SEPTEMBER 1958

FLYING SAFETY

UNITED STATES AIR FORCE

FROM THE ACADEMY....

contents

USAF PERIODICAL 62-1

the editor's view......

"Fear" is a dirty word to an Air Force man. Most of us shun its connotations but we cannot deny the effect that it has. Anyone who says he has never been afraid is either a fool or a liar or both. Fear is a normal emotion. Its primary purpose is to prepare a man or animal to meet an emergency with maximum physiological rigor. The very changes in the body however, which make for maximum physical effort also detract from the ability to analyze and decide upon course of action which require less than an all-out physical effort. Fear then becomes an enemy, for in modern living, brute force is seldom the correct solution to any problem.

It would be difficult to tabulate the number of aircraft accidents that have been caused by fear or even to assess "fear" as a contributing cause. But fear is a prime mover which often causes us to do the wrong thing—or not to do the right thing. Fear compounds small emergencies into big ones, and incidents into fatal accidents.

Most of us can recall situations directly involving us—wherein fear contributed to a result other than what we desired. Looking back, we see that some of those fears were groundless and—if we analyze further—needless. We just didn't know enough. Or, we were not proficient—or we lacked confidence in our ability.

We fear the unknown. And many of the unknowns in our profession are matters of our own doing. We don't learn enough—remember enough—practice enough to be sure of ourselves or our equipment.

A current problem is a good example. Many pilots are not attaching the low altitude bailout lanyard before takeoff. Why? Because they are afraid they will forget to detach it at altitude. We hear about people who do not pull ejection seat pins for fear of inadvertent ground ejection; and pilots who, for fear of a takeoff accident, leave parachute harness straps unbuckled during takeoff.

The files are full of details on accidents caused by "improper operation," "faulty judgment," "improper technique," and "improper procedure," but there is no square to check off marked, "fear." Yet, fear can be the real basis of all these things. It can be overcome only by knowledge, practice, proficiency and training.

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Number Nine

COVER STORY

From the Academy on through, men of the Air Force are, and must be provided with the essential element of safety—training.

In this article, General Curtis E. LeMay states "Improvement in air safety only can be attained if the many aspects of the air traffic problem are fully understood, carefully analyzed and proper and positive action is taken."

AIR TRAFFIC

The air is a national resource

. . . It is also an abundant resource, but it is not unlimited. In fact, when one takes into account the growing demands of organized air commerce, private flying and the military, the air space over the land and sea, is becoming highly congested. This is particularly true along the great trading routes, and it will become more so in the years ahead.

In recent months, mid-air collisions between Air Force aircraft and civilian airliners have understandably focused increased attention on air operations and air traffic control. These air collisions, wholly apart from their grievous cost in human life, have had what I consider a most regrettable side effect. Long before the circumstances could be thoroughly investigated, the implication was publicized that the military is using the air space wantonly. Our jet pilots have been likened to "hot rodders" by one critic; another referred to military pilots "careening recklessly" through commercial airlanes. Still another stated that military planes ought to keep out of the main airways unless specifically cleared for flying there

Everyone, of course, is entitled to his own opinion, but the most valid opinions are always based upon unprejudiced and careful examination of the facts. Improvement in air safety can only be attained if the many aspects of the air traffic problem are fully understood, carefully analyzed and proper and positive action is taken. All users—the commercial airlines, the private flyer and the military are vitally concerned and must be considered.

There are three points that I want to stress at the outset:

First, the Air Force has a basic and continuing interest in safe air operations. To do its job, the Air Force must fly and air safety has a direct relationship to how well we do our job.

Second, the so-called civil airways of this country, which some have chosen to call civilian airways, are in fact federal airways available to all aircraft—commercial, private and military.

Third, the flying that is done by the Air Force is essential to national defense. We do not fly for any other reason.

A flying Air Force is essential for defense, and as I've stated, flying is the Air Force's primary business. The commercial airlines fly to perform a necessary transportation service for the nation. The private pilot flies for business or pleasure. The Air Force flies to keep its crews trained so that we can maintain an adequate combat capability and fulfill continuing military logistic and transportation requirements.

In addition to the pilots who are directly assigned to combat positions, we have other pilots performing staff and command functions who must maintain flying proficiency. We in the Air Force know from experience that commanders and staff officers who are responsible for making decisions concerning flying and the nation's military airpower must maintain a continuing up-to-date knowledge of flying problems.

To maintain the combat readiness stature that the Air Force needs to perform its mission, we flew over seven million hours within the U. S. during the Calendar Year 1957. This is approximately twice as much flying as all of the domestic scheduled air carriers accomplished the same year. In fact, at any given moment of the 24-hour day, 1100 to 1200 USAF aircraft are airborne worldwide. This volume of flying is necessary if we are to continue to maintain our combat readiness and perform our role as a deterrent to war.

When one measures the amount of Air Force and other military flying against the 158,000 miles of airways in this country, it is obvious that the military has to use the airways. In this respect, I must point out that practically all Air Force bases are on or very near airways. I would like to point out further that many of these airways were commissioned long after the air bases themselves were built.

There are several types of airways—low frequency airways, VOR or high frequency airways and high altitude routes. Some of them lie one above another and their locations are generally the shortest routes between two radio aids to navigation. A glance at the various types of aeronautical charts shows that the federal airways literally

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form a three-dimensional web over most of the United States.

There are two types of conditions under which air traffic operates:

First, under Instrument Flight Rules which require close control of aircraft by ground stations to assure safe altitude and time separation between aircraft.

Second, under Visual Flight Rules which do not require close control by ground stations. In the latter case, the ability of pilots to visually observe other aircraft is essential for safe operations. Normally, cloud cover and visibility determine the conditions under which a flight must be made.

The control of air traffic on the nation's airways is a mammoth job—and one that grows ever larger as the air traffic density increases.

During the last three years, the air traffic control system has improved through the provision of more funds, more personnel and more facilities. Nevertheless, it is presently inadequate for the job and will be for some time.

Mr. Pyle, the CAA Administrator, has pointed out that the system can handle roughly 17,000 flights per day operating under instrument flight rules, as traffic is now distributed. He has also stated that there are well over 200,000 flights of all types operating daily in the United States. Obviously, then, if it were directed tomorrow that all flights, civil and military, were to operate under instrument flight rules at all times—all aviation in this country would be slowed to a comparative standstill just as it is under extremely bad weather conditions. This, our country cannot afford, thus the solution does not lie in such restrictions to flying.

There is one other point I'd like to make with regard to the airways.

Federal agencies such as the Civil Aeronautics Administration and the Civil Aeronautics Board promulgate regulations covering the operation of aircraft on these airways. These regulations are followed by all pilots, military as well as civilian. I want to make it absolutely clear that we do not claim any exemptions from these regulations, and we are not accorded any except for urgent military necessities which the CAA acknowledges have not led to abuse. In fact, Air Force pilots, in many cases, are subject to even more stringent rules than those which apply to civilian pilots. Air Force pilots who violate either CAA or Air Force regulations face disciplinary action.

The Air Force's interest in safe air operations is not only a question of the essential flying we must do to fulfill our national defense responsibilities. It is also a question of individual self-interest. A man at the controls of a military aircraft is just as concerned about completing his flight safely as is any other pilot or air passenger. It is human nature to want to live, and military pilots are impelled toward safe operations by the same natural instincts that motivate all others who fly.

Furthermore, from first-hand knowledge I can assure you that Air Force pilots are well trained, emotionally stable and responsible individuals. I will match them against any group of pilots anywhere in the world. The Air Force's contribution to safety in the air—not only for our own people but for all the other users—begins with our having highly qualified people in the cockpit.

Over the years, the Air Force has devoted more and more time and effort to the solution of the flying safety problem. In the selection of our pilots and the development of our equipment and facilities, the principle of air safety has played a major role.

One indication of our progress is that the USAF major aircraft accident rate for 1957 was less than one-third of what it was in 1947, and about one-fifth of the rate in 1937. We are working hard to achieve greater air safety but we are well aware that one factor—human error—can never be positively and permanently eliminated.

In achieving greater air safety, we have worked in close cooperation with governmental and civil aviation organizations for the mutual welfare of all who use the air space. The Air Force has long supported the policy of developing and operating a common system of air traffic control for civil and military flying. We have backed this

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program in a practical manner by sharing the fruits of our progress with civil aviation.

As one of the means toward improving the control of air traffic, the Air Force has continuously advocated the use of radar. Through joint effort with the CAA and civilian aviation interests, the expanded use of radar has proved to be one of the most singular means of providing improved safety and efficiency within our air traffic control system.

As early as 1946, we made available to the CAA one long range search radar and three short range ground control approach units. The long range unit is still in service here in Washington. The three GCA units were installed at Washington National, LaGuardia in New York, and Midway Airport in Chicago. These units provided radar service for several years, but more importantly they served as a basis for the development of improved systems and techniques.

As a result of our experience with this equipment, the Air Force constructed 60 permanent radar approach control facilities in the United States to serve high traffic density military bases. These facilities cost about one million dollars each and are equipped to provide control within the terminal area. At 24 of these locations, where both military and civil air traffic are involved, operational responsibility and authority have been turned over to the CAA.

In the long range radar area, the CAA and the Air Force have agreed upon joint use of 17 long range search radars for both air defense and air traffic control during the fiscal year 1958. Eleven of these radars are Air Force equipment. In the fiscal year 1959, eleven additional Air Force long range search radars (one Navy and four CAA) will be integrated into this dual purpose system.

We have been active, too, in high altitude space control. After extensive inter-agency coordination with the CAA and the CAB, air space above 24,000 feet was designated as controlled air space. This plan went into effect last December. Also, more recently, in the interest of further minimizing possible mid-air collisions, the Air Force voluntarily restricted certain jet activities. We did this knowing that such actions would curtail our operations to some extent, but we want to cooperate to the fullest.

At the present time we are in a joint program with the Civil Aeronautics Administration to review other possible ways and means of further segregating, procedurally or geographically, heavy volume jet training operations from civil en route airway traffic. The high density of air traffic makes this a very difficult job.

The increase in mid-air collisions in recent years is no doubt partially due to the greater speed of modern aircraft coupled with higher air traffic density, the relatively slow human visual scanning capabilities, and the man-machine reaction time.

Our evidence indicates that under high speed closure conditions two pilots must determine that they are on a collision course while they are still miles apart. In some instances, however, when the contrast of the background sky and silhouette of the aircraft is at a minimum, an approaching aircraft cannot be clearly identified even at distances *less* than a mile.

From our continuing studies of mid-air collision problems, we have, thus far, reached the following conclusions:

- Anti-collision warning devices must be developed which will warn the pilot of any aircraft on a collision course and furnish information that will help him decide on evasive action.
- Traffic control procedures must be modernized to provide the maximum degree of control of all traffic through more extensive use of radar, particularly within high density terminal areas.
- Installation of high intensity anti-collision lights is desirable for all aircraft, to provide better daytime detection.

The development of anti-collision warning devices is a difficult problem. We need an anti-collision warning device which will not only identify an approaching aircraft, but present information sufficient to conduct proper evasive maneuvers. Preliminary work done on this problem by the Air Force's Research and Development Command has been turned over to the Airways Modernization Board with whom we are working on the project.

We are also investigating the use of high intensity anti-collision lights, to assist identification in daylight. In addition, we are accelerating a project to mark our non-tactical aircraft with highly visual paint. Our tests show a definite increase in aircraft recognition through this method.

Improved air safety is possible.

I have cited these examples of our efforts and contributions toward safer flying to indicate that the Air Force is dedicated to the solution of this problem.

We shall continue to work in every possible way to improve safety standards in the air.

I believe that a satisfactory air traffic system capable of meeting future requirements can be achieved if all users of the air space make a sincere attempt to recognize each other's problems and exert coordinated effort to attain the desired results.

I recognize that we have a long way to go to achieve the kind of air traffic system and the high level of air safety that we all want.

Despite the fact that the United States has developed the finest air traffic system in the world, it is not good enough. It must become better and we have the means to do this.

Our country has solved some tough problems in the past. If everyone works together, I feel sure that we can solve this one too. ▲

ATTACK THE ANGLE

Maj. John H. Adams
40th Bombardment Wing
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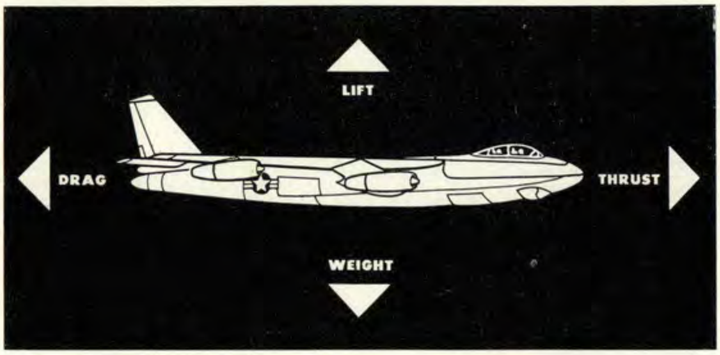


Low speed phases of flight still breed most pilot factor mishaps. This is where induced drag has its heyday—take off and landing.

AN F-100 was landing at an Arizona airfield on a bright sunny day. A little high, perhaps, at touchdown point, so the pilot started a go-around. The nose was a little high too, but—"So what. I've got thrust 'out-the-ears' in this J-57."

The engine revved up to 100 per cent, the afterburner was cut in and the nose pulled up just a little higher to offset the tendency to settle. After several thousand feet of yawing to the right and left, never more than a few feet from the ground, the F-100 made like an atomic bomb just off the right side of the runway. Chalk up another victory for, and victim of Induced Drag.

You say, "What does this have to do with me? I fly a good old six-torch beast, so no sweat." Draw up a chair, lads, and let's review the bidding.

Even in this day of modern miracles, supersonic flying machines and the like, the majority of all pilot-factor accidents still occur during the low speed phases of flight. Mostly during takeoff and landing—this is where induced drag has its heyday, wreaking havoc indiscriminately among the uninformed flying types who haven't learned how to "Attack the Angle."

So, let's look into this problem of induced drag and refresh our recollections. To do this, let's go back to some of the basic principles of aerodynamics which we all learned to some degree in flying school.

You will recall (in military parlance that means you have forgotten) that there are four forces acting on an aircraft in flight. These forces are thrust, drag, lift and weight. Thrust and drag work in opposition to each other, and lift and weight battle it out for the upper hand.

In steady, or unaccelerated, level flight, thrust equals drag, and lift equals weight. See, you knew it all the time. So we'll go on.

When we speak of drag in general, we are talking about total drag which is a combination of parasite and induced drag. Parasite drag consists of all the things that offer resistance to the windstream, such as windshields, doors, rivets, heads sticking out of cockpits, the equivalent flat-plate area of the complete airplane, or "barn-door" drag.

There isn't much you can do— about parasite drag, except keep your head out of the slipstream because it's built in when the airplane is designed. Induced drag, however, is drag that is brought about by the wings producing lift—an undesirable, but unavoidable consequence of lift. This is how it comes about.

When an airfoil moves through the air, an unbalance of pressures acts on it to result in a net upward force, or lift, which is perpendicular to the average relative wind. Lift may also be considered to be the result of the

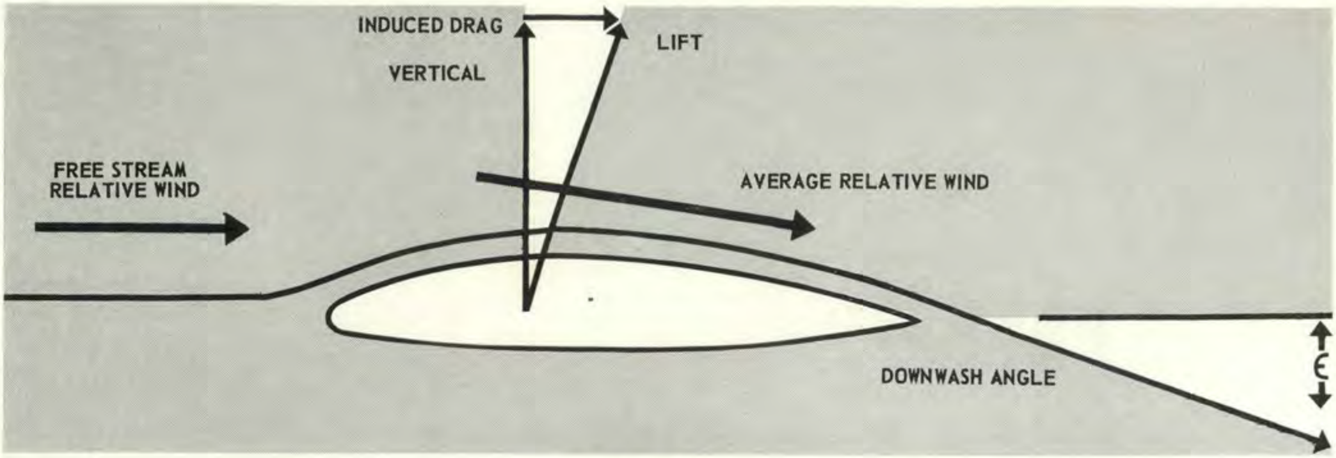
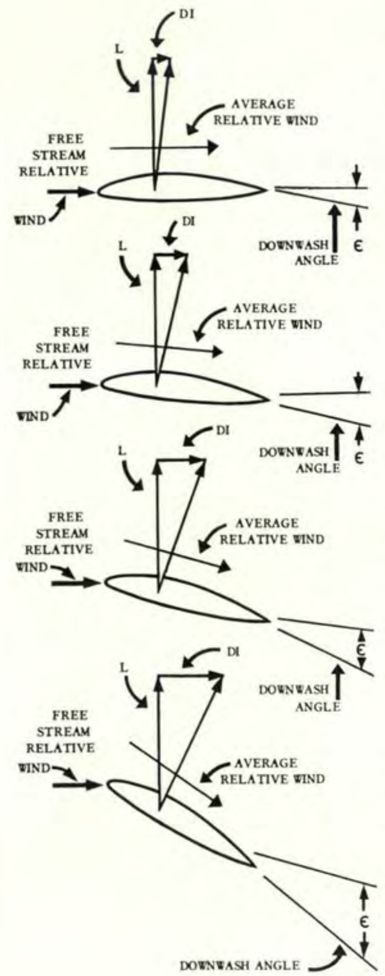


Figure One

Figure Two



At low angle of attack, downwash angle is very slight, camber of the wing. Average Relative Wind and Free Stream Wind are nearly parallel.

•

At a slightly higher angle of attack, the average relative wind tilts downward somewhat and the angle of lift tilts backward or aft slightly.

•

At a still higher angle of attack the airstream is deflected further downward. The lift vector tilts aft even further, and the induced drag (D_i) increases.

•

At very high angles of attack, the average relative wind is considerably downward, tilting the lift vector aft even further and increasing the induced drag critically. At this point, the airfoil is about ready to quit flying.

downward deflection of the windstream. If we consider it this way, it's easier to see where induced drag enters the picture. Let's look at an airfoil in a windstream, Figure 1, and define some terms.

You see the free stream relative wind is ahead of the airfoil, not yet deflected by it. In the vicinity of the airfoil, the *average* relative wind may have a slight tilt as the airfoil raises it over its surface and deflects it downward at the trailing edge. Engineering types refer to lift, then, as being perpendicular to the AVERAGE RELATIVE WIND, although the effective lift to overcome weight has to be vertical. Here is where the old bugaboo, induced drag comes in.

The aft component of lift, when the average relative wind is tilted downward toward the trailing edge of the wing becomes induced drag, or D_i, as it is known in engineering circles. In other words, part of the lift that the wing is producing is toward the south end of the northbound airplane, and works in opposition to the forward motion.

To illustrate, look at this sequence of airfoils at various angles of attack to the free stream relative wind, and note what happens to the lift vector and D_i. Figure 2.

Now, superimposing an airplane on that airfoil pattern, does Figure 3 look familiar?

I thought so.

I know that you bomber-type pilots can all remember stalling off the boom at least once in your checkered careers. Well, our un-friend, induced drag, played an important part in that little drama. You see, at relatively low airspeeds, and high angles

Figure Three

of attack, induced drag represents by far the greater portion of total drag, because of apparent backward tilt of the lift vector.

Let's presume this a little further and consider the total drag picture briefly, and see how the whole thing ties together.

Figure 4 is a rough approximation of a drag curve for almost any airplane. They are all very similar in characteristic shape, although the values may differ. Basically, however, all aircraft have a stalling speed and a maximum speed and speeds in between.

You will notice that at the lowest point on the Total Drag Curve parasite and induced drags are equal. This is the point at which the lift-drag ratio, or L/D is maximum and is the speed at which maximum endurance for a jet and maximum range for a reciprocating type is achieved—neglecting wind.

Above this speed, parasite drag predominates, reaching a maximum of about 99 per cent of total drag at maximum speed.

Below this point, in the lower speed ranges, induced drag predominates, reaching a maximum at the speed where the airplane quits flying and you initiate a quick stall recovery procedure. Induced drag is 75 per cent or more of the total drag at this point.

What most of this boils down to is:

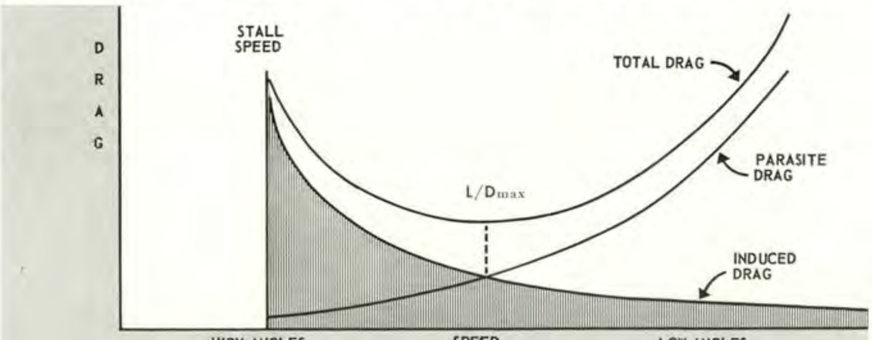
- The higher the airspeed, the lower the induced drag.
- The higher the aspect ratio (span divided by mean chord), the lower the induced drag.
- The greater the lift, the greater the induced drag.

So what does this have to do with flying an airplane?

Remember the story of the F-100?

Talk about the back side of the Power Curve or Drag Curve! With the nose of that F-100 up in the air so high, all the thrust of the J-57 plus afterburner can just barely overcome the induced drag brought on by the excessively high angle of attack. Let's face it. Too much of the lift was backwards. And this can happen anytime the wing is placed at a high angle of attack to the relative wind.

Figure Four. This chart illustrates the Drag vs. Velocity curve. This is for one aircraft at one weight, one flap and gear configuration and one altitude.



Pull an airplane off the ground by brute strength and awkwardness before it is ready to fly and you have the same situation.

These problems are multiplied in the modern, high performance aircraft, with their thin, swept-back wings of low aspect ratio, because a relatively high angle of attack is necessary at low airspeeds to get enough lift in the first place. This makes a critical situation, with little chance for guesswork. You have to know all the angles—of attack, that is.

If you will refer to Figure 1, again, you may note that at airspeeds lower than that for L/D_{max}, it takes more power to hold those airspeeds. In case I haven't mentioned it before, the drag curve is also the curve of thrust required for level flight. Does this make sense? This is why it is so important to fly the airplane every microsecond during low speed maneuvers such as takeoff and landing.

If you pull the nose up inadvertently, the airspeed decreases and it takes more power to hold the lower airspeed. If additional power is not applied the speed continues to decrease until the bottom drops out. This is not good, as even a novice can see.

All is not lost, however. These problems only illustrate why it is so important to follow two simple rules of flying we all learned years ago:

- The throttle is the primary control of altitude, or rate of climb and descent.
- The stick is the primary control of airspeed.

Follow these old standbys in all steady flight conditions; climb, glide and straight-and-level, particularly at the lower airspeeds, and we'll eliminate some of the victims of induced drag. ▲

ESCAPE?

William R. Lundgren, Information Branch, Safety Education Division, D/FSR

WHAT are your chances of getting out alive? Psychologists say it all depends on what's in your mind when you have to decide to eject and on how well you know your job.

The plane you're flying cost anywhere from one to eight or nine million dollars—Prang it and you'll have to face the Old Man—Besides, ejecting can kill you or cripple you for the rest of your life—The seat might not work or your chute might not deploy—You may be down too low to get away with it—Besides, it's warm in the cockpit and deceptively secure, same old familiar place in which you've always worked—And you've made airstarts before and gotten out—They liked that, gave you a pat on the back for saving yourself and the airplane too—

All this, or something like it, may be in the racing, harassed and anxious mind of a jet pilot faced with an inflight emergency in any of today's high-performance aircraft. And more than that, the greater part of his attention must still be concentrated on the business of flight. You're involved in all the pressing details with which you normally work.

So that having perceived the emergency situation with which you're faced, you may delay your decision to eject and that in turn may delay the action that might save your life. The lower your altitude, the less time and therefore the less chance you've got to get out. Panic may be a factor in prodding you to act. Confusion may result. And once ejected, your chance of survival is further affected by the kind of flying you've done and by the range of your experience.

If you've consistently flown different types of aircraft with different types of escape systems, you may find that you don't know how to use the particular system with which you've got to work.

If you have this passing familiarity with different systems, learned habit patterns of escape procedure for one seat may interfere with your acting out the procedure for escape in another.

If you're an older pilot whose training goes back before the advent of ejection systems, you may, in the confusion of tumbling, revert to an older learned response and pull the D-ring before releasing your seat.

If you're a younger and not-so-experienced pilot, you may not recognize an emergency in time to act, or, if you do, you may lack confidence in your equipment and proper training in its use.

These, says Dr. Anchard F. Zeller, Psychologist in the Aero-Medical Safety Division of the Directorate of Flight Safety Research, are some of the factors that may prevent successful escape in the air today. But none of them apply to you. Escape does not present the problems you may think it does.

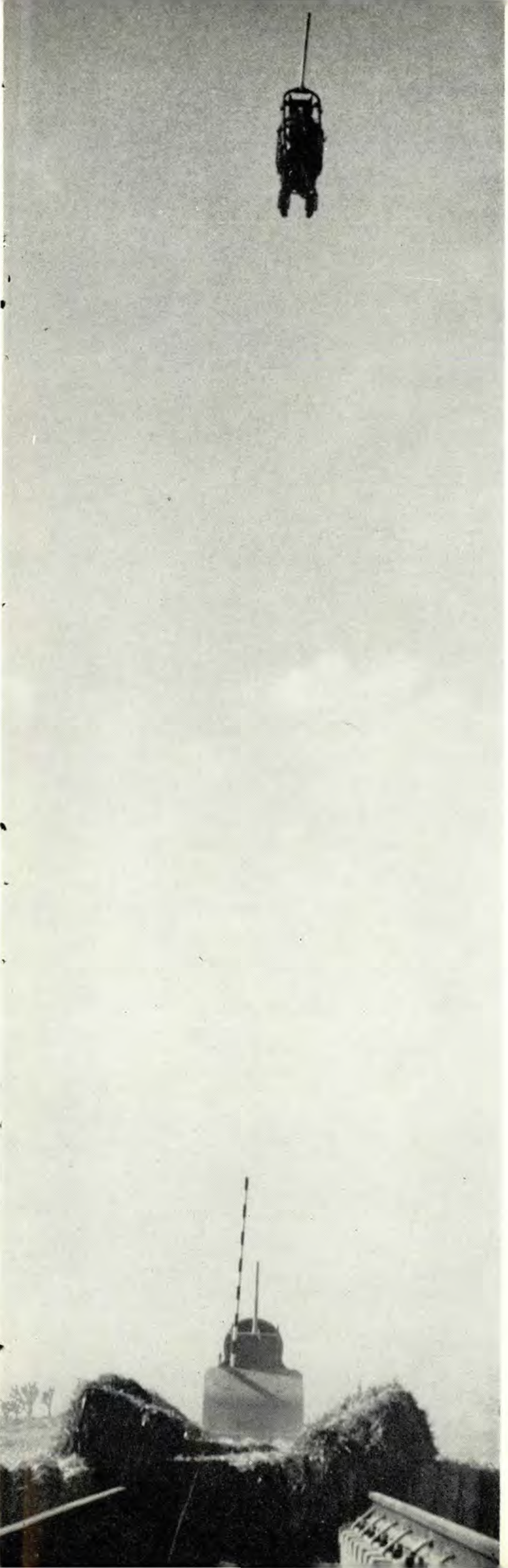
Writing in "Psychological Factors in Escape," a study based on the report or investigation of every ejection which USAF pilots have made since August 29, 1949, when the first seat was blown, Dr. Zeller reports that:

- Escape systems and the almost one-hundred per cent reliable parachute are much more dependable than is sometimes thought.
- The really essential problem seems to be the overcoming of these psychological factors that delay and, therefore, sometimes prevent escape.
- In practically every case studied, these factors apparently were or could have been overcome by training—by giving the individual pilot more information about and greater familiarity with and confidence in every ejection system on which his life may depend.

Here's the substance of Dr. Zeller's argument. Since that first seat was blown, 80 per cent of all ejections experienced have been successful—these pilots escaping with their lives.

The higher your altitude, the more time you have for the serial sequence of perception-decision-action that must precede every ejection and the greater your chance of safely getting out.

In other words, you must first perceive the emergency —then decide to eject and—finally—act on your decision. And that takes time, time measured in seconds only, but seconds that can save your life. Generally speaking, the higher your altitude, the more of that lifesaving time you



Since 1949, 80 per cent of all ejections have been successful.

have. Only five per cent of pilots ejecting above 3000 feet were fatally injured in contrast to 70 per cent of those ejecting below 1000 feet.

But anywhere below 5000 feet, you'd better stay alert. Because, Dr. Zeller reports, the evidence indicates that for one reason or another, a number of pilots will have difficulty in making the final decision to eject. Over a third of the aircrew members fatally injured experienced their emergencies at sufficient altitude—and while there was time—to successfully eject. Why didn't they get out?

Maybe, the Doctor says, because they didn't perceive the emergency in time.

Maybe the pilot was overconfident, convinced he'd get a successful airstart, or, failing that, successfully crash land his plane with a minimum of injury and damage.

Maybe the pilot was over-concentrating on the details of flight.

Maybe he was just confused.

Or maybe he mistrusted his escape equipment and was therefore unwilling to leave the seeming security of the cockpit in which he was about to crash.

Whatever the reason or cause that kept him there, training—more information, better education and practice—could have saved each of these pilot's lives.

That's what it may take to save your own someday, more information than you now have about the equipment with which you work, a better eduction in the escape procedures that may get you out of a plane that can't be flown. For the undeniable lessons the Air Force has learned are clear.

Whether it is in perceiving your inflight emergency—in making the decision to eject—in ejecting itself or in the process of falling away—releasing your seat—deploying your chute and surviving once on the ground—the

I still don't believe this will replace the parachute, Gridley.

more you know about all the equipment on which you will have to depend—and the more familiar you are with each of the steps through which you will have to move—the better your chance of getting out alive.

Because the escape equipment is reliable if used within its limitations. It is the man, usually, who fails. This is Dr. Zeller's conclusion, based on the opinion of men who have used their equipment and survived. Of 565 jet fighter pilots who were asked whether or not they could have escaped from their crippled aircraft without ejection equipment, only 28 per cent of them considered this a possibility. Of 22 jet bomber pilots who got out, only one of them thought that escape without ejection equipment could have been accomplished.

How does the man fail? Well, let's take a specific instance. He's heard stories about inadvertent ground ejections. Unfounded or not, the stories make him leery about pulling safety pins before he begins his flight. His pins still in, he begins his takeoff roll and from that point on, the details of his flight are uppermost in his mind, claiming at most times all of his attention. The pins are forgotten. Then comes the inflight emergency. All other factors are in his favor. He perceives his emergency, rightly decides to eject and properly acts to get himself out of his aircraft but he stays where he is, a needless fatality—needless because, properly informed, he should never have been leery of his equipment in the first place. Between January 1, 1955, and June 30, 1957, the Air Force experienced only one fatality attributed to inadvertent ground ejections that were not the result of high impact forces. Had he known this simple fact, the chances are he would have pulled his pins and survived.

The lesson is an obvious one. Knowledge—information—is experience which is training which is survival. A handful of pilots who have successfully ejected more than once, a greater number who've made one successful ejection and survived—all of them credit the same set of factors with saving their lives:

- Experience—the specific experience of having ejected once before, and overall flying experience too.
- Training—the lessons learned from the ejection trainer, demonstrations, lectures.
- Knowledge—a well grounded familiarity with escape procedures in every system they might have to use, and the knowledge too of how to survive on the ground.

This being so, the final conclusion is equally obvious. It is a primary command responsibility to train aircrew members in the perception-decision-action sequence of escape, in the use of all ejection systems and in every vital step of escape and survival. It is the individual aircrew member's responsibility to train himself to cope not only with those exterior demands that a serious inflight emergency may place on him, but to cope as well with those psychological factors that can delay his decision and prevent his escape. ▲

"... The pins are forgotten. Then comes the emergency. All other factors are in his favor. He decides to eject but ends up as a needless fatality.

WELL DONE

KNOWLEDGE TRAINING

★

First Lieutenant

JAMES E. OBENAUF

10th Bomb Squadron

★

FIRST Lieutenant James E. Obenauf was the copilot of a B-47 flying at 34,000 feet over west Texas. The aircraft was rocked by a severe explosion which was followed by fire that appeared to engulf the entire right wing and fuselage. The aircraft commander ordered bailout. The navigator ejected but when Lt. Obenauf attempted to eject, the seat did not function, although the canopy did come off. The Aircraft Commander's seat also failed to function and he exited through the navigator's downward hatch.

Lt. Obenauf proceeded forward to leave by the same way when he noticed the Instructor Navigator lying unconscious with his oxygen mask off. With complete disregard for his own safety, Lt. Obenauf returned to his seat, engaged the controls, disconnected the auto-pilot and dived the aircraft to a lower altitude where the navigator could survive. The navigator regained consciousness at 10,000 feet, but had been seriously hurt during the explosion.

Although nearly blinded from flying debris and the intense force of the slipstream and numbed from cold, Lt. Obenauf cut off the troublesome No. 6 engine, and obtained steers to his home station. He was picked up by the Dyess GCA crew and vectored onto the final approach. He landed the B-47 on the first attempt.

For his skill and courage in the face of emergency—Well Done, Lieutenant Obenauf!

2 Hours Local...

IT's just good to be alive on a day like this. Just look at those scattered puff-balls. Must be up there about five or six thousand feet. Better give the forecaster a reading on the height of those when I get airborne. Good to get out of that office for a morning too. Seems like it's been weeks since I threw a leg over the side of a T-Bird. Guess it was just ten days or so ago, though.

"Hi, Chief." Boy, he's a young one. Can't figure how these kids can soak up enough learning in a couple of to take on the responsibility of crewing one of these complicated buzzards. Thank the Lord we have specialists who've been around awhile. Keep these young fellows in line, I guess.

Kind of different from the old days. Nothing but old timers held the title of crew chief then. Didn't have many stripes except in the hash mark column. The planes were pretty simple, too. Now it's going to take me thirty minutes to look over this bird. Was kind of nice to kick at the tires and holler "contact."

"What's that, chief? Oh, yes, I just read the latest T.O. on the ejection seat. Wish they'd standardize something one of these days. That PIF is taller than me."

It's the truth. A desk jockey like me gets sick of that paper work and wants to get to the line and do a little flying. And what do we do when we get to the line? Read some more poop. No justice.

"I'll be up a couple hours local, chief. Maybe loosen up the rivets on this bird with some of my uncoordinated rolls. Better tie down all those straps in the rear seat if they're not already secure."

Guess I'd better look in there myself—got to check that fuselage tank cap anyway. Don't trust anyone with that detail since I saw Ed burn up in Alaska in that F-80C. This new cap's supposed to prevent that kinda accident, but I didn't make full bull taking people's word for gospel.

This is a good old turkey to fly though. It's getting so they call this the old man's airplane now, along with the Gooney. And just ten years ago they hadn't even put 'em in service. Even got the kids in cadet training now taking these things solo after a few hours. Not that they can't kill you. Well, better get to that checklist and get off. Got to have lunch with those visiting firemen from the IG at 12:30.

Let's see now. Guess I'll head down to Mobile first, then back up to Jackson. It's a little out of the local area, but with this machine the local area is a little confining. Never did like to bore holes anyway—even in the Stearman. I figure these airplanes were built to take a guy somewhere. Might as well swing up by Birmingham while I'm at it.

Wonder what these scattered clouds are going to do? Looks like they might gather in bunches after a while. I'll just keep the old eyes peeled and start back in if they seem to get more broken than they are now. Can't have a violation in my position. Wouldn't look too good chewing on the young pilots if I get caught off base.

A little music wouldn't be too hard to take. That New Orleans station is usually good for a little jive. It sure would be nice to hear some Glenn Miller for a change. The kids think I'm a square 'cause I can't stomach this "Rock" stuff. It's funny when you get to thinking. My mother thought "A Bicycle Built for Two" was the most, and she probably had to leave the house many a time to get away from "The Music Goes 'Round and 'Round." Ah, that's not bad. Ray Anthony has got a lot of the old beat. And that Mamie. Wow!

There I've gone and done it. Closed up under me while I was day dreaming, I guess. Well, let's head back in, old boy. Been up about an hour and 45 now. Let's see now. I didn't get too good a station passage on Jackson. Then I stooged around a bit after looking at that new double lane highway. That Jackson has really grown since I took primary training there. Wonder if Primo's is still serving that good beer? Kind of odd they call that a dry state.

Yeah, about 110 degrees ought to do it if I've wandered North a little. I'll just set up a heading and tune in the needles. Fifteen minutes should be a good guess for the run to the stables. Better give the old reliable bird dog the first chance at this job. Old number one needle was quite the doozy in its day. Sure beats that coffee grinder radio we used for so long.

It's got its limitations, of course, but this omni is really the business. That little gadget will really reach out and pull those stations in. Mighty good feeling too. Especially at night when the thunder bumpers are crowding around. Wonder what's on the menu for lunch? Got to watch that diet. Doc says I ought to stick to a bland diet a little longer. Can't risk another grounding. Might not get back on flying next time.

What's wrong with that ADF? Looks like it's not going to settle down enough. Can't seem to get Montgomery too well. That's what the omni is for, I suppose. Better give it a try now. Almost time to be getting this bird back on the ground. They'll be needing it for the afternoon flying period and refueling has been slow lately.

Now what! That omni doesn't work at all. Can't understand it. Checked okay before I took off. One of those things. The "never rains but it pours" bit. Guess I'd better swallow my pride and call for a homer. That cloud cover is too thick for me to identify anything on the ground.

"Maxwell Homer. This is Air Force Jet 39272—Request a steer to your station. I'm not sure of my position, but should be to the northwest of you, about 50 miles—Roger, transmitting for a fix."

That's odd. How could I be southwest instead of northwest? Well, these boys know their business. Better stick with 'em. Besides, I've got very little choice. 160 gallons left. That should be plenty, if I'm close to my distance estimate.

"What's that Maxwell DF? Yes, I'm steering 025 degrees according to my compass. Yes, I'll transmit for another steer. Better have approach control alerted. I'm IFR on top with a VFR local clearance. And for your information, I'm now down to 130 gallons."

Can't figure this out. I should have been there by now if their steers are right. Seem to be going in circles or something. To hell with it. There's a break in the clouds. I'll just let down and see if I can find a familiar landmark.

"Maxwell DF, Air Force Jet 39272 here. I don't seem to be making the proper steers. Maybe my compass is wrong. I'm letting down now. Will give you a call when I get through the overcast. Down to 80 gallons now."

Boy, this is really a mess. What made me fool around until I got in a jam like this? This could be embarrassing even if I get down okay. Don't dare get out and leave this thing with everything humming like it should mechanically. I've got to find a field. Might just get away with a forced landing. It's pretty flat around here and a lot of farms. Might even make it wheels down. That's supposed to be the best way anyhow. Less danger of back injuries, the Docs say.

I'll be damned. Nothing familiar here. Let's see—at four thousand feet, this 50 gallons won't last long. Maybe ten minutes if I cut back the RPM. Who am I kidding? That fifty might be gone in five minutes or less. No telling how accurate that fuel gage is. Guess I'd better give DF another try.

Well I've had it. Looks like they can't receive me from this altitude. Must be some hills in the way. Look around good, boy. If you don't find a field soon, it's the silk for you. Wonder what it feels like. Been lucky I guess. Six thousand hours and never had to bail out before.

Thank God for the ejection seat. I'd hate to try it over the side in one of these fast ones. Most likely hit the tail section. Wonder if I should turn this bird over and go out that way if the seat won't work? That's silly. Take your troubles as they come, boy. You've got enough as it is.

What's that? Oh, no! The counter was wrong. You're all out of fuel now, boy. Steady does it. No panic. There's a grass field ahead, looks pretty good too, maybe 2500 feet or more. Nose down now. Hell man, you havn't got a prayer to get in there. You haven't got the airspeed low enough.

Boy, it looks so peaceful out there. If I just wasn't strapped to this piece of metal. What are you waiting for? You know you can't make that field. You should have bailed out long ago.

Who the hell cares what those guys look at Maxwell will say? You can take all the kidding they can hand out. Could it be you just don't want to leave this nice warm cockpit? Pull the nose up, boy. Gain all the altitude you can get, and pull that handle! Now, Boy!

My God! A stall. No more altitude for you, boy. Get out—now! At only 200 feet? Yes, boy. NOW! You're out. There goes the seat. Please God let the chute open. Please God . . . ▲

KEEP CURRENT

NEWS NOTES

Two F-105 "Thunderchief" fighter-bombers are shown keeping a refueling rendezvous all by themselves. The F-105 on top is fitted with an interchangeable package refueling unit, complete with three 450-gallon tanks and refueling boom. The jettisonable kit may be installed on any F-105 aircraft and other types modified to use it. This low cost aerial refueling system is said to increase the striking range of the fighter-bombers by as much as 70 per cent.

One of the features of the system is that it is not restricted to refueling operations with other F-105s only. In fact, successful refueling hookups have been made with most of the other Century Series models and many Navy types.

The drogue system is contained in one of the tanks of the package. When not in use, it retracts completely into the tank pod. When used it can transfer both internal and external fuel from the tanker aircraft. Operational procedures for use are simplified and made less critical than when using the hose and drogue.

F-105s are currently being delivered to operational squadrons.

USAF Combat Survival Agency—The creation of a new Air Force activity in the combat survival field has recently been directed by Hq. USAF. It is located at Stead Air Force Base, Nev.

The function of the new agency (CSA) is to assist all Air Force commands in the survival field by monitoring, coordinating and standardizing combat survival training, tactics, techniques, doctrine, equipment and publications. Briefly, this agency will serve as a long-needed clearing and information center for survival matters within the Air Force. Its personnel will visit major air commands during the next few months to acquaint them with the mission of the agency and to explain services offered to users of the combat survival product.

While the CSA is relatively new, several actions have been planned or are underway. On the basis of a recent study of major air command survival training requirements, several recommendations are in the mill that concern initial aircrew member survival training programs. Also, much thought is being given to preparing "package" base-level survival training programs for maintaining up-to-date proficiency *after* the initial survival training has been completed.

Queries are invited by the CSA.

The Bell X-14—For the first time in aviation history, a jetpowered airplane has risen straight up from a runway in the conventional horizontal position, flown around the airport traffic pattern and returned to the starting point to hover and land vertically. This is the experimental Bell X-14. It differs from the so-called "tail sitter" jet VTOL in that it takes off and lands in a normal horizontal position and requires no special ground handling equipment.

Two Armstrong-Siddeley Viper jet engines provide more than 3500 pounds of thrust to lift the airplane vertically and propel it forward. Jet thrust is deflected downward for takeoff by venetial-blind type vanes installed behind the engines and is directed rearward for forward flight.

Because normal control surfaces, such as elevators, rudder and ailerons, have no effect during hovering or slow forward speeds, the X-14 is equipped with compressed air nozzles at wingtips and tail to provide necessary directional control.

These reaction controls are so closely tied in to the conventional controls and control surfaces that change from one to the other is almost imperceptible to the pilot.

On an early test flight, the X-14 attained a speed of 160 mph and climbed to an altitude of 1000 feet before circling back for landing. The pilot brought it in for the landing at about 95 mph, by deflecting the jet thrust downward, braked the airplane to a full stop 10 feet above the ground, made a 180-degree hovering turn, and settled it to the surface.

An earlier Bell-built VTOL (now in the Smithsonian Institution) initially demonstrated the principle back in 1954. Unlike the X-14, whose engines are stationary, the two engines on the test vehicle were rotated downward for takeoff and to a horizontal positon for hovering.

The Two "Bees"—This country's first all-jet transport (by Boeing), has been landed by an automatic all-weather landing system (by Bell), without the pilot touching the controls.

The 707 prototype was landed automatically three times recently, at Seattle. Bell's equipment used to bring Boeing's huge airplane to touchdown on the runway is a commercial version of the landing system developed for the Navy and Air Force. Employing a combination of radio and radar, the landing system takes over from the pilot while the aircraft is from two to four miles off the end of the runway, and brings it in for a safe landing.

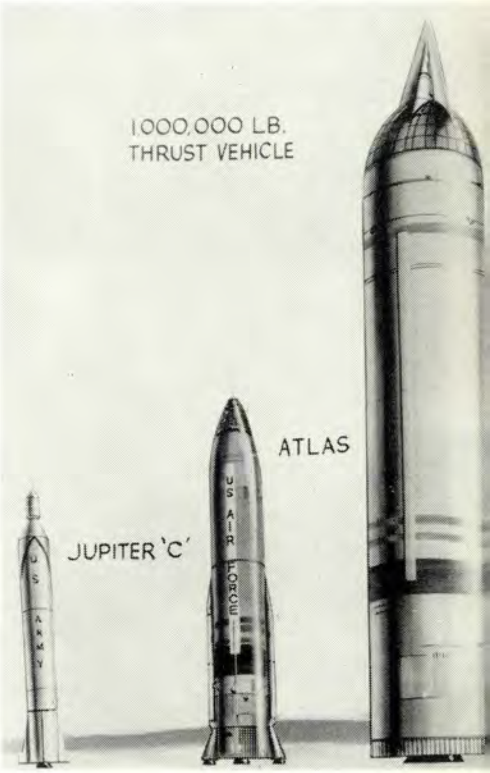
A significant feature is that the system is fully effective even when normal flight operations are suspended because of dense fog or other unfavorable weather conditions. Radar locates the airplane and an electronic computer, into which a desirable flight path previously has been fed, takes over and sends the necessary course corrections by radio to the plane's automatic pilot.

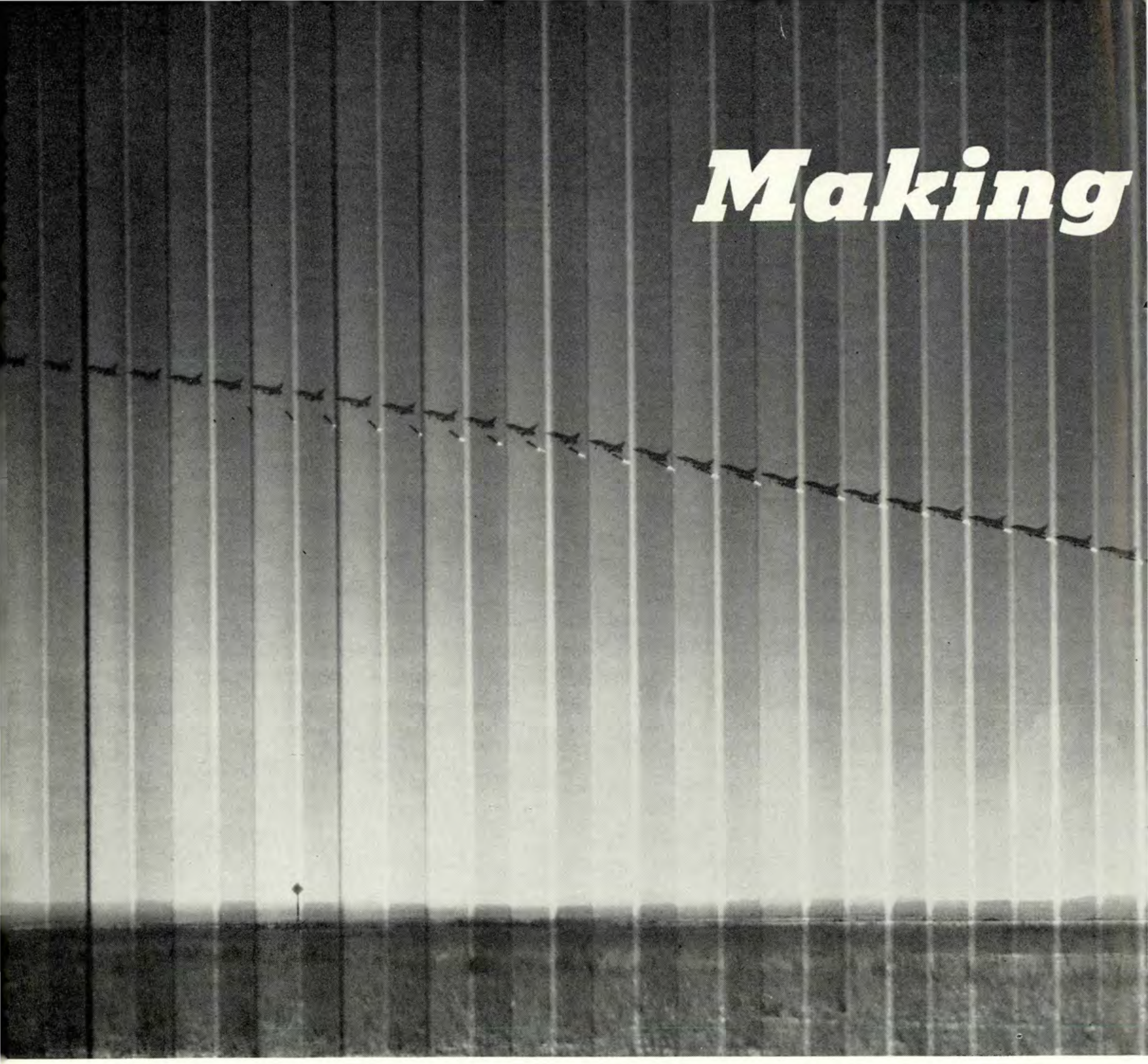
This is the largest airplane thus far landed automatically by the system. More than 2000 landings of other types of aircraft have been made by the system during its development phase, including more than 100 landings of a Navy F3D on an aircraft carrier in the Gulf of Mexico.

A Million Pounder—An Air Force contract to begin development of major components for a rocket engine in the one million pounds thrust class has been awarded to Rocketdyne, a Division of North American Aviation, Inc.

The contract began work toward the giant thrusts acknowledged to be essential first steps in manned interplanetary exploration.

Simultaneously, the Air Force has under separate contract the development of a previously undisclosed engine to provide thrust in the intermediate range between current propulsion systems and the huge million-pound engine. Work in that area has been underway since mid-1955. Both engines are liquid propellant systems.





Making

Albert W. "Al" Blackburn, Engineering

Talk about your "go no-go" concept! Here's the story of a man who got an F-100 airborne with the shortest takeoff roll in history. Total distance? Three-eighths of an inch! They call it "ZEL."

LESS than two years ago, North American Aviation was given the project to launch its F-100D airplane without benefit of runway. Just like a missile, it was proposed to strap an over-sized JATO bottle to the airplane's belly and in a distance of zero feet (more precisely $\frac{3}{8}''$), become airborne—hence the name of the project ZEL for zero launch.

While Gene Salvay, Project Engineer for ZEL, worked out the design details of the launcher and the booster attachment to the airplane, it was up to Engineering Flight Test, under the direction of George Mellinger, to determine the program that would most quickly—yet safely—establish the validity of the ZEL concept.

To implement the zero launch of a fully loaded F-100D

Like a Missile

Test Pilot, North American Aviation, Inc.

airplane, Astrodyne, Inc., built a solid propellent booster that would produce approximately 130,000 pounds of thrust for a period of about four seconds. This push of nearly ten times the maximum thrust offered by the F-100's J-57 engine meant that the pilot would be exposed to a force of between 3.5 and 4G. This would tend to pin him back tight against the seat, his head locked firmly to the headrest by this acceleration.

Firing off from the mobile launcher at a pitch attitude of nearly 20 degrees, it was estimated that the ZEL pilot would find himself at an airspeed between 200 and 250 knots and at 400 feet above the ground as the rocket burned out and the empty booster case fell to earth.

A brief digression is in order here to take note of the fact that zero launch of a manned aircraft was first accomplished in 1953 with Bob Turner, test pilot of Martin Co., (then the Glenn L. Martin Co.), at the controls of an F-84G. That project was conducted as a research and development effort with modification to the airplane being of such an extent as to preclude its use for a tactical mission. Our job was to extend the concept to a fully loaded combat airplane without any compromise of its mission capabilities.

As project pilot for ZEL, my responsibility was to prepare myself as thoroughly as possible for the physical shake-up and psychic shocks that might accompany not only a normal launch but any foreseeable emergency condition.

". . . It was predicted that compressor stalls would occur if the angle of attack exceeded 25 degrees. In our tests, angles of attack greater than 30 degrees were held for periods in excess of five seconds."

The first step was to contact Bob Turner at Martin. His "no sweat" attitude towards the whole idea was most reassuring and some concrete suggestions as to cockpit modifications proved quite valuable. From our discussion evolved the ZEL folding headrest and the ZEL throttle grip. The former positions the pilot's head about two inches forward of the normal ejection position so that he can comfortably observe the instrument panel even though his head is pinned back against the headrest by the high longitudinal G forces imposed during blastoff.

After the launch, should emergency departure from the aircraft prove necessary, the headrest automatically snaps back to the ejection position with actuation of the canopy jettison mechanism. It also can be manually released by means of a lever on one side of the headrest. The ZEL throttle grip swings back against the throttle of the F-100 in such a way that so long as the pilot holds the throttle and the ZEL grip pressed together with his left hand, the engine is held in full afterburner. The trigger for firing the rocket booster is located at the top of the ZEL throttle grip.

For personal equipment, an automatic parachute with a zero second lanyard hooked to the D-ring was chosen. In addition, an automatic seat separation bladder was used for improved low altitude ejection capabilities. A helmet was chosen for best noise protection to minimize the anticipated high noise level in the cockpit during booster firing. Luckily, this also proved to be one of the lightest helmets available, thereby minimizing the acceleration forces on the pilot's head as well.

So much for the cockpit and personal equipment. Next on the agenda was the training program. There were two general aims of the pilot training effort for the ZEL project:

First, to thoroughly acquaint myself with the response characteristics of the airplane during both normal and abnormal launches.

Second, to become so at home under the high rate of G onset and subsequent high longitudinal G that are characteristic of the launch that there would be no surprise effect when I launched the first time. This would allow complete concentration on any possible emergencies that might arise.

The first training objective was accomplished primarily in the simulator. This is an F-100 cockpit set up in North American's flight controls lab. Booster thrust and aerodynamic effects are electronically calculated, and their effects are fed into the cockpit instruments. Attitude, altitude, airspeed, G and side slip were the readings of primary concern. Simultaneously, these indications of the F-100's performance can be corrected to the desired values

by proper manipulation of the stick and rudder, just as in the actual airplane.

In this cockpit surrounded by electronic equipment, many hours were spent investigating every conceivable eventuality—hot day launches at high field elevations and cold day launches at sea level, booster misalignments to the maximum the pilot could safely handle and beyond, engine flameouts during launch and empty booster case hangups.

Where there was a difference of opinion between engineers as to estimated effects on the airplane under a certain set of circumstances, both estimates were evaluated in the simulator. The work in the simulator was found to be immensely valuable. It was learned, for instance, that booster thrust misalignments up to 1.5 inches in any direction could be safely handled. An error of this magnitude is equivalent to filing for New York out of Los Angeles and ending up in Alaska—not only chilling but practically impossible.

Proper control techniques were developed on the simulator for handling rates of change of control effectiveness that take place during the launch. During the first two seconds, all controls are relatively ineffective, but by the time booster burnout occurs, they are very effective indeed. Thus, too great a pitch control correction early in the boosted portion of the launch could very easily result in an over-control condition a second or two later.

On the simulator, the burnout and booster separation pitch transients were clearly illustrated as were the problems of flying with a hung booster case which results in an unstable aft CG condition. What happens when the jet engine flames out at various points in the boosted launch also was demonstrated.

Further valuable training was obtained by flying the airplane itself in the configuration that was to be launched and making a complete evaluation of handling characteristics at low speeds and unusual attitudes. Also determined was the altitude above the ground required to effect a safe deadstick landing for various airspeeds should the engine experience a flameout in the course of a ZEL launch.

Another purpose of the unusual attitude tests was to determine the engine operating characteristics in full afterburner at very high angles of attack. It was predicted that compressor stalls would occur if the angle of attack exceeded 25 degrees. In these tests, angles of attack greater than 30 degrees were held for periods in excess of five seconds and the engine didn't seem to mind a bit.

For all the inflight preparatory work, one of the most valuable instruments in the cockpit was the angle-of-attack indicator. This instrument was installed especially for the ZEL flight test program. By reference to angle-of-attack, optimum techniques for recovery from an excessive nose-down pitch from the booster could be established. Also optimum flare techniques in the event of a flameout were determined through use of the indicator.

The second purpose of the pilot training program was to familiarize myself thoroughly with the acceleration forces exerted on the pilot in the course of the zero launch. Two devices were considered for this acceleration indoctrination—the Navy's steam catapult and the centrifuge at the University of Southern California. Neither was capable of giving a complete picture of the accelerations predicted for ZEL.

The steam catapult gives a very close approximation of the rate of G onset anticipated (about 40G per second) with a peak of 4G, but the duration is only two seconds. The centrifuge can hold the 4G for any length of time but the buildup is slow at a maximum rate of 2G per second. It was decided to take advantage of both catapult and centrifuge to get the complete picture.

At the Naval Air Test Center, Patuxent River, I rode both the steam and hydraulic catapults in an FJ-3 airplane. The former, as noted above, very closely approximated the initial ZEL acceleration characteristics and I found that I was capable of making desired control deflections while still under acceleration by the catapult.

The hydraulic catapult, on the other hand, has a rate of acceleration buildup over three times that of the steam catapult and recovery from such a jolt does not take place until the airplane is free of the catapult. The important thing is that I had experienced a number of acceleration buildups similar to ZEL and several that were greatly in excess of what was expected. The faster buildups on the hydraulic machines were taken for the same reason a batter swings two bats before stepping up to the plate—it makes the real thing seem easier.

In the centrifuge at the University of Southern Cali-

". . . The final ride was a slow buildup from two to six G over a period of 100 seconds. . . . I was ready and so was the launcher. . . ."

fornia, there was mounted a conventional ejection seat along with stick, rudders and a throttle. First, I rode around at 4G longitudinal acceleration for several periods of one minute each. It was reassuring to note that under these acceleration forces, no difficulty whatsoever was experienced in manipulating either controls or throttle.

The final ride was a slow buildup from 2 to 6G over a period of 100 seconds. As the acceleration increased above 3G, the head could no longer be moved from the headrest which fact emphasized proper positioning of the head for ZEL prior to firing the booster. However, even at 6G, perfectly adequate positioning of controls was possible.

It is interesting to note that this last run very closely approximated the longitudinal accelerations that would be encountered in one stage of a three-stage orbital vehicle, and dramatically illustrates that the human guidance system is quite capable of performing useful service even in the powered portion of such a vehicle's trajectory.

I was ready, and so were the launcher, the booster and a specially instrumented ZEL F-100D airplane. Four dummy masses which duplicated the airplane's weight and mass distribution had already been fired. From these launches much had been learned of boresight techniques, launcher design and booster characteristics. The intensive pilot indoctrination program paid off handsomely. Three piloted launches have been accomplished at this writing.

As with any development program, unforeseen circumstances have produced the unpredicted. However, where events proceeded as predicted, observation of other characteristics of the launch could be made with the pilot unharassed by acceleration forces, normal variation in pitch as the booster burned out, or the expected booster burned out, or the expected booster burnout and separation transients. Where events did not proceed as predicted, I was immediately aware that something out of the ordinary had occurred.

For the normal launch, from the very first shot, it was evident that ZEL acceleration forces do not have the surprise effect that identical forces experienced on the steam catapult have. With ZEL, I felt that I was flying the airplane off the launcher with no apparent time required for recovery from the initial jolt. In fact, there is actually a certain feeling of elation associated with getting airborne in this way. On the steam catapult, there always seemed to be a brief period of a second or more required to react against the G buildup. There is a significant difference between the two systems.

On the catapult, the airplane is launched by a catapult operator, and no matter how good the coordination is with the catapult crew, the pilot never knows precisely when the jolt is coming.

With ZEL, the pilot fires himself and consequently is able to coordinate a brief tensing of his body for the initial G onset and recovery time is negligible.

The last two launches have been made entirely with reference to instruments, and this appears to be the best technique. This is the way it is done in the simulator and by so doing in the airplane, the pilot is simultaneously training for a night or actual instrument launch should either event prove necessary.

The noise of the booster has not proved to be any problem, probably because the booster nozzle focuses the majority of the sound behind the airplane.

In the realm of the unusual, the opportunity has been afforded to fly the airplane with empty booster case still attached and this proved to be precisely as demonstrated on the simulator—unstable, but completely controllable. Various misalignments have been observed and again these followed the characteristics seen on the simulator.

The F-100D ZEL techniques are rapidly being refined for incorporation into tactical squadron capabilities. Hopefully there will soon be enough boosters for all F-100 drivers to take a ride. The flexibility of this manned weapon system divorced from reliance on vulnerable runways may well try the missile makers' mettle and ingenuity to the point that they will find it simpler to put the pilot back into their complex machines. ▲

ABOUT THE AUTHOR

Albert W. "Al" Blackburn, Engineering Test Pilot for North American Aviation, is a graduate aeronautical engineer who prefers to ply his trade in the cockpit rather than at the drawing board. Al, on July 31st of this year, asked for and got an 8G "flight" on the centrifuge at the University of Southern California. For all practical purposes he simulated what might be expected when one is hurled into space during a unique 350-second flight into simulated earth orbit.

He's a 1944 graduate of the Naval Academy and served as a platoon leader in the Marine Corps. He began flying in 1946 and flew fighter-bombers until 1949 when he left the service. He received his Master of Science degree in aeronautical engineering in 1952. The Marine Corps recalled him then and he flew two years as a test pilot at the Naval Air Test Center, Patuxent River, Maryland. He joined North American in 1954 and has specialized in flying detailed engineering studies on the F-86, the F-100 and the F-107. He was selected to fly the ZEL tests less than two years ago.

FLYING SAFETY SALUTES

The CAA

THE Civil Aeronautics Administration has come of age! The organization celebrated its 20th birthday last June.

Too few people, both in and out of the aviation fraternity realize the effect which the CAA has had upon their lives and upon civil aviation in the United States.

Back in 1918 the Post Office Department inaugurated the first airmail service. Flying at first between New York, Philadelphia and Washington, the service gradually expanded until, several years later, transcontinental airmail routes from New York to San Francisco were established.

Our present day air transport system owes much to the government operated airmail service of the '20s. The experiences of its pilots flying in all kinds of weather and at night led ultimately to the development of airway navigational aids, adequate weather reporting services, and airports—all of which were essential to safe, regular commercial service.

In 1925 the Post Office turned over its airmail operations to private companies. At first the airlines were almost exclusively concerned with carrying mail. Often passengers were allowed to fly only if there were less than a full load of mail aboard. Gradually the number of airlines grew. Groups of small airlines combined into large trunk lines, and passenger service came to be regarded as a steadily increasing source of income.

Meanwhile the airline became concerned with possibilities of collisions in areas of high density traffic. Instrument flying in bad weather further necessitated some control of air traffic to avoid accidents. The old flying rules established in 1926 were no longer adequate. From time to time, Congress passed regulatory laws, but a still more effective authority was needed. As the result of a thorough study of commercial aviation made under the Black-McKellar Act of 1934, Congress passed the Civil Aeronautics Act in 1938, and CAA was born!

The CAA has as its main purpose safety in the air. To accomplish this objective, the CAA has set up six divisions or offices. The Office of Air Traffic Control is concerned with the safe, orderly and efficient handling of air traffic and the collection and distribution of weather information.

To do its job the Office maintains 34 air route traffic control centers in the United States and the territories. These centers are responsible for the control of all instrument en route traffic. In addition they are aided by 202 airport traffic control towers. Employees of the Air Traffic Control Office man the radar sets, the teletypewriters and the telephone systems of CAA.

At the Newark Center in 1936 there were 15 employees. In the New York air route control center today are 341 men and women who handle the daily air traffic for that area. In 1937, air traffic control centers handled about 150,000 operations requiring separation in flight. Last year there were 25,150,733 such operations.

The second division of the CAA is the Office of Air Navigation Facilities. This office is responsible for designing and buying navigation facilities, the approach lighting systems at airports and the radar sets in control towers.

The Office of Flight Operations and Airworthiness is concerned with safe aircraft, competent airmen and safe flight practices. The Aircraft Engineering Division approves designs of the airplane manufacturers. Its inspectors monitor airplane construction to assure that specifications are followed faithfully.

CAA's flight test engineers put the new aircraft through its paces and certify its airworthiness. Employees of the Air Carrier Safety Division check the airlines for compliance with safety regulations. They observe how the airlines operate flights, and inspect the flight records, the training programs and the equipment maintenance systems.

The General Safety Division devotes its efforts to promoting safety among the operators of general aviation aircraft—all the users of aircraft except commercial airlines and the military services.

Employees of the General Safety Division inspect all general aviation aircraft, give flight tests, administer pilot certification and mechanics tests, and investigate accidents involving light aircraft.

The Medical Division is in charge of administering periodic medical examinations and conducts studies to determine the best arrangement of cockpit instruments and controls for optimum pilot performance.

The Office of Airports is responsible for planning and developing the nation's system of airports. It administers the Federal Aid to Airports Program.

The Technical Development Center at Indianapolis studies air traffic control problems. It tests and evaluates new navigational aids developed by the Office of Air Navigation Facilities and conducts tests of airplane parts and systems.

The sixth division of the CAA is the Office of International Cooperation. This Office assists many of the free world's nations in building airports and in developing air traffic control procedures and air navigation aids.

CAA's services to civil aviation today are tremendous. With the coming of jet transports and the expected increase in air traffic, its work will add continuously to the safety and convenience of air travel in the United States, both civil and military. ▲

FLYING Safety is a major part of the day-by-day experiences of an Air Force Academy cadet. It starts the day a cadet reports to the Academy and will continue on through graduation. Perhaps no group of flying people is exposed to more constant flying safety information than USAF Academy cadets, yet very little of what is given is labeled "flying safety."

For those who are not familiar with the Air Force Academy Cadet Program, cadets go through a navigation training program and graduate as navigators. After graduation they enter the normal Air Training Command pilot training program.

When the air training officers began teaching discipline and airmanship to the first group of cadets, practically every situation they encountered was related to some flying activity. The consequence of failure to accomplish a ground oriented task was related to what could happen if similar error was committed during a flight. To a degree this approach continues, but for the most part the negative aspects of flying safety are minimized.

At the Academy we feel it is necessary to stress the positive side of flying safety particularly as far as the cadets are concerned. If you happen to be an old pro and think back on your flying school days, you will remember that prophets of doom and gloom were avoided like the plague. No one wants to listen to a harangue. The opposite approach is necessary to get flying safety information across to the cadets.

Efficiency in operation, discipline and achievement are emphasized. By placing proper values on the right way of doing things, we should get the desired results. It is emphasized that accidents are generally marks of inefficiency and only in rare instances are they marks of heroism.

We teach that proper training, close supervision and adherence to accepted standards result in a safe operation. While, on the other hand, unsupervised, "back yard" and otherwise haphazard operations carry a high price tag. No one should be forced to pay this price.

For the positive side of Academy cadet education, here are a few of the very basic things that are done. To begin with we try to show (by example) that flying safety is achieved through efficiency and professionalism.

Many of you fly out of airfields one mile or higher in elevation and over terrain where minimum en route altitudes run up to 16,000 or 17,000 feet. You certainly realize that an emergency necessitating bailout after takeoff or at minimum en route altitude, requires proficiency on the part of crewmembers that will enable them to get out of the aircraft as quickly as possible. We have this problem here at Lowry, the interim site of the Academy, and will have it at our permanent site at Colorado Springs.

Safety at the Source

Major Carl H. Peterson, Flying Safety Officer, U. S. Air Force Academy

Air Force Academy cadets are getting the Flying Safety "word" from the start. It's a major part of their day-to-day activities.

Cadets go through navigation training, graduate as navigators.

In the T-29 (navigation trainer) our normal crew load, with students, totals eleven. Consequently if everyone is to get out, there can be no dilly-dallying. The crew must be so familiar with bailout procedures that it can leave in an absolute minimum amount of time.

The Support Division of the Department of Flying Training realizes this and has set up a program of instruction which may be unique in the Air Force. Freshmen cadets, or fourth classmen, are required to take this course prior to their first flight in the T-29. And even before this, they are given a four-hour Physical Training course which augments the one given in Jumping Techniques. In this course, cadets simulate landing falls by jumping off stands of various height. They are also dragged along the ground by classmates to learn the proper procedure for regaining their feet and dumping their canopy.

The first two flights for the cadet are orientation flights. During these, he is constantly practicing emergency procedures until proper reaction becomes second nature. We try to have at least one emergency drill in each flight—it may be fire, bailout or crash landing. Only this constant practice can develop the instinct to take over and produce positive, correct action in that moment of panic when an actual emergency occurs.

Prior to each flight a formal briefing is held. The cadet and crewmembers check each item of equipment to make certain of a proper fit. They also are given a complete and detailed briefing on emergency procedures. After three and a-half or four years, you say, they should be familiar enough with these procedures to make that briefing unnecessary. Maybe so—but these students are not flying every day or every week, and a person can get rusty awfully fast!

Try practicing a bailout drill during a flight—unexpectedly—and see how long it takes your crew to prepare for it. We strive for a maximum of 30 seconds to have packs on, harness tight, be safetied in seats and monitoring interphone.

While he is still a fourth classman, the cadet also receives a jet motivation flight. Prior to this flight, he receives detailed instruction in bailout procedures. He becomes familiar with the parachute and ejection seat, and he must demonstrate a thorough knowledge of ejection procedures prior to flight.

After graduation, cadets enter the normal pilot training program.

Each Second Class Cadet is given two sailplane orientation flights.

Cadets make no practice bailouts. We feel, however, that our crewmembers would react to an emergency just as if it were an everyday occurrence. They are so used to going through every step—except the long one down—that second nature should have them floating down before they had time to panic, hesitate or even think about it.

When cadets become third classmen, they are introduced to the logistical aspects of flying safety. Here, the impact of aircraft accidents on the combat potential of the Air Force is emphasized, then re-emphasized by presenting the cost in dollars and personnel. In addition, classroom work includes a discussion of the philosophy of the USAF Flying Safety Program. The cadets are given case studies to discuss, which point out many of the more common causes of aircraft accidents.

The class of '59 was given nine classroom hours of aviation psychology last year. The objectives of these nine hours were to acquaint the cadet with and give him an understanding to the human factors in aviation. Special emphasis was placed on the flying safety role of the Air Force Officer in accident prevention. The need for aviation psychology and its value to the Air Force was given through lectures, class discussion and films.

The cadets are given more direct flying safety education in their Soaring Program, in which each second class cadet is given two sail plane orientation flights. Third classmen all receive two weeks indoctrination at Air Training Command primary schools during which they receive dual instruction in the T-34 aircraft. They also receive instruction in the T-37 or the T-28. All of these exposures to flying have their flying safety aspects.

A visit by DFSR personnel is scheduled during the last week or so before graduation at which time the senior class is given an impact briefing on Air Force-Wide Flying Safety problems. Cadets should reach our pilot training schools with a professional approach to flying, well rounded in flying safety education. ▲

Conventional

THIS little tale is for you. You, who operate the old reliable, oft-maligned modes of aerial transportation, commonly referred to as the "Bug Smasher," and the "slow-go Gooney," but more properly known as the C-45 and C-47.

This story applies equally well to all—the hoary old, shiny-pated command pilots, "wild blue yonder" type youngsters and those in the middle. Any and all, who fly the old brown mahogany for 28 or 29 days and then go out and perform their derring-do on a round-robin once a month.

There are several other types of aircraft that are used for this kind of flying, such as the B-25, but they are in the minority. With a few slight modifications, the points brought out below can also be applied to them. The old Gooney Bird, and the "Secret Weapon" have been around for so long now that it looks as if they are going to last forever. For this reason my remarks will be pointed in their direction.

What is conventional type aircraft? A point that is often overlooked when discussing conventional aircraft is that the C-45 and the C-47 are no longer conventional! Now, what kind of facts can I use to substantiate such an absurd statement as this? Well, let's see, there was a time

'way back in the primordial days of aviation when all flying machines came equipped with a hunk of ash securely attached to the bottom rear of the fuselage. This was known to our ancient and daring predecessors as a tail skid. As the wheels of progress ground implacably onward, the skid was replaced by a tailwheel. This was progess?

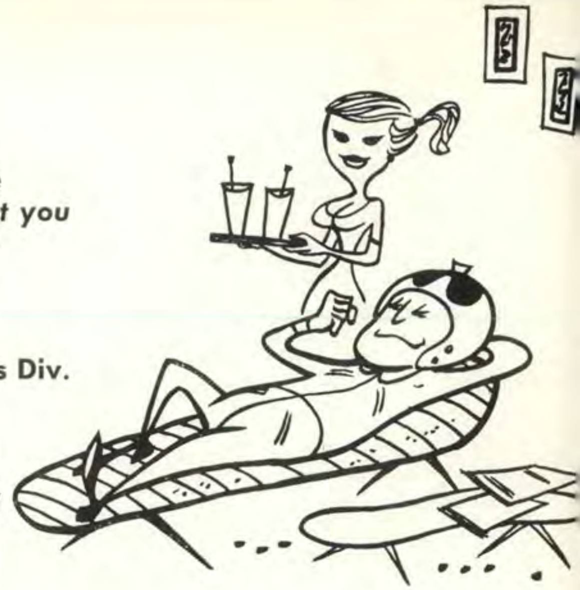
The final stage in the metamorphosis came when the aircraft manufacturers, goaded into a frenzy by pilots making like whirling dervishes on various and sundry runways, replaced the rear end attachment with the nosegear. This was real progress! No more stretching in the cockpit to see over an elevated nose. No more groundloops on takeoff or landing. So, for the past twelve years or thereabouts, every aircraft in our modern inventory has come equipped with a nosegear.

Zounds! There are literally thousands of pilots who've never had the thrill of sitting at the controls in a gusty

The "Smasher," and the Gooney Bird continue to come apart at the seams when they hit the ground. Anyone knows that you can't get hurt in the old standbys. But it is still being done.

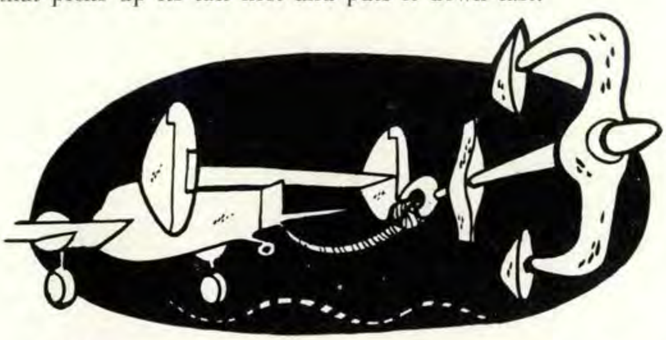
Lt. Col. Albert T. Ward, Cargo Br., Investigation & Field Operations Div.

Complacency



crosswind, making effort after effort to put that swooping, swerving tail on the ground.

Then comes the day, after years of fatcatting it with nosewheel steering, when our hero is relegated to the dubious distinction of once again manipulating a machine that picks up its tail first and puts it down last.



Flashback . . . The scene is set in the cockpit on the end of the runway, ready for takeoff . . . Dialogue . . . Old George (our hero) to Instructor Pilot in right seat:

"Why, when I quit flying the 'Smasher' back in '46, I had nine hundred hours in her. She's a good old beast. No sir, don't think I'll ever forget how to handle her."

Instructor Pilot: "How much time have you had recently in the C-45?"

Old George: "No sir, don't think I'll ever forget how to handle her. Now, if you'll just follow me through on this takeoff, guard the throttles, and raise the gear on my signal, I'll take care of everything else."

The purr of the engines increases to an insistent snarl, as George advances the power and releases the brakes.

"Whew-w-w-w-w-w!" says the IP.

"Good Gosh!" says George, as the careening airplane comes to a lurching, skidding halt in a cloud of dust—off to the side of the runway with its landing gear collapsed.

"Can't understand how this happened," George ventures, as he shouts to be heard over the keening sirens and roaring motors of the approaching crash vehicles.

"Must have been a strong gusting crosswind come up just as we started takeoff. Maybe it was the brakes? That's it—the left one grabbed on me and I couldn't correct it. That's what happened—I bet."

I'll bet that you think this illustration is a ridiculous fabrication written strictly for the purpose of getting your attention. This is partly true, but a recent accident—identical to this in most respects—really happened.

High points from the investigation revealed that the wind was not a factor. There was nothing wrong with the C-45, but there was something wrong with Ol' George. His AF Form 5 indicated that he had a total of 640 flying hours logged, despite the fact that he'd been rated in 1944. In addition, 126 of those hours had been flown in liaison type aircraft. His total C-45 time was exactly eleven hours.

Apparently, he'd been off flying status for some time prior to the day he "should have stood in bed." How did he get in the left seat?

The investigation didn't answer this question.

Why didn't the IP take over in time to avoid the accident? This one isn't answered either.

Why didn't the IP ascertain the student's qualifications prior to attempting the flight? Not answered.

But, what is most important is, what was wrong with the supervision? Why hadn't the Squadron Commander and the operations officer made certain through appropriate SOPs that this could not happen?

Aircrew standardization, adequate checkout procedures and high standards of supervision prevail in almost every outfit, when it comes to primary mission, high performance aircraft.

Where administrative or CRT type aircraft are concerned, a double set of standards frequently comes to light.

"Familiarity breeds contempt." Can it be that this old adage is true? Most of our older birds are awfully forgiving of mistakes—up to a point. Careful flight planning to include fuel computations, maximum refusal speeds, crosswind components, runway temperatures, density altitude and other factors are essential for safe operation of modern aircraft.

The margin for safety in our older, slower types is much greater and less detailed flight planning is required. This condition could lead to a dangerous omission of something vital.

How many times have you filed a hasty flight clearance, done a "run-around" preflight, and took off in your trusty CRT machine? How long has it been since you reviewed the Dash One, or had a flight proficiency check or practiced the emergency procedures? Do you always conduct an adequate crew and passenger briefing before flight? Follow the checklists?

The surest way to make a person realize he's got a sore spot is to keep poking at it. Every pilot error accident that happens to a C-45 or C-47 keeps hitting me in a sore spot and I'd like to pass my bruises on to you.

Let's look at part of the record for 1958.

As of this writing, which covers less than a four-months period, eighteen pilot-factor or IP-factor accidents have occurred in these two "safe" old aircraft. In other words, responsibility for all of these accidents has been placed on the pilot in charge of the aircraft. Every single accident that has happened to the C-45 is of this nature.

All but four accidents that have occurred to the C-47 are of the same type. Ten of these "goof ups" happened during landing, of which six involved loss of control of the aircraft. Six more of the total occurred during takeoff or shortly thereafter, and four of these were—you guessed it—groundloops! Ten of the eighteen operator factor accidents then, involved loss of control on takeoff or landing.

Every solitary one of them is an example of improper technique and most of them involve supervisory oversight. The rest of the operator error accidents were caused by equally avoidable factors, such as inadequate flight planning or lack of knowledge of the aircraft and its systems.

There are certain types of aircraft accidents that most people would say are unavoidable. Structural failure, an uncontrollable fire—such things are understandable as an accident cause factor. Most accidents in these catagories could be avoided too; however, that is a different subject not pertinent here.

We are all human beings and not infallible. For this reason, an occasional operator-factor accident can be understood. Not condoned—you hear—just understood. But when we have eighteen operator-caused accidents in two old and proven types of aircraft in less than a four-months period, it is time to take a jaundiced-eye view of the causes.

What are the causes? You don't have to look very deeply into background information to find the secret. The old Air Force Form 5 is a revealing document. For example, after a couple of recent accidents, a review of the pilot's forms revealed such interesting items as these:

- A pilot assigned to administrative duties was given a recheck in the C-45. His last previous flight in this type had been completed more than six months prior to the check ride. The check flight lasted just 20 minutes, and two landings were logged. The crash occurred less than a month later.

- Another pilot was given an initial checkout and also qualified as an instructor pilot during one flight. This flight lasted three-and a-half hours, but only one landing was logged. The pilot had plenty of previous time in the bird; however, his last flight in that type aircraft had been more than a year previous to the check flight. His next most previous flight had occurred more than four years before the check. Two weeks later this qualified Instructor Pilot, flying the aircraft from the right seat, groundlooped while demonstrating the proper techniques for lowering the tail.

There's more, much more, of this type of information in the records. This should be enough evidence to give you the idea that complacency, overconfidence and a lack of supervision caused these accidents.

Let's suppose that you're a skilled boxer, but haven't been practicing your skill in recent months. An important boxing tournament is pending and you are going to participate. Would you enter the ring without an extensive training and conditioning period? Of course, you wouldn't. Not if you wanted to keep from having your head knocked off.

The biggest difference between this analogy and the facts in many an aircraft accident is that frequently the pilot suffers more than just a physical beating. Sometimes he isn't around anymore. Is it worth the gamble? ▲

CROSSFEED

LETTERS TO THE EDITOR

But, Sir!

I have just read the July 1958 issue of FLYING SAFETY MAGAZINE and would like to commend you for the article on the Weapon Systems Concept.

This is a very complex subject, and your explanation of it is one of the best I have read. Please accept my congratulations and pass them on to the author. You both are to be commended.

Gen. E. W. Rawlings, USAF
Commander, Hq Air Material Command

★ ★ ★

Too Much Humor

I am writing to recommend that you take FLYING SAFETY out of the comic book ranks and put it back where it belongs as the "Bible" of flight safety, written and illustrated in a serious, thought-provoking manner.

After reading your Air Discipline issue and the July issue, I talked with many of our pilots and supervisors. All agreed that most of the pilots were only leafing through the magazine. There are entirely too many silly cartoons and articles written in a humorous, light handed style. Personally, I was very disappointed in the "Air Discipline" issue—all I can remmeber is that "Moe hit Smoe with a club." I am not opposed to humor; "Mal Function" is an old and respected character, and so is Rex Riley. I am stating that you have too much humor and too many cartoons.

If you doubt what I have said, research past issues and conduct a survey among pilots. I believe you will find that most are looking, not reading.

A Form 14 is not humorous.
Publish this?

Lt. Col. Robert H. Clark
Commander, 3550th CCTGp (Int.)
Moody AFB, Ga.

Published with pleasure. Rocks or roses, we appreciate the comment.

★ ★ ★

Specter

I should like to comment on the article entitled "Specter in the Sky," which appears in the June issue of FLYING SAFETY MAGAZINE.

In the second paragraph it refers to the human eye as the best warning device presently available. It goes on to tell what to do and what not to do to enhance this "device." Nowhere is "Hypoxia" mentioned. Of what use is the best device if it is not operating?

The Personal Equipment field is not performing the job. I do not mean to say they are not trying. I'm sure they are. But given marginal equipment, few 7-level authorizations, can we expect the superior results we must have?

Conventional pilots don't pass this up: 10,000 at night can get you too.

Capt. Arthur R. Magee
Hq EADF, Stewart AFB, N. Y.

Go For Broke

Thank you very much for the very valuable contribution by Dr. Thomas F. Staton in your May issue. The doctor's article, "Go For Broke," contains the wisest words about flying safety (or for that matter any other kind of safety) that I have ever read or heard. The doctor is really getting to the heart of the matter. Please try to bring more material like that.

Maj. Kjeld Pedersen
Operations Officer
Vaerloese AB, Denmark

★ ★ ★

Decisions

The enclosed article is a result of "discovering" the need for decisions in advance as a mental condition in analyzing student pilots' actions and reactions. I was an instructor in the CrewTAF B-29 program for three years and later an instrument check pilot in the same program.

The ease with which some pilots handle emergency situations goes back to their complete familiarity with the procedures involved and their mental preparation to use that knowledge. This includes not only mechanical difficulties but also instrument procedures, radio trouble, and, not the least, correcting for the human errors.

The FLYING SAFETY MAGAZINE is one of our main sources of information about the flying Air Force. We value it greatly and want you to keep up the good work. I really like the idea of concentrating a single issue on a single subject.

Capt. John R. Shipley, USAF
AFROTC Det. 860, Utah State Univ.
Logan, Utah.

Thanks for the kind words and specially for the contribution. Hope to schedule the article for an early issue.

★ ★ ★

Professional Pilots

This is in reference to the lead editorial in the June issue of FLYING SAFETY, entitled "Memorandum for Professional Pilots. Subject: Las Vegas Collision."

Your concern regarding precipitate rulemaking, regulations, enforcements in air traffic control is well founded and shared by our organization. We all have a tough job to do, and the hysteria created around us in trying to do that job just makes it all the tougher.

I am currently preparing our organization's position for presentation before both Senate and House Committees on the Federal Aviation Agency Bill. It's not an easy task now to analyze and calmly evaluate a proposal such as this. But, in it we see the opportunity to knock out some of the past evils and to create a true partnership in the air, in which the military air establishment will work in full and close relationship with the civil air space users.

With this objective in mind, it becomes frustrating to see the continued and sole recognition given by the Air Force to "our brother professionals, the Airline Pilots" with complete and total lack of recognition of the professional pilots who fly more hours, more airplanes, to more airports in business aircraft than do the other professional pilots as represented by our allies, the Airline Pilots.

The CAA estimates that there are 18,292 professional pilots in the general aviation fleet, a much greater amount than enrolled as Airline Pilots. Our equipment ranges from single engined aircraft to Viscounts, DC-6s, CONVAIRS, DC-3s. Our personnel includes a great number of pilots holding ATRs, the remainder commercial and instrument certificates. The great majority are as keenly interested in improvement of flying as any other professional pilot should be. Many are active in the military Air Reserve components.

It is earnestly suggested that you, as spokesman for the Air Force as far as safety in the air may be concerned, become more aware and better informed as to who the professional pilots in the air really are. Assuredly, the mantle of professional pilot does not rest solely on the shoulders of the military pilot and the airline pilot.

If we are to cooperate in the air—as we must to survive—we also must do better in knowing each other. Perhaps this informal note will help to do that.

William K. Lawton
Executive Director
National Business Aircraft Assn, Inc.
Washington 4, D. C.

We had no intention of slighting the many thousands of professionals not affiliated with the military or airlines. We have to admit, however, that the 18,000 figure did surprise us. Just another bit of proof that it's getting crowded up there.

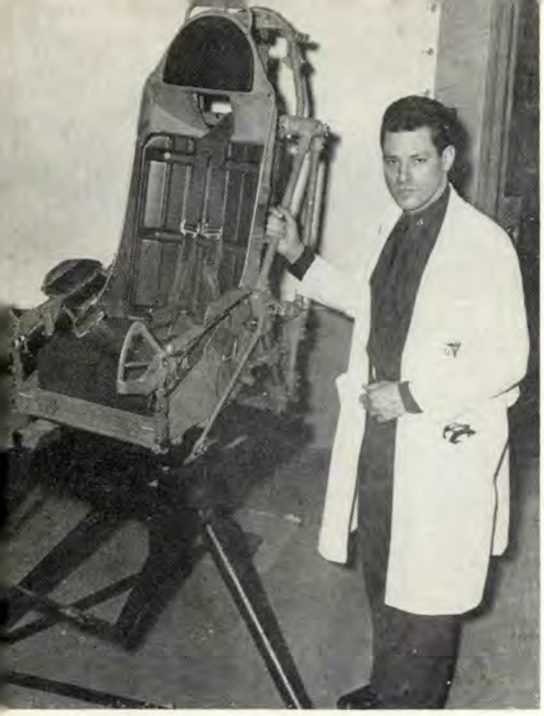
★ ★ ★

"Big Ones"

I have the additional duty within this Group of Flying Safety Officer. Our Group extends over approximately one-fourth of the State of Texas and has numerous squadrons deployed at various locations within that area. These squadrons engage in search and rescue flying, proficiency flying, flying in connection with Civil Defense Activities, and indoctrination flights for CAP Cadets.

We have a flying safety program in effect and have been quite successful with our program to date . . . I enjoyed the article about "little ones" in the June issue . . . After all, many times we are the ones out looking for the "big ones" when they've gotten into difficulty.

Lt. Col. Robert L. Forche
Gp 22, Texas Wing, CAP
Corpus Christi, Texas



Free Jag

Through the combined efforts of the 50th Field Maintenance Squadron and the Flight Surgeon's Office, a Barany chair has been installed in the Hospital at Toul Rosieres Air Base. This chair—a revolving one—will produce symptoms of air-sickness and disorientation that pilots experience in supersonic flight. Also, they can tie into a quick, "free" jag without the help of liquid spirits.

During regularly scheduled classes, pilots will see demonstrations of how vertigo and physico-mental disorientation may be produced and how it affects their proficiency. According to Capt. Noah Dixon, Hospital Commander, the simulated Barany chair (so named for its Swedish inventor) will prove a most realistic approach for training and conditioning pilots for what may occur in high speed flight and to indoctrinate them in how to react to loss of equilibrium.

Captain Dixon furnished the specifications, and T/Sgt. Max Bryner devised the Barany simulator that his machine shop crew built from a salvaged F-86 seat. Within a week, the crew turned out a finished product. The chair has passed its tests, and Captain Dixon thinks it's the best of its type in Europe! He is pictured here, steadying his training device.

Sounds good for a thrill—as well as good experience. (See FLYING SAFETY, November, 1957.)

★ ★ ★

Booster Pump

For about five months now, the 4926th Test Squadron (Sampling) has been operating B-57B aircraft in the Pacific Proving Ground.

The nature of the primary mission makes it necessary to fly with light fuel loads in order to reach maximum altitudes. Upon completion of the mission, the pilot must return to base as rapidly as is consistent with safety. This results in maximum performance descents during which the fuel collects in the forward portion of the tank. In two instances, single engine flameouts occurred and it was determined in both cases that the forward boost pump had failed. In the first instance, a re-light was successful but not so in the second.

During this time there'd been three booster pump failures in the No. 1 fuselage fuel tank. There are two booster pumps in the tank and the failure of one will not adversely affect normal operation, a condition which except for conscientious post and preflight inspections, could go unnoticed.

If the forward pump is inoperative with the aircraft in a steep desecent configuration and relatively low on fuel, there will be a reduction of fuel pressure and one or both engines may flame out.

To preclude the possibility of taking off with one booster pump inoperative, the Squadron has established an SOP which requires the pilot to turn off one pump at a time during runup, by means of the circuit breakers. If the low pressure warning light comes on during this operation, one of the pumps is not functioning properly even though it may be operating. This procedure is called for on engineering test flights but we have found a need to use it more frequently. Perhaps other Squadrons could benefit by doing the same.

1st Lt M. D. Kimball, Jr.
FSO 4926th Test Sq (S)
APO 187 San Francisco

Sounds simple enough. The extra minutes spent in preflight checking may save some of those "stark moments" later.

★ ★ ★

Handy rack attached to F-100 ladder offers convenient, safe place for stowing flight gear, while making the preflight rounds or while grabbing a cup of coffee before filling out the old '175. Gimmick was dreamed up in the Fighter Test Branch, at Wright-Patterson.

Clearance

Major Dawson's "Jet Age Delinquents," in the June issue of FLYING SAFETY, glossed lightly over the fact that "the pilot received a very complicated and detailed clearance involving four radio fixes, a route other than the one he had planned and so on."

We harp on "Plan Your Flight—Then Fly Your Plan!" But this is only lip service to flying safety, as the above clearance clearly illustrates. A "very complicated and detailed clearance" is not as *safe* a clearance, obviously, as the one the pilot PLANNED and FILED. Certainly I do not expect to be cleared "flight planned route" every time, but I insist that ATC ought to pay far more attention to the expressed desire of a pilot to be cleared as planned.

I do not like to make dogmatic decisions based upon insufficient evidence, but, with only the "facts" presented by Dawson, I believe a strong case exists here for a secondary cause factor—a gobbledegookish clearance change after takeoff.

Maj. Dale S. Jeffers
Chief, Prime Ops Ofc, Fld Svcs
Directorate, Maint. Engineering
Warner Robins AMA.

True, perhaps. But recognizing that changes occur and may be expected, it's best to plan for the unexpected too—just in case.

★ ★ ★

Down Thru The Centuries

. . . We would appreciate very much receiving 650 copies of the May 1958 issue for distribution to the various CAA operational facilities. We believe this would be good reading material for all operational personnel.

We will then distribute one copy to each center, tower, RAPCON, Air Traffic Communications Station and International Air Traffic Communications Station.

R. E. Sturtevant
Chief, Operations Division
Civil Aeronautics Administration
Washington 25, D. C.

We're looking over the reprint budget now. Anybody else?

★ ★ ★

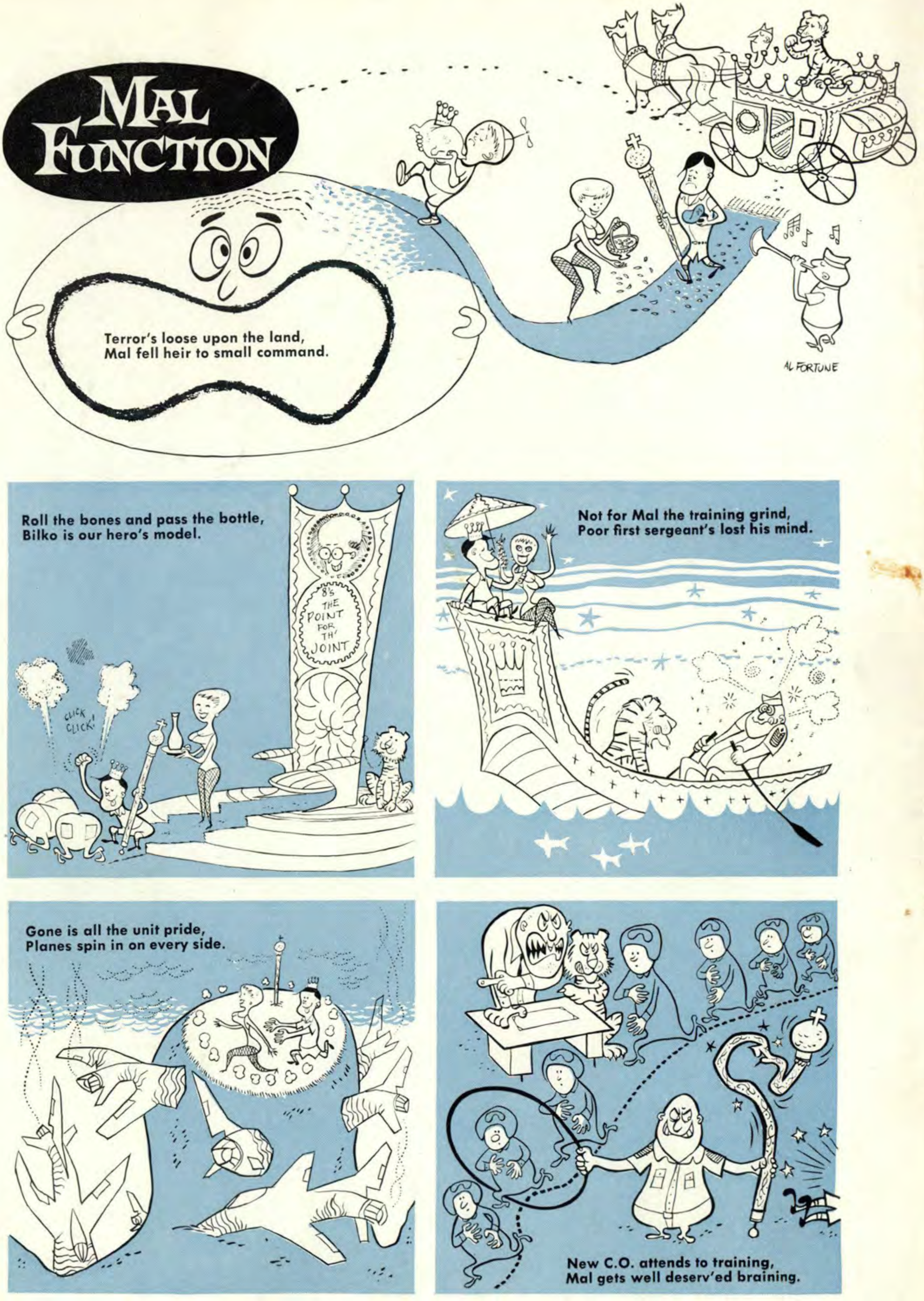
Century Series

I've enjoyed the Century Series Landing articles tremendously, especially since we at North American have been trying to sell the "flat power approach" for over two years. Unfortunately, we did not make much headway until our F-100 Landing Demonstration Team toured each F-100 base and demonstrated the "flat power approach," and now this timely issue (May 1958) comes along to back up our demonstrations. Bravo!

My pilots read FLYING SAFETY enthusiastically from cover to cover.

Bob Baker
Chief Engineering Test Pilot
North American Aviation
Los Angeles Division.

Looking for something? It's all right here, and it's yours for the taking—But like most things of real and lasting value, it doesn't all appear at first glance, nor does it come to you without some effort on your part. So it is with the material included in the pages of this issue. It can be revealing and of lasting value, if you use it in combination with your previous experience. Your safety is what you make it.


MAL FUNCTION
Terror's loose upon the land,
Mal fell heir to small command.
AL FORTUNE
Roll the bones and pass the bottle,
Bilko is our hero's model.
8's THE POINT FOR TH' JOINT
CLICK CLICK!
Not for Mal the training grind,
Poor first sergeant's lost his mind.
Gone is all the unit pride,
Planes spin in on every side.
New C.O. attends to training,
Mal gets well deserv'ed braining.