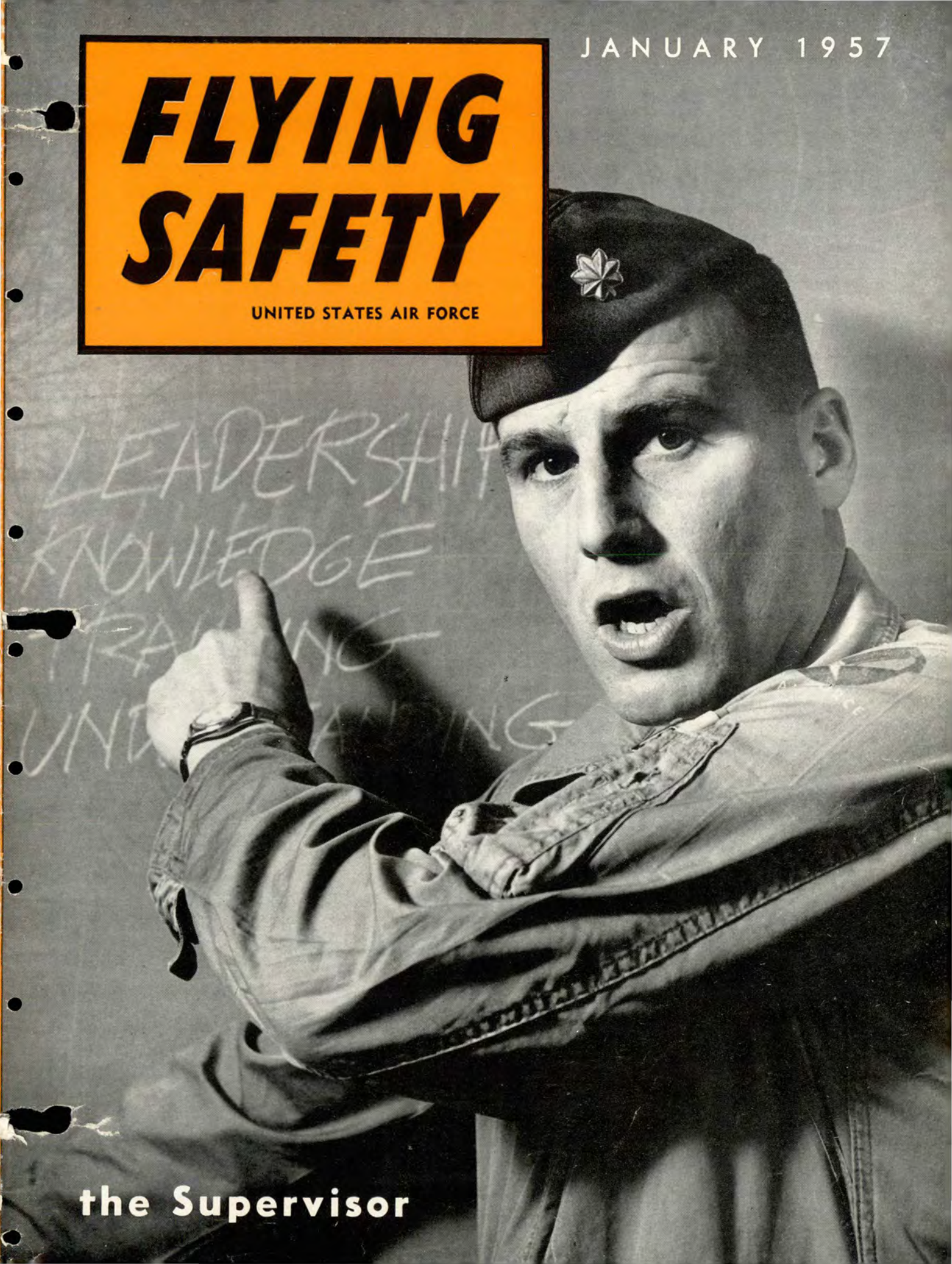
JANUARY 1957

FLYING SAFETY

UNITED STATES AIR FORCE

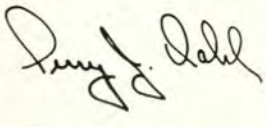


the Supervisor

File Thirteen

This month our cover symbolizes the "supervisor." This happens to be our special subject for this month, in keeping with our yearly program. You can get the whole pitch by reading page one.

In October, "File 13" made reference to the inadequate crash rescue facilities at some P and PC fields. I guess we should have gone on to point out some of the other deficiencies one might expect at this type of installation. P and PC fields are not set up for the military. They have a landing privilege agreement . . . PERIOD. Okay, so they have your type of fuel on contract. This doesn't mean they know how to get it into your particular type of aircraft. Likewise, for oxygen and oil servicing. Further, do not expect them to provide wingwalkers, to comply with Air Force spacing standards or to insert canopy or seat pins. Even if there is somebody on hand to provide some of these services, you had better supervise the whole operation. Just remember, that individual crawling all over and in and out of your aircraft may not know the seat ejection trigger from the pitot tube. Of course, if you are not completely familiar with the care and feeding of your bird, stay away from P and PC fields. And therein lies a good point for commanders and supervisors, such as Ops Officers and AOs. *Think twice before clearing some of your troops into these installations.*



CONTENTS

VOLUME THIRTEEN NUMBER ONE

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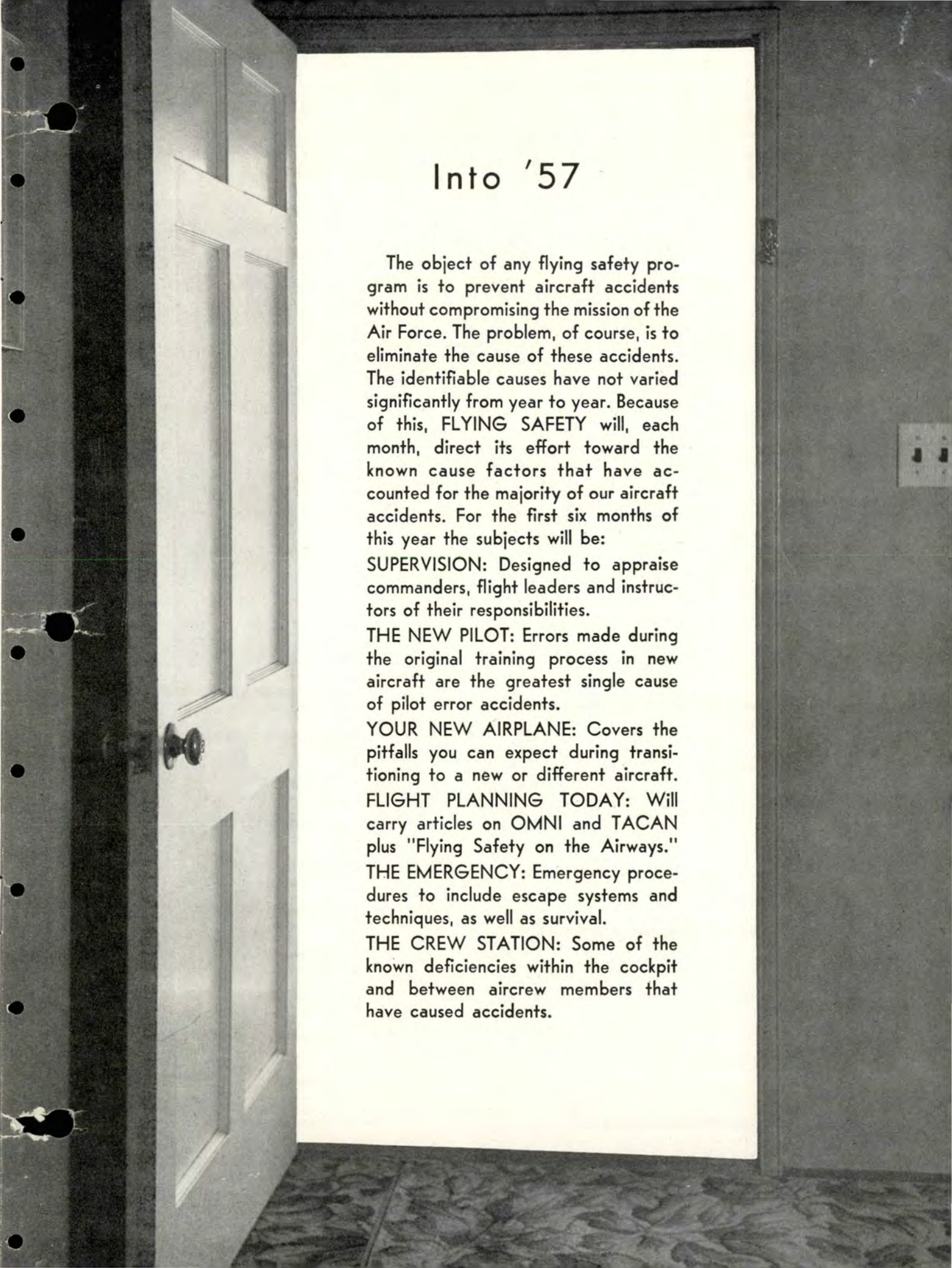


Into '57

The object of any flying safety program is to prevent aircraft accidents without compromising the mission of the Air Force. The problem, of course, is to eliminate the cause of these accidents. The identifiable causes have not varied significantly from year to year. Because of this, FLYING SAFETY will, each month, direct its effort toward the known cause factors that have accounted for the majority of our aircraft accidents. For the first six months of this year the subjects will be:

SUPERVISION: Designed to appraise commanders, flight leaders and instructors of their responsibilities.

THE NEW PILOT: Errors made during the original training process in new aircraft are the greatest single cause of pilot error accidents.

YOUR NEW AIRPLANE: Covers the pitfalls you can expect during transitioning to a new or different aircraft.

FLIGHT PLANNING TODAY: Will carry articles on OMNI and TACAN plus "Flying Safety on the Airways."

THE EMERGENCY: Emergency procedures to include escape systems and techniques, as well as survival.

THE CREW STATION: Some of the known deficiencies within the cockpit and between aircrew members that have caused accidents.

SUPERVISORY SCOREBOARD

THEY SAY big trees from little acorns grow—but that rarely impresses anybody. You walk through a forest and rarely see the acorns. Few people even see the scrub oak and the saplings. The usual thing is that the oak sits there and grows for a hundred years or so before some nature-loving soul says, "What a wonderful old tree that is, and look how big it has grown."

And this is true. Great things grow from small. And if their growth is slow, more often than not, it is unnoticed. But here is one that has grown: Accidents caused by supervisory error. And its growth has not been so slow as it has furtive. All of a sudden it was there. The facts may surprise you.

An analysis was made in an attempt to discover just what type of accident occurs because supervisors fail to exercise their assigned responsibility. What conditions result and what types and patterns of unsafe acts occur because of errors made by the supervisor of the pilot?

A total of 5365 major aircraft accidents were considered in the study. Of this number, it was found that 925 (17 per cent) involved a supervisor who had neglected to exercise his assigned responsibility.

These supervisors ranged throughout the units within the USAF organizational structure. Failure to assume responsibility resulted in numerous unsafe acts, omission of acts and inadequate decisions both from ground and inflight supervisory personnel. Sometimes instructor pilots allowed the pilot to perform a maneuver for which he was not qualified; maintenance personnel cleared aircraft without proper maintenance; operations failed to provide adequate briefing; major commands failed to provide adequate directives or regulations and so it goes—on and on.

The collision and wheels-up type of accidents were more frequently associated with unsafe acts and conditions resulting from a supervisory

Per cent of Supervisory error in total accidents studied.

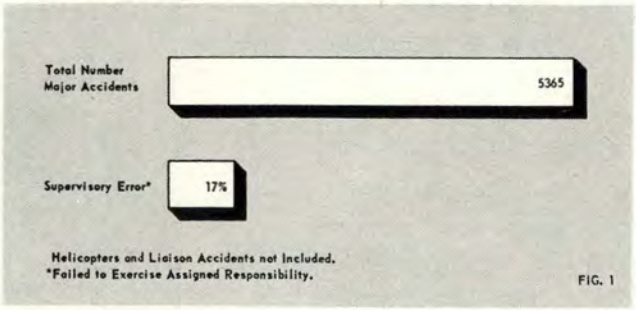


FIG. 1

Per cent Supervisory errors in accidents by type aircraft.

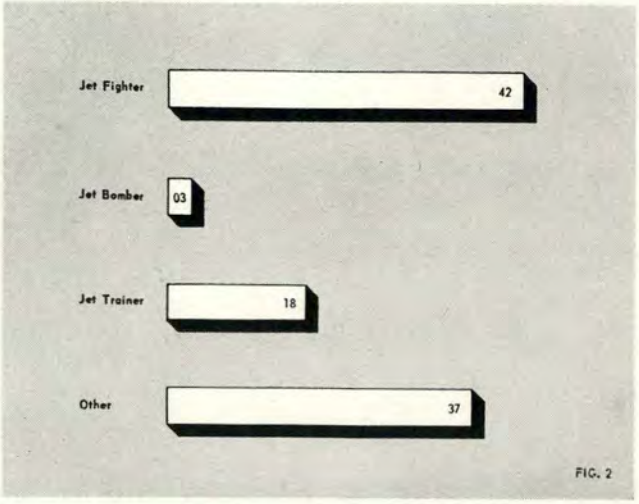


FIG. 2

Supervisory errors in major accidents by type of acci

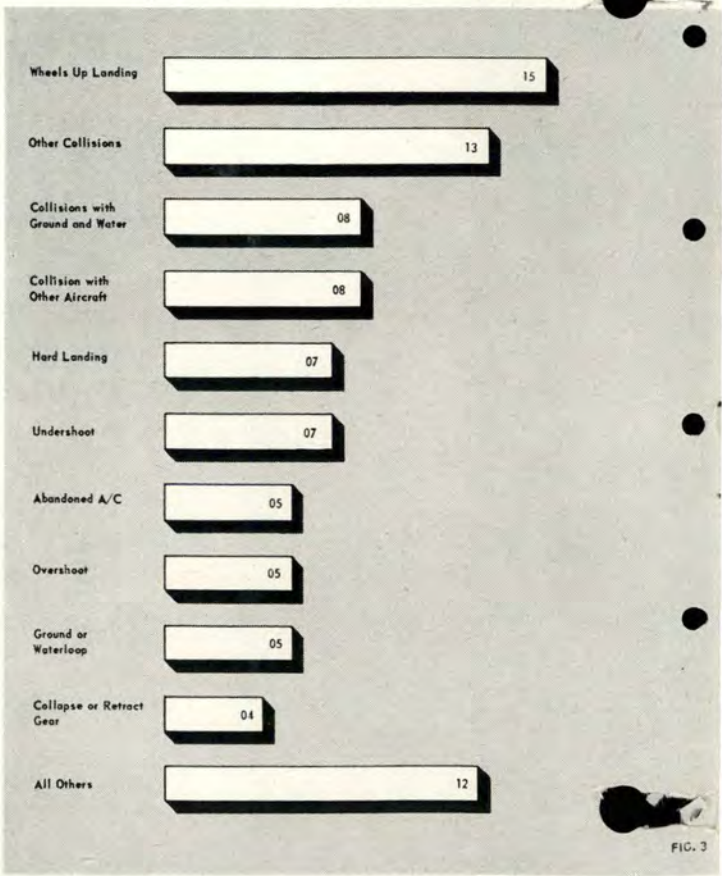
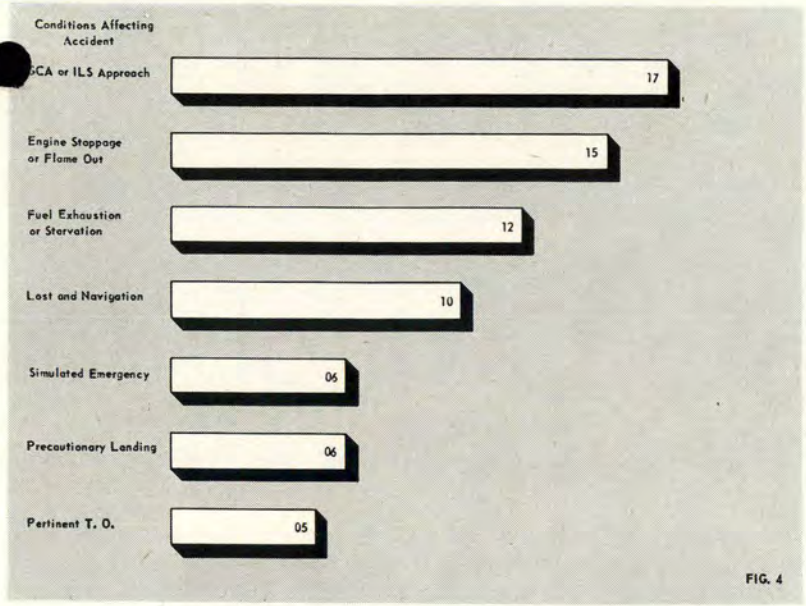
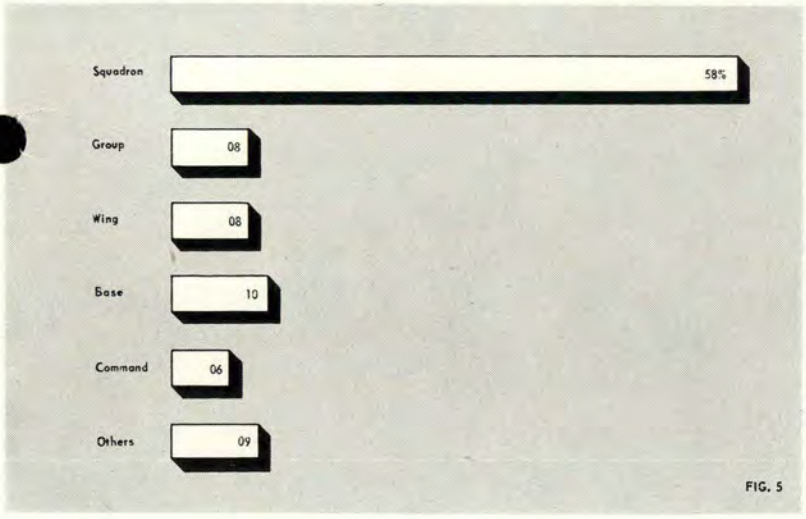


FIG. 3

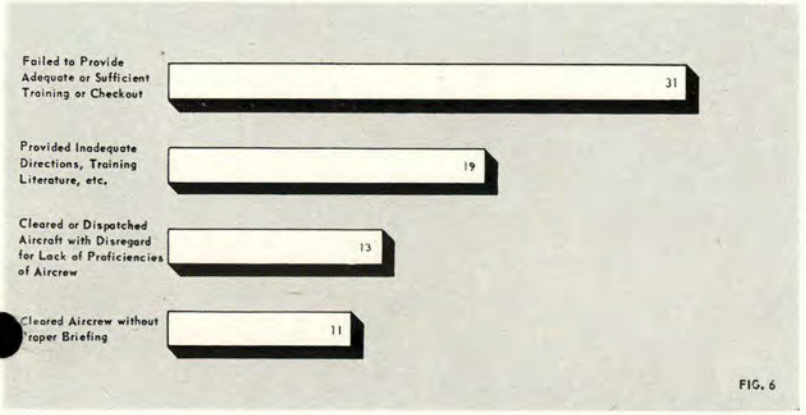


These conditions occurred in more than 5 per cent of accidents studied.

Level of personnel contributing to accidents supervising from ground.



Unsafe acts involved in over 10 per cent of total supervisory accidents.



error. When the 925 accidents were broken down by type of accident (Figure 3), collisions accounted for 29 per cent. Wheels-up landings accounted for 15 per cent of the total number. Again, a supervisor failed to exercise his assigned responsibility.

In over one-half of the accidents where supervisors committed an error, no prior conditions affected the accident (Figure 4). The most frequent "conditions - affecting" were GCA or ILS approaches, flameouts, fuel exhaustion and/or starvation, and navigation conditions. In 435 accidents, one of these prior conditions affected the result.

One of the most interesting parts of the whole study concerned recommendations made as a result of these accidents. You will recall that a total of 5365 accidents were studies in this survey. Only 925 reports indicated that an error in supervision had affected the accident. But—5016 reports (93 per cent of all accidents included in the study) contained recommendations to one or more supervisors for the prevention of similar accidents. These recommendations to supervisors concerned pilot training and procedures—addressed to commanders; traffic control — to operations officers; weather forecasting—to weather personnel; inspection and maintenance procedures — to maintenance supervisors, and there were even more.

The meaning is clear. Future accidents, similar to the 5016 that we've already had, can be avoided—if you recognize and squash that little acorn.

Here are a few to look for:

- Incomplete preflight briefings.
- Lack of consideration for individual capability.
- Improper evaluation of conditions and/or capability of individuals.
- Lack of specific, clear instruction or directions.
- Failure to assure understanding of instructions and/or directions.
- Failure to notify people concerned of changed conditions.
- Inadequate or improper inspection.
- Allowing an unsatisfactory, but correctible situation to exist.
- Failure to provide adequate directives and regulations.
- Release of improperly maintained aircraft for flight.
- Failure to provide the proper training. ▲

Take Care of Your

SUPERVISE — it's an old Latin word, the past participle of *supervidere*, to oversee, from *super* (over) and *videre* (to see). This is as clear as crystal and yet every once in a while someone improperly declines it into *oversight*. We lose an airplane then. It shouldn't happen but it does.

Here are some oversights charged to supervisory error in 1956, an inventory of aircraft damaged or lost through the carelessness of men who were responsible for other men. Here is what happens when supervision fails:

LOST, a B-57B because the transition training of the pilot had not adequately prepared him for the flight conditions he encountered. The pilot was killed.

DAMAGED, a B-57C because revisions concerning the use of wheel brakes were not inserted in the appropriate T. O. and P.I.F.s.

DAMAGED, an F-86F because during a practice toss-bombing mission the flight leader failed to establish sufficient space to provide adequate safety during over-the-shoulder type deliveries.

LOST, two F-94Bs because the flight leader committed his flight to a penetration and letdown which left the pilots with insufficient fuel to reach an alternate.

LOST, a T-33A because after observing that the right wing tank was not feeding, the instructor pilot failed to take corrective action and because later, when the airplane snapped into a right spin, he waited too long to initiate recovery.

LOST, two T-33As because the instructor pilot in one airplane gave his student acrobatic instruction in the transition area occupied by other aircraft, and because student pilots in transition had not been briefed on a new climbout procedure which might even then have prevented the mid-air collision that took place. One pilot was killed.

DAMAGED, a T-28A because a student pilot was cleared to fly this aircraft in which he was not proficient.

DAMAGED, a T-28A because an improperly installed fuel pump was not discovered until it had caused a serious fire.

DAMAGED, a T-28A because a runway control officer failed to recognize a hazardous condition on a runway used by student pilots.

DAMAGED, a T-28A because the instructor pilot failed to notice that his student had descended below a safe minimum altitude.

LOST, a T-28A because while flying in trail formation an instructor pilot flew in a reckless manner, leading his student through an unauthorized maneuver and causing the student pilot to stall his airplane into the ground. The student was killed.

"Everyone makes mistakes. Nobody's perfect. You can't win every time." The old excuses sound a little bit hollow now because the error that caused these accidents is hard to forgive. Someone just forgot to do some simple and routine thing that would have prevented each of them.

Somebody *failed*—*failed* to prepare a pilot, *failed* to file a piece of paper, *failed* to establish sufficient space, *failed* to plan, *failed* to correct, *failed* to observe air traffic rules, *failed* to properly check out a student pilot, *failed* to discover someone else's error, *failed* to recognize, *failed* to notice, *failed* to obey.

You ask him why and the sad fact is he doesn't know why he failed this time to do some simple, required thing he has always remembered to do before. He can say nothing to excuse himself except, "It slipped my mind. I meant to. I thought I had. I usually do but this time I forgot." It all sounds trite. It's commonplace. Forgetting is man's oldest ill. It began in the garden where Adam forgot, or was it Eve? We can't seem to remember now.

What's the prescription for th[redacted] complaint? It seems as trite as the excuses when you write them down. *Watch yourself. Stay on the ball. Check and double-check. Remember that somebody's life is in your hands. Think! Stay alert* and *Plan ahead.* But how do you do the simple thing that all of this describes. How do you make yourself remember not to forget? Is there a simple trick, some short cut to a perfect memory? A two-dollar book you can read that will free you from carelessness?

The answer, of course, is a genuine Alpine echo of the original, heartfelt, mournful *no*.

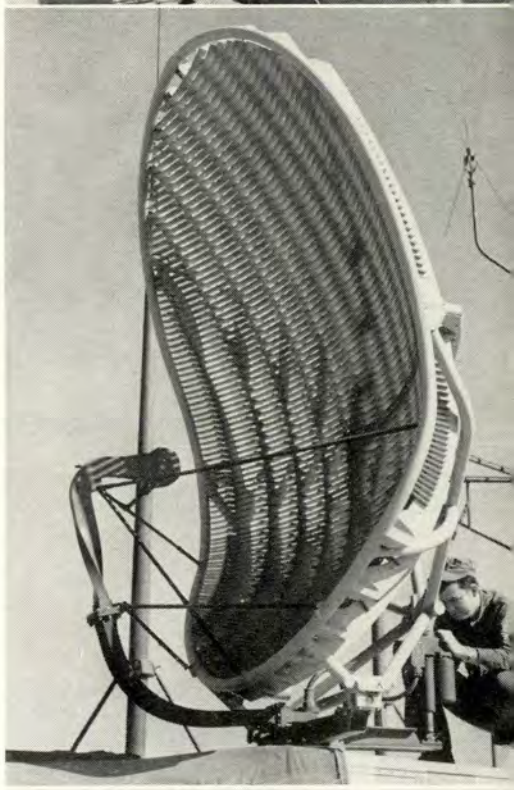
Then maybe you'll settle for some common-sense but slightly prosaic advice. This comes from the experts, a handful of men we've run across who haven't yet forgotten when the chips were down. Why haven't they failed? Let each of them speak for himself about the sort of thing he tries to avoid:

INSTRUCTOR: "I keep reminding myself that each of these boys is green as grass. I try to anticipate for them all the rough things that ever ha[redacted] pened to me or to anyone I ev[redacted] knew."

OPERATIONS CLERK: "When-

Oversights resulting in losing a pilot or an aircraft just shouldn't happen. If you are the leader, remember the welfare of the troops is in your hands.

Chicks !



ever I pick up anything the pilots or anybody ought to see, I never just put it down. I put it where it belongs, where I know they'll see it. That way I know I won't forget."

FLIGHT LEADER: "You have to remember that anything can happen and that it usually does. You have to look forward to the worst. I try to take everything into consideration, even the little error the other guy might make."

FLIGHT LEADER: "Whatever happens, you have to have a plan."

INSTRUCTOR PILOT: "I go on the assumption that if a mistake can be made, the boy I'm riding with will make it."

CREW CHIEF: "I check it. Then I go back and check it again. I try to outguess them. It gets to be a kind of game. I never play this to lose."

TEST PILOT: "In this business you can't afford mistakes. Whenever I get into an airplane I check everything, then I go around and check it all again. Always, no matter what I'm going to do, I try to remember every step in the process before I begin. You have to practice. You have to be sure. You can't just bluff these airplanes we're flying now."

But the best advice of all comes from a worn old sergeant who bosses ground crews on a nearby fighter base. "You take chickens," the sergeant said in an affable voice. "If the ordinary barnyard chicken isn't the most stupid animal that ever wore a pair of wings, then I don't know. Unless," he admitted, "you want to talk about people for a while.

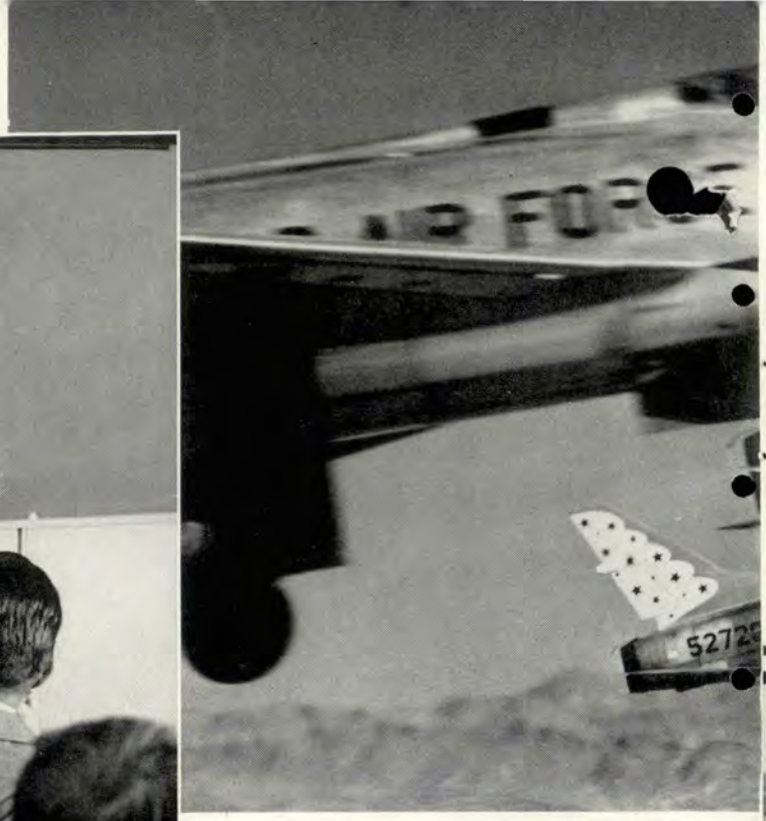
"Let's stick to the chickens. It's easier that way. You ever watch a fat old hen walking her brood across the yard? She knows all the rules. And yet they say that chickens don't have any brains. It says so right in the book. Well, maybe so. But that old hen doesn't give her chicks a chance to prove how true this is.

"She clucks and nudges and beats her wings; she hovers and leaps and worries them on. She watches 'em every step of the way from wherever she found them to wherever it is she wants them to be.

"That's what you've got to do with people," he said, reflectively, aiming a wad of tobacco at an approaching fly. "You've got to study them all the time, watch them," he spat and the tobacco flavored fly dropped to the ground, another casualty in man's war against stupidity. "Yes, sir," the sergeant continued, "no matter how smart they seem to be, you have to assume your boys are pretty stupid, just like the chickens." He shifted his plug and carefully scratched his graying head.

"You've got to be just like that old hen," he stated thoughtfully. "You've got to look after your own. If you really want to keep them out of trouble, you've got to look after them all the time. No matter what mistakes they want to make, what they're doing or which way they run, you've got to be there before they are. That's all there is to it," he said, cracking his knuckles and shifting his plug again.

"If you want 'em to get where you know they've got to go, you've got to take care of your chicks. Because, for all you know, they'll never make it on their own. That may not seem fair to chickens but it is," the sergeant firmly concluded, nodding with his conviction now. "At least," he said, "it's the only assumption you've got any right to make." ▲



Newspapers next morning read something like this: ". . . World's first supersonic precision team, flying their four red, white and blue 'Century Series' fighters, performed loops, rolls, vertical U-turns, cork-screw rolls and other spectacular maneuvers in a closely-knit diamond formation, wingtips overlapping, maintaining a scant five-foot separation at speeds ranging from 150 to 750 knots."

You've seen them? So have we—several times. After having watched a few of their shows, we get almost as big a kick out of watching other pilots' faces while they're watching. The big question is written all over them: "How do they do it?"

What follows is not an attempt to analyze all of the particulars but it does concern itself with one of the biggest and most important secrets to a Thunderbird show or your mission for this afternoon. Major Jacksel M. Broughton, Flight Leader of the Thunderbirds, gives you some clues on what to do while you rehearse to take over as his replacement.

I'VE HAD A terrific opportunity. During the past two and a half years I've had a chance to analyze the various problems connected with leading and building a strong flight. I am highly conscious of detailed aspects of this problem because one of my primary responsibilities is selecting and training a flight that represents the United States Air Force under show conditions.

In my job I naturally have some advantages that normally would not be available. I can, and do, screen very thoroughly each aspirant for a position in my unit. I talk and fly with them before I select them. This opportunity to be very "choosey" has impressed me more than ever with the problems, the weaknesses and the strength that a flight leader can build into his flight.

You must appreciate from the staff that a flight is a vital striking factor.

A Flight Leader Speaks...!

Major Jacksel M. Broughton, 3595th Air Demonstration Flight

I'm sure you have all read of the vast strides being made in missile development. Depending on which article you choose to believe, we are told that at some indefinite time in the future pilots will be "old stuff." At the same time we are all familiar with the advances in the single-ship attack pattern. Nuclear developments point in this direction. However, for some time to come the flight is and will remain the basic means of deployment of aircraft and aircraft weapons. When we become completely automatic I don't suppose we will need articles or even magazines dealing with this subject.

The flight then must be a strong and controlled unit if it is to succeed. To accomplish its mission (whether it be air supremacy, escort or tactical support) it must be a closely knit unit and it must be forcefully led.

To lead a good flight the leader must have the burning desire to do just that. Every prominent leader I've ever seen has had the desire to be outstanding in his job. This attitude just naturally rubs off on his associates, increasing efficiency and bringing out talent. Chances are that if you possess the necessary basic talents and really want to be a good leader, you can do it. If you don't have the burning desire you will, in all probability, never progress past the mediocre stage of development.

The leader's experience and organizational ability should first show in the preflight area. The preflight, I feel, consists of much more than strapping on the parachute, getting into the aircraft and accomplishing the checklist. The leader should determine the physical make-up of his flight as far in advance as possible. Once he has done this, he should let his people in on the nature of the mission. If crewmembers can think and plan through a flight well in advance they will be more relaxed and competent when the actual flight occurs. This mental drill process is as vital as physical drill. Examine your resources for talent available, plan its use, then don't keep it a big, dark secret. Let your crew in on your plans.

When he gets into the area of specific preflight tasks, a smart flight leader finds ample opportunity to increase the know-how of his people. Don't hesitate to delegate some authority for planning. You should, of course, maintain control of details to the extent of determining the general course to be flown, time to start and related subjects. However, I feel that one or more additional flight members should be charged with preparation of maps, research of navigational aids and facilities available, fuel reserve and so on. If you'll get the rest

of your people in on the act, you'll find that their interest and efficiency will increase greatly. Don't forget to double-check their preparations, or your own. Your name is still on top of the flight ladder and you are the one who assures that all planning is correct. When you have done this and when you are sure that all of your people are both physically and mentally ready to go, you have completed your preflight planning.

Two words that have been used extensively are briefing and critique. Usage, however, has not made these words lose any of their importance. Occasionally, we find a peculiar type who thinks he is too good to be bothered with these details. Those who neglect this area of flight control usually are not around too long or at least not in a position of authority. There are no two ways about it, if you are going to have an outstanding flight you must tell them what you are going to do. Then you must evaluate their performance after you are on the ground.

A good briefing need not always go into minute details. The degree of thoroughness should be governed by the talent and experience of the weakest flight member. It is folly to attempt to lead a flight unless all members know at least what you are going to do, why you are going to do it and what basic techniques you intend to use to accomplish the mission.

I prefer simply to talk through my flight with my troops. I find a blackboard or large paper helpful. I also make use of model aircraft in an attempt to avoid excessive talking with my hands. It seems to be easier for a wingman to visualize his actions when he looks at a model than when he looks at the back of my hand. Regardless of what I use, I still talk through the flight.

By evaluation of my past performances I've discovered that I have a few particular ways of doing things. As long as we are all people I doubt that we will ever become completely standardized. Don't fail to blend in your personal touch in briefing. Brief on what you personally intend to do. In this regard, no one should know better than you what you plan or are likely to do. Figure out what you usually do when faced with given conditions. And then give your flight the word. The better they know you, the better they are going to perform for you. So sound off.

After the flight is over, you have to tell your people how they performed. A basic evaluation of the success of the mission is the minimum acceptable critique. The more important phase of this aspect of flight leadership comes when you as a leader delve into personal performances.

If a flight member has not done well, he probably knows it. It does no good to launch into a tirade and proclaim that things are pretty grim all over. The pilot who failed, knows this already. People generally do not like to do a poor job. They want to do well and in the situation we are discussing, the poor performer looks to you for help. You must thoroughly analyze specific mistakes and make specific corrective comments.

If you can provide accurate advice the wingman will readily accept the hints you give him. It is most important that you give these hints as soon as possible. Let him have time to think through his actions. Again, mental drill is important. If the man in question can mentally go through his ac-

The flight is and will remain the basic means of deployment of aircraft and aircraft weapons.

tions between now and his next flight, his performance will improve.

All people are basically egotistical to some degree. In other words, those who do a good job like to hear about it. If a man really puts out for you, tell him. You will reaffirm his belief that he is doing well, and you will spur him on to further good efforts. If he is an excellent wingman, then it is up to you to start looking for and exploiting his flight leading capabilities. Start building leaders now.

One area of the critique that is often ignored completely is the flight leader's re-examination of his own techniques. Re-check your practices for smoothness, efficiency and firmness. You should get a few items for that mental notebook after each flight.

The sharp flight leader knows and understands the capabilities of each flight member. In fairness to his flight and to himself, he cannot do any less. We have established long ago the fact that the flight is only as strong as its weakest member; therefore, the leader's problem boils down to bringing the weak member up to strength. This can best be accomplished by direct supervision during training flights. If a two-pilot upgrading program is possible it presents the quickest and most efficient solution. If not, then the flight leader must hold back his sharp people until the weaker ones are up to par. This is basic but important.

The "pretty good" pilot is a constant source of difficulty. It is quite easy for the leader to glance out at a wingman, say "Old Joe is pretty good—he can probably hack this," and promptly get himself and "Old Joe" into trouble. It is entirely wrong for the leader to place any of his charges in a rough spot by attempting something that he can barely accomplish or that overtaxes those with inferior experience. Do you remember when you were just learning? Accept the personal challenge of bringing each of your people up to the desired proficiency level.

If all flights went as planned and as briefed, there wouldn't be too much effort involved in being a flight leader. In actual practice there is an almost constant demand for inflight decisions. If you were to pick one specific area where a good flight leader earns his pay, this is that area.

Inflight decisions are made necessary by several factors but most generally by aircraft malfunctions, pilot inabilities or drastic weather changes. No matter what the cause, the requirements placed upon the leader are the same. He must first evaluate the situation and make a decision, then he must forcefully relay this decision to his flight.

When it becomes apparent that a decision is required the flight leader must first sit back and look over the possible moves. He should weigh each alternative carefully, placing appropriate value upon his own ability, the ability of his wingmen, the capabilities of his aircraft and the various aids available to him. In most cases this process cannot be excessively time-consuming, but must never be less than thorough.

When a decision has been reached, the leader must firmly relay it to his wingmen. I know of no single factor more detrimental to flight integrity than a leader who stumblingly presents a weak or vacillating decision to his troops. If you don't believe in it, how can you expect them to? Be firm, but as in your ground briefing, explain enough so that each flight member understands exactly what is expected of him. If you choose well and

The flight must be a strong and controlled unit if it is to succeed. Also, it must be closely-knit.

A trail of smoke streams from the exhaust of an F-100 so spectators can better follow maneuvers.

explain well, implementation of your decision in flight should create no problem. This facet of leadership, of course, assumes its greatest importance during an aircraft emergency situation.

Assuming that the leader has correctly trained his people in the mechanical functions of emergency procedures, and has correctly briefed on the ground, the safe and correct solution of the emergency depends solely on the leader's judgment. Each leader should have the basic outline of emergency conduct firmly in mind.

★ ★ ★

The Author

Now Commander of the 3595th Air Demonstration Flight (Thunderbirds), Major Jacksel M. Broughton, came up the professional route. Graduating from the U. S. Military Academy at West Point in 1945 as a Second Lieutenant, Jack toured Europe in '51 flying F-47s. Upon reassignment, he worked some long hard years as an instructor in jet combat crew training squadrons.

Reassigned to Korea with the 49th Fighter Group, he logged 114 combat missions during 1951. From then until two and a half years ago he served as Squadron Commander and Director of Training in combat fighter training.

In October, 1954, he was chosen as the Leader of the Thunderbirds.

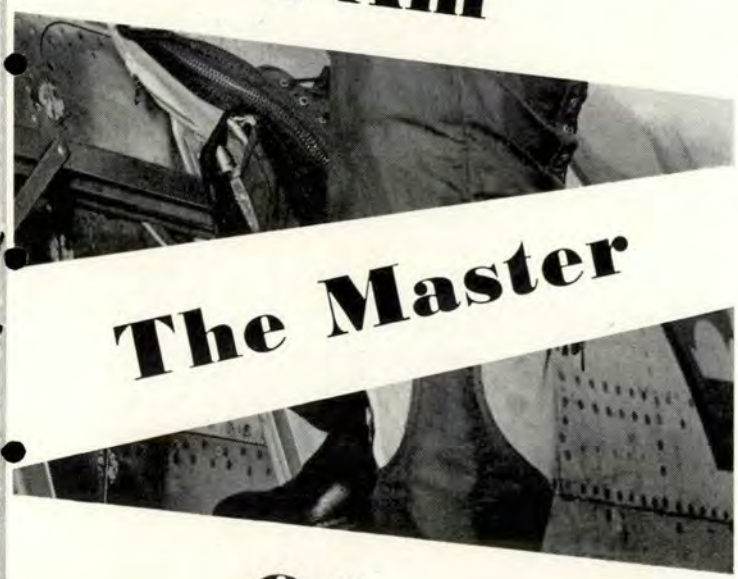
He should know who he will send with the stricken aircraft, who he will direct to establish radio contact with rescue facilities and who he will direct to conserve fuel for possible capping duties. Again, firm decisions and concise instructions are a must.

In screening pilots as possible replacements for myself I've discovered that I have developed a flight leader checklist. Here's what I check:

- Does he have the "burning desire" to be the best possible leader? (If he does, his chances of success are good. If he doesn't, he has no business leading people around the sky.)
- Does he know how to plan his flight?
- Does he utilize the talent available to him?
- Can he talk to and inspire his people?
- Does he know his business well enough to conduct a briefing and critique efficiently?
- Can he make specific corrections?
- Does he give credit for a job well done?
- Does he plan for his wingmen?
- Does he accept his wingmen as his specific responsibility?
- Does he make decisions soundly and intelligently?
- Does he relay his decisions forcefully and accurately?

Why not run yourself through this checklist and see how you stack up as a leader? ▲

I Am The Master Of....



WHENEVER YOU hear somebody say "supervisor" or "supervision," you ordinarily think of some top-management type sitting behind a large mahogany desk passing out large decisions. Decisions that may remotely or indirectly have some effect on something or somebody.

A closer look at the real meanings of the words may surprise you. It may even lead you to recognize that a supervisor, as such, is much closer to the problem. He is the immediate superior, directly responsible for giving directions and making decisions.

Let's go a little farther. The farther we go, the more evident it becomes that the true meaning of the word "supervisor" refers to your most immediate superior. In many ways, your most important boss is none other than yourself. You "oversee for direction," just like Webster says in that book he wrote.

This is something that everybody has to do for himself. But this problem of self-supervision is no easy task. Why? Simply because a more egotistical, stubborn and opinionated person can seldom be found. All of us have a remarkable combination of abilities. Despite this, even the most capable and most self-disciplined are beset by a large number of limiting characteristics which make sustained, continued self-monitoring difficult.

What supervisor, for instance, tells you to go home from a good party just because you have to fly the next morning? *You.* The only guy who can insist that you get up in time to eat breakfast and get organized for the day before that flight is you—again. You are the only supervisor who can guarantee that all the items on the preflight checklist are adequately covered.

Maybe you're different, but it takes a lot of supervising to make me crawl out of the cockpit on a cold day to check an item that I know I forgot on the walk-around. It may sound silly, but I'm the only guy who can make me do it. I'm the only guy who knows.

In the air, particularly in a single seat bird, you are both master and servant. It's a temptation to take short cuts in air procedure, or to allow attention to wander from the task at hand, a task which has become routine through hundreds of hours of familiarity. It is easy to take "calculated risks" which have been taken many times with impunity, even though you know that such unnecessary risks have resulted in disaster. Similarly, the post flight check and completion of forms after a long flight when you are tired, cold and hungry, is a matter of self-supervision or self-discipline.

Year in and year out, 50 per cent of all aircraft accidents are charged to that anomalous category "pilot error." It is in this area that the greatest remedial gains can be made in the future accident picture. It is interesting to note in this regard that only about four per cent are directly charged to supervision, meaning in this case higher authority. So it figures that self-supervision, self-discipline and strict adherence to procedures would have prevented a great many of our accidents.

Recognition by each crewmember of his responsibility for performing in accordance with existing knowledge and known procedures will go a long way in preventing aircraft accidents.

So the next time you get ready to leap, remember that the best place to look for a helping hand is at the end of your arm . . . your most immediate and important supervisor is . . . YOU. ▲

AN A/C SOUNDS OFF!

Lt. Col. Thomas L. Murphy, D/FSR

ONE OF THE most serious aspects of operating multi-crewmember aircraft is man's ability—or lack of it—to supervise, There are many definitions of supervision and yours may differ widely from mine or someone else's; however, in the final analysis I suspect that we all mean about the same thing. To make a clean break for this article I want to offer my concept of "supervision" as related to you, the aircraft commander. Plain and simple, supervision comes in two sizes, good and bad. Self-evaluation will place you in one or the other category. It is too easy, however, to fudge a little in self-evaluation, so let's do some soul-searching among ourselves and then re-evaluate what we see.

Supervision, in the case of our aircraft commanders, is pointed in one direction: to mold the material at hand into a safe machine, capable of effectively performing the assigned mission. Once you've been given the raw material, no one else can achieve the desired results except yourself. You can do it only through positive and direct supervision.

Take the positive approach to this problem of supervision by aircraft commanders. The few negative angles thrown in along the way are for spice, not to be derogatory, mind you, but to point out the evils of complacency and poor supervision. Let's take a fast look.

Building

The unit has been assigned new aircraft. You've been away to school and have hurdled the last ditch in preparation for becoming an aircraft commander. Your crewmembers have been assigned and now the arduous task of building a team must begin. They must be able to accomplish the job safely as well as effectively.

During the early phases of training you will be most concerned with filling gaps in your own education concerning the new machine. Confidence must be built up. A hay rack of forms and manuals must be continuously studied and maintained. You presume that the other members of your crew are having the same problems and are as conscientious as you are about fulfilling their obligations. Therein lies a trap in which no good supervisor would ever be caught. Questions have not been asked or answered. You have concentrated so hard on your own problems that those strangers with whom you have been flying are still strangers. Despite this, a certain amount of reliance must be placed upon their effectiveness now that solo time has arrived. Let's spice this up by throwing in one little mistake and see what happens.

The mission has been laid out. It seems like operations has included a dab of everything on the charts—day/night navigation, rendezvous and refueling, RBS, cruise control and other items of lesser magnitude. An eight-hour mission and back over the field with 30 minutes fuel reserve. We can hack that mission without too much trouble. Weather looks pretty good. Flight planning went smoothly.

If you are an Aircraft Commander, you know how to handle your bird. But are you really qualified as a leader? Try this article on for size.

If you are an A/C, take a positive approach to this problem of being a good supervisor.

Let's get this show on the road.

Everything goes as planned and we arrive over the home station VOR to terminate night celestial, fuel reserve as predicted. Switch to approach control and receive clearance to let down for start of penetration. Oxygen and altitude checks from copilot, okay. Everyone must be as tired as you are but you've got it made now. Call in over high cone as requested; one minute to start of penetration turn and descent to minium altitude. Now start descent and penetration turn. Boy, this thing unwinds on a letdown. Dials and instruments cocked all over the panel. Approach control has some weather information. Sky partial obscuration, visibility seven miles, fog —no problem. Fuel pressure warning light on. But they told me about that. You have plenty of fuel but in this machine low pressure warning lights may come on during a fast descent. Lights from that town look awful close. Hey, copilot, how about that altitude check? Approaching 10,000 feet, sir!

Now let's freeze this picture right here. The stage has been set for one of several things to happen: Abrupt contact with the ground, inflight disintegration due to an abrupt pullup

Good coordination in the cockpit is a must. As "the boss" it is your job to assure it.

After the mission has been laid on and you are on the line, your work has just started.

or we hope in this case, a near miss. Why? The copilot misread the altimeter 10,000 feet! Now don't laugh, because this has happened. It also may be a simple explanation for one or more "Cause Undetermined" accidents. The truth is that during initial crew training and checkout back at the home base, an instructor pilot rode the second seat most of the time. The copilot who was even greener than the pilot just did not, or had not been made to, realize the speed which this aircraft could lose altitude during a descent. A quick glance at the altimeter, a black night, partial sky obscuration, rapid descent, several successive turns, radio chatter and a touch of fatigue—both pilots misreading the altimeter is not so far fetched as it may seem. It happened.

Now what has being a supervisor got to do with a human nature type failure such as this? Plenty. It all started when the crew was put together and mated with their aircraft for crew training. At that particular time the aircraft commander should have begun the exacting task of acting and thinking like a supervisor. No aspect of crew ability, as a unit or as individuals, should have been overlooked or taken for granted. One of the big jobs of the aircraft commander is to determine exactly the individual performance reliability of his crew. He must use this as the basis for unit performance capability. He must know how far he can go on the strength of crewmember reports, and he must discover how much double checking on his part is required.

Specific training requirements laid down by higher headquarters are only a medium for establishing a basic minimum. You must supervise their training and their progress, and, in your own mind, determine their dependability. Don't get in a rut by thinking that being called "aircraft commander" automatically puts all things in their right perspective. This rut may turn out to be an open grave.

Check Pilots

In most USAF units a certain number of aircraft commanders are selected to perform duties as instructor pilots or check pilots. The unit commander should take careful steps to insure that pilots so designated have a keen outlook as to their responsibilities as supervisors. Total flying time, in itself, will not always tell the story. When supervising the activities of a crew, an instructor must be able to identify that fine line between *supervision* and *subjugation*. He must be able to recognize just how far to let a student go before changing his talk to physical corrective action. Let's look at a case history. This story, fortunately, has a not too unhappy ending; however (except for the God of Chance) it could have been one of the most disastrous accidents in the history of aviation. In retrospect it must be stated that supervisory error, other than that committed by the instructor pilot, also played a distinct part in this accident.

A C-124 aircraft departed home station on an IFR flight clearance for a destination approximately four hours distant. The mission:

- Route check a copilot.
- Transport 166 trusting souls and their baggage.

The pilot crew consisted of an instructor pilot, a pilot who had been checked out as a qualified C-124 copilot and the squadron commander acting as aircraft commander.

The first leg of the mission was flown by the instructor pilot and completed without incident. After loading 166 passengers and their baggage, an IFR flight plan was filed for return to home base. Now the plot thickens. With a heavily loaded aircraft, the copilot (who was getting his route check) was placed in the left seat for the takeoff and subsequent landing at home base. The qualified instructor pilot occupied the right seat. All went well on the return trip —weather VFR and no complications.

For landing it was decided to accomplish a practice GCA. In the GCA pattern the copilot (now on the controls) decided that during the approach and landing he would let the flight engineer handle the power. He wasn't exactly proficient in landing the aircraft in this manner but he wanted everything to be exactly right for the check pilot. GCA instructions were clear and everything appeared normal until about seven miles out on final. All three pilots and the radio operator stated that it appeared they were lower than usual. While descending on glide path and nearing the runway this became even more pronounced. GCA was calling "on glide path" to a maximum of 40 feet low. When passing through GCA minimums the copilot acknowledged

receipt of this information and took over to land visually. He called for full wing flaps and shortly thereafter a reduction in power to 15 inches of manifold pressure. At about this time in space he realized he was much too low and started to call the flight engineer for more power. He also noticed the IP motioning with his hands to pull up the nose. Unfortunately, at this time, the aircraft made the decision and landed 100 feet short of the runway, resulting in major damage to the left gear and structural members. The crew did not realize this until later.

Upon review of board proceedings the Division Commander aptly classed the primary cause factor: "Faulty judgment on the part of the operator and his supervisor as to distance rate of closure." The supervisor (instructor) in this case, oddly enough, gave us the clue to exactly why this accident occurred. It was his personal philosophy as an instructor pilot. I quote: "I believe there are two types of instructor pilots: One who will let an individual get into trouble, then see if he can get out of it; and the other type who will never let him get into trouble and as a result never let him learn anything." End quote. He classed himself as Type One. I will not attempt to pro and con the evaluation of his philosophy at this time. However, I will stand by my earlier statement: An instructor pilot is an important supervisor. As such he must be able to know just how far he can let a student go before changing his talk to physical corrective action. In this case the IP (the supervisor) had an additional, grave responsibility placed upon him: 166 passengers. His closest and most direct supervision and action was demanded to assure their safety.

You now begin to see that being a supervisor is not always something inclusively identifiable, per se. Rather, it is often that "something" which may determine whether a flight will turn out to be routine or wind up in the statistics column. The necessary ingredients are:

- Something to supervise.
- Someone to do the supervising.
- A clean-cut delineation of supervisory responsibility.

That's your job. The first two are you and your crew. The third is supplied by the written word. You, the aircraft commander, must recognize these facts and conscientiously prepare yourself to act accordingly.

Let's review one more case history for the prosecution. It's a duzie! The Captain was a line aircraft commander. The other pilot was a Lt. Colonel from Staff. The flight order lineup designated the Captain as the Aircraft Commander. He was to run the show. But the 175 lineup showed the Colonel as the Aircraft Commander and he had signed it. The Captain wondered . . . but the Colonel said it would be that way. Trouble was in the making.

The Captain sauntered out to the aircraft and started his preflight, but it was never completed. The Colonel already had issued instructions.

A Form 14 was in the making—the carbons were in, the typewriter poised. Only the blank spaces needed to be filled in.

The show got on the road. The first half of the flight was uneventful.

But remember: Flying has been defined as long periods of utter boredom interrupted by short periods of stark terror.

After lunches had been eaten and at precisely the right time to insure an advanced case of burning indigestion the prop synchronizer quit. There was no choice but to put the props in fixed pitch. They held.

Five and one-half more hours of utter boredom passed.

The Approach

Upon approaching destination it was decided to make a practice VOR approach. Night had arrived. During the let-down the gear warning horn had to be silenced. It was switched.

To further complicate matters the warning light in the gear handle was shining too bright. Some industrious soul had replaced a bulb of somber brightness with one of daylight brilliance. He didn't want to be caught with an AOCP. Consequently, visibility, both inside and outside the cockpit, was reduced. Quick thinking by someone produced a paper cup. A Dixie cup. This was hung on the gear handle to black out the light. A similar job of paper hanging had been accomplished earlier—a paper cup had been placed over the landing gear emergency release lever. The "door open" warning light stayed on.

The heavy hand of split responsibility and the absence of a true supervisor had left its mark on the crew. Up to now their actions have been

Every man is part of the team. Coordination and close teamwork is what you strive for.

The briefing is an all important function.

Below, one of the links in the chain at work.

Here is the price that was paid, because of no positive leadership.

governed mostly by a reluctant respect for the wishes of a superior officer. This fact had not affected the flight to any great degree up to this point. But let's continue.

The Captain planned to make a normal fixed pitch approach and landing. No problem, because he had full control of the props and two flight engineers to do what the prop synchronizer had been doing. But the Colonel suggested that the props be returned to automatic for the final approach. Unfortunately, the Captain relented and complied with the suggestion. The Colonel was reading the checklist. The next item called for "Props: 2550 rpm." The engineer advanced the synchronizer control and the props immediately surged 400 to 500 rpm. Down went the checklist. Back to fixed pitch went the props. The final approach was started. The checklist was forgotten. The tower operator was not required to call for a recheck of the landing gear and all glaring red lights nestled snugly under a black-out cover of paper cups. Utter boredom held sway for a moment—then stark terror, as a frantic grab was made for the gear handle! But the farm had been bought. There's no mistaking the mournful sound of tons of aluminum cutting an epitaph in the surface of well seasoned cement. . . . Except maybe the sound of your boss' well manicured teeth as he digs for the right answers.

The Form 14 is now filled in.

There were many factors which directly or indirectly contributed to this accident. Most of them are obvious and need no explanation. But sometimes the most obvious things are overlooked and in the final analysis stand out as the most important items of all. In this case there is little doubt but that the inability to supervise properly started a chain of events that ended in a materiel loss to the Air Force and a loss of prestige to an otherwise fine pilot. If the first "IF" had been removed from this case history, it is doubtful that the accident ever would have occurred. Aircraft commanders, supervisors, must realize this responsibility.

Reminders

We mentioned using the positive approach to this problem of supervision. What can you do as an aircraft commander to enhance your newly found status as a supervisor? A few reminders may point you in the right direction.

First of all you must realize and evaluate your own limitations. Older and more experienced pilots are almost always available to provide answers and background information. Don't be reluctant to ask their help.

When you've been assigned a crew, start immediately to evaluate each man as an individual. Study his records, become familiar with his background and try to peg his reliability. Your crew may consist of only two people—yourself and one other crewmember—or as many as 21 souls. A certain amount of reliance must be placed upon these crewmembers' capability to accomplish their jobs. Actually, your own capability will determine just how much. If you've exercised proper supervision during their growth period, the finger of doubt will not affect your own actions.

Question each crewmember about his specialty. Besides getting some idea as to progress and reliability, your own position as a supervisor will be enhanced.

What about the new copilot? He may be one of the old hands that has been around quite a while and who knows (or thinks he knows) all of the answers. Or, you may be one of the fortunate ones to be assigned a brand new second lieutenant. Now, here's your chance. A real chance to prove your ability as a good supervisor. This gent is either going to be a liability or an asset—to you as well as to the Air Force. Your efforts as an aircraft commander, a supervisor, will determine which. This angle must be considered since (whether you've thought about it or not) he's the guy who may be your replacement.

So, let's do this. Let's make him "Sir Boss" for a day. Give him the responsibility that will cause him to sit up and take notice. From the time the training mission is first laid on, let him run the show. Now, he worries about briefing times, transportation, lunches, station times and all of those little things that heretofore he took for granted. Now, he must figure the flight plan, compute the fuel reserve and correlate plans with the navigator. The Form F must be computed accurately otherwise all of the takeoff and landing data will be incorrect. Form 175 has to be filled in and filed with operations. Weather must be studied and decisions made as to the route to be taken. The gimmick is to let him make the decisions first, then, you—as a good supervisor—step in and make corrections where necessary. Of course you must be looking over his shoulder all the way. You are still the aircraft commander and as such are responsible for the conduct of the entire mission. But, progress has been made. You'd be surprised at the difference it makes to a gent who knows that he has from one to three years to sit in the other seat before he can hope to become an aircraft commander.

Now what have I tried to leave with you? I believe simply this:

- Don't try to find or rely upon any single definition of "supervisor."
- Ask yourself "What's the problem?" Take care of that and you won't have to answer for the "IF's" sometime later.
- Rules and regulations (from a training aspect) are laid on as minimum requirements. They cannot guarantee a finished product. You, as the supervisor, the aircraft commander, must fill in the gaps.

Now that we're finished with our soul-searching, let's re-evaluate ourselves as aircraft commander supervisors. Which size are you? Good or Bad? One thing is sure—if you are in a supervisory position when the chips are down, no one is responsible but You. ▲

Keep Kurrent

NEWS AND VIEWS

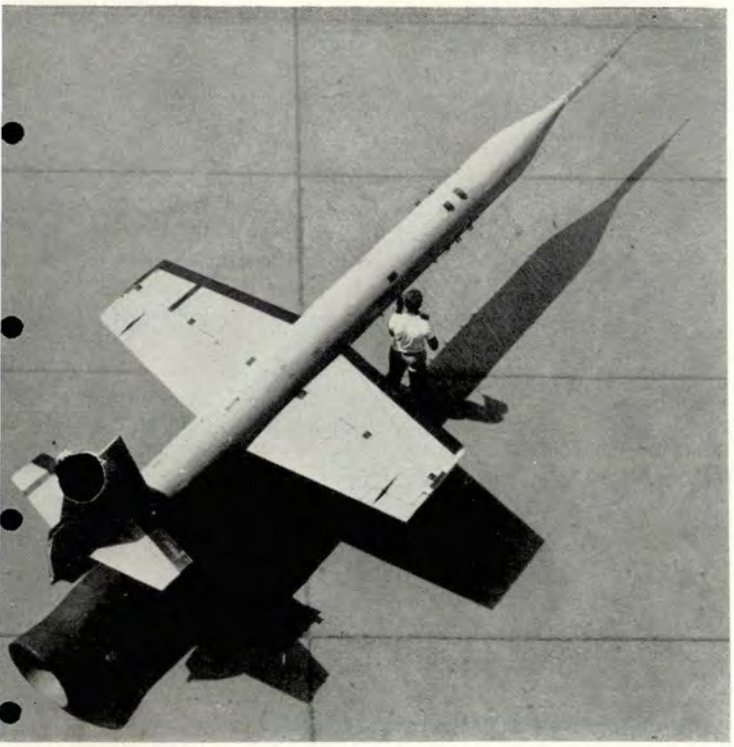
Above, shows the first KC-135 during initial aerial refueling tests.

The Hustler—That is the title Convair has hung on its new, supersonic bomber, officially designated the B-58. The delta-winged aircraft was test flown for the first time by B. A. Erickson and in his words, "The flight was outstandingly successful."

In normal operation the B-58 will carry a crew of three: the pilot, navigator-bombardier and defense systems operator. Its four General Electric J-79 engines are equipped with afterburners and mounted in separate nacelles slung underneath the wings.

The wing span is about 55 feet and the overall length is around 95 feet. Elevons in the wing trailing edges combine the control functions of conventional ailerons and elevators.

The B-58 is regarded as the first really supersonic bomber. It is designed to operate in excess of 50,000 feet.



Above, after seven years of secrecy, the supersonic X-7 makes debut.

Below, is Convair's ultra-fast B-58 shown during actual flight testing.

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KTIK
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WRI W2X1L--F 234/63/62←14/ 315 1XXX 89X02
LIZ O30 324/45/31↙2/ 502

PQI O20 325/44/334↓5/ 802 / ///9/ ///3/
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    INTER 031/4 ///9/ ///1/
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    04314 ///4/
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MDT M27D50D3RW-F 209/64/61↑^9/ 319 1500 ///2/ GRADU
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PIT O8 201/65/50↙7/ 500/ GRADU 0/864 0/624 0/344
YNG 30D8 210/66/51C/ 305 1100/ 99864 GRADU 99644 ///2/
MQT W5X11/2L--F 210/59/57^7/ 108 1XXX BY INR
CEF M15D10R-- 281/50/46←↙11/ 314 15XX 88615
FOK 1628E M7D7R- 56/55 ↙15 BY MDT
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Above, the detailed sequence comes in every three hours. Right, at 20 minutes intervals, you get any weather changes.

The meteorologists got together and came up with a method for providing a much more current look at the weather.

IN THE DAYS of old, when the knights of the air were somewhat younger — if not bolder — your friendly weatherman sent you a full weather report on the hour. This was very convenient, particularly as he supplemented this with special reports when the weather changed in between times.

As you've undoubtedly noticed, if you've visited your local soothsayer's shop recently, something new has been added. There is now an entirely new system of weather reporting designed to give you a current observation every 20 minutes. This system is known as the "20-Minute Weather Reporting Program," and this article will clue you in on why a change was necessary, how it works and how it helps you. But let us start at the beginning:

Weather

It is well known that the Wright Brothers really started something when they dreamed up their flying machine. In the process, they generated a sideline revolution in the weather business or, to give it the two-dollar title: The Aeronautical Meteorology business.

The early iron birds flew low, slow and for short distances, so it really wasn't necessary to exchange weather data for long distances nor in very great detail.

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KTIK
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ORD
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ILN
BTV
ILG
TAX
PIT
YNG
MQT
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Streamlined Sequence

C. J. Callahan, Headquarters Air Weather Service

The low and slow birds have been replaced by high-flying speedsters.

When the baling wire-adhesive tape days drew to a close, it became apparent that there was a requirement for more and more weather data from greater distances. The solution was to link up the reporting stations by teletype circuits. These operated under somewhat of a built-in handicap—there are, unfortunately, only 60 minutes in an hour.

You'll recall from your early adventures in arithmetic that if your teletype runs at 60 words per minute you can send, or receive, a maximum of 3600 words in an hour. A "word" is used here as a group of five teletype impulses, be they letters, figures or symbols. This places maximum circuit capacity at just 18,000 impulses per hour.

Now this was generally satisfactory in good weather but when the elements soured, a great many specials were taken, and the total, if sent, was more than 18,000. The net result was obvious — anything over 18,000 simply couldn't be sent and sadly enough just when you needed the information the most, in bad weather!

The wily weathermen began to search for a solution to this and the first answer you've probably guessed —run the teletypes faster. They decided to run them at 100 words per minute instead of 60, a theoretical increase in capacity of 66 per cent. However, this required the development of new machines, which isn't done overnight.

By the time the speedster models were about ready, demands for data had increased to such a point that even they would'nt help much. Something else had to be done.

A long series of interdepartmental conferences failed to come up with a common agreement. Actually, the civil circuits were not hurting as much as the military—they had more lines so the problem wasn't as acute. Still, the Air Force decided to go ahead with the "20-Minute Weather Reporting Program."

Here's how it works. The Air Force observer is keeping a constant watch on the weather at his station. Every 20 minutes he is required to indicate any significant changes that have occurred. We emphasize the word "indicate" because if nothing has changed, only the call letters of his station appear on the teletype. The professors call this "Management by Exception."

Now let's go through the full cycle. Every three hours each station sends a full weather sequence report, just like you used to get every hour under the old system. The "scan" comes in at 20-minute intervals and operates like this:

A monitor station (Tinker) sends a station's call letters. If the weather has changed since the last full report (or the last scan), the station has two seconds in which to send its new report—not a full one but enough operational meat like ceiling, visibility and wind, to let you know what has changed. If the weather hasn't changed, the station sends nothing; the monitor waits two seconds and then sends the call letters of the next station on the sequence. This is repeated every 20 minutes for three hours when all stations again send full blower reports.

Brother, this is one way to guarantee that you're never more than 20 minutes behind current weather. Even if the station has sent nothing for seven scans (2 hours and 40 minutes) you know that the conditions reported on the last three-hourly sequence haven't changed. Those specials which couldn't be transmitted are a thing of the past: you get more information, while the weather man, blessed with more (and current) data readily available, can do a better job on your flight forecasts.

This application of the principle of "Management by Exception" has been accompanied, as is usual with innovations, with a certain amount of confusion.

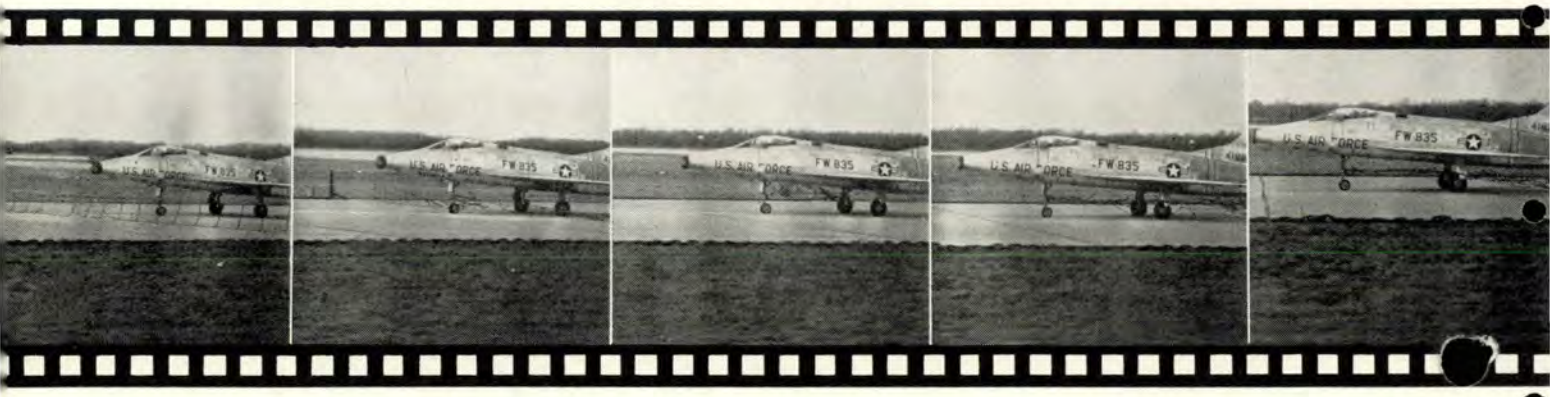
The main difficulty doesn't lie in the system itself. It's the physical handling of the teletype paper that causes some bugs. Though no standard system for processing the data has been established as yet, several systems have been developed by various ingenious weather types and seem to work very adequately.

If you've had trouble finding what you want, ask your local weather officer to check you out on how he handles the paper. As is also usual, a few people didn't get the word, but recent "All Points Bulletins" should clear this up quite rapidly.

In short, the new system permits you to stay within 20 minutes of current weather. Under the old procedures you could be as much as an hour behind it. ▲

Do all of your boys know what to do when a barrier engagement appears imminent? If not, they have no one to blame but themselves . . . and you.

Stop of the Century



MORE THAN 200 Air Force aircraft are flying today although at one time each was headed for a certain crash. These birds, because of landing long or aborting a takeoff, were headed for the boondocks when, at the last moment, they were snatched to a sudden stop. We are referring, of course, to the landing barriers that are perched at the end of some 300 Air Force landing strips.

These barriers carry a tab of about $10,000 each. Figure this cost against that of over 200 airplanes and you have little difficulty in justifying the barriers' existence.

The standard USAF MA-1A runway overrun barrier is the outgrowth of a similar system developed and tested in Japan during the Korean conflict. The original system proved successful in arresting most of the jet fighter types in service at that time. The runway barrier in current use is basically the same design with some improvements. The improvements were necessary because fighter aircraft of today have grown considerably in size and gross weight and have higher landing speeds.

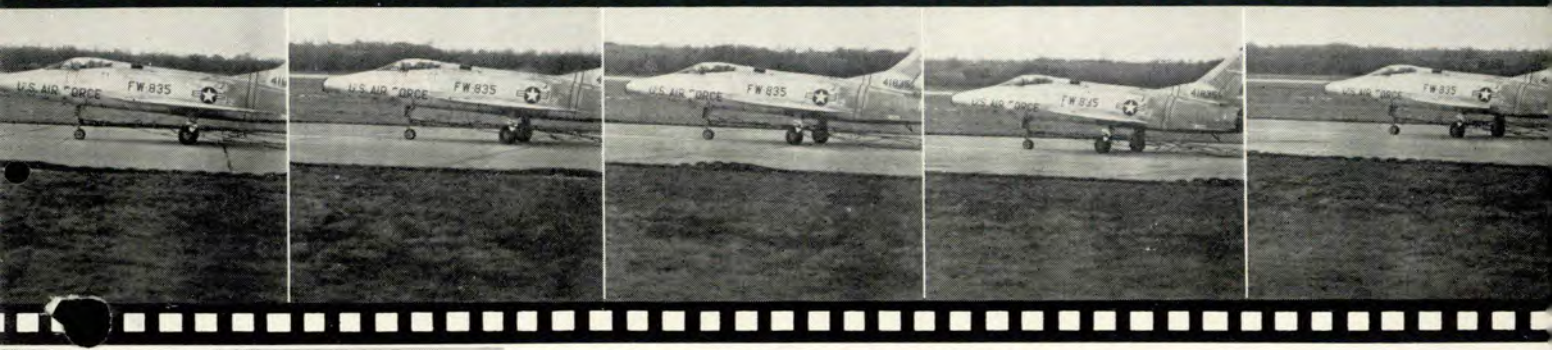
For those interested in the actual construction and design of today's barrier, here is a fast rundown. The barrier is made up of two remote-controlled, pneumatically-operated stanchions, one on each side of the runway. They support a nylon rope at a height of 38 inches above the runway. The nylon rope is attached to the stanchions by release assemblies fitted with shear pins that fail and allow the arresting gear to be actuated to catch the struts.

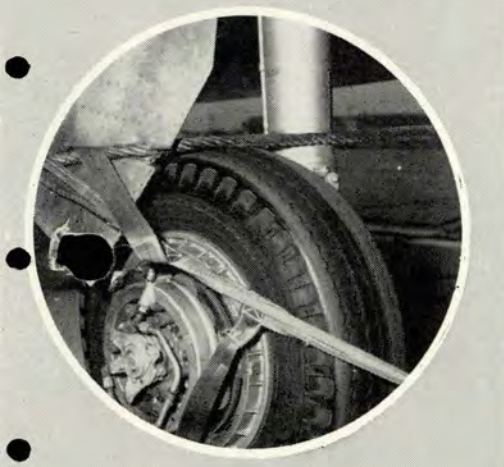
The rope may be described as the trigger for the arresting system. Attached to the nylon rope are 25 lifting straps, made of nylon webbing, 12 on each side of the runway centerline. The other end of each lifting strap is fastened to a 7/8 inch diameter steel arresting cable. Movement of the aircraft through the nylon rope causes the lifting straps to lift the arresting cable into position to be engaged by the main gear. The arresting cable is attached to the stanchions at each end by a shear device which fails when sufficient tension is placed on the cable. This cable is further attached at each end to a length of chain lying off the runway. As the airplane continues down the runway, the chain is dragged along, gradually slowing the aircraft down. The chain weighs approximately 55 pounds per foot for the first 90 feet, and then the weight is doubled for the remaining 360 feet. The whole trick is getting the aircraft main gear to engage the arresting cable.

The Catapulting and Arresting Section at WADC's Equipment Laboratory, heads up the Air Force barrier program. The problem of arresting high performance airplanes during ground roll emergencies is a very real one. Each new aircraft design presents its own special engagement problem as landing gear spacing, fuselage clearance, and external store configurations and locations all affect the engagement capability.

In previous issues FLYING SAFETY has covered the tests on the

Here are some shots of the F-100 and landing gear struts. The tests were run at various speeds and in various configurations to determine the adaptability of the aircraft to the standard MA-1A barrier. The aircraft proved itself okay.





F-86, F-84 and others. In this one, let's look at the F-100. It turns out that the first of our Century Series aircraft fares pretty well after tangling with the barrier. Your chances are greatly enhanced, however, if you keep a few things in mind.

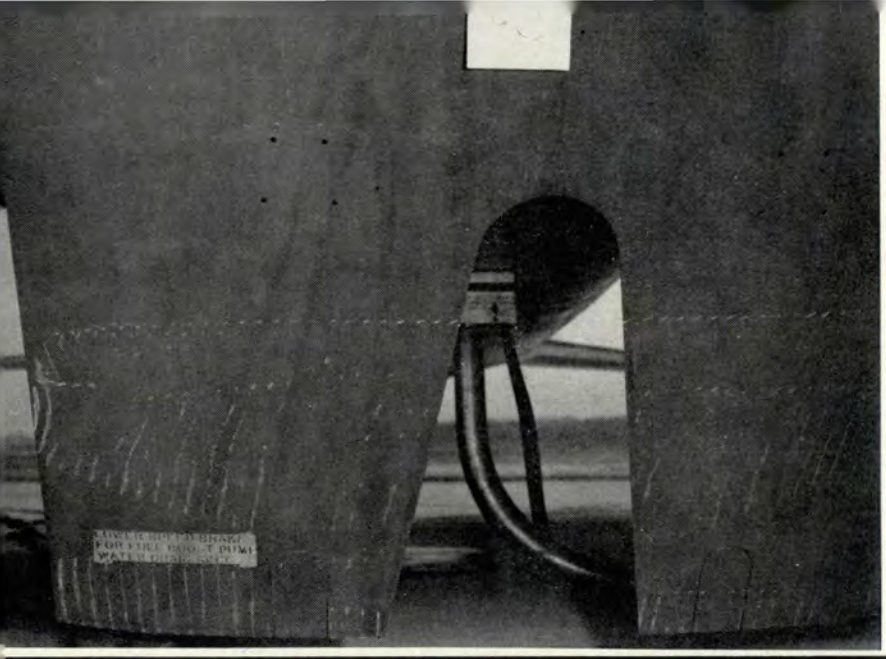
It is rather reassuring to know that somebody has performed a very comprehensive barrier testing program on the bird you fly. They determine the adaptability of the airplane to the barrier and the barrier to the airplane. Therefore, just about everything is tried. The object, of course, is what can you, the pilot, do to better your chances for a successful barrier engagement?

External Tanks

In all of the tests conducted with external tanks, not a single aircraft made a successful engagement. One tactical unit has sent in a report concerning an F-100 carrying two external tanks and successfully engaging the barrier. This, however, is the exception and exceptions don't make the rules. The tests conducted at WADC prove that retention of tanks greatly reduces the odds for a good catch. This applies to all external stores. The rule says: The aircraft is considered unsatisfactory for barrier engagement in the external stores configuration. So get rid of 'em.

This wasn't a hit or miss proposition. Realizing the hazards associated with jettisoning external stores, an attempt was made to develop a method of engaging the barrier by means of hooks attached to the dive brake door. With this modification the cable could be caught by the dive brake with the external tanks in place. However, the door is not structurally designed to withstand the barrier engagement load. Therefore, the "get rid of 'em" rule remains.

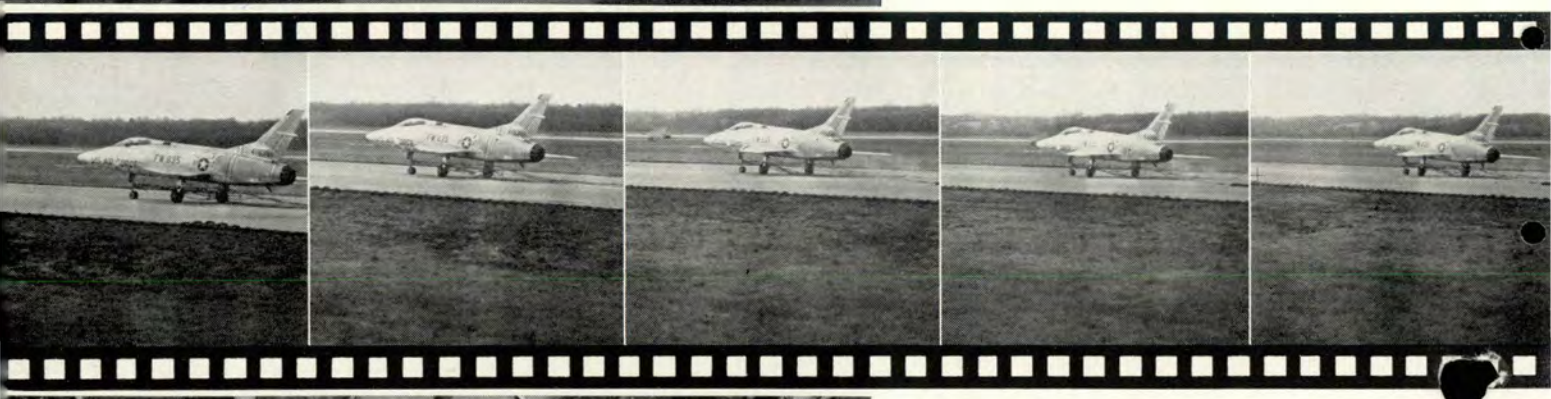
As in the T-Bird, an open dive brake, as now installed on the '100s, will louse up the whole operation. The arresting cable comes up, hits the door and neatly goes down and under the main wheels. Result: *Nothing!* So,

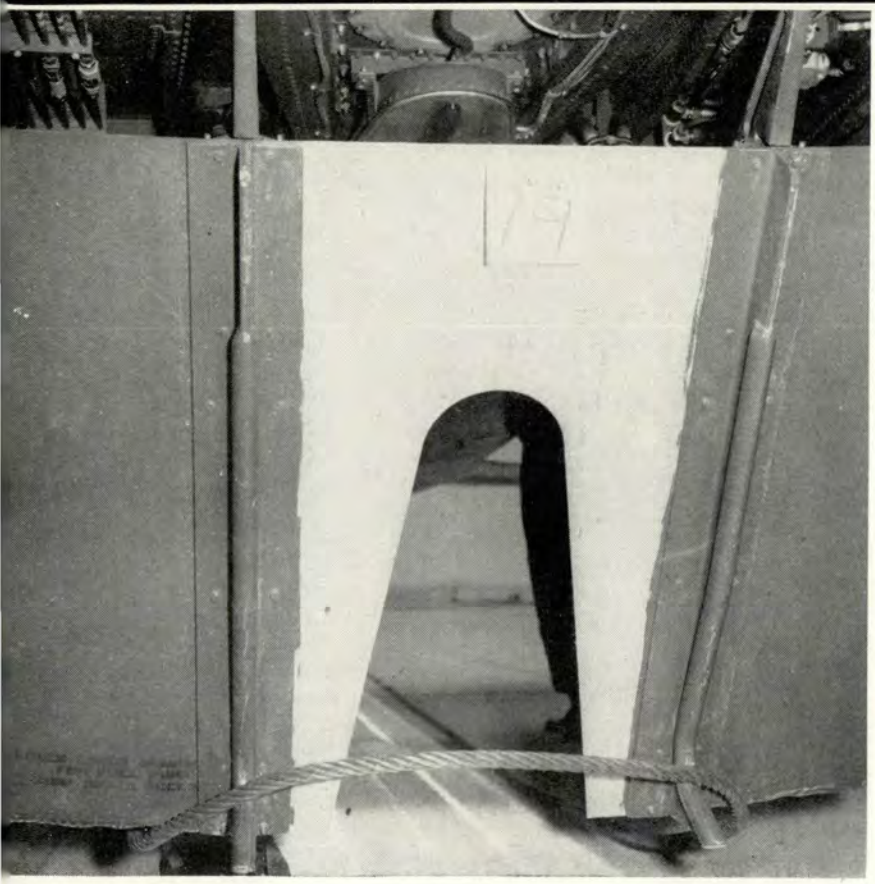


it's speed brakes up and tanks off to insure an engagement.

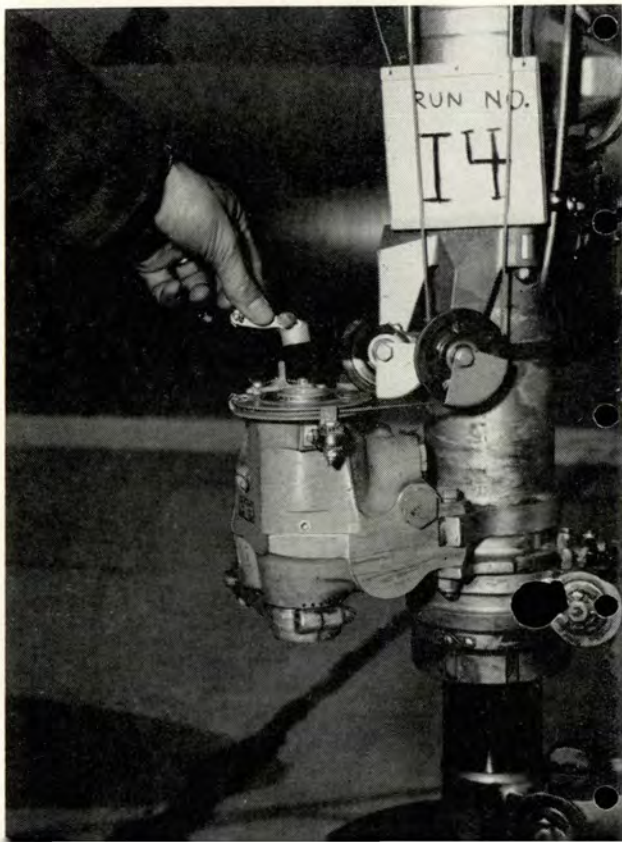
Clean

In the clean configuration, the barrier engagement results were very satisfactory. The highest speed used was 92 knots and the engagement was a satisfactory one with a runout of about 1000 feet. Normally speaking, the higher the speed the better the engagement . . . up to a point. One of the problems of an extremely high-speed engagement is not having enough chain to stop the aircraft. As





At left, notice the cable marks on the speed brake door and the hook modification. Below, is the obvious reason for possible loss of nosewheel steering after engagement.



a result, a successful catch is made, but the aircraft proceeds out of the overrun with resultant damage. Studies are being made now to determine the feasibility of adding more links of chain on each side.

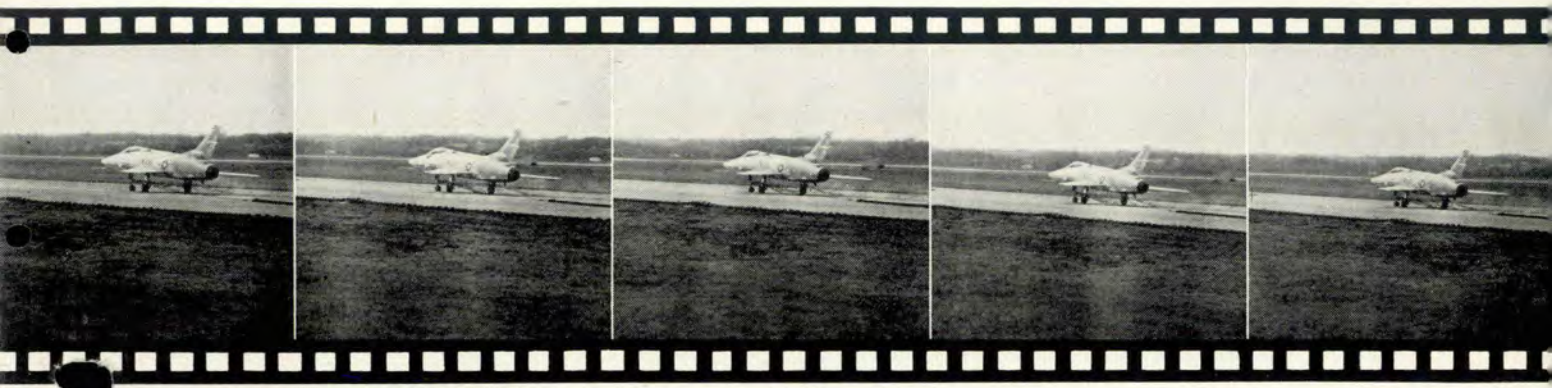
Low Speeds

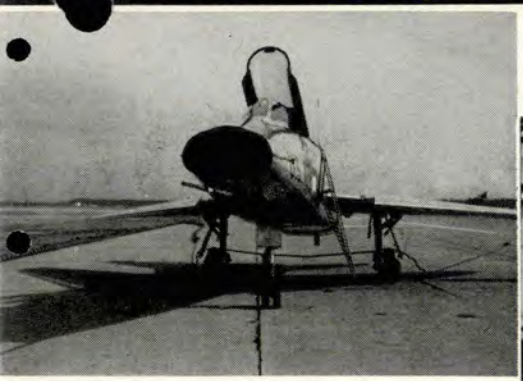
One of the reasons for testing is to determine the low speed cut-off point. In the F-100, for example, the low speed cut-off point fell between 33 and 28 knots. At 33 knots the engagement was successful, while at 28 knots it was unsuccessful. As such, somewhere below 33 knots you can not expect a good catch. It was noted throughout the low speed engagement program that the shear devices which retain the nylon horizontal straps across the runway, failed to shear simultaneously; in many instances one side would shear while the other held throughout the engagement. This resulted in a slight yawing after engagement. The pilot was able to correct the yaw with nose gear steering in each case. At engagement speeds of 60 knots or above, this condition was not apparent.

During several of the higher speed engagement tests the mechanical hydraulic and electric components of the nose gear steering system were damaged. As a result, there was a loss of nose gear steering. Although it may not happen, it is always a possibility.

For planning purposes, figure it this way:

- The F-100 can be arrested successfully in the clean configuration.
- It cannot be engaged with external stores installed.
- The dive brake should be closed.
- Expect loss of nose gear steering upon contact with the barrier. ▲





Above, are the engagement results at 38 mph. Below, the aircraft engaged—doing about 54.

The nose gear strut actuates the webbing and acts as the trigger to set off the mechanism.

REX SAYS

THE CAPTAIN of a Viscount airline type reports that shortly after takeoff, when at a height of 12,000 feet, the first officer requested a glass of Alka Seltzer from the stewardess. Upon receiving the drink, the aircraft bumped in turbulence and a very small amount of the liquid was spilled on the pedestal. The captain requested a cloth immediately but before it could be obtained, one inverter switch had shorted out, blowing the fuses. The area was dried rapidly, but the second inverter also shorted out. The aircraft was flying in the clouds and a turn was made to return to the point of departure. An attempt was made to activate the standby inverter but it had also been shorted out. The captain was able to locate a break in the clouds and a successful landing was made.

***REX SAYS**—This account was received from the Royal Australian Air Force, who reported that this incident reveals a weakness present in practically all modern aircraft. In aircraft such as the Convair 240 and Douglas DC6 it is possible to cause propeller reversing in flight by spilling liquid over the control switches on the pedestal. There is only one answer, of course. Keep liquids out of the driver's compartment.*

★ ★ ★

DURING a recent test, the Missile Test Center of Ground-to-Air Interceptor Missiles picked up an unidentified target adjacent to the restricted area. Its presence was detected visually and not until a few seconds after a test missile had been launched. This aircraft was in real danger. If the missile had not malfunctioned, there is a strong possibility that the aircraft would have been destroyed. There have been other instances of unidentified aircraft flying at very high altitudes through these restricted and warning areas. Apparently some pilots of high performance aircraft feel there is not much danger in flying through these areas at extreme altitudes. This is not true. Pilots must realize that there is no safe passage through such an area unless properly cleared.

***REX SAYS**—You may be flying the hottest aircraft around but you ain't seen nothin' 'til you see one of those missiles perform. So, regardless of your altitude, regardless of your speed —one of those jobbies will get you if you don't stay clear.*

★ ★ ★

WHILE ON a cadet orientation mission I made a normal pitchout for landing. On the roll-out, the gear and flaps were lowered and the turn to base started. Upon checking the gear handle, I found that the handle would not lock in the down position even though I had a safe gear indication. Three attempts were made during this part of the pattern to lock the handle, but with no results. So a go-around was performed.

After climbing to altitude once more, the aircraft was slowed down and approximately six more attempts made to lock the handle. I notified the tower of the difficulty and requested the crash crew to stand by, and also for gear pins to be brought to the end of the runway.

I instructed the cadet in the back seat to hold the gear handle down during landing and after-landing roll. A normal pattern was made and upon flareout and reduction of power, I too held the gear handle down. After a normal touchdown and landing roll, the aircraft was stopped at the end of the runway and gear pins inserted. The aircraft was taxied to the parking area without further incident.

It is my recommendation that the importance of checking the gear handle every time in the pattern be reiterated to all T-33 pilots.

It is also noteworthy that this same message has been presented in Flying Safety Magazine. After two years of T-Bird flying, that gear handle check finally paid off for me.

***REX SAYS**—You just can't be too careful when it comes to herding Uncle's Birds. Like the man said, "That gear handle check finally paid off for me."*

Thanks a lot for the story. It is real live incidents like this that pound home the importance of some of the seemingly insignificant, inflight checks. Congratulations on a real fine, heads-up job.

★ ★ ★

AN F-100D aircraft was involved in an incident which uncovered the following information:

The aircraft aborted takeoff at approximately nose lift-off speed (135 knots), after covering some 3400 feet of an 8700-foot runway. Gross weight was approximately 30,000 pounds.

The drag chute was deployed and the throttle stopcocked. The drag chute streamered and provided no braking action, yet the aircraft was stopped successfully in approximately 3100 feet with normal braking action. This F-100 was equipped with the anti-skid braking system. No damage was done to the aircraft nor were there any evidence of excessive use of brakes (flat spots, skid marks or smoking brakes).

"Gridley, I suspect that you failed to grasp my point on closer supervision!"

Information like this should be brought to the attention of F-100 pilots in all commands. The continual publication of data such as this makes more information available to the pilot and promotes the cause of flying safety in all aspects.

REX SAYS—*It is always good to get the word on incidents such as this, especially when it involves a relatively new bird. So often a new aircraft gets so involved with rumors, that before you know it, it has a real bad reputation. Don't believe half the stuff you hear at happy hour. Just get the facts, man.*

★ ★ ★

TWO PILOTS in a T-33 took off on a routine flight. Approximately 10 miles from their destination, it was noticed that the Airspeed Indicator and Altimeter were not functioning properly. An immediate call was made to Radar Approach Control Center. The closest GCI site picked the '33 up on radar and scrambled an F-89. GCI vectored the F-89 to intercept the distressed T-33 and they joined up. The weather was reported as partially obscured with ¾ mile visibility in fog. With the T-Bird flying wing, the F-89 penetrated, broke out and led the '33 down to the runway. The F-89 pulled up and came around and landed.

REX SAYS—*That, gentlemen, is what's known as cooperation. It just goes to show you that if you get into a pinch and let somebody know about it right away, you can be helped. This deal of waiting until you are down to a dram of fuel before asking for assistance won't hack it. Congratulations to all hands for saving the T-33.*

★ ★ ★

A T-BIRD accident was just barely averted—thanks to an alert tower operator. While making a modified flameout (practice, amen) pattern, the pilot placed the gear handle in the down position and checked the indicators for wheel position. Assured that there were "three green" and pressure, the pattern was continued. As the bird came over the fence, the tower angel called to "pull up" (you guessed it), no gear! A successful go-around was made with no damage other than a slight scraping of the dive boards.

The next landing was made a little higher from the ground. After shutdown, a quick check was made on three birds and all seat positions had microphone wires between the gear handle and the left console and in some cases the wires were wedged tightly.

All wires have since been relocated to come over the back of the seat.

REX SAYS—*Whew! You can't come much closer than that to pranging a bird. Maybe I've misunderstood the trouble. I don't quite get the picture on this misrouted wiring but I'm glad that you've fixed it, whatever it was. One thing about a deal like this, if everybody complied with the (here we go again) Dash One. . . . It says, "Gear handle down and JIGGLE." If it is in the down detent, that handle isn't going any place. IT'S IN THE DOWN POSITION . . . period.*

★ ★ ★

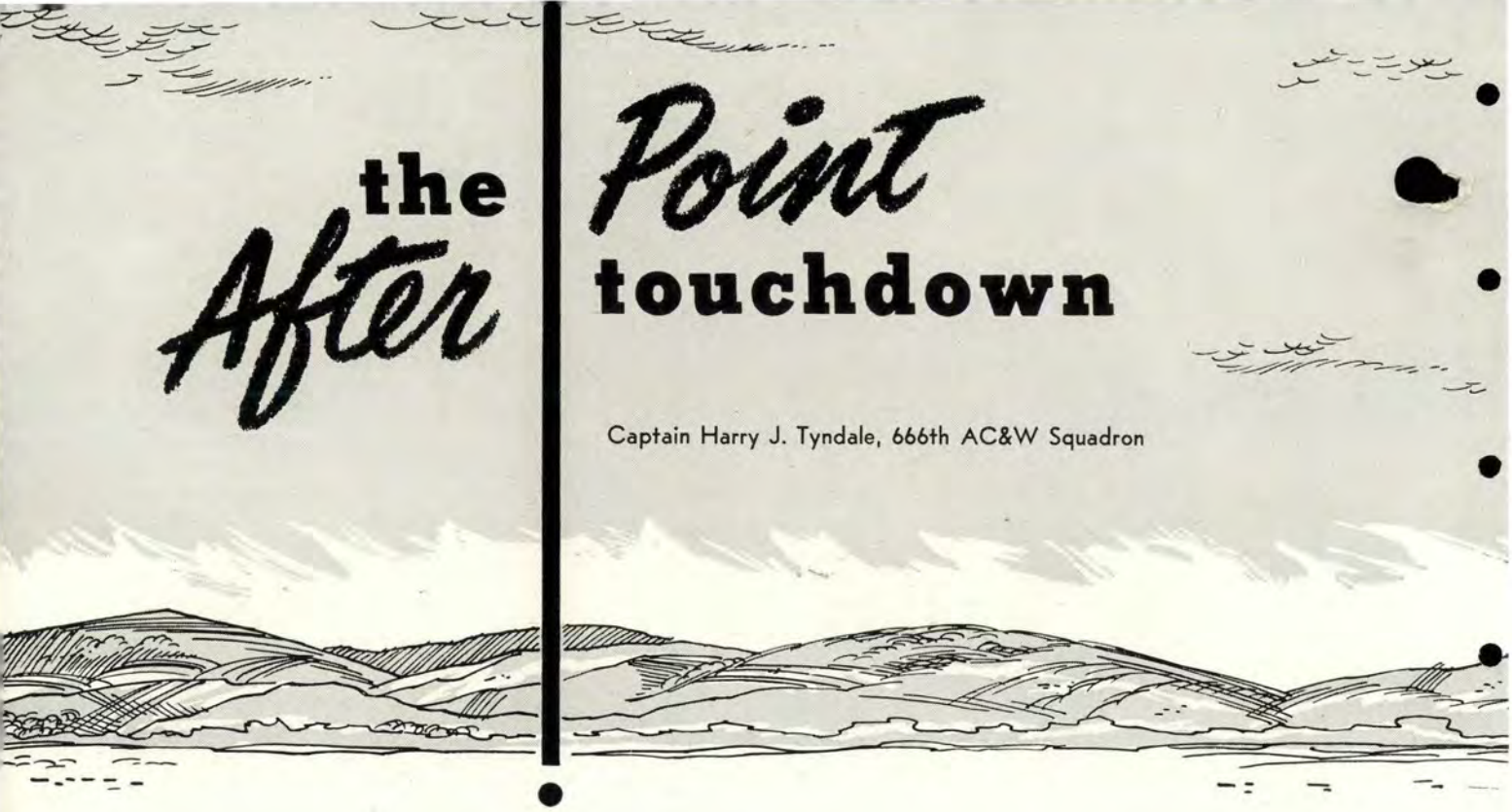
WHILE ON my first instrument ride the instructor said he had the aircraft and wiggled the stick. He then demonstrated the use of several instruments. About five minutes later, he said, "You need a little more back pressure on that maneuver." At that time I had my hands in my lap. I don't know how long I was supposed to have been flying.

REX SAYS—*Who's on first?*

★ ★ ★

AN INSTRUCTOR pilot entered an inadvertent spin in a B-25. He was trying to demonstrate unfeathering procedures without the use of the feathering motor by slipping the aircraft to start the propeller turning. Experience is a good teacher though, he now recommends that everyone use the normal procedure.

REX SAYS—*If the Baker two-five was built to go sideways, they'd have pointed the seats that way.*



the After Point touchdown

Captain Harry J. Tyndale, 666th AC&W Squadron

Considering the pace of today's world, it takes a lot of effort to keep up with the refinements in this flying business. A good boss knows this.

"IT'S NO GOOD, sir, you'd never stop the bird."

"That's a matter of opinion, Captain." There was obvious displeasure in Colonel Kelly's tone as he answered Captain Johnson.

"We won't lose more than an hour, sir. Just put the boards down and keep a high setting. If the runway dries out in the meanwhile, we might try it earlier."

The Colonel didn't bother to acknowledge. What he had to say, he'd say on the ground.

There was no further discussion. In the locker room Captain Johnson could read unhappiness on the Colonel's face. He buttoned up and made a hurried but silent exit. Bill Johnson took the leisurely approach, deep in thought about the factors behind the decision he had just imposed upon his base commander.

It came as no surprise when Captain Johnson was summoned to the office of the Director of Operations.

"Good afternoon, Bill," greeted Major Ham, as he returned the salute. "Sit down," he said, offering a chair with a wave of his hand. "What's the Old Man so upset about?"

"I suppose it's customary for the ranking man to get indignant in any difference of opinion," answered Captain Johnson. "Did he explain the situation to you, sir?"

"In a sense," answered Major Ham. "Of course it was the Colonel's opinion that I had heard. On the surface, it's pretty serious. He wants me to pull you from the IP list."

"Maybe you'd better, Major, because I won't do any different the next time."

"Well, before I can do anything, I've got to find out what happened. Right now I'm dealing with a case of hurt pride, and since it involves my Commander, it's a big case. As I understand it, you overrode his opinion and flatly refused to let him land. Is that the right dope?"

"That's it, sir. If I wasn't there I'm sure that he would have landed. And I'm equally sure that I'd be out there in the rain investigating the accident."

"Could you prove your judgment on paper, Bill?"

"Yes, sir, at least to a reasonable man of average savvy."

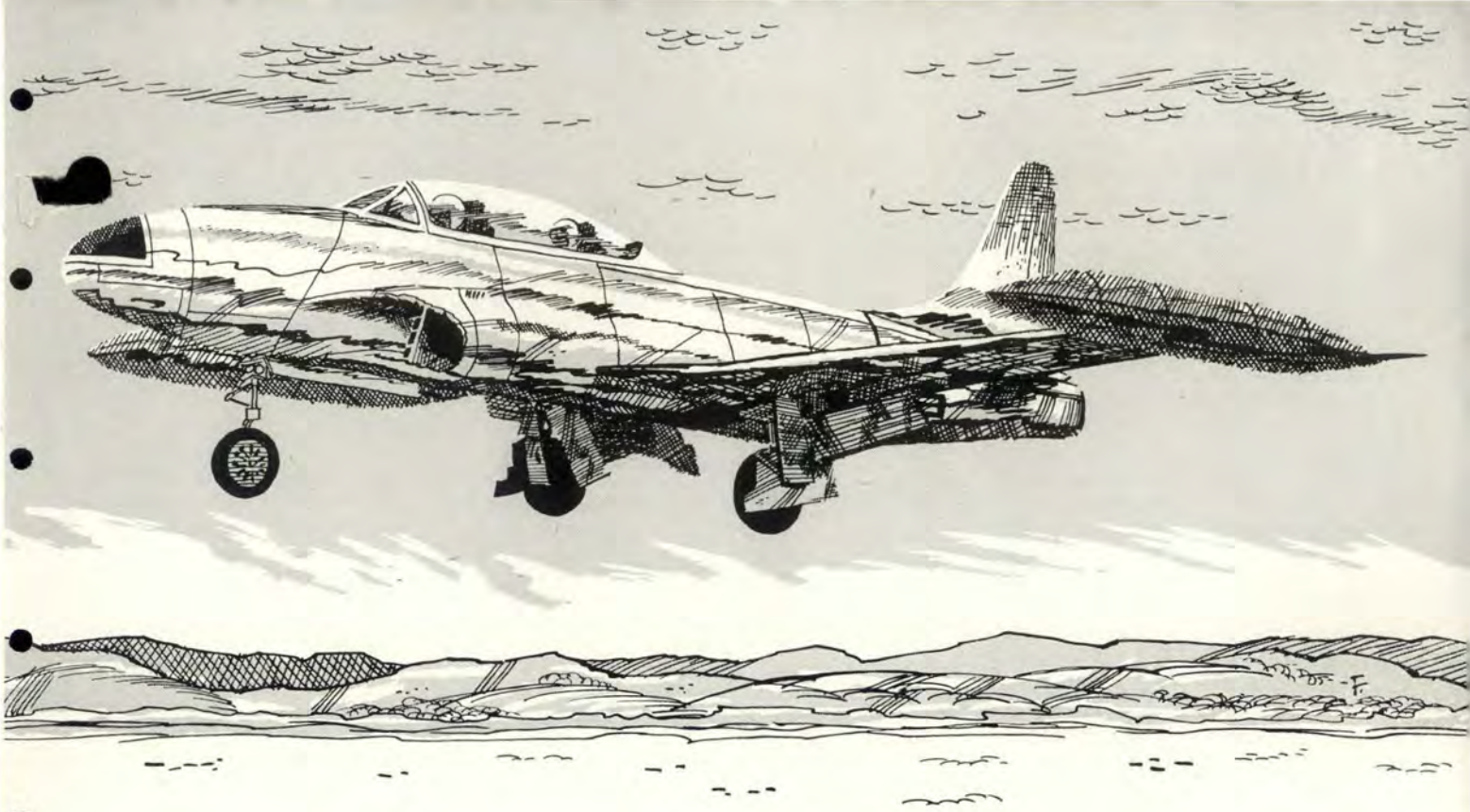
"How about trying with me?" invited Major Ham.

Captain Johnson reached across the table to pick up a pencil and pad.

"In computing the takeoff we're reminded that we're dealing with a rather warm day, at high altitude—88° and 6000 feet, to be precise. Since we'd taken off with a full load of fuel, there was no effort to figuring the landing weight. There was a shower over the runway when we started so there was no doubt about how wet it was." (Captain Johnson wrote each of these figures down as he said them.) "Oh yes, 8000 feet," he mumbled and jotted.

"The T. O. will show a landing distance of 4200 feet for the T-Bird at 15,000 lbs. and 6000 feet MSL. There is no firm advice available for wet runways, but down at USC they indicated that 50 per cent traction was pretty optimistic on wet blacktop. If you use that figure you come up with 8400 feet of rollout. Add to this the runway lost before touchdown and you'll have a picture that I don't want to appear in."

"Don't you think that a sharp pil[illegible] using short field technique, could make it?"



"It's very possible, sir. I feel that a genuinely sharp pilot would pass up the try though, unless he was relieved of the risk for experimental purposes. He couldn't afford it."

This reply puzzled Major Ham. "What do you mean, Bill?"

"I mean that when a pilot really understands the physics behind a landing, he avoids accidents by keeping the performance limits working for him, not against him. I can't believe that Colonel Kelly would try a landing if his computed roll-out was 400 feet longer than the runway."

"Are you suggesting that the Colonel doesn't know how to plan for an overweight landing, Bill?"

Landing Roll

"Suppose I answer you by asking if you know the details behind a landing roll?

"Try me," he invited, feeling the confidence of his experience.

"All right," began Captain Johnson. "What does the average pilot have in his mind for a basis of landing estimates?"

"Well, I always have the normal distance at my home base as a start."

"Fine," answered Bill, "let's start at sea level. What did you have when you were flying out of Tyndall?"

"Well, a maximum, hard-brake stop would be about 3000 feet, I should say," answered Major Ham.

"All right, how much extra would you allow for a full fuel load, and, incidentally, why?"

"I'd make a liberal estimate of 4300 to 4500 feet, and what do you mean why?"

"Did you make your estimate by considering extra weight or, were you thinking extra speed?"

"The weight, of course. The speed has nothing to do with it. The performance chart in the Handbook doesn't even mention speed."

"What formula or rule do you use in your estimate, sir?" asked Captain Johnson.

"Double the basic figure and reduce it by 10 per cent for each year of experience, I suppose. Why? Is there actually a rule?"

"In a sense, yes. Your stopping distance is directly related to the touchdown speed." (Captain Johnson waved the Major back into his seat, then continued.) "To understand roll-out, you must break the function down to an average rate of decelera-

Captain Johnson started to jot down the figures to show how an overshoot could have happened.

tion, and analyze it from there. The factors that cause deceleration are aerodynamic drag and braking action. To avoid excessive detail, we'll regard the aero drag as a minor item and concentrate on brakes. Suffice to say, however, that in these days of fast landings in clean aircraft, drag devices are very important. Braking action will deliver a given proportion of stopping force for each pound of weight on the wheels. The exact amount is a consideration of the coefficient of traction. A coefficient of .4 would mean that a force equal to 40 per cent of the weight on the wheels would be delivered during the time of application.

"Stopping is a progressive reduction of speed. The initial speed is reduced by some number of feet per second, progressively. If you land at 100 knots and come to a stop in 20 seconds, you have decelerated at a rate of 8 feet/sec/sec. The definition of 1G is an acceleration of 32 feet sec/sec. Eight is one-fourth of 32, so you can see that a 20-second stop from 100 knots is a .25G deceleration. Average!"

Major Ham seemed to be with it to this point, so Bill continued.

"Now, more basic physics.

60 kts = 100 ′/sec.

100 kts = 166 ′/sec.

"If you touch down at 100 kts and apply your average deceleration, what do you see? You see that a speed of 166 ′/sec. was reduced to 158 ′/sec. during the first second of roll-out. The average speed during that second was 162 ′/sec. This means that 162 feet of runway was used to reduce the speed by 8 ′/sec. or 5 kts. Consider the last second of motion now. You enter at 8 ′/sec. and reach zero in one second. Your average for the time is 4, so you only used 4 feet to lose 5 kts. This makes the touchdown speed look pretty important, doesn't it?"

"Where does the weight come in?" asked Major Ham. "The Dash One says——"

Weight or Speed

Captain Johnson interrupted him with an apologetic wave, then began, "The old T. O. gave actual test flight figures. They published it in terms that our pilots were familiar with. It was a necessary move because the Air Force didn't have the time or means to educate us. Unfortunately, it still doesn't. The new T. O. gives a plot of the actual factors to be considered. You'll find that it shows IAS and then gives the factors which affect the TAS. These, of course, are temperature and altitude. Also, weight is conspicuous by its absence. There's a reason for this.

"You're familiar with the rule for extra speed for heavy approaches. It is not only the approach speed that goes up though, your touchdown and stall speeds rise by the same amount. The real reason for the speed adjustment is to provide you with the same attitude for every approach and touchdown. The increased speed allows the same old angle of attack to carry a heavier load. You remember, lift increases as the square of the speed. In familiar terms, 5 per cent more speed gives 10 per cent more lift. That's how the squared power works.

"Here's some more dope along the same lines:

- 5 per cent more speed requires 10 per cent more runway. Bear in mind, this extra speed works in that area where you use over 160 feet of runway to lose five knots.
- 5 per cent speed increase gives 10 per cent more lift, also. You can see by this that 10 per cent extra weight requires 10 per cent more runway."

"Now I've got it," offered Major Ham, "you just figure the weight in percentage and add that percentage of runway. That's easy enough."

TAS Effect

"Easy now, we haven't discussed TAS and wind, yet. First of all, the bird flies on IAS because this speed shows the dynamic pressures at the speed. This is a reflection of the weight of the air and that's what you fly on.

"In stopping you are dealing with the actual velocity along the ground. Consider our case today. I figured that we'd touch down at 115 indicated. At 6000 feet and 90°, the E-11 shows a true speed of 132 kts. That's a bunch of speed. You'll use about 220 feet of runway to lose your first 5 kts. of speed.

"The important point is that your touchdown speed is now 23 per cent over the light airplane at sea level. That means your roll-out is increased by over 65 per cent although your weight may only be up by a small percentage."

"Bless my soul," said Major Ham, "there's more to this than meets the eye. Let's see, if you adjust the speed to meet the weight, you then convert to true," . . .

"Add or subtract the wind," Captain Johnson picked up the sequence, "convert it to a percentage of basic landing speed, then apply twice that percentage to your landing distance."

"Let's see," Major Ham performed some mental gymnastics, then continued, "I figure that 5000 should do it for a fully loaded T-Bird here at Peterson today. Why did you say you refused to let the Colonel land?"

Bill Johnson didn't answer; he just glanced out the window. The current rainshower served to refresh Major Ham's memory. "Oh yes, I forgot to figure the traction factor."

"That's the whole point. You've got to figure all the angles." ▲

It's just one more way to prevent an accident.

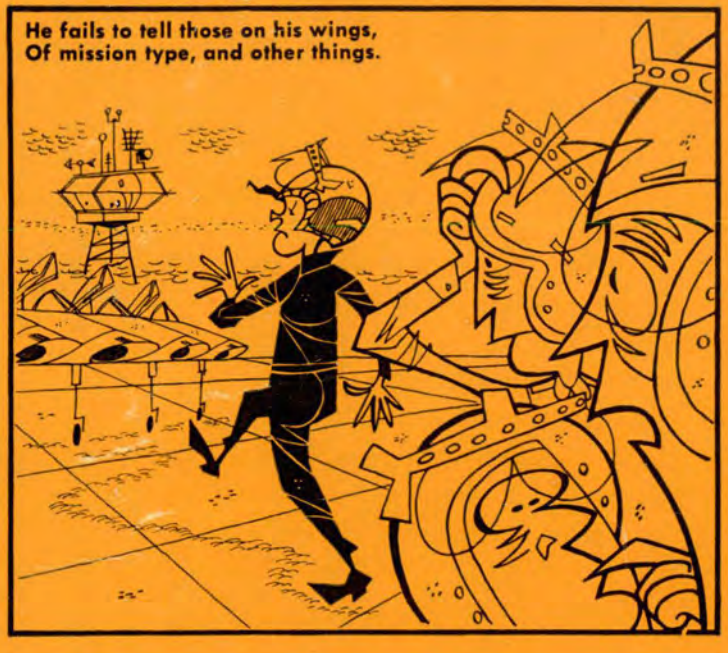
FORMS

The Air Force has lots of forms and each one has its purpose. The purpose of one is to save aircraft and pilots. This form, known as the Operational and Hazard Report, has been taking a back seat of late.

Let's give each other a break by sharing our experiences. When you have a near-miss or come upon a hazardous condition, make out and submit an Operational Hazard Report. Incidentally, Rex Riley would appreciate receiving a copy too.

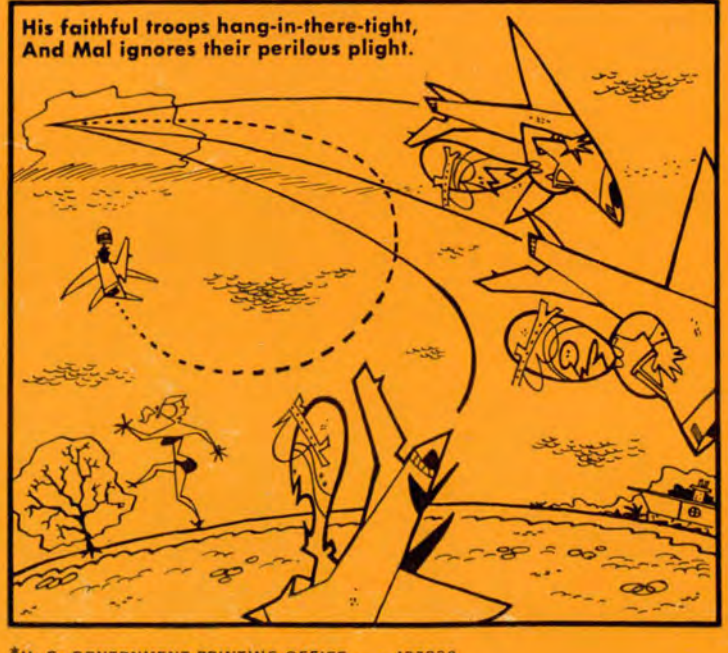
Mal Function

Mal is leader, flight of four,
All preflight briefing does ignore.



He fails to tell those on his wings,
Of mission type, and other things.

From 30,000 he screams down
Just wants a look at yonder town.



His faithful troops hang-in-there-tight,
And Mal ignores their perilous plight.

The price for this flight-leader's spree,
Three wingmen roost in yon elm tree.

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