorrect emergency procedures by the pilot.
- Being unaware of ground facilities available to help him.

There are cures for these causes, and they are, of course *education and training.*

In a lost aircraft situation, the pilot's first question to himself is, "What do I do?" And if he knows the answer to this one, he is well on his way to safety. However, en route to that nearest, suitable airfield, there may be distractions. The pilot needs a good basic foundation in the principles and problems involved in getting him down. Therefore, let's consider the answers to these questions, in the order named.

- What should I know?
- What do I do?
- What happens then?

What should I know? In the first place, the jet pilot has at stake his own life, a million dollars worth of flying machine and a hundred thousand dollars worth of combat training. He must know that he can never let "professional pride" delay a request for help when he feels doubtful of his position or safety. There are ground radio, radar and DF stations ready and able to help, and there is absolutely no penalty for using them. Delay has caused crashes and cost lives. Take action—immediately.

The pilot must realize that he "loses no face" in such a situation. We will only call it a practice steer, if you like. But let's get down in one piece. Your ground radio link will classify your situation as one of the following emergency phases, depending on the urgency:

Uncertainty. Doubt exists for your safety or position,

Alert. Apprehension exists, or continued lack of radio contact with you.

Distress. Imminent or grave and serious danger threatens you.

You—the pilot—may indicate the emergency phase if you wish.

The pilot must know that he can declare an emergency: First, by emergency IFF; second, by sending emergency mesage, or, third, by flying the triangular pattern when he does not have a two-way radio.

He knows the ground stations have three electronics means of helping him: first, by receiving the emergency message; second, by radar detection of IFF signal and triangular pattern, and, third, by DF bearings. (We're advised, however, that radar detection of a triangular pattern is not reliable, therefore, a good operating IFF on all squawks is good life insurance.)

In any potential emergency situation, the pilot must know the five "C's". Here they are:

- *Confess* your predicament. Do not wait too long. Give the ground stations a chance.
- *Communicate* with your ground radio link and pass as much of the distress message as possible on the *first* transmission, and in the correct sequence. Then, if for any reason communications are lost, your ground link may at least have your identification and position.
- *Climb*, if possible, for better radar and DF detection. Ask for emergency ARTC clearance.
- *Comply*. Be sure that you comply with the advice and instructions received, if you really want help. Assist the ground "communications control" station to control communications on the distress frequency on which you are working. That's the distress frequency for your case. Any interfering stations should be asked to maintain silence until you call.
- *Conserve*—slow down. Set up maximum endurance power. You needn't be in a hurry now. Find out where to go and then set up maximum range power.

And we might circumscribe all five "C's" with another, and that one is *Cooperate*. Stick with your ground link unless some compelling reason warrants a shift. Shifting frequency and shifting stations have caused many crashes. So, we can say that the pilot mainly needs to *know* the importance of a prompt request for help, and the five "C's" to safety.

What do I do? This is the next big question of concern to the pilot. There are only three simple—but important—things to do:

- Switch IFF to "Emergency."
- Transmit the emergency message.
- Comply with instructions received.

If you do these three things, you are almost guaranteed a smooth comfortable descent to a safe landing. If you don't, then you are due for a rough, confusing tumble to the wilderness.

Radar stations are particularly sensitive to the emergency squawk on IFF. They will pick up your signal and pinpoint your position at long ranges, if you have altitude.

The emergency message should be committed to memory and repeated to yourself on every flight so that you'll be ready for immediate transmission, should a critical situation arise. The various parts of the emergency message should be transmitted in sequence. There's a definite reason. Here's the message. Memorize it!

- MAYDAY MAYDAY MAYDAY (if distress).
  PAN PAN PAN (if uncertainty or alert).
  (If CW transmission, use SOS for distress, and XXX for uncertainty or alert.)
- Identification and type aircraft.
- Estimated position, course, speed, altitude.
- Fuel remaining—in hours and minutes.
- Nature of difficulty.
- Pilot's request and intentions.
- Two 10-second tones with mike button, and identification.

On a recent jet bailout, the pilot called MAYDAY, gave his identification and then used up valuable seconds describing the rumbles in his engine. He bailed out without giving any estimate of his position, course, speed or altitude. The ensuing search covered a rather large area and the pilot spent an uncomfortable night in cold water.

So, as we study the sequence of the distress message, we see where a definite priority of transmission is important. Give us your distress phase first (MAYDAY or PAN); then, your identification (so we'll know who); then, your navigational data (position, course, speed, alti-

tude); then, your remaining fuel; then, a little data on what's wrong and what you want; and, finally, transmit for DF bearings.

The third thing which the pilot must do should be the easiest—*comply.* Experience, however, shows the lack of compliance to be the frequent cause of a crash. The pilot must comply with the advice and instructions offered, if he really means business. He must help his "communications control" station to maintain radio discipline by silencing interfering stations. He must stick to a plan of action. As mentioned earlier, shifting frequency, shifting to other ground radio stations, and following no plan of action have caused many aircraft accidents.

After the pilot has done the three simple things expected of him, in a lost aircraft emergency, he is undoubtedly eager for further instructions.

What happens then? The ground radio link receiving your emergency squawk may be an individual station or a member of a Net. He may be Air Force, Navy, Coast Guard, CAA or other. He has definite procedures for orienting you and aiming you toward the nearest suitable airport, and he needs your cooperation.

Regardless of the identity or hook-up of your ground radio link, he will follow five basic principles in getting you down. You should also have an appreciation of these five principles, each of which can be expressed as a single word: Information, Communications, Steer, Fix, CAA-GCA. If you, the pilot, understand the importance of these principles, you can cooperate much better with the station trying to help you.

- *Information.* This is definitely needed to start action. The emergency message and IFF squawk furnishes the information. For DF bearings, we need identification and frequency. For radar positions, we need identification, frequency, IFF Squawk, position, course, speed and altitude.
- *Communications* must be maintained with the pilot and interfering stations must be silenced. The pilot must be reassured. The guard channels (121.5 or 243.0) should be used, if practicable. If not, use any frequency and clear it for the emergency traffic.

A Good Commander gets behind his FSO.

- *Steer* must be passed quickly by the communications control station, and the pilot must advise which steer is being used.
- *Fix.* This is obtained by radar plots and DF bearings. After the fix, the distressed pilot will be steered to the nearest suitable airport, commensurate with the current fuel and other situations.
- *CAA-GCA.* This principle completes the assistance to the pilot. The communications control station will quickly obtain ARTC emergency clearance; alert GCA at field of intended landing, and pass weather to the pilot. "Hand-off" of communications control to the station of intended landing will be made at the proper time.

These five basic principles for assisting a lost aircraft should be used in sequence. As an aid to your memory, the first letter of the following sentence suggests the principles: "**I** Can **S**ee **F**ewer **C**rashes." (**I**nformation, **C**ommunications, **S**teer, **F**ix, **CAA-GCA.**)

If you're a "disoriented" pilot, the service rendered by an individual radar or DF station may get you down safely. In some cases, the coordinated efforts of several stations linked by hotline telephones may be necessary, and this is particularly important when the fuel situation is critical. Your position must be *fixed* quickly, and you must be steered to the nearest *suitable* airfield.

An example of a coordinated DF-Radar Net is the one serving the Maryland-Virginia-North Carolina area. This is the Norfolk DF-Radar Net. There are five stations on the North Leg, with NAS, Patuxent River as Leg Control.

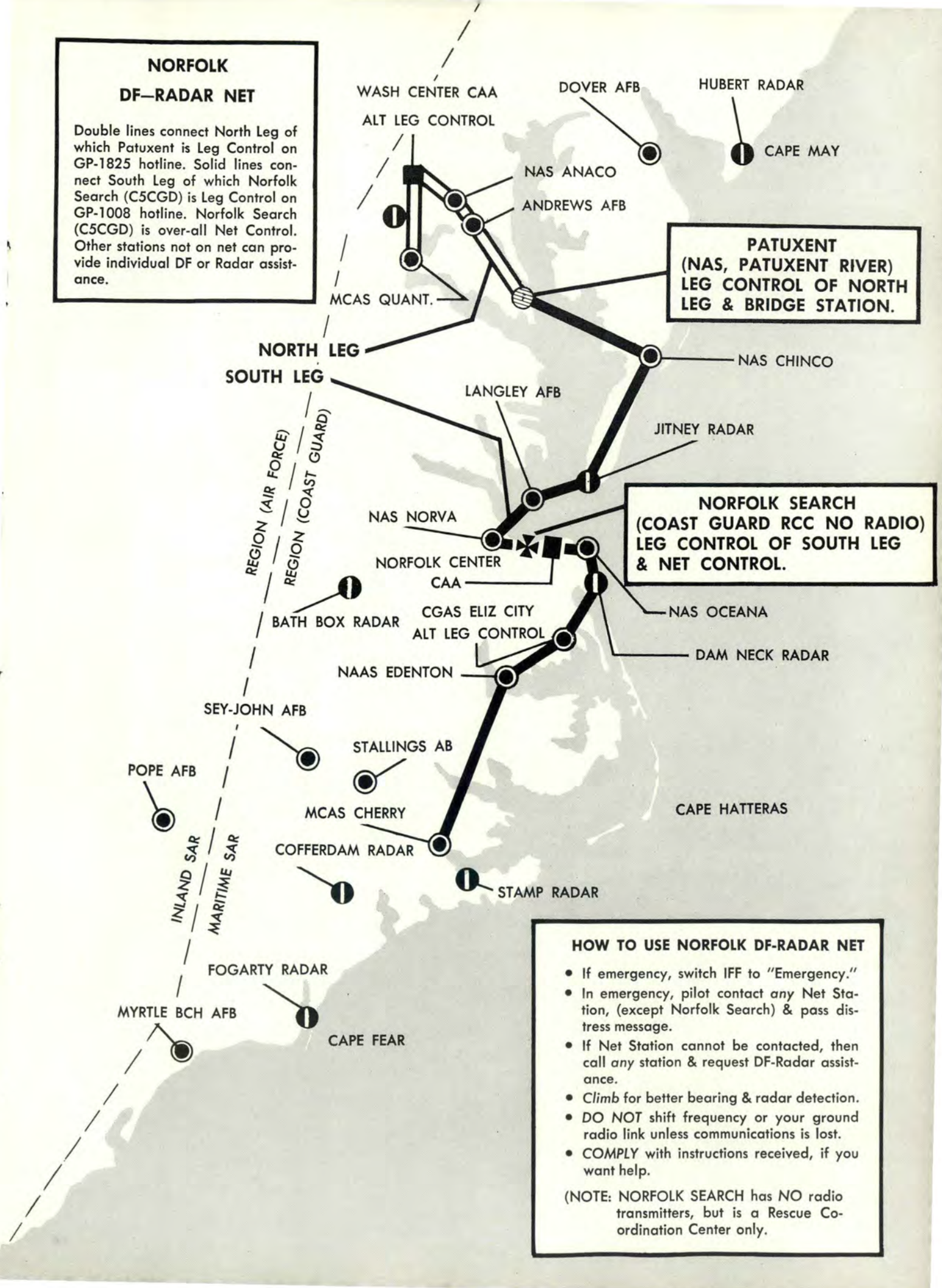
There are 12 stations on the South Leg, with the Fifth Coast Guard District Rescue Coordination Center as Leg Control and over-all Net Control.

For the calendar year 1957 this Net had a record of 21 probable saves and 23 possible saves with an estimated value of saves approximating 32 million dollars. The coordinated efforts of Net Stations rendered material assistance to 246 aircraft during this period.

It is apparent that the business of taking action in a lost aircraft situation is indeed a simple, commonsense process. By the same token it is one which deserves a good basic foundation in the principles involved and in the actions to be expected.

What now? The pilot should now be concerned with this question.

- Commit to memory the five "C's", and use them.
- Don't stand on "professional pride" if you think you are lost.
- Commit to memory the emergency message and repeat it to yourself on each flight.
- Learn the DF and radar stations in your area and know how to contact them.
- Remember the five basic principles in assisting a lost aircraft.
- And, finally, you have a great responsibility to your Service, to your country and to your family. Plan every flight carefully and deliberately execute every detail of that plan. Know the limitations of your aircraft and of yourself and maintain a healthy respect for each. If—even after doing all these things—you inadvertently become "disoriented," remember to follow these simple "lost aircraft" procedures carefully and promptly. You may be surprised at the results which are possible. ▲


NORFOLK
DF—RADAR NET
Double lines connect North Leg of which Patuxent is Leg Control on GP-1825 hotline. Solid lines connect South Leg of which Norfolk Search (C5CGD) is Leg Control on GP-1008 hotline. Norfolk Search (C5CGD) is over-all Net Control. Other stations not on net can provide individual DF or Radar assistance.
WASH CENTER CAA
ALT LEG CONTROL
DOVER AFB
HUBERT RADAR
CAPE MAY
NAS ANACO
ANDREWS AFB
PATUXENT
(NAS, PATUXENT RIVER)
LEG CONTROL OF NORTH
LEG & BRIDGE STATION.
MCAS QUANT.
NORTH LEG
SOUTH LEG
NAS CHINCO
LANGLEY AFB
JITNEY RADAR
REGION (AIR FORCE)
REGION (COAST GUARD)
NAS NORVA
NORFOLK SEARCH
(COAST GUARD RCC NO RADIO)
LEG CONTROL OF SOUTH LEG
& NET CONTROL.
NORFOLK CENTER
CAA
BATH BOX RADAR
CGAS ELIZ CITY
ALT LEG CONTROL
NAS OCEANA
DAM NECK RADAR
NAAS EDENTON
SEY-JOHN AFB
STALLINGS AB
POPE AFB
MCAS CHERRY
CAPE HATTERAS
COFFERDAM RADAR
STAMP RADAR
INLAND SAR
MARITIME SAR
FOGARTY RADAR
MYRTLE BCH AFB
CAPE FEAR
HOW TO USE NORFOLK DF-RADAR NET
If emergency, switch IFF to "Emergency."
In emergency, pilot contact any Net Station, (except Norfolk Search) & pass distress message.
If Net Station cannot be contacted, then call any station & request DF-Radar assistance.
Climb for better bearing & radar detection.
DO NOT shift frequency or your ground radio link unless communications is lost.
COMPLY with instructions received, if you want help.
(NOTE: NORFOLK SEARCH has NO radio transmitters, but is a Rescue Coordination Center only.

USC AND THE FSO

Louis Kaplan, Ph. D.,
Director, Aviation Safety Division, USC

Symbolic of the standard of excellence at the University of Southern California is the Trojan warrior. USAF students who have successfully completed the FSO course there can testify to its excellence and ruggedness. USC and USAF can be proud of this program.

Soon after World War II, the need for adequately trained Flying Safety Officers became increasingly obvious to the Inspector General of the Air Force. In October, 1951, he summed up the situation in these words:

"At present, full value of Flight Safety personnel in the field is not being achieved because of lack of training." He then went on to mention that the ground safety program in the Air Force provides university training, including graduation with a Master's Degree in Safety Engineering.

Subsequent to 1951, under the leadership of Generals Victor E. Bertrandias and Richard J. O'Keefe, the need for an organized program of training was impressed on the Air Force. The Directorate of Flight Safety Research received approval for the organization of an official course for Flight Safety Officers. It was decided that this course could best be conducted at a civilian institution which was able to provide personnel who could devote themselves to this training program without interference from other requirements.

Civilian instructors also could offer stability to the program. There were, of course, very able people in the military service. Those who were qualified to conduct such a program, however, had other primary obligations which would not allow them to give their full attention to such a course of training. Furthermore, the rotation policy existing in the military services was thought to be a handicap in developing any type of stable program of instruction.

The University of Southern California, Los Angeles, was selected because of the proximity of the institution to the aircraft industry, the opportunity for close liaison with the Directorate of Flight Safety Research at Norton AFB, and the human centrifuge available at the University.

In addition, USC, through its Department of Aviation Medicine, had been engaged in research which led to the development of the Partial Pressure Suit, the protective helmet, and some of the basic data derived from studies on the human centrifuge.

With the selection of USC as the training site, it became the function of the University to select a staff, conduct the research required to implement these general objectives and to organize a training program.

In the selection of the staff, it was realized that there might be some question in the minds of Air Force officers as to how a civilian institution could prepare Air Force pilots for what was strictly an Air Force problem. With this question in mind, the University and the Directorate drew up the criteria and desired qualifications of the faculty. Selection of the staff very closely matched the qualifications which had been determined desirable.

The next problem was to develop a curriculum built around the basic objectives set forth by the Air Force. Special meetings were held with key staff officers of the Directorate. Its vast store of studies, special investigations, statistical and educational materials were made available to help determine the curriculum core. From this data was derived a basic understanding of the knowledge required by a Flying Safety Officer.

Contacts were made with other organizations conducting flying safety programs to obtain ideas and information which would be of value to the development of the aviation safety program. Volumes of literature in the field of flying safety were surveyed and screened.

Staff members visited command headquarters and bases where they conferred with Flying Safety Officers and other pertinent personnel. Through this series of visitations and interviews, the field of study was narrowed down to five major subject areas:

- Aeronautical Engineering
- Aviation Psychology
- Aviation Physiology
- Aircraft Accident Investigation
- Aircraft Accident Prevention

The major purpose of instruction in the area of *aeronautical engineering* is to provide the Flying Safety Officer with background knowledge which can help him in aircraft accident analysis and accident prevention.

Aeronautical engineering material is presented on the basis of practical application with a minimum of theoretical development. Emphasis is placed upon critical design characteristics and limiting operational factors with which Flying Safety Officers should be familiar.

In the area of *aviation psychology* basic principles of human behavior

are presented as they apply to safe flying, accidents and accident investigation. The course reviews research findings of psychologists and shows how they can be applied to the work of a Flying Safety Officer.

The *aviation physiology* material emphasizes the importance of the human element in aircraft accident prevention and investigation. It contributes to the training of Flying Safety Officers by developing:

- The basic psysiology of flight essential to an understanding of physiological stresses, as causes of aircraft accidents;
- The medical aspects of aircraft accident investigations, and
- The human side of an aircraft accident prevention program.

Some detailed subjects included in the course are physics of the atmosphere, respiration and circulation, hypoxia, hyperventilation, vision, noise, sensory illusions, microwave emanation, oxygen systems and personal equipment.

The *investigation* phase of the course provides training which will qualify the individual to conduct complete, thorough and accurate investigations in a scientific manner. Also, he learns to place the resulting information in a finished report which can be used for aircraft accident prevention.

Presented in this course are the various organizations which participate in aircraft accident investigation and the regulations under which they function. Other items covered in detail are organization of investigations, procedures, analysis of wreckage and the mechanics of reporting an accident.

The portion on *aircraft accident prevention* deals with the organization and administration of prevention programs. Flight Safety doctrines are developed and the overall aircraft accident prevention program in the Air Force is discussed. This provides the Flying Safety Officer with a background for organizing an aircraft accident prevention program appropriate to his local situation.

In addition to the five principal areas of instruction, the student takes a course in educational principles and methods. The purpose of this course is to develop an understanding of the basic principles of learning and to show how the Flight Safety Officer may utilize these principles in teaching and in disseminating information to make people safety-conscious. FSO students at USC also visit the Directorate of Flight Safety Research, and Edwards Air Force Base during the school period.

At the Directorate, a representative of each division presents a summary of the activities of his department and points out how it may assist him in his work. Illustrated orientation lectures emphasize the need for efficient and effective Flying Safety Officers by describing current aircraft accident losses in dollars, manpower and combat readiness.

At Edwards Air Force Base, the students gain first hand knowledge of the responsibilities and functions of the USAF Flight Test School and its relation to the Flight Test Center. ARDC advancements are presented, and problems and phases of aircraft testing are explained. Students are given the opportunity to see the latest model aircraft undergoing tests. The NACA facilities are visited and here the students see and hear about the most recent design concepts and developments in the aircraft industry.

As you can see, this is a comprehensive and intensive program. The first seven classes of officers completed this course in six weeks. They received 215 hours of instruction which was equivalent to the number of hours of instruction an ordinary university student receives in 13½ weeks. Evaluations made by the students indicated that they were under considerable pressure to accomplish the required work in a six-weeks period. They also felt that certain parts of the course should be expanded to be of greater benefit to them.

This information was forwarded to the Air Force and beginning with the eighth class of students, which started on April 5, 1954, the course was expanded to eight weeks' duration. It now comprises 260 hours of instruction. Since the beginning of the Flight Safety Officers Course in 1953, twenty-nine Air Force classes have undertaken training, and as of 11 July 1958, 669 officers have graduated.

Courses for Navy pilots were initiated in October, 1954, and to date, 472 officers have graduated.

A program for the Army was set up about two years ago, and 139 officers have now completed the course.

In addition, a similar course was started recently for Allied Officers under the Mutual Assistance Program. This course is for 12 weeks' duration. The first class of 15 Allied Officers graduated in June, and Class No. 2 is now in attendance. Countries represented so far in these Allied Officer classes are Norway, Germany, The Netherlands, Turkey, Pakistan, China, Japan, Portugal, Italy, Chile, Peru, Iran and Greece.

After six years of conducting classes in aviation safety, we are convinced that the Accident Investigation and Prevention phase of the course is the core of our program. The technical learnings derived from other courses are integrated therein so that the student sees how to use them in the investigation of accidents and the development of prevention programs.

From a philosophic viewpoint, accident prevention is something much more basic than "selling." Prevention is now approached from the viewpoint of education, efficient personnel management and supervision. Today, emphasis is placed on discovering the causes of aircraft accidents before they occur—not after. ▲

Emphasis in aeronautical engineering is placed upon factors with which FSOs should be familiar.

HELP HELP HELP HELP YOURSELF TO HELP

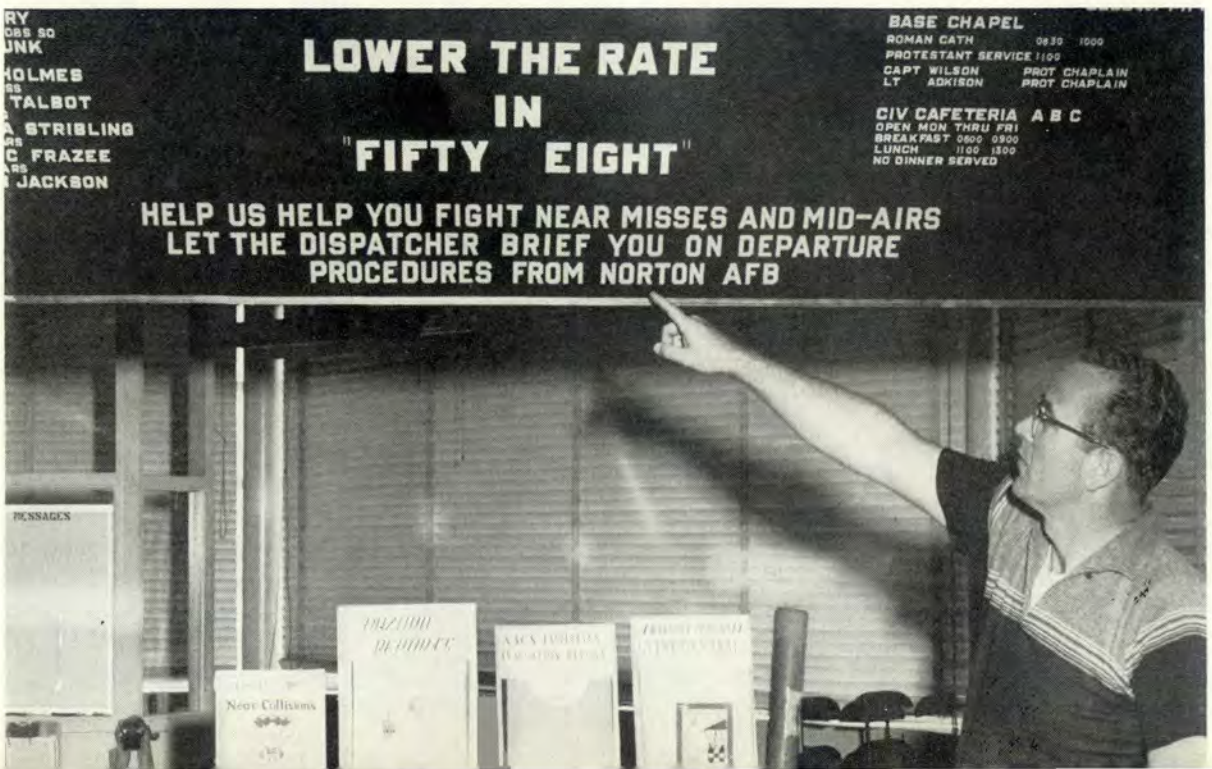
The guy in the case is Ben Antrobus, Chief Air Route Controller at Norton Air Force Base for the past eleven years. In cooperation with his base Flying Safety Officer, Ben is doing his part every day to prevent mid-air collisions. In addition to the help he gives the departing pilots, he and his men make sure that the incoming pilots see all the pertinent forms which might be needed. Simple stand-up holders have been made for CAB Form 352, the Near Collision Report, and others. When a pilot turns in his cross-country clearance at the end of his flight, the lads are right there to check with him on any inflight trouble report that may need the attention of higher headquarters.

Traffic at Norton AFB, as in hundreds of other bases throughout the world, has increased geometrically. Time was when the daily airplane traffic was close to 12 arrivals and departures. Today the daily total of landings and takeoffs is just over 100 on the average.

In May of this year, inbound transient traffic totaled 1104 aircraft, and outbound, 1192. This adds up to over 2000 transient aircraft movements alone, and all on one base. Complicate that with a sizeable amount of what once was "local" flying, depot test flying, home based aircraft, arrivals and departures on cross-country flights, and you have a problem for the airdrome alone. Tone up the picture even further with the air space above, high mountains in the immediate vicinity, six airways within ten miles, 62 civilian and military airfields within a 50-mile radius, and things start falling away fast. Oh yes, remember to throw in some smog. And now everybody who moves through the air needs all the help they can get.

But like the sign says, it's there for the asking. The surprising part of it all is the big increase in questions since the sign was put up.

Control is only as good as the capability of the individual pilot to follow instructions. The Flying Safety Officer at Norton AFB is aware of this problem and alert to the many opportunities he has to help with this instruction. Pilot education is part of his job and this applies to the transient as well as to the home town boys. ▲



In recent months, noticeably fewer reports of near-accidents have been received. In fact, about three months ago, Ol' Rex expressed concern about this. If near-accidents or hairy incidents are occurring less frequently, all well and good! But, should you know of any, tell us about them—in the form of an Operational Hazard Report.

Lower the Accident Rate

Here's one for the book. This pilot's probably the luckiest guy alive and although no special credit is his in this instance, it does speak well for the ejection equipment.

It happened in Holland to a Dutch pilot flying an F-84F. He was making a *low* altitude napalm run, misjudged where Mother Earth was, hit the ground and bounced twice at 400 kts. Fuel and napalm tanks were turned off and the pilot managed to pull up to 800 feet before the airplane started an uncontrollable roll to the right. The pilot ejected from an inverted position at this altitude and survived with minor bruises. Maybe he should go to Monte Carlo while he still has this lucky streak.

★ ★ ★

I wonder how many T-33 pilots today would make the same mistakes recently made by highly qualified instructor pilots because the information cannot be completely spelled out in the red bordered pages of the Dash One? In order to get you all thinking, I'll set up this simulated emergency condition for you, and before you read on, think how *would* you handle the situation?

You're at high altitude, say somewhere above 25,000 feet, and you encounter an overspeed condition uncontrollable by the throttle. Before I go any further, let me tell you what two different IPs did. The first one attempted to land his aircraft, using the power which was uncontrollable between 96 per cent and 101 per cent. He made a very high and long straight-in approach, and on the final, the engine overped to 106 per cent and the pilot—fearing an engine explosion—stopcocked the engine, landed short; the aircraft was destroyed and one of the pilots killed.

The second incident: The IP had an overspeed condition which he also could not control with the throttle. He elected to stopcock and made a beautiful deadstick landing.

Now the solution: Both of these pilots were able to stopcock the engine with the throttle even though they could not control the RPM between idle and full throttle position, indicating that throttle linkage was not the problem. If throttle linkage had been the problem, overspeeding would have been very unlikely. Your RPM will usually go to around 60 to 80 per cent. Therefore, either clue should let you know that the problem is in the fuel regulator and that you still have the emergency side of the fuel system working. Had either pilot reduced the throttle to the idle position and selected the emergency fuel switch, he could have proceeded to the nearest base and made a normal landing.

★ ★ ★

The other day a copy of an Unsatisfactory Report on the upward ejection seat of a bomber type was placed in the IN basket on my desk. It was interesting. In fact, it was interesting enough to watch closely until I saw the answer, several days later. First, I'll quote the UR:

"When any piece of equipment, such as a brief case or technical order file slides under the edge of any of the integrated harness type upward ejection seats and the seat is then lowered, the integrated actuator arm cam lever strikes the object and releases the safety belt. In some cases both sides of the belt and the shoulder harness are released. This can and does occur even when the release handle is locked in the stowed position. Design deficiency is indicated. Flight crews have been briefed to keep area under and around seats clear at all times. Suggest suitable protective cover be installed to prevent accidental actuation of integrated release."

And now for the answer: . . . "This office does not accept subject EUR and will not forward same to contractor for action. Difficulty described falls within the pilot training category, and not aircraft design. . . ."

REX SAYS—*Seems to me that both sides have a point here. Obviously, the aircraft designers cannot foresee and forestall every possibility of foul-up in the building of their aircraft. And the pilot is certainly responsible for checking the cockpit area of his plane before taking off. Murphy's laws have yet to be repealed. Loose objects have been known to find their way under seats before. You may feel like the old maid looking under the bed at night, but it might just pay off sometime. Bend down and take a look. It's good for the waist line too.*

★ ★ ★

After landing at a mid-western base on a cross-country, the leader of a flight of two F-102s went in to base ops to close his flight plan and to re-file. He removed the Aircraft Flight Report, AF Form 781-1, from his fighter and took it with him into ops. He returned to the aircraft with the Form 781 and, in preparation for flight, performed the walk-around inspection. Upon completion of the inspection, he placed the form booklet in the left side engine intake duct and went to another plane to borrow a ladder.

Thirty-seven thousand feet later, the metal clasp and cover of the form collapsed and the pieces bypassed the screens and guide vanes and entered the engine. Moderate

noise and momentary cockpit smoke were reported by our flight leader and his wingman saw a brief puff of smoke issue from the tailpipe. The engine ran smoothly for the rest of the flight. Nicks in the compressor section dictated shipment of engine to depot for teardown inspection.

REX SAYS—*Passing of AF Form 781s through jet engines is a neat trick but it makes them rather hard to read. These engines don't need the pilot's help in finding objects to ingest. They pick up enough trash on their own. This pilot was lucky. Normally, it's safer to eat it yourself than to feed it to the engine.*

★ ★ ★

A B-57 pilot, airborne only a few minutes, elected to abort his mission when one of his engines malfunctioned. His landing was made at maximum gross weight with excessive airspeed. To further compound his difficulty he landed long on a wet runway.

Needless to say, the wheel brakes could not carry the load and the bomber ran off the end of the runway onto a poorly prepared overrun. The nosewheel collapsed when it struck the protruding edge of a concrete culvert cover.

REX SAYS—*No one will argue that the pilot of this aircraft made a poor decision when he came in to land with a balky engine. His execution of the emergency procedure, however, is certainly of the "non-pro" variety. Materiel malfunction was the primary cause here, but cockpit panic is indicated. Or maybe just ignorance of the red-bordered pages.*

The supervisor can share the blame for damaging this aircraft. And in this case, "Supervisor" is a collective noun. Included are base operations, air installations, flying safety and, of course, the commanding officers. Inspection of the Airdrome is a responsibility of all.

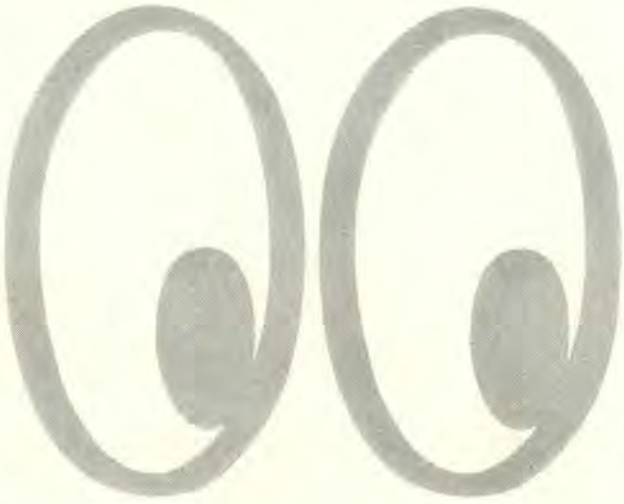
★ ★ ★

In the paper storm that blows across my desk, occasionally I short stop an item that renews my confidence in man's ingenuity and perseverance.

Here's one about a fighter pilot who stayed busy instead of succumbing to paralysis, and saved us another expensive aircraft. He was flying an F-84F on an instrument chase mission at 23,000 feet, and while in a gentle turn, his engine flamed out. Throttle off, the pilot made a fuel check, established a glide to maintain 20 per cent and then attempted seven normal and six emergency starts, using standard procedures. During three of these airstarts, the engine accelerated to 60 per cent, only to flame out each time. As he passed through 8000 feet (he had decided to bail out at 5000), a final emergency airstart was tried with the throttle just aft of the idle position. On this airstart, as the engine RPM accelerated to 50 per cent, the emergency fuel switch was returned to the normal fuel system and the engine accelerated to full RPM. By this time he'd descended to 6000 feet, and was able to return to base without further incident. His improvisation had worked!

My guess is that this is one pilot who spent a lot of time in the ready room with the Dash One emergency section rather than with the latest issue of Playboy. How else can you explain his ability to accomplish so many airstart attempts in the altitude available to him? How busy can you be?

"Disapproved, Gridley. This method isn't likely to solve accidents!"



watch for the

As this issue goes to press, the folks at Air Materiel Command are writing a new Tech Order which will change the looks of many of the Air Force planes in the inventory. The brilliant summer sun will be shining on ramps dotted with vivid spots of color. The human eye in the cockpit will pick up splotches of fluorescent paint reflecting from other aircraft nearby. All in all, the job of flying promises to be an even more colorful career when crew chiefs begin to pick up their spray guns and paint brushes to comply with the latest order.

The AMC action came about when Headquarters USAF ordered that maximum conspicuity patterns be developed for planes now in use. The color to be used will be a daylight fluorescent orange with military specification as outlined in MIL-L-3891. The only aircraft in our inventory not to be affected will be the active combat force planes in Strategic, Tactical, Air Defense and Refueling forces.

The Tech Order covering the change has now been published. Work will be accomplished by wing, base and depot not later than 30 days after receipt of the order. Failure to accomplish the work by expiration date shall make an exceptional release mandatory thereafter until compliance. Representatives of ARDC, WADC and AMC have agreed that the Tech Order will require that the paint be applied in two basic bands completely around the fuselage.

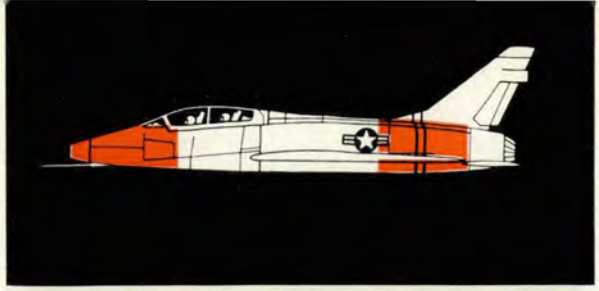
The first band, around the nose, will extend from the nose cone to include 20 per cent of the overall fuselage length. Probes or other special equipment on the nose will be excluded. The amount of fuselage length to be painted from the nose aft will be no less than 10 feet on small aircraft, nor more than 25 feet on large ones.

The second band will begin at the leading edge of the horizontal stabilizer and go forward approximately 15 per cent of the fuselage length. From this end will be painted a band no more than 20 feet on large aircraft and eight feet on small. Special provisions will be made on the Tech Order for delta wing, helicopter and other airframes of unusual shape. Personnel of Wright Air Development Center have said that special markings using this paint will also be allowed as determined necessary by the major commands. Thus you will probably see the wing tiptanks of the T-Bird showing up like a blushing peacock in most areas.

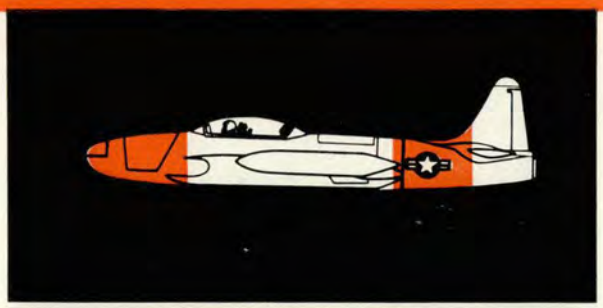
In a message to AMC and ARDC, Headquarters USAF laid down the following guidelines and objectives for the proposed aircraft marking. These should be of interest to pilot and maintenance men, alike.

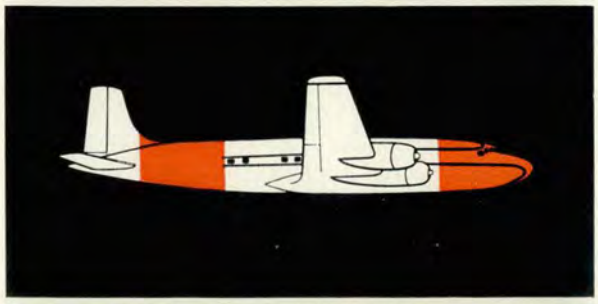
- Maximum conspicuity marking patterns under minimum daylight conditions using fluorescent materials.
- Minimum initial and recurring maintenance cost.
- Minimum interference with aircraft aerodynamic characteristics including minimum weight penalty under all flight and climatic conditions.
- No detrimental optical effects from close association to other aircraft under all ground and flight conditions such as day, night, or instrument conditions with current light recognition equipment operating.

One other Government agency is already in the act of using fluorescent paint. On 13 June the Airways Modernization Board announced that a new H-13 helicopter, recently acquired, had been painted with fluorescent paint as an anti-collision aid. This helicopter is one of approximately 20 aircraft to be procured and operated by the AMB for its research and development programs leading to modernization of the national system of aviation facilities. The use of special, high-visibility paints in various experimental configurations to improve the conspicuousness of aircraft is one of the anti-collision aids to be tried



COLOR





in this program according to Mr. James L. Anast, Acting Technical Director of the Airways Modernization Board.

Within the Air Force, the use of fluorescent paint is not new. The Air Training Command completed on 1 June a year-long experiment, using this type paint with dramatic results. Its experiment began, according to Lt. Col. John K. Graham, Director of Flying Safety of Air Training Command, when personnel of that command accepted the obvious conclusion that when only two aircraft are involved in a crash it is because one or both of the pilots fails to see the other aircraft in time to avoid an accident. The ATC thereupon decided to paint its planes so that they might be more easily seen.

Studies were started and tests were made to determine what kind of paint might make a silver aircraft more visible against the sky. A further study was started to determine where the paint should be applied to the trainers so it would attract the most attention. The configuration of different types of aircraft used by ATC as trainers determined that the wingtip fuel tanks of some seemed to flame as if on fire when the fluorescent paint was applied. Bands around the fuselage and painted engine cowlings on others made these aircraft easily visible in flight.

Lt. Col. Graham reports that during a 12-months period of 1957-58, ATC reduced mid-air collision accidents by 75 per cent. Only two "see and be seen" accidents occurred, as compared to nine during the previous 12 months. The two accidents recorded involved aircraft without fluorescent paint markings. Some will argue that there might have been other factors involved in this accident reduction record. But who can argue with success?

At any rate, the Air Force as a whole is coming out with a new look. We can hope that this new look will bring equally dramatic results for all of us. Watch for the Color! ▲

Cruise OR Maintain

A habit is much like a rabbit. Once started it's hard to stop. It is only human to develop habits. It is equally human to resist any change in habit once this habit is firmly established. In the flying game it is part of good training to commit certain procedures to memory and, in effect, consciously develop habit patterns. These patterns of the mind are expected to make it easier for the pilot or ground crewman to perform his duties in the heat of battle or in the stress of emergencies. Trouble arises when, for some reason, a habit pattern outgrows its usefulness and the human is expected to reject a dearly loved automatic response and react to a familiar situation in an entirely new manner. Such retraining can be an expensive and sometime fatal exercise.

A reader of this magazine called our attention recently to a habit pattern which, so far as we know, has not proved fatal, but which easily could cause some very nasty accidents. He pointed out that many of the more experienced pilots and ground controllers are accustomed to use the phrase "cruise and maintain" in reading or copying IFR clearances.

There is no doubt that this phrase has been accepted through the years as common usage when assigning altitudes for instrument flight. The odd part of it is that according to best advice this phrase was ruled out as far back as 1949. Almost ten years have gone by and a few of us die-hards are still clinging to this venerable phrase. A check with the Flight Information Manual, Volume II, August 15, page 59, reveals the following definitions of the words "cruise" and "maintain":

CRUISE—"The term 'Cruise' may be used instead of 'Maintain' to signify to the pilot that descent from cruising altitude *may be commenced at his discretion without further clearance from ATC*. 'Cruise' is normally used only for relatively short flights in uncongested areas and is authorized for the flight to *proceed to*, and *make an approach at, destination.*"

MAINTAIN — "The altitude instructions in an ATC clearance normally required that a pilot 'Maintain' the altitude at which the flight will enter the control area of the next center along the route of flight. Altitude changes while en route should be requested at the time the change is desired."

According to definition, therefore, it is impossible to "cruise and maintain" at the same time. Not long ago an incident occurred in which a pilot copied an IFR clearance to "cruise" to his destination. He did just this, starting his letdown as soon as he had arrived at his destination. While in his letdown he called ARTC and told them he had departed his "cruise" altitude and expected to be over the field in two minutes. ARTC was extremely busy for the next few minutes in assuring separation between the "cruiser" and two aircraft which were below.

This hazardous situation resulted from confusion on the part of the pilot who assumed he was to cruise at an altitude and on the part of ARTC who wanted him to maintain an altitude. If this situation can occur once it can occur again and again. The words "cruise and maintain" were obviously used in conjunction. The pilot heard the first part and acted in good faith. ARTC probably issued a "maintain" clearance and the cruise must have been added somewhere along the line of communication. Pilots will be wise if they are alert to the possibility of receiving an ambiguous clearance. If one is received, the only action possible is to refuse the clearance and ask for clarification. Am I to "cruise" OR "maintain?" ▲

IF RESPONSIBILITIES WERE DREAMS

FSOs should be so lucky to have time for day-dreaming about such pleasant subjects. Truth is that for the busy Flying Safety Officer there is far too little time in the day for the myriad jobs he must do and the people he must talk and coordinate with. He is quite often bald from changing hats, trying to take care of many areas imposed upon him by commanders who do not fully appreciate the role the FSO can play in mission accomplishment. If given a chance the FSO can reduce the number of nightmares resulting from aircraft accidents. Let's give him this chance.

MAL FUNCTION

"Bring me Mal," the C.O. cried,
"I've got some jobs he hasn't tried.

"I'll make him my new FSO,
"These accidents have gotta go.

"With that he won't have much to do,
"I'll make him mess inspector too.

"I'll make this boy another Rex,
"But first count stock in the BX."

Mal is willing, but quite unable,
Forms fourteen pile on his table.

With no time for preventive role,
Mal spends his time in gaping hole.

*U. S. GOVERNMENT PRINTING OFFICE 481005