aerospace

SAFETY FEBRUARY 1976

UNITED STATES AIR FORCE FEBRUARY 1976

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

aerospace SAFETY

THE MISSION - - - - - - SAFELY!

SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

Safety In '76

When our aircraft accident figures are all compiled and the books are closed on 1975, many people will conclude that we had a good year. By comparison with 1974 and the past several years, we did; but when accidents cost the lives of 43 Air Force pilots and 221 other military people and more than $300 million in equipment destroyed, as they did in 1975, we can't spend much time congratulating ourselves. We can and must do better, but it will take the most professional and concentrated effort all of us can put forth.

There are many factors we must identify, isolate, and correct. They fall into two basic categories—people and hardware. Historically about 50 percent of our accidents are people-caused—either as the sole factor or as a contributor. These are not new cause factors. The large majority have been clearly recognized over the past 10-15 years. In fact, they have been talked about so consistently that they sound like trite phrases and entreatments rather than very real mistakes.

Aircrews in some cases were guilty of gross violations of discipline. Some just did a poor job of flying and others didn't follow established procedures.

Supervision caused or contributed to far too many accidents. We saw no new errors in supervision but, almost without exception, those that were made have been highlighted and talked about for as long as I have been flying.

Although it is nearly impossible to pin down the exact number of accidents caused or contributed to by maintenance, poor design or unresponsive modification programs, we know the number is significant, and that many of these problems have been with us for years. Now how do we attack them in 1976?

We have already begun to put together a long range, coordinated effort stressing safety research, human factors analysis, and evaluation and improvement of training.

A major goal is to improve our ability to identify and analyze past data, so that we can take action to prevent accidents rather than react to them. In doing this, we must be sure we are collecting the right data and making proper use of what we collect. We haven't done this adequately or very successfully in the past.

New systems frequently incorporate old problems. We hope to counter this by improving design criteria, so that we do not keep repeating the old mistakes, and by concentrating to a greater degree on system safety engineering.

Statistically we may have shown some improvement in the numbers of accidents during 1975; however, in terms of combat capability lost, which may be irretrievable in today's economy, we must do much better in 1976.

We must do the job right, from the ground up whether it be designing new hardware and weapons, scheduling our missile or aircrews, or performing the overhauls and unit maintenance required. Too frequently this past year we have seen the band-aid approach to problem solving. We need to identify root causes to our problems and correct these, perhaps to the exclusion of other more visible and appealing fixes.

I'm convinced we have more capable and dedicated people in the Air Force today than we have ever had. The challenge is here for all of us, whatever our level of assignment or area of endeavor. We must and can maintain an Air Force second to none —that is our goal this year at the Directorate of Aerospace Safety.

Richard E. Merkling

RICHARD E. MERKLING, Brig Gen, USAF
Director of Aerospace Safety

OPS

let there be light!

The KC-135 boom nozzle light failed in flight. Despite the fact that the lack of light limited his ability to see the area behind the receiver F-4's air refueling receptacles, the boom operator attempted to complete the air refueling. In the process, a combination of receiver movement and the boom operator's inability to see resulted in the loss of three upper TACAN antennas and damage to a fourth on the receiver F-4s.

F-111 fire warning control unit

The F-111 experienced a left fire warning light shortly after takeoff. The crew accomplished the proper checklist procedures and made an uneventful recovery. The fire warning light was caused by a faulty fire warning control unit. The top of the unit had been dented. This probably occurred when a crew member stored some gear under the seat.

a real surprise

The copilot of the C-5 was executing a planned breakaway maneuver after completion of air refueling. However, he inadvertently placed all four throttles in reverse instead of just the inboards. All four thrust reversers went into reverse without effort. The AC immediately placed the outboard throttles in the positive thrust range and all reversers retracted normally. Review of the maintenance data recorder shows that only nr 4 engine actually went into reverse. The cause was the failure of the reverse thrust lockout actuator.

right idea wrong button

As the O-2 pilot pulled off a marking pass he tried to contact the fighters. But he pushed the pickle button instead of the mike switch. The rocket impacted 5 "clicks" away, but luckily still on the range and caused little damage.

smoke screen

The T-37 IP had just completed starts on both engines when he saw the crew chief pointing to the right engine. When he looked over his shoulder, the IP saw greyish smoke in the nr 2 engine exhaust. He immediately shut down both engines. The smoke dissipated during shut down and maintenance could find no discrepancies. The aircraft subsequently flew without incident. Discussion with the pilot indicated that there had not been a large volume of smoke, but since he had never experienced smoke during start, he wisely elected to shut down the engines and let maintenance investigate. It is a characteristic of the T-37 engine that if an engine is shut down quickly from a relatively high power setting, insufficient scavenging of oil from nr 2 bearing can occur. If this oil does not completely burn away but pools in the engine there will be oil smoke during the subsequent engine start.

aircraft strobe lights

The general officer panel on midair collision potential has determined that aircraft strobe lights contribute significantly to the reduction of midair collision risk. The panel has directed AFSC to take immediate action to start development of strobe hardware specifications.

barriers and antennas

Barriers are still biting aircraft antennas. A VHF antenna was knocked off a C-141 by a bouncing cable.

TOPICS

big wind

The A-7 was returning to parking. The pilot saw an A-10 running up in an adjacent parking place. Thinking the A-10 was at idle, the A-7 pilot proceeded to taxi behind the A-10. Unfortunately the A-10 was at about 85%, and before the A-7 pilot could close his canopy it departed the aircraft. As a note, the A-10 ground crewman saw the A-7 too late to advise the A-10 pilot to reduce power.

"guard" means just that

An F-4 pilot was very embarrassed when he tried to land gear up. Many pilots have tried this trick. That's one of the reasons RSU officers check configuration. In this case, the RSU observer did check the configuration and directed a go-around three times on Guard. The pilot did not hear the Guard transmissions because earlier he had turned off his Guard receiver. Luckily, an alert controller in the tower made a transmission on the tower primary frequency and prevented the mishap.

overstress

As the F-101 raised the gear after a practice missed approach, the aircrew heard a loud sound. The gear indicated unsafe and this was confirmed by a tower fly-by. The crew used the emergency extension system and then made a successful landing. The nose gear attach and beam assemblies had failed. This failure is possibly the result of overstress from exceeding gear limit speed on previous flights.

hazard reports

A USAF aircrew flying in the Mid East received clearance to descend which did not provide adequate clearance. The crew recognized the erroneous clearance and there was no problem. However, the crew waited almost a month to report the hazard. This delay unnecessarily endangered other aircraft and precluded any realistic investigation or corrective action. If you are involved in a mishap that should be reported as a hazard, do it as soon as possible. You might prevent an accident!

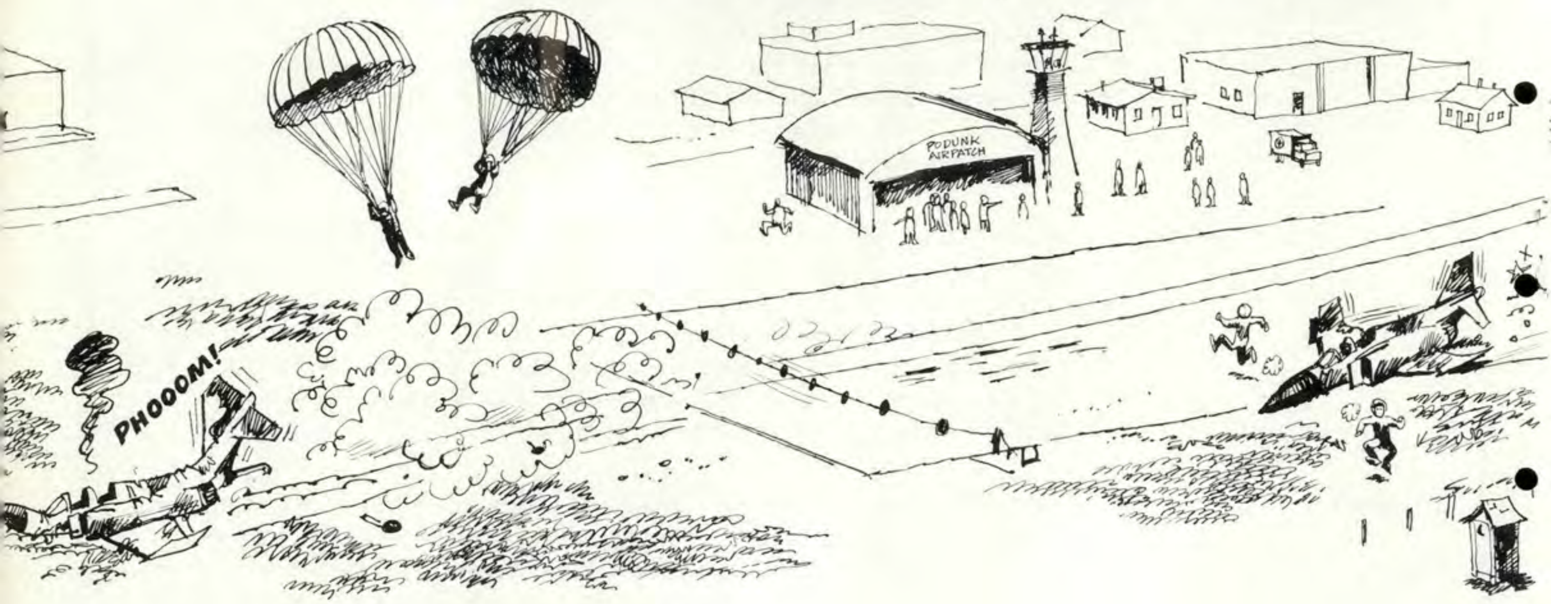
ARTC

The FAA has introduced a system which will alert controllers to potential conflicts between aircraft above 18,000 feet. The computer program projects what the flight paths of aircraft will be in the next two minutes. When these projected flight paths exceed the required horizontal or vertical separation minimums the data tags on the display begin blinking, alerting the controller to the possibility of conflict. This system is operational in 20 of the centers in the CONUS.

F-4 double generator failure

Right after lift-off the F-4 yawed and the DC bus light came on. The crew accomplished the emergency checklist for double generator failure. Another F-4 joined on the emergency aircraft and led it to a straight-in final for a successful approach end engagement. Maintenance found the electrical test receptacle cap under the right canopy sill in the rear cockpit was loose. When this cap was properly tightened both generators functioned perfectly. This unit has submitted an AF Form 847 to include checking the test receptacle cap security in the double generator failure checklist. ★

LANDING...

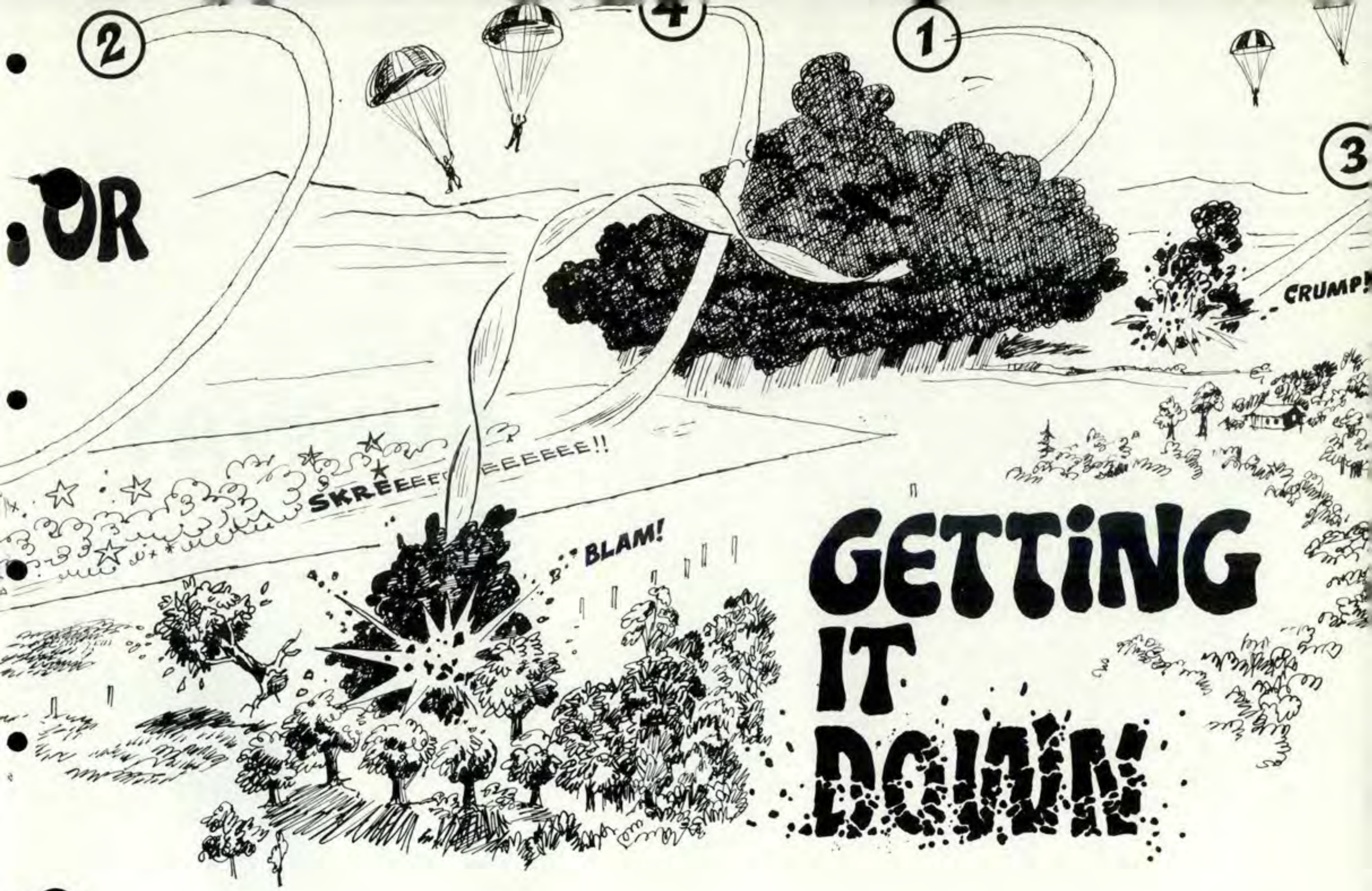


LT COL JOHN P. HEFFERNAN, Directorate of Aerospace Safety

Most pilots are good at getting it up but when it comes to getting it down, landing that is, it seems we're still on the learning curve. Space won't permit a reiteration of the errors we've made in all types of flying machines; so, since the fox four fleet is a large one, let's pick on it and contemplate some of the things which have happened to others but "will never happen to us."

(1) The aircraft was returning to base after a night range mission with weather reported as 500 and 2 with light snow showers and fog. The first PAR approach resulted in a go-around near decision height, and the second PAR, with weather at 400 and 2, ceiling ragged, resulted in another missed approach. Had enough? The pilot elected, with the concurrence of the SOF and DCO, to try again before diverting to an alternate. The third approach was normal until 2.5 miles on final, when glide path deviations became significant. The GCA controller directed a missed approach; however, the aircraft struck the trees and the crew ejected safely.

(2) Lead and his wingman had split up after their gunnery mission. Lead had returned to base and was in the GCA pattern when the runway was closed for emergency barrier engagement. The wingman heard of the emergency and diverted to a nearby base. Lead stayed with GCA and attempted to determine the runway condition. Fourteen minutes later, with his fuel below divert minimums, lead diverted. He took the long route to jettison his tanks, and acquired his divert runway at 8 miles with about 1000 pounds remaining. The approach was a steep, descending turn downwind to prevailing traffic. The landing was hot and touchdown was 7000 feet down the runway. The aircraft passed over the barrier before the hook could deploy, and departed the end of the runway at approximately 180 knots. The crew ejected safely.



(3) During a local theater orientation mission, the pilot was cleared for a TACAN approach which included an altimeter setting departing FL 180. However, the approach contained flight level restrictions which delayed resetting of the altimeter. Radio problems were encountered, but clearance to FL 040 was obtained and contact with local radar was accomplished. The arrival controller did not give an altimeter setting and the pilot did not ask for one. The approach was continued with 29.92 set in, instead of the actual setting of 29.52. Gear check was accomplished, and 35 seconds after departing the FAF, the aircraft crashed in an open field at a normal rate of descent. Again, the crew ejected safely.

(4) The pilot, on a day ferry flight to home base, was cleared for a TACAN penetration and approach, and contact was established about 8 miles out on final. The landing clearance was given at 5 miles; the approach was continued to a smooth touchdown without gear or flaps. It slid about 5000 feet. The crew egressed safely.

These are but a few examples which point out there is more than one way to get down. All the aircrews escaped injury, and three of them ejected at ground level. Whether you have the luxury of riding a hot seat or not, it would seem rational to consider how you come back to mother earth. The first step in the "How To Get It Down" checklist is PLANNING. Try it—you'll like it. ★

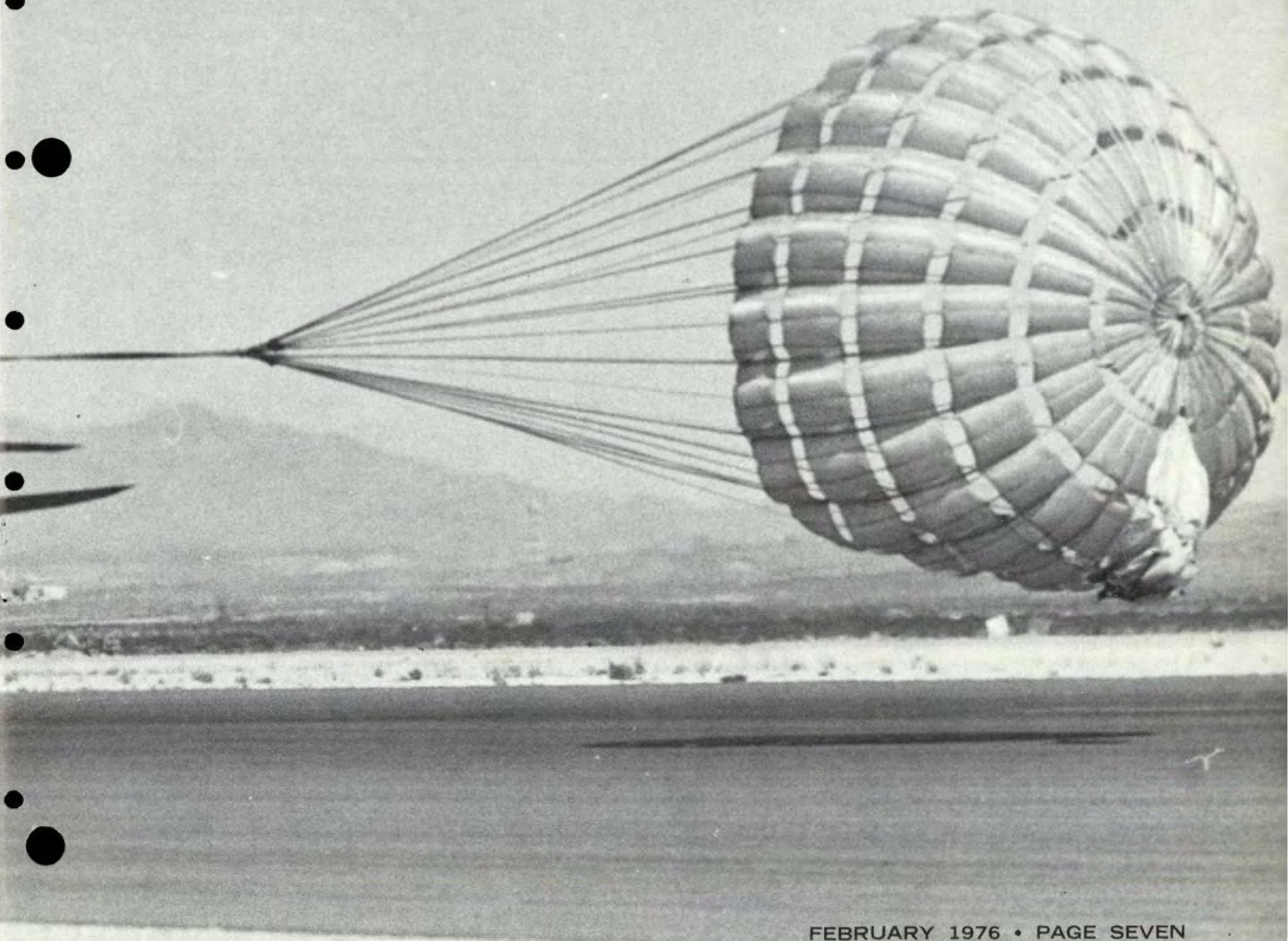
STOPPING/ ON THE RUNWAY

CAPT GARY A. VOELLGER
523d Tactical Fighter Squadron
Cannon AFB, New Mexico

Most aircrew emergency training emphasizes the idea of "getting it safely on the ground" when things go wrong in flight. I could hardly dispute this concept, but I sometimes think we don't pay enough attention to what happens between landing and the time the aircraft is stopped. Inflight emergencies such as those involving single engine approaches and no flap configurations or BLC malfunctions traditionally dictate greater than normal approach and landing speeds. Volumes have been written on aircraft approach and landing techniques, and aircraft flight manuals generally devote considerable verbiage to this stage of flight. In contrast, the intimately related and equally critical aircraft braking phase is often given cursory coverage, usually by reference to a multi-lined chart hidden somewhere in the aircraft limitations or performance data sections. But let's face it, safely stopping a 150- to 200-knot tricycle on a skinny strip of runway is a full blown emergency by itself.

Having been on that ride a time or two myself, I was prompted to do some research into the problem. For the sake of brevity, there are many factors involved in high speed braking that won't be addressed here. However, I would be remiss to entirely neglect mention of them, so to stimulate your thinking in this area, here are a few of the more important ones: rubber deposits on the runway, residual lift after touchdown, antiskid system effectiveness, tire condition, runway condition, gradient and RCR. A comprehensive explanation of all the contributing factors in high speed braking would require a book rather than a magazine article. Therefore, I have selected what I consider the key fac-

continued



tor to the whole problem, *kinetic energy* and its dissipation.

In mathematical terms kinetic energy, in foot pounds, equals one-half the mass times the velocity squared ($KE = \frac{1}{2}MV^2$). Since the mass (weight of the aircraft) remains relatively constant, the variable we deal with during landing is velocity (V) or the aircraft speed. To graphically explain the effects of kinetic energy I have taken a model landing and broken it down to show the dissipation of kinetic energy vs. the dissipation of groundspeed.

At point A the aircraft touches down, and both groundspeed and kinetic energy are at 100% values.

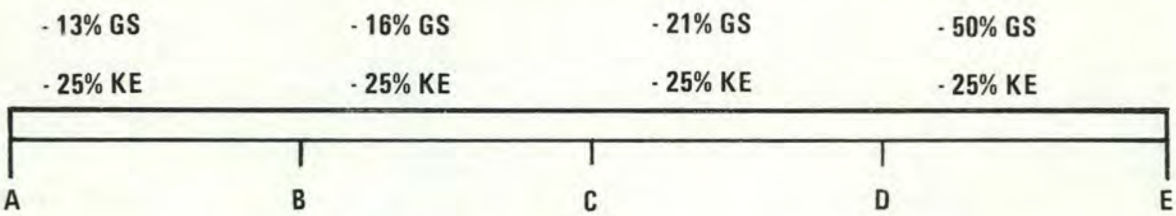


CHART 1

At point B, 25% of the kinetic energy has been dissipated, however 87% of the groundspeed still remains. At point C we have dissipated 50% of the kinetic energy and only 29% of the groundspeed. Finally at point E we have completed our full stop, 100% of both kinetic energy and groundspeed have been expended. What does all of this theory mean to you the pilot?

Well, as the graph illustrates to even the most casual of observers, kinetic energy is dissipated at a somewhat constant ratio. In contrast, groundspeed dissipates exponentially. In layman's terms, this means that high speed, initial attempts to brake have little effect on groundspeed. But then as groundspeed begins to decay, it does so at an increasing rate. You might say: "The slower you get, the faster you get slower." The statement is grammatically confusing but it pretty much sums up the theory behind kinetic energy.

Because of this phenomenon, the landing roll can be highly deceptive. During the initial stages of an abnormally high speed landing roll, the runway markers flash by at a seemingly steady rate, the groundspeed remains nearly constant and one begins to feel as though he is executing an 8000 foot landing roll on a 7000 foot runway. This is the point when many of us might panic, stomp on the binders and burn up the brakes or blow a tire. Why? Because of kinetic energy. All of that stored energy has to be spent on some form, usually as heat.

The amount of energy required to just barely sense the deceleration of a 40,000 pound aircraft at 140 knots (i.e, "I just checked the brakes to see if they would work) is more than that required to slow the aircraft from 55 knots to a full stop. Where does that put you and me during a high speed landing roll? You're right, in the proverbial "high profile spotlight" unless it is handled properly. To do that I would suggest a few tips:

1. CHECK THE CHARTS—Even if you can't do it in the aircraft, get the SOF or RSO to look at the dash one charts and find out how much of a landing roll you'll need (don't assume perfect conditions). Then check the brake energy charts for the airspeed at which you can start braking for your specific gross weight. As an editorial tip, it's a good idea to be generally familiar with this chart all the time.
2. LAND ON SPEED—Remember that the landing roll energy is increased by the square of the velocity.
3. USE ALL OF THE RUNWAY—Particularly the first part. You can't begin stopping until you are firmly on the ground.
4. KNOW WHAT TO EXPECT—Realize how and where the kinetic energy dissipates. Remember that the groundspeed intially dissipates very slowly and then at an ever increasing rate.
5. DON'T FORGET THE BARRIER—Don't be so engrossed in stopping that you neglect the barrier as an alternative braking device. It's one heck of a lot better to be explaining how you ended up in the barrier than explaining why you ran off the runway. The only thing worse than not knowing what to do is knowing what to do and letting pride prevent you from doing it. STOP SAFE!!! ★

The number of USAF aircraft which are fully equipped for carrying passengers has been steadily declining for several years. As a result, most of our mass nontactical personnel moves are handled by contract carriers. However, our support flights still sustain a significant volume of passenger traffic and our cargo/tanker fleets double as personnel carriers when required. As opposed to our sophisticated C/VC-types, these aircraft do not have passenger address systems, equipment information cards in the seatback packet, or passenger-oriented emergency equipment.

The larger planes generally have a loadmaster or other crewman dedicated to passenger care; but in the small birds, the service available may be limited to a flight mech who loads bags, hands out box lunches, and checks seat belts. For experienced passengers, and under normal circumstances, this may be sufficient; but at the onset of an emergency, the passengers' needs multiply rapidly.

Passengers seldom remember even the cardinal points in the preflight briefing, and experience has shown that persons under stress may not comply with instructions without direct, forceful language or physical urging. This was again confirmed in a recent incident involving a commercial aircraft on a military charter flight.

A brake fire during ground operation resulted in an order to evacuate. In spite of instructions given in the briefing and repeated over the PA system as the evacuation was being carried out, some passengers failed to use only the primary exit evacuation slides and were injured when they attempted to egress through overwing exits. In a more serious situation, this could have been fatal.

PASSENGER ASSISTANCE IN EMERGENCIES

LT COL ROBERT J. BRUN, Directorate of Aerospace Safety

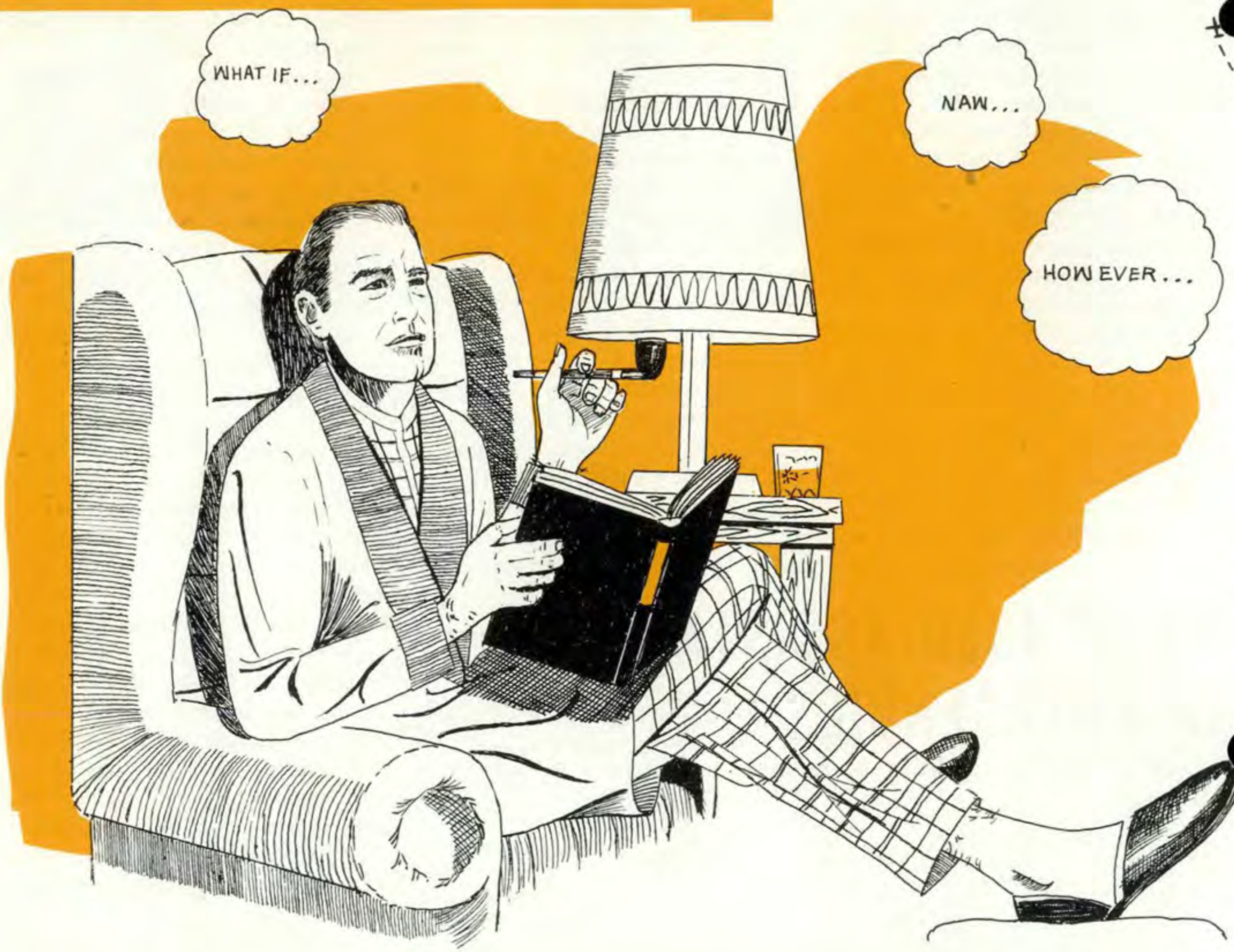
In another large aircraft mishap, the sudden loss of cabin pressure created a seemingly low stress requirement to use the passenger oxygen system. A postflight review of the passengers' reactions revealed that less than 5 percent of them knew how to use their masks, and some of these did not fully understand how to start and maintain oxygen flow once they had the mask in place.

These experiences should serve as a warning to aircrews and their supervisors that an aircraft emergency involving passengers creates an immediate demand for supervision and assistance. Gaining confidence and establishing control are among the initial problems an aircrew member faces, and it is hard to project confidence when you are unsure of your own ability to cope with the situation. In short, you must know what to do and do it right the first time. A strong positive aircrew reaction to an emergency can be the key factor in preventing panic and establishing passenger confidence.

While passenger confidence is built on trust, aircrew confidence is built on knowledge. Here is where the challenge to crew members and supervisors comes into play. Our aircrew training and qualification standards have to meet and exceed anticipated emergency situations. This is where the outcome of passenger-related emergencies is decided. Even though passenger supervision and assistance may be a secondary duty for some aircrew positions, the passengers' lives are literally in their hands when an emergency arises. Individual aircrew members, their evaluators and supervisors have a solemn obligation to insure they are the most skillful and dedicated hands that can be provided. ★

HANGAR FLYING

MAJOR JOHN R. SPEY
475 ABW
APO San Francisco



Twenty years ago if we pranged a bird it could cost our life and a few hundred thousand dollars. Today the dollar cost of an accident is staggering, apart from the tragic loss of life. What's the answer?

Our leadership has endorsed and encouraged safety, stan-eval and training programs. These programs have had a positive effect but still we have accidents. Today there is less flying time for you and me. As a result there is less time available for our flying proficiency. The fuel crises, inflation and budget cuts have seen to this. Given the circumstances of fewer hours, younger pilots and the unchanged (and still demanding) flying environment, the accident rate could get worse.

The solution for achieving a lower accident rate rests somewhere and that is with you and me.

Did you ever see a bird have an accident? Can you remember seeing a bird land on a tree limb "gear up?" Did you ever see him land short or have a midair with a buddy?

A bird is born into the flying game. He solos early in life and the sky is his environment, his home. On occasion he'll ram an unseen window, a speeding automobile or an airplane. But given his natural environment, his accident rate per flying hour must be regarded as pretty remarkable. He survives a darting dash through a dense bamboo thicket and flies flawless formation in unforgettable flocks. In poor weather, low VIS and VFR, without instruments, doppler or inertial, he gets his job done. His environment is always hostile. He must constantly be on the alert for bandits ready to bounce him even while in the chocks. In spite of all these problems, his performance as an aviator is inspiring and led man to join him.

Since our fledgling days at Kitty Hawk, we as pilots have attempted to leave our natural environment and join the eagles; most have been successful, but many have

failed. If we pilots are to adapt to the sky and survive, we must aspire to be an eagle; a true aviator.

Ancient Polynesians, with a highly trained sense of observation sailed across seemingless endless ocean to make landfall without aid of compass, sextant, or chart. Those skippers were *totally involved* in their problem; their minds completely tuned to the mission. Anything less could and often did result in disaster.

How many times is our preflight planning performed to fill the squares? Our mental effort directed toward the administrative process, toward making sure the system is satisfied. What we may fail to do is to quietly, personally digest the data, scramble it with our mission and "day dream" the flight.

Day dream, you say! Yes, day dream. Think the flight through alone—at home—quietly; just you. Give it a complete mental review. So much for the normal mission. Now give yourself an unusual occurrence. What was your solution? Create an emergency situation. Solve it mentally and critique yourself. Don't worry if your first reaction was not the best; nobody is listening. This process is just between you, the pilot, and you, the aspiring eagle. Was the corrective action appropriate for the circumstances created? If not, think it through again.

The process of mental "Hangar Flying"; mentally preflying a sortie, complete with emergencies, can sharpen our knowledge. Getting mentally involved in flying, doing our own personal "Hangar Flying" and giving ourselves a private Stan-Board is one way to stretch the shrinking flying hour and gain experience.

We have all marveled at the calmness of the "old head" who, while in the pitch, calmly advises the tower he's flamed out and has a fire light, and requests permission to land, with the same everyday tone and tempo he might use praising his daughter at home. He's been there before and it's no surprise. He is mentally involved and prepared.

Several years ago, while in my apartment, I "daydreamed" a sortie to be flown the following day. I created a situation where both engines were damaged while on a low level mission. I mentally took the best action under the circumstances, all in the quiet of my living room. The following morning the totally unexpected happened. At 100 feet above the ground the right engine suddenly stopped from a lucky AK-47 round; 15 seconds later the left engine received a dose of the same. Total mental chaos? Not quite!

My action, previously rehearsed, exploded from my subconscious and permitted me to convert near disaster into a happy ending. When I think back on that and other incidents, I'm convinced there would have been chaos in my mind and my cockpit, and emergencies encountered then and since would not have been handled as satisfactorily without prior rehearsal at home or privately in my own "hangar."

Flying safely is everyone's job but in the final judgment it is ours. We long to join the eagles but in so doing, we leave our environment for their's and we'd better be prepared. "Hangar Flying" is one aid. ★

ABOUT THE AUTHOR

Major Spey enlisted in the Air Force in 1956, attended A & E school and served as a mechanic for two years prior to entering the aviation cadet program. Since graduation from pilot training he has acquired 6700 flying hours, including 3500 hours IP time and 1100 combat hours. Most of his experience has been in the C-123 and he spent 3½ years with the Ranch Hands flying defoliation missions.

MAJOR THOMAS R. ALLOCCA
Directorate of
Aerospace Safety

HE HIT A WHAT?

". . . The right main landing gear struck a highway 'YIELD' sign. . . ."

In the 1920s when the Waldo Pepper types were terrorizing the countryside as they flew down main street between the old general store and the town post office, accident narratives like this were fairly common. So, if you guessed that the opening statement was extracted from an accident report narrative, circa 1924, you could not be accused of making a bad guess. But, this highway "yield" sign was not struck in 1924—it was hit in 1975!

The accident sequence states, in what has to be the understatement of the year, ". . . he flew a shallow approach which failed to provide obstruction clearance. . . ."

The point of all this rhetoric is not to indict some poor chap, who, like many of us, may have suffered a momentary lapse of judgment and had to suffer the inevitable consequences; no, the point is that we have to be aware of the all-too-human tendencies to occasionally fracture the rules and disregard due caution. And each of you concerned with flying safety—commanders, crew members, flying safety officers, crew chiefs; in short, everyone—must be aware of this tendency and its concomitant result—that occasional lapses of judgment are going to come up and bite you on the ______!

Is this an isolated incident?

Tree branches are not recommended for engine inlets.

Did I extract this mishap narrative from the thousands in our files and portray it as representative? Read on.

". . . Upon return from a crew training mission, an enroute penetration was made followed by radar vectors for a visual approach and landing. The pilot turned base leg at approximately 4 miles at a VFR pattern altitude of 1400 feet MSL and rolled wings level on final approach at 900 feet MSL. He said that he discontinued the approach when he encountered a rain shower on final. Postflight investigation revealed that tree branches were in the engine inlets. . . ."

And on . . . ". . . Bull 18, returning from a local continuation training mission, began the pilot proficiency portion of the mission after a full-stop, taxi-back landing. After the first approach, Bull 18 advised Metro that some local fog was moving in which might affect airfield visibility. Advisories were issued that fog obscuration would affect approximately one-half of the 12,000 feet of runway 06. Bull 18 requested radar vectors to a visual approach for 06. During the approach, the aircraft descended to the point where trees were struck 3 miles from the runway . . ."

And on . . . ". . . Seth 84 was on a return flight for a passenger pickup. The airfield weather was deteriorating with scattered to broken clouds at 1500 feet and visibility of 5 miles in haze. A Tacan straight-in approach was flown because GCA was inoperative. One and one-half miles from the end of the runway, the pilot noticed that the aircraft was getting low—the tree-tops were illuminated; power was added and a climb initiated. Postflight analysis revealed that some slat damage resulted when the aircraft struck the top of a tree. . . ."

Okay, you have had enough. But think. In the short span of 23 days, we had 5 separate incidents involving aircraft hitting trees, yield signs and other such foolishness. Fortunately we lost neither crew members or aircraft; but it requires little imagination to develop a scenario wherein any one (if not all) of these mishaps could have resulted in a tragic accident. So we have been lucky.

What caused these incidents? It is difficult to point to one cause common to every mishap, but this "type of finding" crops up in every instance: "A Command regulation specifying that an approach should be flown to position the aircraft 50 feet over the runway threshold *was not complied with.*" or "A VFR approach was flown to an airfield reported to be below weather minimums in violation of AFR 60-16."

The antics of the Waldo Peppers and the excesses of which they were guilty fostered upon modern aviators the stream of regulations with which we now live. These directives, conceived by aviators far more perceptive than you and I, are designed to make us fly safer—and live longer. Can we afford *not* to follow them? Hardly!

In the 1920s, airplane costs were measured in the hundreds of dollars; in the 1970s, the costs are many times as great. In the 1920s, the "barnstorming" approach to airmanship may have been condoned; in 1975, it's intolerable. ★

The only comment for this is "Lucky Pierre!"

From Whence We Came

BIGGS FIELD, TEXAS

CIRCA 1920-22

Biggs Field, a part of Ft Bliss, in El Paso, Texas, during the early 1920s was the home of the intrepid flyers of the 12th Observation Squadron and their Curtiss "Jennies" and DH's. Created during World War I, this rough and tumble outfit was one of a handful of units engaged in military flying during the lean years following the war. Its rolls were rich with the spirit of flying pioneers that helped form today's Air Force.

We are interested in presenting an ongoing pictorial documentation of the history From Whence We Came. We were fortunate to get these shots of that bygone time from a man who was actually there. We hope that you, too, may have some knowledge of historically interesting photos of other times and places and will contact us. All photographs would be carefully handled and returned to sender after use. Please call AUTOVON 876-2432 or write AFISC/SEDA, Norton AFB CA 92409.

The officers and pilots of the 12th Observation Squadron a varied array of uniforms.

The CO of the 12th Observation Squadron, Major He proudly accompanied General John J. ("Black Jack") Persh an inspection of his troops. Note the full field packs men. They were still a part of the Army and expec able to shoulder a rifle, march, and live in the field.

In an early version of AF open house they conducted a race between two wingless aircraft, the Spark Plug and the Damfino (dam-if-I-no). It is reported that there was heavy betting among the spectators and some hard feelings when the leading aircraft, Damfino, tried to take off and skip along the ground, thereby blowing the victory. Knuckle sandwiches were traded off behind the hangars as the wagers were settled.

During the open house 1st Lt Claire Chennault, disguised as a little old lady, took an "aeroplane" ride. The watching crowd was horrified when the plane flew by inverted and Chennault threw out a dummy from his open cockpit.

pose before one of their fragile craft, a Curtiss JN-4 "Jennie", in

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'Nuff said.

With mountains to the north, east, and west it became common practice for "lost" pilots from Biggs Field to fly south across the border into Mexico. There they would land and seek help from friendly natives.

Brig Gen Billy Mitchell (left) visited Biggs Field often during the period after World War I. Later he was to achieve immortality through his prophetic insight and dogged pursuit of the advantages of air power. Because of command resistance, which led to his demotion to colonel in 1925, he pressed for his own court martial to gain public attention. Convicted, he retired and fought for his beliefs until his death in 1936, scant years before they were amply proven in the skies of WW II. For his sacrifices, in 1942 Congress awarded him a special medal of honor but, contrary to popular belief, he was never posthumously promoted to major general. As late as 1957 Secretary of the Air Force Douglas concurred in the findings of the court martial. On USAF rolls he remains to this day a retired colonel.

The field exercises held for one month each year made the spartan Biggs Field seem like living at the Ritz.

Almost every kind of aerial activity visited the field during these years. Blimps were viewed as a promising area of research. The building at right housed the mess hall where they served spaghetti by the mile.

In windy West Texas, handling blimps was often a matter of luck and manpower above skill. This blimp was later destroyed when it brushed against a building and caught fire.

Between WW I and WW II the flying corps and the cavalry were both considered to be elite services. There was a curious contrast during this brief overlap period as the horse was passing into history and pilots were beginning their reach for the stars.

Those were the days of trial and error flying. Even so, this (right) was stretching it a bit far.

"Old Leatherface," in leather hat and jacket, Gen Claire Chennault of WW II Flying Tiger fame shares an earlier day as a 1st Lt with his fellow pilots of the 12th O.S. The dogs were a common item at Biggs Field where almost everyone had one.

There were no more valuable men to the pilots of the 12th than the stalwart mechanics who kept their craft in flying condition (some things have never changed). These are a few of that hardy breed leaning on their gasoline truck.

A TRACE OF DISASTER

LT COL ROBERT J. BRUN
Directorate of Aerospace Safety

Details released by the National Transportation Safety Board on two winter takeoff accidents illustrate how dangerous "a little bit" of frozen precipitation can be.

In the first example, the aircraft was a light four-place single engine recip. The pilot's attempted takeoff with two passengers ended in a plowed field 700 feet past the field boundary. Results of the investigation indicated the plane rolled the full length of the runway before becoming airborne, climbed about 20 feet, then stalled and crashed. Fortunately all of the occupants survived.

Two hours after the accident, investigators inspected the wreckage and found the upper wing surface completely covered with a jagged layer of ice up to half an inch thick. The ailerons and empennage control surfaces were partially covered to an equal degree. In his post-accident interview, the pilot stated that he noted ice and snow on the aircraft during the preflight but did not do anything about it since he had taken off "lots of times" with ice on the wings

The second accident involved a twin jet similar to our T-39, with an air transport pilot at the controls and a copilot plus seven passengers rounding out the list of occupants. The pilot called for taxi clearance at 1645 and was advised to expect a 20 minute delay. They were cleared to taxi at 1750 and the takeoff roll began at 1805. An excerpt from the weather at that time period including "indefinite ceiling, visibility one-fourth mile in snow showers, temperature 33 degrees." Part of the delay was spent on the ramp during which the pilot said he deplaned and brushed off some of the snow which was accumulating on the aircraft. He emphasized that it was not sticking to the metal. A ramp area witness reported there was more than an inch of wet snow on the aircraft as it passed his position.

The pilot reported the takeoff was normal until he began to rotate, and the aircraft did not feel right so he aborted. Failure of the drag chute and snow on the runway resulted in an abort distance which exceeded the runway available. The excesses included a light fixture that marked the end of the paved surface, the field boundary fence, and a 1,000-foot divot in the golf course which adjoined the airport. Once again the good earth bordering the runway was instrumental in preventing serious injuries.

In their summary, the Board pointed out that despite the difference in equipment, pilot qualifications and experience, these two accidents shared the same basic cause—an accumulation of ice and snow on the aircraft which was not removed prior to commencing takeoff. Also cited was the statistical record of the 1970 through 1974 takeoff accidents involving airframe icing. There were 58 such mishaps, and they accounted for 62 personnel injuries and 27 fatalities. The 12 persons involved in the accidents described above came closer than they realize to joining these lists in the latter category.

Winter operations require some special safety precautions. Among these a careful preflight should be a primary consideration. The Board issued some advice and a warning to cover this situation: "It is an aerodynamic fact-of-life that adherence of ice or snow to an aircraft can change the lift and drag values to a point where it can impair controllability and even make it impossible to obtain or maintain flying speed . . . and such accumulation should be considered a no-go item."

Remove the snow before you go! ★

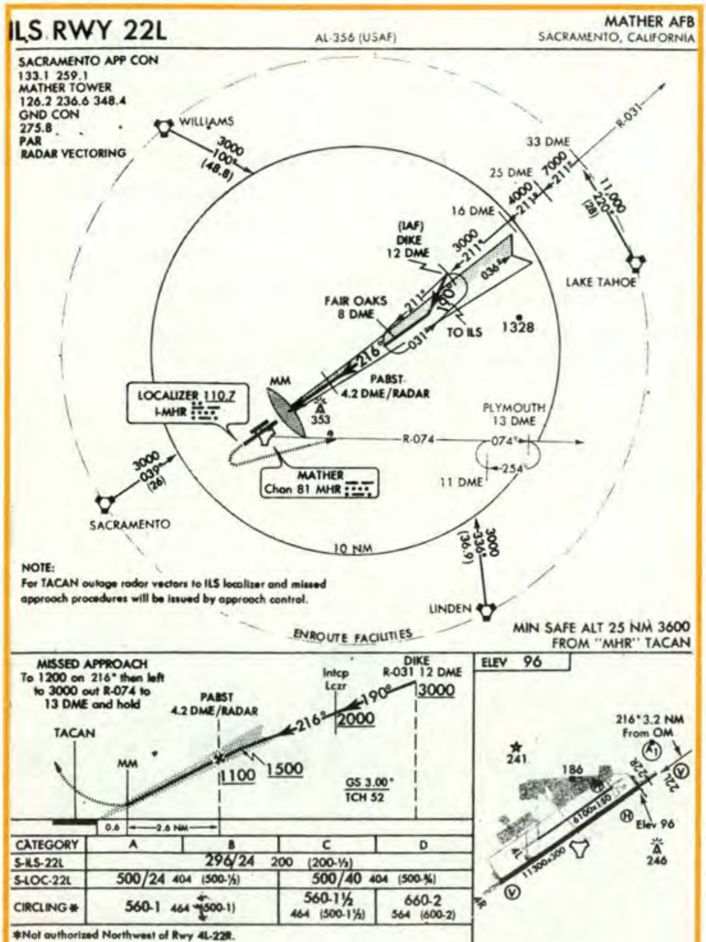
THE IFC APPROACH

ILS OUTER MARKERS

An old NAVAID is slowly but surely fading away. The Air Force has directed, where possible, the decommissioning of outer markers as a cost reduction measure. Locations which have the capability to provide a radar and DME fixing capability at the final approach fix, are phasing out their outer markers.

What effect will this have on flying instrument approaches? Either radar or DME will be required to locate the final approach fix (FAF). For those aircraft without DME, air traffic control radar will inform the pilot when the aircraft is over the FAF. However, if radar is the only available means to identify the FAF, use radar only procedures and file an alternate. An example of this type of approach is depicted on the instrument approach procedure chart shown in Figure 1.

FIGURE 1



CATEGORY	A	B	C	D
S-ILS-22L	296/24 200 (200-½)			
S-LOC-22L	500/24 404 (500-½)		500/40 404 (500-¾)	
CIRCLING*	560-1 464 (500-1)		560-1½ 464 (500-1½)	660-2 564 (600-2)

*Not authorized Northwest of Rwy 4L-22R.

LOC FAF to MAP 3.2 NM					
Knots	60	90	120	150	180
Min:Sec	3:12	2:08	1:36	1:17	1:04

MIDDLE MARKERS

Some confusion seems to exist as to the purpose of the middle marker on an ILS or localizer only approach. Normally, the middle marker is *not* used to identify minimums for either of these approaches. However, it may be used as an aid to alert a pilot that he is near decision height on an ILS.

The middle marker may also alert the pilot that he is at or approaching the localizer-only missed approach point (MAP). Compare the distance shown in the timing block to that shown in the profile view. In Figure 1, the localizer-only MAP is located 3.2 NM from the FAF. Looking at the profile view, you can see that 3.2 NM would place the aircraft 0.6 NM inside the middle marker and over the runway threshold. Timing is the primary means of locating the localizer-only MAP on this Mather approach. As mentioned earlier, a blinking marker beacon light is a good alert that you are nearly there.

The point to remember is that you must study an approach thoroughly prior to flying it. Never assume, just because a middle marker is shown, that it identifies the missed approach point.

FINAL APPROACH STEPDOWN FIXES

Q: May an aircraft without dual NAVAID receivers fly an approach which depicts a stepdown fix that is located inside the final approach fix when the fix is formed by a crossing radial from another facility? (Figure 2 is an example)

A: Yes, but descent below stepdown fix altitude is limited to aircraft capable of simultaneous reception of final approach guidance and the stepdown fix. An aircraft equipped with a single VOR receiver would not be able to descend below the stepdown fix altitude of 2000 feet at Kelly since that fix is formed by two VOR radials. To help alleviate this problem, many aerodromes have published radar stepdown fixes which are depicted in a manner similar to the Radar Final Approach fixes discussed earlier. Using approach control radar to identify the stepdown fix will enable aircraft equipped with a single NAVAID receiver to descend to the lowest published minimums. Remember that final approach course guidance must be continuously displayed after passing the final approach fix.

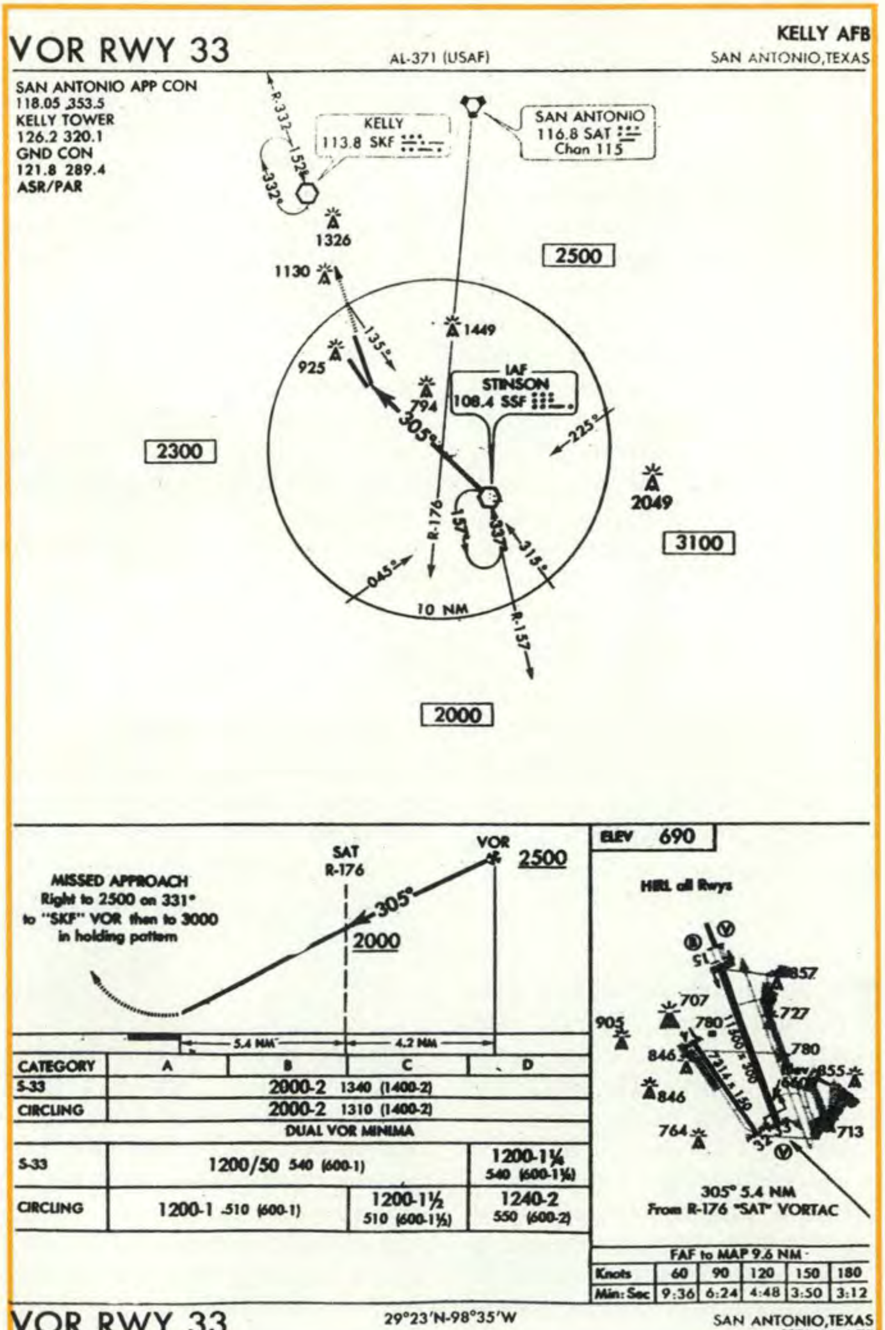


FIGURE 2

The USAF Instrument Flight Center encourages questions and suggestions regarding instrument flying. Comments from our readers are used to write "IFC Approach" articles and to clarify the various regulations affecting instrument flying. Call or write USAF Instrument Flight Center/FS, Randolph AFB TX 78148; AUTOVON 487-4276/4884. ★

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

# of heart attacks

ANCHARD F. ZELLER, PhD, Directorate of Aerospace Safety

A 55-year old pilot collapsed and died of a heart attack while flying on a check flight. Two more very short paragraphs of this obscure news release, buried in the body of the newspaper, indicated the individual was an airline pilot, that there were no passengers, and that the plane landed safely.

That's too bad you say, but so what?

That couldn't really happen to me, I'm an Air Force pilot. Maybe it could happen to some of the old guys, but I'm young, combat ready, just had my three-year physiological training and my annual physical. The worst thing I ever get is a little cold or maybe a slight stomach upset after an extended attitude readjustment session. No problem, right? —wrong. Just read on.

During a climb through 9500 feet, the student felt light headed and thought the aircraft was in a roll and diving. Actual attitude was wings level in a slight climb. The IP took control of the aircraft, declared an emergency, and landed safely. Post-flight medical examination showed that the student had infections in both middle ear canals.

Ah, you say, a student. Now don't insult me. Students aren't too bright you know. He probably had a little pain, hyperventilated, and got all shook up. Happens lots of times to students.—Well let's try again.

During the initial climb, the cabin pressure would not go above 1000 feet. Manual control was selected and cabin pressure increased to 5000 feet. The system was returned to normal and functioned as designed for the rest of the flight. Two hours later during descent, the navigator — the NAVIGATOR? — yes, the navigator, complained of having difficulty clearing his ears. The aircraft was passing 10,000 feet at the time. The pilot notified the controlling agency and slowed his descent. On the basis of communications with the flight surgeon, the aircraft was climbed from 3000 to 16,000 feet and the cabin pressurization was brought to 16,000 feet. Various positions and methods for clearing his ears were tried by the navigator as recommended by the flight surgeon. All were unsuccessful. Following a slow descent and landing, the navigator was evacuated to the dispensary. Examination indicated inflammation and fluid behind the left ear drum.

First an old airline pilot, then a student, and now a navigator. It doesn't seem to me your examples are very persuasive.

Well, read on. But let's deviate a little from colds for a minute.

The aircraft was nr two in a flight that was scrambled from an alert facility in response to a request for tactical air support. The WSO flew the aircraft most of the way to the tanker where the aircraft commander took control. His control was erratic and illogical. He attempted several rolls as if he were attempting to dive bomb. Each time the WSO assumed control before the maneuver became dangerous. The aircraft commander then called Lead saying, "The ball game is over." He initiated a dive from 20,000 feet which could have been fatal if the WSO had not again assumed control and pulled out at 4000 feet. From thereon, there was a battle to see who could control the aircraft with the aircraft commander making 3 or 4 more dives toward the ground. On the return toward base, the aircraft commander repeatedly stated his intention of landing on the runway "about five miles ahead." There was no runway. After an attempted gear-up landing, which the WSO aborted by again taking control of the aircraft, the gears and flaps were lowered and a successful landing made. After landing, the pilot was given a psychiatric examination. Not surprisingly, he was diagnosed as having had an acute schizophrenic reaction.

Poor guy, you say, he'd just been through too much. Shouldn't have been pushed so hard.

What about the WSO?

Well, what about him? Besides, we were talking about colds and things like that, not the stresses and strains of combat.

So, let's talk about colds some more.

The Nr three pilot in a flight of three on a day, low-level training, navigation mission, started a pullout from a 40-degree dive. The pullout appeared successful but in that attitude there was not enough altitude for recovery. The pilot ejected at about 150 feet. He and the seat struck the ground seven feet apart, 127 feet from the point

...and belly aches

(FOR PILOTS ONLY)

of aircraft impact. The parachute was approximately one-half open. The pilot was killed. His left glove and clip board were found with the aircraft canopy 150 feet before the impact point. The pilot had suffered from an upper respiratory infection for about 10 days prior to the accident. He was confined to bed for three days, treating himself with aspirin, an inhalant, and other medication. The autopsy indicated an inflamed and blood-filled middle ear and evidence of inflammation in the trachea and bronchus. The position of the left glove indicated that it had been removed prior to the crash, probably, to get his hand to the left ear or to valsalva to relieve a severe pain due to a middle ear block. The pilot was probably not in control of his aircraft for a period of 5 or 10 seconds and realized his precarious position too late.

Closer to home? The only difficulties you ever have are a little cold or a stomach ache? Let's talk about the stomach aches.

During the past 48 hours the student had had some symptoms of abdominal discomfort, with loose and more frequent bowel movements. He had not been acutely ill and his appetite had remained good. He had had three bowel movements in the 2½ hours prior to flight. Conditions were normal throughout the pattern work, but on the way to the work area, symptoms of increased abdominal pressure occurred passing through 19,000 feet. These were not relieved by belching or the M-1 maneuver. The student did, however, perform the spin prevention and two good spin recoveries. When the IP directed the student to return home, he got no response. The student was holding his hand to his stomach while the aircraft was descending in a shallow turn, apparently unnoticed. The student was unresponsive, appeared in pain, and was, in the opinion of the IP, incapacitated. The IP took the aircraft home. The student recovered uneventfully.

We're back to students and the dumb things they do, you say.

Come on now. Do we have to go through this whole thing again to get you to admit what you really know and, that is, that even you very skilled and experienced pilots take chances too?

OK, so you agree that sometimes you do stupid things, you still contend, however, that that example of the airline pilot was a little farfetched. Let's check.

While flying at 8000 feet, the center called out a target at 11 o'clock low to the pilot. The pilot, copilot, and flight mechanic looked in that direction. The flight mechanic spotted the other aircraft and pointed it out. The copilot acknowledged that he had seen it. When the pilot was asked why he had said nothing, he turned his head and raised his right hand. He appeared to be having a stroke. The other crew members were called forward and moved him to the back of the aircraft. Attempts to revive him were unsuccessful. An emergency was declared and the aircraft landed at the nearest suitable field. He was pronounced dead on arrival at the hospital. Cause: a coronary occlusion.

Fortunately, this was a multiple crew aircraft and the remaining members, reacting as they should, made it possible to document the cause. Sometimes this isn't the case. How many accidents in which the cause cannot be determined because of total disintegration or because the aircraft is lost over water are the result of some form of pilot incapacitation? No one knows for sure.

So you're shaken a little. Let's level with each other. Sure your chances of having a fatal heart attack aren't great. But, by your own admission, a few colds and an upset stomach, perhaps even a headache or two, aren't all that uncommon.

In these times when flight time is so hard to come by, it sure would be a shame to have to scrub a flight just because of a sniffle or pain in the belly. Maybe you could take the chances with a little self-medication (no reason to let the flight surgeon know) and make it. Thousands have—but some haven't. The cases cited, all real, are only a few of many, many examples. One shouldn't dwell on the morbid. It's not healthy. On the other hand, if you ignore the realities of experience, it really can happen to you too. ★

BUMBLE BiRD

MAJOR TONY HELBLING, JR.
Directorate of Aerospace Safety

Maybe we can learn from our "feathered flyers" when it comes to "crashology." Birds, like pilots have a learning curve! The average bird "graduate" approaches this survival plateau after one year. During this one-year period, a young bird must master at least three specific areas:

- Lookout Techniques (Check Six)
- Intercepts
- Advanced Maneuvering

A "graduate bird" can spot a fat bumblebee at R_{max}, positively identify him as a food source, calculate his vector, velocity and plot an instantaneous intercept with a break-away heading. A "smart bird" such as this one is usually a "big bird." A high skill probability (P_k) results in a proportionally high protein intake. We, here at the Safety Center have designated this large, smart graduate bird as "friendly." He is awarded an "Aircraft Avoidance" Diploma with a red, white and blue seal.

This seal certifies our "Wonderful Winged Warrior" as a friend of American airpower and encourages him to maintain this degree of proficiency so as not to degrade the combat capability of friendly forces through an inadvertent "BIRDSTRIKE."

On the serious side, there are a few things we have learned about birdstrikes: The birds who learn and survive the first year will probably never strike an aircraft. Some birds such as the red-tailed hawk reside in the vicinity of airdromes and are constantly in the pattern with fighters and jumbo jets. They know how to identify turbulence hazards and how not to intercept something larger than themselves (avoid collisions). They have a high exposure *and* higher success rate.

They possess a simultaneous computer-like sense of staying clear of multiple aircraft. Some studies show birds involved in aircraft strikes are for the most part young. What can we do as pilots?

- Landing lights help and we think strobe lights do too. Turn 'em on! (Even young birds have figured out that bugs and bees don't have landing lights!!)
- Certain birds prefer specific altitudes. Know your local birds and their habits!
- The chances of a birdstrike on a low altitude route are good. Since the energy generated (damage) during a birdstrike increases with the square of the velocity, it makes sense not to go any *faster* than you need to at low level for training purposes.
- 3-lb bird at 300 KTS = 11,974 FT/LBS of SMASH
- 3-lb bird at 500 KTS = 33,262 FT/LBS of SMASH

Big difference, huh?

Not all birds are born equal!! Some are truly BUMBLE-BIRDS! For whatever reasons, they'll look at an F-4 and think it is an airborne bug . . . , or, never check six and be run over by a C-5 . . . or, maybe not be up to speed on hard-defensive maneuvering such as an "aircraft break" (equal to a SAM-BREAK for birds).

Birds, like people sometimes have bad days (got up on the wrong side of the nest!) . . . or, ate a bad berry for breakfast . . . or whatever!

Keep the eyeballs out of the cockpit whenever possible!

Don't forget! An airborne object which has *no relative motion* with respect to your aircraft is on a *collision course!*

BEWARE OF STUDENT BUMBLE-BIRDS! ★

FLYING 'N DYING

LT COL JIM LEARMONTH
Directorate of Aerospace Safety

Sufficient time has passed for us to discuss the loss of comrades in aircraft catastrophies. As all things are significantly clearer viewed from the security of the headquarters, the tendency to critique persists.

Since 1969, five A-7Ds have flown into the ground while practicing air-to-ground ordnance delivery—three in 1975. All of the pilots involved in these accidents lost their lives. All of these mishaps involved dive angles of less than 20 degrees and most occurred after the recovery maneuver.

In our past attempts to prevent these types of accidents, minimum recovery altitudes have been raised, maximum dive angles restricted to low angle events, plus any number of briefings and rebriefings,. ad nausem. Apparenty to no avail.

Have we, then, investigated all possible avenues to try to save the lives of A-7 pilots? Today at the Oklahoma City ALC, a further study of the ADI system is expected to provide the pilot with an active system malfunction warning device to supplement the power on/off indication presently available. This move may prevent a spatial disorientation episode, compounded by unreliable attitude information from turning into a sod buster.

But, attitude indicators and instrument failures are not my concern. Are you, the pilots of the wonderful, one-heart one-seat Corsair, doing your part to save your own derriere? In three of the accidents mentioned, the radar altimeter was found set at 100' ± a few. Well, sure that keeps the low altitude warning light from causing a lot of tension in the cockpit during takeoff. But, couldn't we make time to reset it to the minimum recovery altitude prior to the range mission? ★

ENROUTE WEATHER SERVICE

MAJ HERBERT WEIGL, JR, HQ Air Weather Service (MAC), Scott AFB, IL

Air Weather Service (AWS) places great emphasis on providing assistance to those responsible for protecting Air Force resources on air bases and in the airspace immediately around those air bases. AWS has not been able to provide comparable service to aircraft outside of the terminal area simply because the means to do so were not available.

Concern over the deficiency has resulted in a joint AWS, National Weather Service (NWS), and Federal Aviation Administration (FAA) test that is directed toward helping enroute aircrews avoid hazardous weather. A small weather forecasting unit has been established in the Kansas City Air Route Traffic Control Center (ARTCC). The forecasters use FAA radars, pilot weather reports (PIREPs), and weather radar reports to better identify weather hazards such as thunderstorms. They monitor the ARTCC's jet routes and vector airways affected by thunderstorms, icing, or turbulence. They issue advisories to the ARTCC controllers who, in turn, relay the advisories to aircrews approaching hazardous weather areas. The forecasters operate a unique pilot-to-metro service (KANSAS CITY METRO) on Channel 369.9 capable of responding to calls from any part of the Kansas City ARTCC area.

The ARTCC forecasters are equipped with a radar scope that can display thunderstorms, the ARTCC route structure, aircraft, and the projected routes of aircraft on IFR flight plans. Such information combined with data from several weather radars and wide-area PMSV opens a new dimension in enroute weather watch. The meteorologist now can see both the weather and the aircraft on radar; he can also get in-flight pilot evaluation of the weather. The result is a more complete, responsible capability to help aircrews avoid weather hazards.

The test service is available at Kansas City now. When you're operating in the Kansas City ARTCC's area of responsibility, use it. To assist in evaluating the test's utility, your comments should be given to the AWS weatherman at your destination. ★

THE FALCONER

TSgt ALFRED C. SWIFT
513 TAW

ZOOM

While US Air Force Security Policemen watch the entrance to RAF Mildenhall, England, with eagle eyes, a different type of policemen watch the skies.

These policemen are Lanner Falcons and are handled by "The Falconer," Mr. Phil Bland. They have none of the sophisticated weaponry of modern jet fighters—just feathers, talons and all the natural instincts of birds of prey.

Phil is a former hotel owner from Northamptonshire, England. The Falconer and his ten falcons work from dawn to dusk, seven days a week, scanning the skies over the 1,000 acres of land that make up the American transport base. They look for flocks of lapwings, seagulls, pigeons or any other flock of birds that could damage expensive jet engines if they were ingested into them and possibly cause the aircraft to crash.

RAF Mildenhall is known as the "Gateway to the United Kingdom." Nearly all US military personnel and their families who come to England for an assignment, process through the base's passenger terminal.

Charter flights come into the base about 15 times per month, carrying troops and their families, while military aircraft bring in additional people. About 8,000 people pass through the Gateway every month.

Huge C-5 Galaxies, C-141 Starlifters, C-130 Hercules and KC-135 Stratotankers make up the bulk of the military aircraft passing through Mildenhall.

Naturally with this large number of people and expensive aircraft, the US Air Force needs to protect them as best it can.

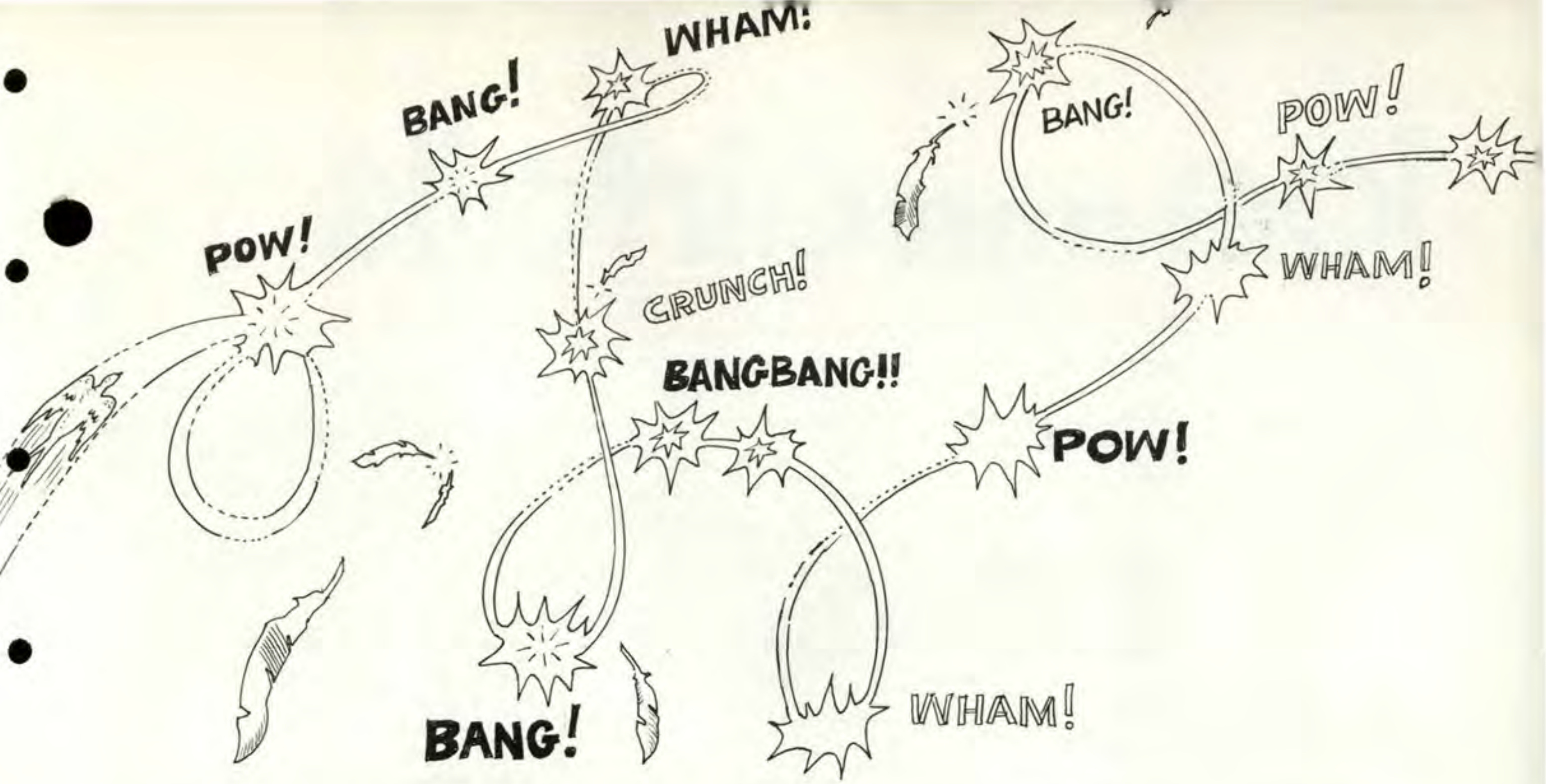
England's Royal Air Force (RAF) uses a taped recording of bird calls to scare off unwanted birds. But in spite of this, they continue to lose aircraft. Three Harrier Vertical Takeoff jet fighters were lost in 1971 due to bird strikes. A civilian Falcon fanjet crashed at nearby Norwich airport while taking off two years ago—it flew into a flock of seagulls. No injuries resulted from that one but the airplane was a complete write-off.

"Operation Longwing" started in England in 1970 after recordings, shotguns and many other methods of removing birds from the airfields had failed. The Falconer summed it up by saying: "The birds got used to the 'all talk and no action' concept of the recording devices, and the shotguns only spooked them for a few seconds, then they would settle back down on the field again.

"During the first two years of Operation Longwing, the RAF had 343 recorded bird strikes and the USAF had 11. This covered the six major US bases in the United Kingdom (RAFs Mildenhall, Lakenheath, Bentwaters, Woodbridge, Alconbury and Upper Heyford.) Of the 11 strikes, only five caused any damage and no major damage was noted."

Major General John A. Bell, Third Air Force Commander in 1970, conceived "Operation Longwing" after watching a display of Falconry. He initiated a study of using falcons on US Air Force bases, found it to be successful and placed it into effect.

Headquarters United States Air Forces in Europe (USAFE) made a



recent study on the value of falconry, looking at the cost of the operation as opposed to the amount of money and lives saved.

As a result of the Survey, "Operation Longwing" in England is now considered mission essential.

According to the Falconer, the Royal Navy first introduced the use of falcons for bird control around an airfield at Lossiemouth, Scotland, just after World War II. "Aircraft would be deployed a squadron at a time," Phil said, "and the Falconer would only fly his birds just prior to a launch or immediately prior to the squadron's returning to the base."

Phil Bland is a former Royal Navy man himself. He was Chief Petty Officer Air Gunner during WW II, and put in 12 years service with the Fleet Air Arm.

"When we were flying during the war," he explains, "we would often run into a flock of birds. They didn't do as much damage to us as they do to modern day aircraft because we were flying the old propeller driven, piston engine aircraft. They were a lot slower than today's planes, and the propeller blades would just chew the birds up and throw them behind us."

Phil was introduced to Falconry as a boy; now, it's a very busy full time job and he says he wouldn't trade it with anybody. If afforded the opportunity, he would love to prove to commercial airports, either in the United States or Europe, that lives and aircraft could be saved by using falcons for effective bird control.

Most of the Falconer's birds of prey are purchased from Africa as young birds. Then, he trains them, not tames them, otherwise they would lose their natural instinct to kill. Without that natural instinct driving them on, they would not go up and drive other birds away from the area.

Phil explained that East Anglia, in which Mildenhall is located, is not just a rural farming area, but one of the busiest migratory routes for birds in this country. Because of the many nature reserves in that part of England, some birds are attracted to the airfields because they like nesting by large open spaces.

Phil rarely allows his falcons to kill other birds, otherwise they would get used to it and would no longer depend on him for their livelihood. They are fed daily on fresh meat purchased locally.

The Falconer works closely with Air Traffic Controllers and is in either telephone or radio contact with them all the time he's on duty. If the control operator spots a flock of birds, he calls Phil, who takes a falcon out to have a look around.

Other times Phil can be found in one of his two Land-Rovers patrolling the base, looking for birds. On a busy day he may fly each falcon on three or more flights chasing birds away.

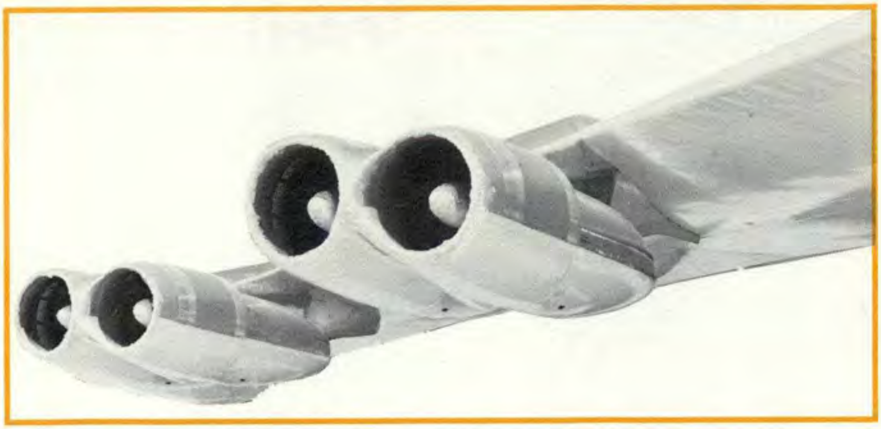
All the US Air Force bases in England use "Operation Longwing," but Mildenhall's Phil Bland has the distinction of having done his job professionally longer than anyone else in the world.

"I get a lot of satisfaction from my job," Phil said, "if I and my falcons can prevent a multimillion dollar aircraft like the C-5 Galaxy or a DC-8 with a couple of hundred people on board from crashing, then I have more than earned the money I'm paid.

"My method of operation at the airfield is simple," Phil Bland emphasized, "it's pitting nature against nature, for the protection of resources and people, and it works." ★

ice and airfoils

Courtesy January 1976 Northrop F-5 Technical Digest



Prevention, not removal, is the name of the game for ice on jet engine intakes in flight.

Ice buildup on leading edge of an airfoil. Weight of the ice and its affect on wing configuration can be dangerous.

The penetration began at 20,000 feet. There were three layers of clouds between 20,000 feet and 1500 feet that the F-5A had to pass through. The lower layer was nearly 3000 feet thick with icing conditions prevailing. The F-5A was flown on initial approach at 170 KIAS with air-speed reduced to 155 coming over the fence. The flare was started at 145 KIAS and the aircraft stalled and made a hard contact with the runway at 140 KIAS. The calculated touchdown speed should have been around 133 KIAS.

The F-5A touched down on the right main landing gear, bounced and was quickly brought under control by the pilot. Upon deplaning the pilot and ground crew noted that the leading edge of the wing and air inlet ducts had a layer of rime ice ⅜ of an inch thick, and the leading edge of the vertical and horizontal tail were covered to approximately ½ inch. The ice had also coated an area of about 4 inches of the underside of the wing from the leading edge aft.

Without becoming academic and just to refresh your memory on ice producing conditions, let's review some basic fundamentals that apply in the foregoing near accident/incident.

Ice forms when two conditions prevail. Moisture in liquid form must be present in the air and the effective temperature must be freezing or lower. All clouds contain moisture in one form or another so icing can be expected if the temperature is at or below freezing. In fact, light ice or frost forms when an aircraft flies from a cold area that has reduced the temperature of the airplane itself to freezing, into a saturated cloud where the temperature is above freezing.

Supercooled water droplets can exist in the atmosphere as a liquid at temperatures as low as −40 C. These droplets do not freeze because of the surface tension of the drop, its salt content, and most important, the liquid is undisturbed. Once it is disturbed or broken, as when it is struck by the aircraft, the drop quickly transforms into ice.

Rime ice is formed by the instantaneous freezing of small supercooled water droplets upon contact with the aircraft surfaces. Fast freezing can take place when the temperature is anywhere from 0°C to

Ice on this helicopter was deposited during test. In flight such a condition as shown could be catastrophic.

−40°C. Since the individual droplets freeze in individual spheres on the airfoil and the freezing is instantaneous, a large amount of air is trapped within the ice. This gives the ice an opaque appearance, makes it very brittle and relatively easy to break off. Rime ice does not normally spread over an aircraft surface, but protrudes forward into the airstream along the leading edges of the aircraft's airframe. The weight of rime ice per unit is less than clear ice. However, the danger lies in the added drag created by the disfiguration of the airfoil. Incidentally, most structural ice has a pronounced effect on the aerodynamics of the airfoil. In its purest form, rime ice is found generally in stable cloud conditions where vertical or turbulent air currents are restricted. Such conditions are typical of a stratus-type cloud layer.

Clear ice is formed by the relatively slow freezing of large supercooled liquid-water droplets, which have a tendency to spread out and assume the shape of the surface on which they freeze. As a result of the spreading of this supercooled water and its slow freezing, very few air bubbles are trapped within the ice, which accounts for its clearness. Clear ice is tenacious, harder, smoother, and more difficult to de-ice or remove once it has built up. At times it may appear rough, but it is never granular like rime ice. You should keep in mind that clear ice also forms rapidly on aircraft while flying in zones of freezing rain or drizzle. Clear ice is most likely to form at temperatures from 0°C to about −10°C. However, it may occur with temperatures as low as −25°C and at altitudes as high as 40,000 feet in cumuliform clouds.

Lengthy studies pertaining to the icing characteristics of clouds show that in stratus (layer type) cloud formations, the actual icing region is seldom more than 3000 feet in depth with 1000 feet the more usual occurence. However, the icing region can extend for many miles horizontally. For cumulus-type cloud formations, the depth of icing is considerably greater but the horizontal dimension of the icing area is seldom greater than three miles; therefore, whenever operational conditions permit, the general rule should be to change altitude (climb or descend) when encountering layer cloud (stratus) icing, and vary course as appropriate in order to avoid cumulus type cloud icing.

Aircraft icing is one of the major weather hazards to aviation. It affects an aircraft both externally and internally. The pilot should anticipate and plan for some type of icing on every flight conducted in clouds with temperatures colder than freezing. He should be familiar with the icing generally associated with different atmosphere conditions. You should keep in mind that a weather forecaster cannot generally observe icing. They rely on pilot reports. They can only forecast the probable maximum intensity of icing that may be encountered during a flight, but not necessarily the intensity of icing that will be encountered by a particular aircraft. Many variables bear upon icing problems. It is the pilot's responsibility to make certain he obtains a complete weather briefing to include the information he deems necessary to the safe completion of his proposed flight, not only to minimize any icing hazard, but all hazards of flight. ★

FOR CREWS Ground and Air

One score and 12 years ago our forefathers in the Army Air Force brought forth a document dedicated to the idea that aircrews' lives are precious and the loss of critically needed aircraft excessive. That document titled *Flying Safety* has endured and its pages have chronicled the achievements of men in their constant quest for flying safety. Today we call it *Aerospace Safety*.

As we look back we see 20,000 aircraft accidents a year reduced to 118; our people living instead of dying—5603 dead in 1943, not in combat—in accidents—with the toll reduced to 98 in 1974.

We rejoice for those crewmen and our aircraft that have survived the demands of the relentless sky. But our gladness is muted when we consider the ruthless advance of the cost monster. Whereas an average aircraft accident cost $940,000 in 1964, today the Air Force worth is reduced by the amount of $2,200,000 per-accident. In one year we are seeing the loss of $312 million.

Let us dedicate ourselves then to the idea that not only are aircraft accidents preventable, they are also intolerable. With this thought uppermost, we have set the course of this publication toward the Air Force air crew. And in our crusade to extinguish the maintenance-caused accident we have created a new vehicle known as *Maintenance*.

Whereas, this magazine is hereby dedicated to aircrews everywhere and,

Whereas, a sister magazine is to be devoted to our maintenance people,

Therefore, effective this date, *Aerospace Safety* will address the needs, problems and interests of aircrews and those who provide them close support.

Further, the journal for the maintenance people, those unsung heroes who labor long so that their machines will safely fly, will be known as *Maintenance*.

May both of these succeed in their missions so that they may earn the respect, affection and support of those they are dedicated to serve.

In other words, guys, these two mags are for you. And the pages are open. Let's hear your advice, comments, gripes, but most of all your ideas and knowledge that can be passed on to others in your professions. Thanks—your editorial staffs. ★

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UNITED STATES AIR FORCE

Well Done Award

Presented for outstanding airmanship and professional performance during a hazardous situation and for a significant contribution to the United States Air Force Accident Prevention Program.

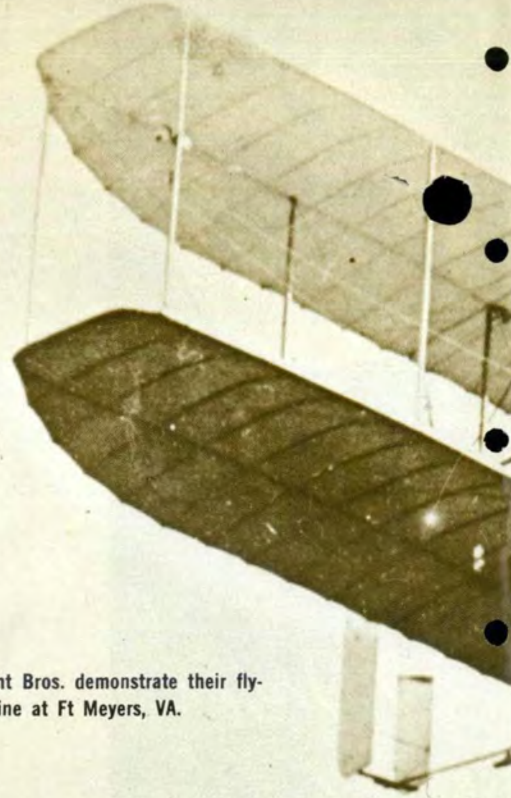
First Lieutenant KENNETH C. ARMSTRONG 85th Flying Training Squadron Laughlin AFB, Texas

On 23 January 1975, Lieutenant Armstrong, the IP, and his student launched on an instrument mission in a T-37. Weather was 400 scattered, measured 700 overcast, 3 miles visibility, fog, wet runway, and cloud tops 13,000 MSL. On takeoff leg in the weather with the student flying the aircraft, Lieutenant Armstrong observed that the attitude indicator showed 8 degrees nose high, but the vertical velocity was less than 1,000 feet per minute. He took control and made a slight nose-up pitch change, at which time the attitude indicator rolled to indicate a vertical climb and began counterclockwise controlled precession at the near vertical position. Lieutenant Armstrong attempted to use the right turn-and-slip indicator to keep the wings level, observing the needle to be centered but all three heading indicators showing the aircraft in a turn. Realizing that from his vision angle the left turn needle would be of little value, Lieutenant Armstrong began to make small aileron control inputs until the heading indicators stabilized. With the wings level, he then made small pitch corrections to maintain a straight climb at 200 KIAS.

At approximately 6700 MSL, Lieutenant Armstrong found a clear space 100 feet high between the cloud layers. Knowing that the cloud tops were 13,000 MSL, he elected to remain in the limited VMC conditions he had encountered rather than climb an additional 6300 feet in the weather. After leveling off in the clear space, Lieutenant Armstrong determined that AC power was available and that the attitude gyro fuses were not burned out. The supervisor of flying assigned a chase aircraft which assumed the lead and the flight executed a formation PAR recovery.

Lieutenant Armstrong's timely assessment of a critical situation and his professional ability prevented possible injury to the crew and the loss of a valuable aircraft. WELL DONE! ★

FROM WHENCE WE CAME



The Wright Bros. demonstrate their flying machine at Ft Meyers, VA.

This Bicentennial Year is a time to look back From Whence We Came. In that interest we believe that our proud US Air Force heritage holds much to offer. From very crude beginnings we have sped to the very edges of space and have fought in four wars along the way. In this and future issues we hope, with your help, to pay homage to the valiant and farseeing few who made it happen. For more, turn to page 14.

L to R. The Salmson 2-A, flown by the A.E.F. in WW I; The Boeing P-12, one of the finest bi-wing pursuits ever; the legendary 8th AF's B-17 over Germany in WW II; the F-80 using JATO assist flies over F-86 in Korean War days; the F-4 Phantom gets ready in Vietnam; SR-71 pilot's flying garb.