AEROSPACE

SAFETY • MAGAZINE FOR AIRCREWS DECEMBER 1980

Director's Holiday Message

■ The holiday season is here, a time of celebration, thanksgiving and happy giving and receiving. It is also a time of assessment of what we have accomplished during the past year and where we are going in the year ahead.

This past year has been particularly good to me. This is my first Christmas as the Director of Aerospace Safety, and our aircraft mishap picture has considerably improved over last year. Both the number of Class A mishaps and lives lost have been drastically reduced, for which we should all give thanks.

Our successes, however, should not lead to complacency. The status quo has a way of changing for the worse if we do not put forth the effort to make things better. I believe that we can improve our mishap record, that we can reduce our losses while maintaining the readiness necessary to accomplish our mission. It will mean a lot of hard work, attention to detail, strong management, and leadership on every level. We must attack the preventable mishaps.

In my opinion, you have been doing an excellent job during 1980. I look forward to all of us, working together, doing even better next year. We in the Directorate of Aerospace Safety wish you a merry Christmas and a great 1981. ■

LELAND K. LUKENS
Brigadier General, USAF
Director of Aerospace Safety

UNITED STATES AIR FORCE

AEROSPACE

SAFETY MAGAZINE

DECEMBER 1980 AIR FORCE RECURRING PUBLICATION 127-2 VOLUME 36 NUMBER 12

AFRP 127-2
Entered as a controlled circulation rate publication (USPS No. 447-810) at Terminal Annex, Los Angeles, CA.

COVER
Cover photograph by SSgt Rob Marshall and MSgt Rick Diaz of AAVS.

Page 2

Page 11

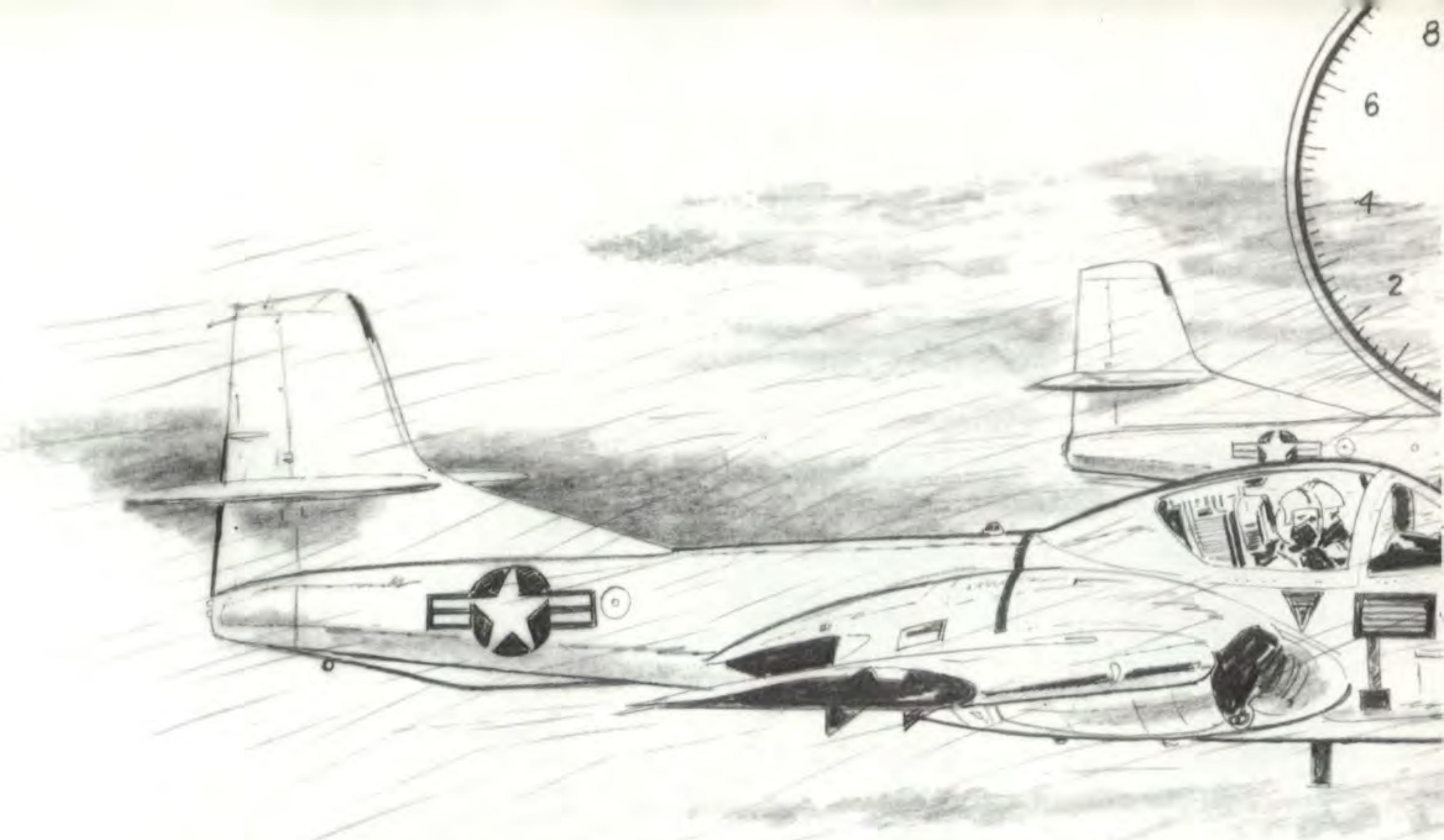
Page 20

SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

SUBSCRIPTION—AEROSPACE SAFETY is published monthly and is available on subscription for $17.00 per year domestic; $21.25 foreign; $1.50 per copy, domestic; $1.90 per copy, foreign, through the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Changes in subscription mailings should be sent to the above address. No back copies of the magazine can be furnished. Use of funds for printing the publication has been approved by Headquarters, United States Air Force, Department of Defense, Washington, D.C. Facts, testimony and conclusions of aircraft mishaps printed herein may not be construed as incriminating under Article 31 of the Uniform Code of Military Justice. All names used in accident stories are fictitious. No payments can be made for manuscripts submitted for publication in the AEROSPACE SAFETY Magazine. Contributions are welcome as are comments and criticism. Address all correspondence and, Postmaster: send address changes to Editor, AEROSPACE SAFETY Magazine, Air Force Inspection and Safety Center, Norton Air Force Base, California 92409. The Editor reserves the right to make any editorial change in manuscripts which he believes will improve the material without altering the intended meaning. Air Force organizations may reprint articles from AEROSPACE SAFETY without further authorization. Prior to reprinting by non-Air Force organizations, it is requested that the Editor be queried, advising the intended use of material. Such action will ensure complete accuracy of material amended in light of most recent developments. The contents of this magazine are informative and should not be construed as regulations, technical orders or directives unless so stated. Authority to publish this periodical automatically expires on 26 Jan 1982, unless its continuance is authorized by the approving authority prior to that date. Distribution: 1 copy for every 2.5 aircrew and aircrew support personnel.



...and a few moments of stark terror

■ I've been meaning to sit down and write this article for years, but being the unofficial President of Procrastinators International, I've put it off. No particular reason has prompted me to do it now, except that being desk-bound, naturally all my idle time is spent thinking about flying.

What I'm about to relate to you happened about eight years ago, so many of the particulars and specifics of the story have been clouded by time and many more experiences. Bear with me though, and perhaps you'll be able to relate to this story. If you can't relate, you're either kidding yourself or you haven't had the opportunity— yet. This story happens to involve two combat seasoned and highly qualified Training Command instructor pilots and two of their fledgling student pilots on a typical weekend cross-country flight in the venerable T-37. (Now don't let the airplane or the command turn you off. Perhaps the circumstances or the aircraft might be a little different, but the experience could be just as dramatic.)

It had been an uneventful cross-country so far. The students had done a creditable job planning for and executing four sorties since we left our west Texas home station on the previous Friday. As planned, we had RON'd on Saturday night in "Lost Wages," and were in the process of assembling ourselves at Base Ops early Sunday morning to plan the two hops home. Believe it or not, crew rest had been observed (a feat not all aircrews visiting the Entertainment Capital of the World can boast). We were as fit mentally and physically as could be expected with one day off in the last 14 (not atypical of ATC in those days). The itinerary called for a refueling stop at Albuquerque and then on home to catch at least part of the NFL play-offs that were under way at the time.

The leg to Kirtland, a long one for the Tweet, required a little more precise flight planning and just the right westerly winds to make it with the required fuel reserves. Because of this fact and because of enroute weather, the two IPs decided to give the studs a break and plan the entire flight (in retrospect, a good move). The steely-eyed weather prognosticator assured us that the weather enroute posed little problem and that our sleek silver jets should be able to level off well above the reported tops of 20,000 MSL. And, you bet, the winds were just what the doctor ordered— 280° at 110 kts at our cruising level. Destination weather was VFR with scattered to broken conditions at 8,000 MSL and light rain showers to the southwest.

All this sounded very comforting to us, but our intuition, experience, or whatever you want to call it, told

By CAPTAIN ERIC A. PETERS · HQ USAFTFWC/XP · Nellis AFB, NV

us to investigate a little more. The intrepid flight lead then called and talked directly to the Kirtland weatherman. Not surprisingly, we found that the teletype reports were close to his own forecast. So, armed with the information we set about planning the event. We elected to request radar vectors to our planned course and altitude (FL 250) and not to use the heater until level off (standard procedure to save a few pounds of fuel, although unsubstantiated in the flight manual). We figured the winds conservatively at 90 kts instead of the reported 110, and our start descent point was planned to provide us with the most time at altitude.

When we discussed our departure plan with the Base Ops dispatcher, he was unable to "guarantee" us our requested radar departure and the proposed traffic routing was going to cost us more precious fuel. Whoa, Silver – let's get on the horn and talk to some supervisor about this. "Hello, Ops Officer? Here's what we have. Looks like we'll be stretching it a bit – got any advice? You say maintenance has to have the airplanes back by 1400 to get them ready for tomorrow's flying schedule? What? Take off VFR and stay beneath the weather until 30 miles out, then climb and get our IFR clearance? No, sir, we're not anxious to spend another night in Vegas. I'm just giving you the facts. Yes, sir, we'll take another look at it." Back to the drawing board and micrometer.

Here again, the little buzzer went off – better have a go-no-go point midway in the route to allow us to escape to the south in case the weather deteriorates or the winds are less than expected. We'll call Center, METRO, and FSS at that point for the latest weather info and make the decision. The "warm and fuzzies" are abundant now. Time to file the flight plan and get our formal weather briefing.

The DD 175-1 was prepared with virtually the same info we'd received on our initial query. The flight lead made one last call to destination and was relieved to hear that conditions were still copacetic. So how come there's something gnawing at me. Must be a little tired.

Armed with meticulous flight planning and the latest weather information, the fearless aviators launched into the murky gray. Clearance delivery raised our spirits greatly as they relayed approval for our radar climb on course. Good formation takeoff, and after what seemed like an interminable climb we leveled at FL 250 still in the cirrus. Funny, I thought tops were at 20,000. Oh well, we'll probably be out of it in a few miles. Fuel check was good. Our conservative flight planning was paying off. ☞

...and a few moments of stark terror continued

Everything was progressing normally as we approached our go-no-go point, although still in the weather. (For those of you who may have forgotten, the Tweet is unpressurized and limited to 25 thousand.) We queried Center on any weather activity ahead of us and were assured of no more than the status quo. A quick call to FSS and the closest METRO told us that Kirtland still was calling for scattered to broken conditions, winds within limits, and light rainshowers to the south and southwest *slowly* moving to the north. Fuel was on schedule, although we had discovered the winds aloft were in the 60-70 kt range instead of the 110 kt forecast. Decision made—press on to ABQ.

About 100 miles out, Center decided they'd like to start us down, but we talk them into our plan and stay at altitude, still in the weather for a few miles farther. Fuel still OK. Descent check and start down. So far so good, huh? Time to go to Approach Control and request a straight-in ASR (PAR not available at Kirtland).

"Fungo 21, descend to 10,000. Hold south of the vortac on the 180° radial, left-hand turns." Uh—pardon me, Approach, but we'd like to continue our enroute descent to a straight— "Negative, Fungo 21, the FIELD IS BELOW MINIMUMS. Have two airliners below you at 9,000 and 8,000!"

Geez, how come it's getting so turbulent? Can't write down the instructions. Better check my wingee. Wow! Is he ever bouncing around. Sure is getting dark. Stanley—get that approach chart out and find that holding pattern. Can't hold this thing level, it's so turbulent. What's that blinking? The low level fuel light, dummy. Remember, this was a long hop! What!! The holding pattern isn't published?! "Approach, say again our holding instructions." "Roger." Come on brain, where are those mountains around here? When are they gonna turn this rough air off. Boy, two looks panic-stricken. No sweat— "Hey, Approach, Fungo flight is min fuel." "Roger." Roger? Hey, these 6,000 lb dog whistles don't hold that much! Fuel lights are on steady now. Wonder if we're anywhere close to that holding pattern? Ain't no place else to land out here except highway or desert. OK, Lord, you got it!

Some of the longest minutes of our lives passed now. Thoughts raced through my mind about how we were going to explain jumping out of two perfectly good airplanes. My student had long since become very silent and I thought for a moment he had returned to the prenatal position. My continual pleadings with Approach seemed to be reaching unsympathetic ears, but at last the controller must have sensed the desperation in my voice as he soon had us on a base leg for the ASR approach. Descending to 8,000′, we finally broke out of the weather we had entered almost *two hours* previously. "Two, stay with me, all the way through landing." Not enough fuel for separate approaches. Whew, on final at last. Quick glance at the fuel gage—ugh! Wish I hadn't looked at that. Two must be fumes only by now.

Formation landings were not practiced in the Tweet and our landing showed it, but we were finally down and heading for parking. The canopies came open and we were immediately drenched by the still heavy downpour. We didn't care, we were down. Unstrap, jump out, and caress the ramp. Remembering the fuel we shut down with, I walked over to my wingman's aircraft and nonchalantly peered at his fuel gage. My trigger-like mind quickly added the two aircraft fuel quantities and the total, folks, was only double digit!

After a brief, silent thanks to my Maker, we trudged off to have a word with the weatherman. "Pardon me, but have you by chance revised your forecast? No? Perhaps you'd like to join us as we look out your handy window?" "Guess I'd better issue a revision after all, huh?"

End of story. They didn't get the airplanes back by 1400 that day. We walked away from another one, shaken but hopefully wiser. Mistakes? Yes, probably several, but as you know, hindsight is always 20/20. We had flown right into that proverbial "box canyon" doing everything as correctly as we thought we could do. Bottom line folks, is *be prepared* for the unexpected. No matter how routine your mission appears to you, Murphy's Law applies. Always have an out. Don't be hesitant to declare an emergency, don't trust anybody and remember to take your vitamins every day!

It wouldn't hurt all IPs to occasionally place more than cursory emphasis on some of the basics. Your studs may be able to perform the finest double inverted high angle off snatch back to a high deflection snap shot against multiple bogeys, but, where is he when his jet flames out on RTB due to poor fuel management or he forgets to keep tabs on the marginal weather conditions back home? You've heard all this a thousand times, but isn't it worth the emphasis?

Hey, guys, we got a seat open this weekend. Anybody want to go cross-country? ■

ABOUT THE AUTHOR

Captain Peters is a 1967 graduate of Texas A&M University. A senior pilot with over 3,000 hours, his assignments have included Forward Air Controller, SEA, T-37 Instructor Pilot, ASTRA tour, HQ USAF, Flight Commander/Instructor Pilot, F-4E, USAFE, and Instructor Pilot with the USAF Fighter Lead in Training Wing, Holloman AFB, New Mexico. He is currently assigned to the Plans Directorate of the Tactical Fighter Weapons Center, Nellis AFB, Nevada.

OPS topics

A Hot Time in the RSU

■ Want some action? Try ducking an AN-M37A2 illuminated signal ricocheting around the inside of a distressingly small runway supervisory unit (RSU). This happened to three startled high steppers when the loaded M8 pistol fell out of the M1 mount and discharged the signal.

The story goes something like this: A pilot assigned RSU duty loaded and placed the AN-M8 pistol in the M1 mount. Two individuals arrived at the RSU in support of a local exercise. Since the RSU was originally designed for one individual, the additional people found the quarters cramped. While the three individuals were conducting separate operations, they heard a loud bang and the RSU immediately filled with smoke. After the fire was extinguished, the RSU officer noticed that the pistol was lying on the floor.

So you ask, what ever started this sporty action? The sequence of events which caused and could have prevented this mishap were:

WRONG: The RSU officer loaded and then installed the M8 pistol in the M1 mount.

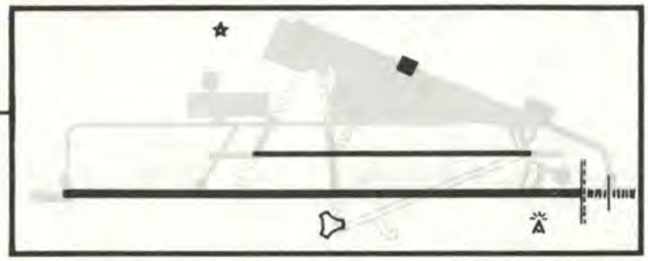
SAFE: The M8 pistol should be loaded with the signal after the pistol is installed in the M1 mount.

WRONG: The M8 pistol could not be locked into position due to excessive wear on the M1 mount.

SAFE: Make sure that a positive lock is evident when the M8 pistol is secured to the M1 mount.

WRONG: The M8 pistol fell out of the M1 mount possibly by vibration or by accidental bumping because the RSU was overloaded with personnel.

SAFE: The RSU should be manned only with the proper number of personnel and other arrangements should be made for additional personnel during exercises.



Airfield Diagrams

The Defense Mapping Agency (DMA) publishes loose-leaf 5″ x 8″ airfield diagrams for 341 locations worldwide. The information includes runways, taxiways, parking and alert areas, prominent buildings, obstructions and radio facilities. The purpose of this product is to support operations of aircraft equipped with Inertial Doppler Navigation Equipment. However, it can be a very useful flight planning tool for aircrews filing for unfamiliar airports. Check with Base Operations for the availability of this publication. For several years, DMA has been asked to publish full-page airfield diagrams for selected airfields in the Terminal Instrument Approach Procedures books. This product may be available during 1981. —*SMSgt Marshall E. Holman, Directorate of Aerospace Safety.*

Loss of Reset Knob Can Cause Instrument Errors

When a T-38 pilot went to RESET on the AAU 19/A altimeter during the Before Taxi Check, the reset knob fell off in his hand. Since this was a dual flight, the aircrew did not consider this to be a problem and elected to continue with the mission. After takeoff the aircrew encountered erroneous altimeter, airspeed, and vertical velocity indications after climbing through 8,000 feet. Another aircraft joined on the mishap aircraft and a successful recovery was completed.

Investigation revealed that the snap ring which holds the reset knob in place had broken. When the knob came off it permitted a leak in the pitot static system which caused the erroneous indications.

Although we all know this altimeter operates using static pressure, neither AFM 51-37 nor the T-38 Dash 1 specifically mention that loss of the knob can cause a leak in the pitot static system. At any rate, we now know loss of the reset knob will cause the same pitot static instrument errors which occur when the altimeter glass is cracked or broken. This is true not only for the T-38, but any aircraft with the AAU 19/A altimeter. —*Capt. Dennis D. Dailey, Directorate of Aerospace Safety.* ■

Plastic Airplanes Are Coming Your Way

By **MAJOR ROGER L. JACKS** · Directorate of Aerospace Safety

■ The evolution of the airplane has been dramatic to say the least. From the Kitty Hawk days when an airplane of wood, wire, and fabric putted along on its piston engine skimming the tree tops, to sleek jet aircraft built of titanium and other space age metals blasting through the air at several times the speed of sound. Indeed, aircraft technology has come a long way. However, another breakthrough in aircraft manufacturing has launched us on even a more spectacular phase of evolution.

Over the past ten years a quiet revolution has been developing in aircraft materials. Metals are being partially replaced by carbon/graphite fiber reinforced plastics. A member of the advance composite family which includes Boron, glass and Aramid fibers — a carbon/graphite fiber has a diameter of 0.02mm, finer than a human hair. Thousands of these fibers are put into usable form by incorporating them into plastic binders. The plastic binders impregnated with the fibers are then molded into the various shapes needed for aircraft production. Why the change? As Mr. Leslie N. Phillips, Head of Plastics Technology for the Royal Aircraft Establishment, puts it "The driving force behind this aeronautical transformation is the same as that which took place when light alloy replaced timber — greater efficiency. Designers want better speeds, greater payloads, lower fuel bills and cheaper maintenance. They are prepared to pay for a material that promises these things by being stronger, stiffer, and lighter than light alloy and which does not corrode."

A recent U.S. Government study of energy requirements supports Mr. Phillips' statement by showing that energy savings of composites over metals can be as high as 33 percent. There is an abundant supply of raw materials and their conversion to final form costs less than with metals. For these reasons we will probably see an increased usage rate by the manufacturers in the coming years. The family of advanced composites already has found a home in the sporting goods industry where manufacturers of golf clubs, tennis rackets, skis, and fishing rods are using the technology extensively. Government predictions show the next major industry to turn to composite materials will be the automotive manufacturers.

Advance composites would be too good to be true if they didn't have some negative aspects. One of those aspects is their ability to be good electrical conductors. That characteristic has an adverse effect when an aircraft containing carbon/graphite composites is involved in a mishap where a fire or explosion occurs. The problem arises when the electrically conductive fibers are liberated as free floating debris during and after the mishap sequence and settle on unprotected electrical circuits. That can lead to malfunctioning electrical equipment.

NASA and DOD became interested in the phenomenon in the mid-1970's. NASA formed a working group and contracted with several private firms to research the problem and identify possible fixes. DOD called the logistic commanders from the three services together to form a working group. An organization called the Joint Technical Coordinating Group (JTCG) was formed to research the problem. They, in turn, contracted with some private research firms for support. For the Air Force, the Rome Air Development Center became the composite fiber research focal point.

In 1978, the JTCG released the HAVE NAME protection guide handbook as a preliminary assessment of the carbon/graphite hazard. The Air Force, working through the safety offices and Disaster Preparedness Offices, established local plans based on the handbook to combat the potential problem. The planning was done on a worst case basis since all the data on the problem was in the infant stage. Aircraft containing carbon/graphite fibers were tracked by tail number by the Logistics Centers and AFISC. In the beginning, two members of the advanced composite family were of primary concern: Boron and carbon/graphite. After the initial research stage, Boron was dropped from the problem primarily because of its heavier weight and higher voltages required to present a hazard. The heavier weight means a smaller chance that the fibers would have a large dispersion pattern and the higher voltage requirements eliminates a significant amount of electrical equipment from potential damage. It should be noted, however, that Boron can be a nuisance or even a hazard for people working around an aircraft mishap containing the material.

Once the Boron fibers are shattered, exploded, or any way broken loose from their resin binding, they leave sharp and brittle pointed strands projecting out from the damaged surface. For the unaware, it can be a painful encounter. They can easily penetrate the human skin, much like a sharp wooden splinter. Solution to the problem is in the wearing of protective clothing and being aware of the problem. No special protective gear needs to be kept on hand, just the normal work clothes with long sleeves and gloves.

As research efforts were concluded, it became apparent that even the carbon/graphite problem was not as serious as first thought. The problem initially had so many variables to consider, that only a best guess could be given until complicated research efforts were concluded. It was better to worst case the problem until enough facts were in to make a more definitive statement.

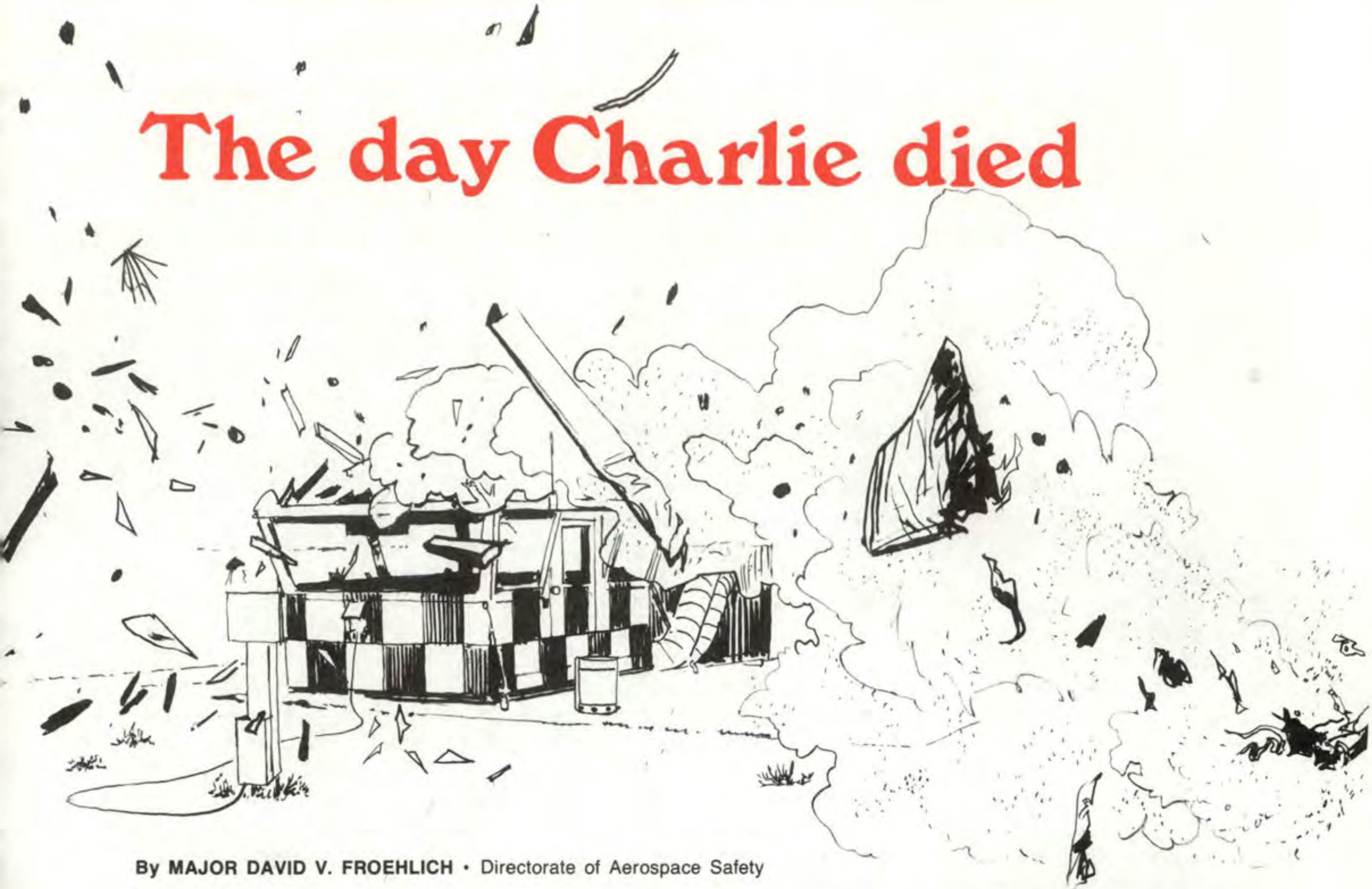
In December of 1979 NASA concluded a 22-month study by stating that the risk of electrical equipment damage from release of carbon fibers from a civil aircraft accident is insignificant. They found that very few carbon fibers are released during burning and that most electrical components are adequately insulated against possible contamination.

The JTCG was still involved in some research efforts when the NASA findings were released. They agreed with NASA on some of their fundamental statements but made it clear that a difference in exposure rates and missions made it imperative that a DOD position be developed. In June of 1980, the JTCG briefed their conclusions to the DOD community. In that presentation, it was stated that the risk to the Air Force was small or negligible. This conclusion doesn't mean that the Air Force carbon/graphite protection program is going to be abandoned. It will, however, be tailored to reflect the knowledge gained in our latest research efforts.

The NASA and the JTCG studies found that there will be a continuing need to clean up the carbon/graphite fiber residue following a mishap. Even though remote, under the right conditions secondary electrical effects can be experienced from a mishap aircraft constructed with these fibers. It will be early 1981 before new documents are available to use for guides in revamping our base disaster preparedness plans. In the past, aircraft or missile mishaps that involved carbon/graphite fibers were called "Corkers." In the future, the work composite will most likely be used to describe or highlight the event.

Until the new guidance on composite mishaps is incorporated into our base disaster plans, the current plans will be utilized. If any doubt exists on actions to be taken or additional assistance is needed, call the AFISC technical assistance number AUTOVON 876-7479. ■

The day Charlie died



By MAJOR DAVID V. FROEHLICH • Directorate of Aerospace Safety

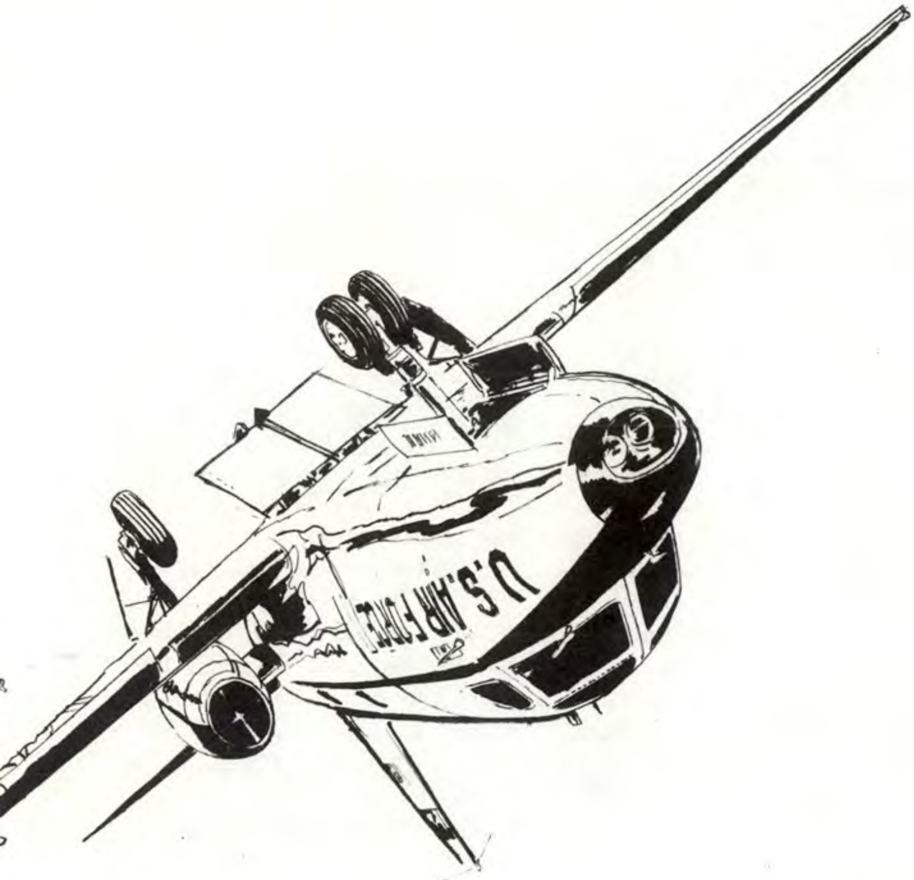
Author's Note: Charlie is a fictitious flyer. He is the guy who sat in the left seat, flew on my wing "up North," yelled at me from the back seat or hovered over me while I was pulled up on a cable. Charlie is the aviator that has the mental, physical ability and skill, but through some disregard of rules, limits or flight discipline, he kills himself (and mayhaps others). Those of us who fly, either have known or will know, a Charlie, before he dies.

■ Charlie was a mini-MAC airline pilot! He took some flak from "friends" when he took the job, but after a year or so he realized that a lot of the gibes were coated with a layer of envy. He had really settled in and was enjoying the airplane, the mission and the new outfit. He began to appreciate all the fun little details that non-39 flyers really don't think about.

For instance, his job description probably could have read like the opening scenario to a popular spy-type program which is still being re-run. "Your mission, Charlie, should you decide to accept it, is to take an aging and somewhat under-equipped (by present standards) aircraft, fill it with passengers (including VIP's from Code 2's on down), luggage and small cargo and follow an ever-changing schedule in and out of the crummiest weather you've ever seen. You will land everywhere from the ulcer-producing LAX to somebody's 6,200 foot concrete driveway without so much as a coke machine (let alone a tower). You'll do this 7 days a week, on a lot of 14-hour days (but no more than six stops per day), often with a General in the left seat, and then return home (unless we need you to RON to come out early the next morning). You'll also be part-time Red Cap, coffee waitress, aircraft refueler, system troubleshooter, pax service rep and full time diplomat."

Despite the grinding sound of the above, Charlie loved it! He felt a sense of pride in that, although he wasn't delivering bombs or dodging bandits, his safe mission accomplishment called for a professional aviator. Unfortunately, the sense of pride probably is what helped auger him in! Pride over judgment equaled mangled metal.

Charlie and his co had drawn a late afternoon takeoff to transport a three-star and party of four halfway across the country to an interplane stop, and then return. Should have been a short day and almost a no-thinker, but mother nature had to get her two cents in. Enroute weather and destination forecast was OK, and the return to home drome looked fairly painless. Charlie had his act together, the machine worked well and they arrived (with General and on-time) at the interplane/gas stop.



Then the plot thickened.

The ominous "Call MOTHER-MAC" note was waiting for Charlie as he got to the dispatch counter. The duty officer wasn't pushy. He told Charlie that the General's interplane had crumped, the General really needed to get home and would Charlie mind an unscheduled RON. Charlie checked with his partner and they said "sure, no sweat." (You could almost hear the duty officer's sigh of relief long distance, 'cause this was probably the first thing that had gone right all shift.)

Anyway, the team sprang into action as Charlie headed for the DV lounge to tell the General that they would be a few moments to re-file and add extra gas, but that they would try to get him home tonight. The General was genuinely appreciative, but said if there was any problem he could spend the night here and go on home first thing in the morning.

Charlie headed back to the flight plan room; he found the co putting final touches on the 175 and they went to see the weather folks. TILT! Destination weather is partially obscured with ⅛ mile and fog. Forecast to get better? Nope — about the same. Right about here, Charlie's "no-go" light should have begun to flash but as the co watched in disbelief, Charlie began to ask for alternate weather and an AUTOVON number for the destination weather forecaster. "Can-do" attitude had begun to overshadow "Should-do" judgment. The destination weather forecaster stuck by the forecast and added an unofficial "And I don't look for any better."

Charlie was hemming and hawing when the General walked up and inquired how things were going. "Uh, just fine, sir, the, uh, destination weather's not real good but the civilian airport across town is carrying a better forecast and as

The day Charlie died

continued

soon as we have gas we'll be on our way.'' The General again mentioned that he could stay the night here, but Charlie brushed the offer aside with another, ''No problem, General, we'll get you home.''

The still dumbfounded co could only get out a ''but, but . . .'' as Charlie nudged him toward the door and said ''Get started on the walkaround and I'll finish filing and bring the passengers out.'' Can do had taken over should do, but Charlie was to have one more chance for a reprieve.

By this time it was severe dark outside but Charlie was still breaking speed records down the parallel taxiway headed for the active. About the time Charlie rounded the last corner on one wheel, the right side attitude indicator tunbled. Dutiful copilot spoke up but Charlie only responded with ''What! Check the circuit breakers! Oh well, mine's OK. We'll watch it closely; tell tower we're ready!'' (One more nail in the proverbial coffin.)

Two hours later the aircraft was descending past FL 240 in an enroute descent as the copilot finally got through to metro. No better news unless you consider the weather at the civilian airport across town down to 300 and ¾ with drizzle and fog as good news. Destination was still completely ''yuk'' with ⅛ of a mile in fog. As Charlie drove by the base on a sort of a radar vector downwind to an ILS, he commented ''I can see the VASI's from here; we'll shoot one and if we can't get in, we'll go across town.'' No comment!

Turned two corners, ran the checklists, checked FAF and started down the glideslope. When the landing light was turned on, it looked like the inside of a pillow. Altitudes were called by the co and Charlie's last shot at life-saving judgment came at the words ''minimums – GO AROUND.'' Charlie mumbled something like ''I've got the field'' and let the machine settle deeper into the murk.

There was no fire. Actually, there was very little noise and it took a few moments for the tower to realize what had happened and hit the crash net. The visibility was so bad that all of the crash vehicles had to creep out to the site. They found a mangled, inverted T-39 lying in the muddy infield between the runway and the parallel.

The passengers all survived with minor cuts and bruises. The crew, unfortunately, was not so lucky. As Charlie let the airplane sink into the fog, he was so intent in looking for the runway that he drifted to the left. The left wing caught the empty RSU shack, the aircraft cartwheeled and tumbled through a chain link fence into an antenna structure. Part of the structure entered the cockpit and took the lives of both crewmembers.

The mishap board found the inop attitude indicator and listed that as a theorized ''cause.'' The pilot should have . . . The copilot could have . . . The crew wouldn't. . . The cause was actually that the ''can do attitude'' out-voted the ''should do judgment.'' ■

We
in the Directorate of
Aerospace Safety
wish you a glorious
Christmas
and a safe and
successful
New Year

DOWN & OUT

■ During a service mission to transport two passengers to a tactical field site, the pilot of an OH-58 began a circling approach as he reached the landing area. He then made his final approach with the aircraft oriented into a 10- to 15-knot wind. About 15 feet AGL, he suddenly decided to change his heading so as to land near a parked AH-1. He applied right pedal and a slight amount of right cyclic, turning the aircraft approximately 140 degrees to the right while maintaining 3 to 5 knots of forward groundspeed. With the aircraft in a downwind position, the pilot noted he had to apply a slight amount of aft cyclic to prevent a nose-low attitude. He also noted the aircraft was descending. Although he applied 95 to 100 percent power to check the descent, the aircraft continued its downward movement until it finally hit the ground.

In the pilot's words: ". . . Out of nowhere, we lost all sorts of lift. I didn't think we could lose that much lift. I immediately applied power and aft cyclic as the aircraft began to settle. The rate of descent kept on increasing as I continued to pull in power in an attempt to cushion the landing. We had a little forward airspeed as we hit the ground . . . we hit the ground hard.

"I believe the power I had pulled in earlier had just begun to take effect because we came back off the ground . . . the aircraft began a very slow, gentle clockwise turn. I thought it was the wind. I was not very concerned at that time. I was in the process of adding forward cyclic to stop the aircraft's slight rearward drift. The left rear skid dug into the ground and we rocked back and to the left . . . the aircraft hit again,

☞

DOWN & OUT

continued

and I believe that is when the tail rotor separated from the aircraft because at that point we started spinning. We were spinning just above the ground. The spin was very rapid. I can't tell how many times we went around. At least twice, if not more. I put the collective down and the aircraft came back down to the ground and to a halt . . . I cut the fuel off and turned the battery off. All three of us then exited the aircraft.''

Although no injuries resulted from this mishap, the cost to repair the damaged aircraft exceeded $11,000. And the cause? Settling with power. As one investigator more precisely stated it: ''The pilot, while executing a terrain flight approach to a tactical field site, exercised poor judgment by abruptly applying right pedal and the right cyclic at an altitude of 15 feet AGL, contrary to the guidance provided in the operators manual, and the Aircrew Training Manual. The abrupt 140-degree right turn, with little or no forward speed, placed the aircraft into an approximate 10-knot downwind condition. This improper flight control input resulted in the aircraft settling with power. The pilot was unable to stop the descent, and the aircraft landed hard.''

Nothing New

Settling with power is not a new expression. Yet, sometimes ''true'' settling with power is confused with other conditions that mimic it. Basically, for a helicopter to settle with power, the following three conditions must be present simultaneously: The airspeed must be less than 12 knots, at least 20 percent power must be applied, and the rate of descent must reach or exceed 300 to 400 fpm.

As a refresher, take a look at the figures that illustrate the types of vortex systems present during the different conditions of zero airspeed climb, hover, settling with power, and autorotation.

During a climb, air flows downward through the rotor. Although three distinct vortex systems exist in the wake of any propeller or rotor, the system can be simply depicted as shown in figure 1.

When the helicopter is hovered, the airflow is still downward through the rotor system. However, this air is picked up from a lower level, as shown in figure 2.

When a helicopter settles with power, the usual vortex systems are altered, and a separate one emerges. It lies in the plane of the rotor and is a continually recirculating one. This condition, commonly referred to as the vortex ring state, can cause severe turbulence. It is depicted in figure 3.

The final situation occurs during autorotation, also referred to as the windmill brake state. During descent of the aircraft, the airflow is upward through the rotor system as shown in figure 4.

A look at some examples of mishaps commonly (but erroneously)

Figure 1

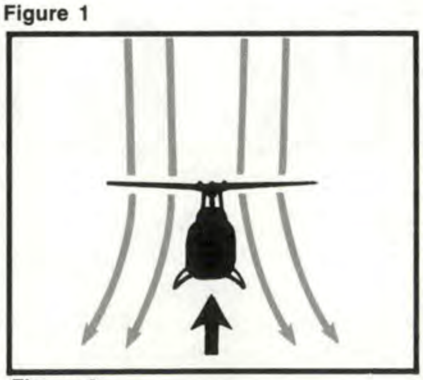


Figure 2

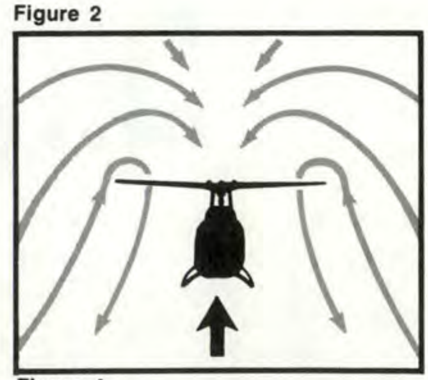


Figure 3

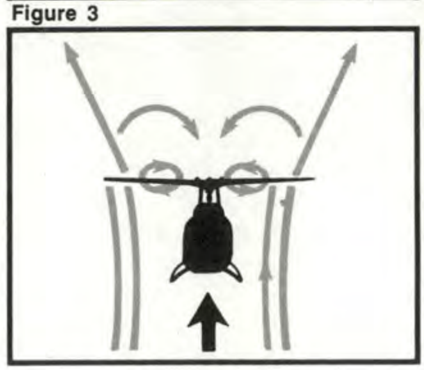
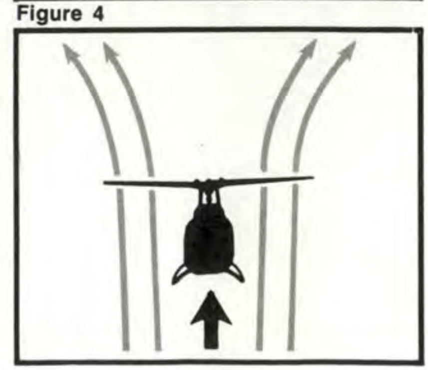


Figure 4



attributed to settling with power can help you to better understand this phenomenon so that you can avoid it.

First, consider a helicopter that takes off into a 20-knot headwind on the lee side of a slope. After reaching an altitude of 50 to 75 feet and attaining an airspeed of about 50 knots, the pilot begins a 180-degree turn. As he completes the turn, the aircraft begins to lose altitude. The pilot reduces airspeed and applies full power, but the aircraft continues to lose altitude until it finally crashes.

In this example, the pilot made a sharp turn in a known downdraft area. During a turn, more lift is needed to maintain altitude. This can be done either by sacrificing airspeed or by increasing pitch. The pilot tried both but was unsuccessful— because he was operating in a downdraft. Consequently, poor judgment can be blamed for this mishap. The pilot should have reached a safe altitude and built up sufficient airspeed while operating in a known region of a downdraft before attempting a turn. This was not a true case of an aircraft settling with power.

In a second example, we find a pilot performing a test flight to check the effectiveness of the tail rotor. The pilot zeroes the airspeed and enters autorotation at 1,000 feet above the airfield while headed into a 15-knot wind. He then elects to make a series of small turns while traveling backwards over the ground instead of making 360-degree turns. At 400 to 500 feet AGL, he senses he is falling too fast and he applies power. At about 150 feet AGL, he starts to apply pitch. When the aircraft is about 25 feet above the ground, the pilot notes the rate of descent is excessive, and he applies full pitch and power. The aircraft crashes.

The Facts

Let's examine the facts. At an altitude of 500 feet, the rate of descent was approximately 2,400 fpm. At 150 feet, the rate was the same. This meant the aircraft would reach the ground in 4 seconds. It is doubtful if any pilot could have made a successful autorotation or power recovery under these circumstances. Beginning the maneuver at an altitude of only 1,000 feet, delaying power recovery, and failing to regain airspeed before reaching a minimum of 500 feet showed poor judgment. However, here again, the true cause was not settling with power.

But didn't the aircraft in both of these examples actually settle with power? In all probability they did shortly before they hit the ground. This is true because the three requirements for settling with power were present in both instances. However, these requirements were not evidenced until just before the aircraft hit the ground. So, settling with power was not the actual cause of these mishaps.

Finally, let's look at a third mishap. This one occurred a number of years ago and involved a Royal Australian Air Force pilot. The importance of this mishap lies in its ability to show the three conditions required for true settling with power, and how readily they can occur simultaneously during flight when pilots fail to remain consciously aware of them.

This pilot was making an approach to a pinnacle. However, this approach was steeper than he intended it to be, and he allowed his airspeed to decrease below 10 knots while the aircraft was still 30 feet in the air. At this time the aircraft began to settle to the ground, and no amount of power could stop its descent.

In this instance, two conditions conducive to settling with power were present during the first part of the approach. The rate of descent was more than 400 fpm, and more than 20 percent power was being applied. When the airspeed decreased below 10 knots, the third condition was satisfied, and the aircraft promptly settled with power.

In summation, the following is quoted from this mishap report: "The phenomenon of settling with power manifests itself under conditions applying at the time, and involves high vertical rates of descent and reduced cyclic control effectiveness. This condition is entered following a low-speed, partial-power descent where the airspeed is inadvertently zeroed.

"The characteristics of settling are very similar to the feel of stall in a conventional aircraft. The recovery procedure is also approximately the same, i. e., drop the nose and accelerate into forward flight. If this cannot be done, recovery can also be made by reducing collective pitch to a minimum, which results in considerable altitude loss."

The point is clear. Applied power, airspeed, and rate of descent are the three prime factors associated with the condition known as settling with power. Any time you let your airspeed decrease below 12 knots while you are applying 20 percent, or more, power and you allow your rate of descent to reach or exceed 300 to 400 fpm, you can expect your aircraft to settle— regardless of any remaining power you might then choose to add.

Should you find yourself in this predicament, and your altitude is insufficient for recovery, you can be sure of one thing: You are going to come down, and in all probability, your aircraft is going to be out of commission for repairs. Stay aware of the conditions that lead to settling with power, and avoid this trap. The place for your aircraft is up in the air and in commission— not down and out. —*Courtesy of U.S. Army* Flightfax, *Aug 80* ■

X-COUNTRY NOTES

By MAJOR DAVID V. FROEHLICH
Directorate of Aerospace Safety

■ TRENDS

MANNING — Base Ops and TA manning seem to be on the upswing. Commanders are realizing that these are two very critical areas that cannot stand short or badly inexperienced. We'll keep you posted.

TRAINING — Good news! Rex is working with the audiovisual folks on what we think will be a super addition to your 271 training program. It's planned to be an orientation/motivation film which will depict the diverse duties, roles and responsibilities of the Base Ops dispatcher. We're gearing it as a tool for getting new folks up to speed quicker. Without a tech school, all's fair!

COMMUNICATING — More folks are talking about transient services! Some are called Rex Riley committees, Transient Services Working Groups, etc. The end result is the same — interested members from all base agencies are getting together and cooperating toward better and safer transient services. The keys are a "no-threat" atmosphere and a "pull-together" attitude.

Pre-answered questions can aid in better service.

INTEREST ITEMS

PHONES — We all know the costs involved and cost-cutting in progress, but aircrews have to communicate! There has to be a provision in Base Ops *and* in the billets for crews to call out or be reliably contacted. There are ways to work the problem.

INFO — I'm not one to propose cluttering walls or bulletin boards, but there is a need for info. Posted phone numbers, operating hours, bus schedules and other *necessary* information will save a lot of counter congestion or needless distraction for billeting clerks or Base Ops dispatchers. In these days of personnel cutbacks, pre-answered questions can aid in better service.

PREFERRED DEPARTURE ROUTES — Places with bunches of traffic usually have these. Even with a SID, an arrangement with departure and center may smooth transients filing out of your airfield. Work them up and post them in the flight plan area.

CREW REST/DUTY DAY — These are the rules by which crewmembers are often governed. There are still lots of folks at bases that don't completely understand. Education is the key! Officer or enlisted, colonel, captain or staff sergeant — if an individual is crewing an aircraft, he or she probably has a maximum duty day and minimum rest requirement prior to beginning the next duty day. These are *rules*, not preferences, and they have a sound basis providing a safety margin for aircraft ops. You can't have a completely smooth transient services operation at your base if some of the players don't appreciate the rules.

NEW ADDITION

Dyess AFB—Folks down Abilene way are putting out the welcome mat. TA, Ops, billets, transport and inflight all checked OK. A good place for a mid-U.S. fuel stop or an RON when you travel the southern route.

REEVALUATIONS

Elmendorf AFB—Once again, we received an outstanding report on this up-north place. The key word that kept showing up was attitude. They get a good load of transient traffic and all concerned display an obvious attitude of helpful and courteous service. Good work!

An otherwise excellent operation (may) be dragged down by one gross area.

Kadena AB—Had some problems in the past, but we got good words about them on the most recent reports. Some strange airfield, weather and location problems, so study up if it's your first time in.

NO CIGAR

BASE X—Generally a good report except the TA area. Only 9-10 folks on board to work a high count overseas, 24-hour TA section. At times dangerous!

BASE Y—This location had plenty of help but shoddy. The TA folks were all over, but lackadaisical. Procedures were careless, safety precautions non-existent, and service matched all of the above.

BASE Z—Broke my heart! Flightline operations were outstanding. Transport and food facilities excellent. Billeting was the bust! Officer quarters acceptable, but nothing to write home about, but the quarters that the enlisted crew folks were assigned were the "pits." Mosquitoes breeding, roaches marching, and facilities falling apart. A shame to see an otherwise excellent operation be dragged down by one gross area and apparently one individual who doesn't care!

PLEASE WRITE! We keep files on every base in the world. We often forward correspondence to installation/unit commanders and receive positive feedback. Our mail to "Dear Rex" is increasing, and we're happy that we are a sounding board for crews, managers and anyone with the desire to improve transient services. Better communication leads to better cooperation leads to better and safer transient aircraft operations. Write Rex Riley, AFISC/SEDAK, Norton AFB, CA 92409. ■

THE

REX RILEY
Transient Services Award

LORING AFB	Limestone, ME
McCLELLAN AFB	Sacramento, CA
MAXWELL AFB	Montgomery, AL
SCOTT AFB	Belleville, IL
McCHORD AFB	Tacoma, WA
MYRTLE BEACH AFB	Myrtle Beach, SC
MATHER AFB	Sacramento, CA
LAJES FIELD	Azores
SHEPPARD AFB	Wichita Falls, TX
MARCH AFB	Riverside, CA
GRISSOM AFB	Peru, IN
CANNON AFB	Clovis, NM
LUKE AFB	Phoenix, AZ
RANDOLPH AFB	San Antonio, TX
ROBINS AFB	Warner Robins, GA
HILL AFB	Ogden, UT
YOKOTA AB	Japan
SEYMOUR JOHNSON AFB	Goldsboro, NC
KADENA AB	Okinawa
ELMENDORF AFB	Anchorage, AK
PETERSON AFB	Colorado Springs, CO
SHAW AFB	Sumter, SC
LITTLE ROCK AFB	Jacksonville, AR
TYNDALL AFB	Panama City, FL
OFFUTT AFB	Omaha, NE
BARKSDALE AFB	Shreveport, LA
KIRTLAND AFB	Albuquerque, NM
BUCKLEY ANG BASE	Aurora, CO
RAF MILDENHALL	UK
WRIGHT-PATTERSON AFB	Fairborn, OH
HOMESTEAD AFB	Homestead, FL
POPE AFB	Fayetteville, NC
TINKER AFB	Oklahoma City, OK
DOVER AFB	Dover, DE
GRIFFISS AFB	Rome, NY
KI SAWYER AFB	Gwinn, MI
REESE AFB	Lubbock, TX
VANCE AFB	Enid, OK
LAUGHLIN AFB	Del Rio, TX
FAIRCHILD AFB	Spokane, WA
MINOT AFB	Minot, ND
VANDENBERG AFB	Lompoc, CA
ANDREWS AFB	Camp Springs, MD
PLATTSBURGH AB	Plattsburgh, NY
MACDILL AFB	Tampa, FL
COLUMBUS AFB	Columbus, MS
PATRICK AFB	Cocoa Beach, FL
ALTUS AFB	Altus, OK
WURTSMITH AFB	Oscoda, MI
WILLIAMS AFB	Chandler, AZ
WESTOVER AFB	Chicopee Falls, MA
McGUIRE AFB	Wrightstown, NJ
EGLIN AFB	Valpariso, FL
DOBBINS AFB	Marietta, GA
RAF BENTWATERS	UK
RAF UPPER HEYFORD	UK
ANDERSEN AFB	Guam
HOLLOMAN AFB	Alamogordo, NM
DYESS AFB	Abilene, TX

SURVIVAL: Thinking Cool

By MSgt DONALD R. McLAUGHLIN | Current Operations Division
3636th Combat Crew Training Wing (ATC)
Fairchild AFB, WA

■ With the forthcoming winter pressing at our backs, let's turn our attention to the mental and physical preparations that one must make to ensure a safe and healthy return should an emergency arise. Military aircrew personnel are faced with the fact that mechanical failure, human error, weather, and, because you are in the armed forces, battle damage may render your aircraft unsafe for human occupancy. Since that only happens to others, many of us unconsciously drift into a state of complacency and become unprepared for an arctic survival episode. Don't be a Johnny-come-lately! Use the information discussed in this article to increase your survivability in the event you become the victim of an aircraft emergency.

Often, when involved in a discussion on arctic survival, we tend to limit the conversation to the geographical boundaries that encompass the North and South poles. To establish a practical extreme cold survival plan you must also include areas of high altitude where arctic-like conditions may also occur at any time of the year. Weather in extreme cold areas is unpredictable and can change so rapidly that all attempts of the *unprepared survivor* may be of no avail. The long periods of darkness during the winter months and subzero temperatures require the survivor to be totally familiar with issued life support equipment and well versed in such skills as shelter construction and firecraft.

Personal Protection

Personal protection, from a survival standpoint, might best be defined as those preventive measures taken to preclude both physiological and psychological injury or harm. A most important step toward cold weather survival is *maintaining body temperature*! Personal protection in arctic or arctic-like environments may be more difficult than in other areas of the world due to the extreme harshness of the conditions to which the survivor may be exposed. But, it is *not* an impossible task.

The tools for survival are furnished by the Air Force, by you, and by the environment. Survival training has provided you the skills and techniques. But tools and training are not enough; neither is effective without the will to survive. When you find yourself faced with a survival situation, remember this: The mental barriers to be bridged may be far greater than the obstacles presented by the natural environment. Emphasis should be placed on a healthy attitude; always be alert to complacency creeping in to control your actions and emotions, either before or during a survival episode. Get to know your capabilities and tolerance levels. The following are nine survival stresses that you may be faced with: (1) Fear and anxiety; (2) Pain, injury, and illness; (3) Cold and hypothermia; (4) Thirst; (5) Hunger; (6) Fatigue; (7) Sleep deprivation; (8) Depression, feeling sorry for yourself and boredom; (9) Loneliness and isolation.

Cold Injuries

The prevention and early detection of injuries associated with arctic conditions cannot be overemphasized. In severe cold climates, if injuries such as bleeding, burns, and fractures are incurred, the treatment necessarily becomes twofold. Not only do you have to stop the bleeding or splint the fractured limb, but you must also guard against frostbite by adding insulating material to the injured member.

Hypothermia is a common medical problem. It is also prevalent during milder temperatures, especially if dampness is present. Hypothermia results when the body's core temperature is lowered due to an inability to produce enough heat to keep up with losses which occur through radiation, evaporation, conduction, convection, and respiration. To prevent hypothermia you should eat, drink warm fluids, take frequent rest breaks, stay dry, and regulate your body temperature through proper utilization of clothing and shelter.

Frostbite is the freezing of body tissue and fluids. You may suffer superficial frostbite (the skin only) or deep frostbite (that which may penetrate as far as the bone marrow and includes all tissue to whatever depth the frostbite reaches). Except in rare cases, frostbite is restricted either to the extremities of the body (hands, feet, nose, and ears) or to areas like the heels, chin, and cheeks. The severity of the injury is influenced by the intensity of the initial exposure and length of time before adequate circulation can be restored. Frostbite is prevented by wearing protective clothing and by not allowing flesh to become exposed to cold and wind, or come in contact with cold objects like wood, fluid and metal. If flesh does freeze, do not rub, massage, or open blisters. Do not rewarm using the flame of a fire. If superficial frostbite is the case, rewarm immediately using body heat. Deep frostbite should not be rewarmed when it is not known how long it will be before receiving clinical treatment.

It is good practice to enroll in a first aid course with emphasis on self-aid. After all, a lone survivor must also be the doctor.

Clothing

Clothing is the first line of defense against any environment in which you may find yourself. In order to prevent such cold injuries as hypothermia and frostbite we must know how clothing keeps us warm. The degree of warmth that clothing provides is determined by the amount of insulation. Insulation in clothing is nothing more than dry, dead air held in between the fibers and the layers of clothing.

Both natural and synthetic materials used in clothing for insulation must be able to breathe so as not to cause condensation on the inside of the garment.

An acronym of the word COLD can help you to remember how to use and care for your clothing.

Keep it **C**lean
Avoid **O**verheating
Loose and in Layers
Keep it **D**ry

You must keep it clean to prevent the entry of dirt particles into the fabric, which through friction would wear holes in the garment. Dirt also clogs the air spaces and causes heat to be lost by conduction. By ventilating when warm and slowing down your rate of work, you can avoid overheating which causes the clothing to become wet from sweat.

Remember heat is lost nearly 200 times faster through wet clothing than through dry clothing.

Multiple thin layers of clothing will be more effective in keeping your body temperature at a constant level than a couple of very thick layers. This will also allow you to add or remove layers as you get warm or cool off and not cause you to dampen the thick layers from sweat caused by wearing too much clothing for your activity.

The layer system is a very personal thing that must be experimented with by YOU to see what keeps you warm. Your ability to use clothing properly may make the difference whether you live or die.

Remember if you take care of your clothing and equipment it will take care of you when you need it.

Fire

Many people have suffered unnecessarily, and in some cases died, because they waited too long before attempting to build a fire. (Read Jack London's short story—To Build a Fire.) As a result, their fingers lost the dexterity necessary to hold matches, flint and steel, or other fire starting devices. DON'T WAIT! As soon as you recognize the need for a fire, get busy gathering the necessary materials.

Within the tree line, fuels for fire are plentiful. Bark from birch trees, found throughout the northern regions of the world, is one of the best tinders for starting fires. Highly flammable and easy to procure, it provides the foundation upon which to build. The lower dead limbs from spruce, the predominant evergreen in the North, provides the kindling. This abundant source of dry wood may be gathered by the arm load; it ignites easily, producing both heat and light. Dead standing birch and aspen trees are also sources of fuel. Often these may be pushed over and brought into camp in large pieces. Chopping and sawing expend large quantities of energy and produce wasted body heat and excessive sweat. In the treeless regions of the arctic, scrub willow and drift wood may be your only sources of wood.

While survival manuals and ☞

schools historically have advocated the use of primitive fire starting devices, i.e., flint and steel, *nothing beats a match* for getting fire going quickly. M-2 Firestarters contained in some survival kits are another excellent fire starting aid. Metal matches, magnesium fire starting tools, and flint and steel are also effective, but require a higher degree of skill to use and allow less time for practice under cold conditions.

In order for a fire to burn efficiently three things are necessary:

Heat—initially that heat produced by fire producing device.
Oxygen—from the air.
Fuel—from natural resources, POL products, etc.

Remove any one element and you will be without a fire.

Start with thin, fine dry materials such as: shredded birch bark, dry moss, or wood shavings.

Increase size of wood gradually, allowing each successive layer to ignite before adding another.

Maintain adequate ventilation. Don't compact the layers of wood and smother the fire.

Warmth, light, drying clothing and equipment, melting snow and ice for water, cooking food, signaling, and morale are all dependent, to a degree, upon your ability to produce and maintain a fire.

This is only a guide to firecraft. "Hands-on" practice is the only way to develop the necessary skills to ensure your ability to maintain your body heat through the use of survival fires.

Shelters

Shelters for the arctic are designed to afford effective maintenance of one's body temperature from a minimum amount of expended energy. Careful shelter site selection, available materials, and the proper shelter for the type of weather are the three factors a survivor should consider.

In selecting an area to construct a shelter it is necessary for one to consider safety as well as individual needs. Natural hazards such as avalanches, high winds, water fluctuations, and dead standing timber are just a few dangers that may be encountered. The survivor should also, at the same time, evaluate other basic survival needs. These needs consist of food, water, fuel, adequate signaling area, and building materials. With personal safety and these needs satisfied, the survivor is ready to begin the construction of a shelter.

Arctic shelter construction is based on the thermal principle. There are two basic concepts of this principle. First, the use of the insulation quality of dry snow derived from the mass of dry, dead airspace enclosed between individual crystals. Second, the use of heat radiating from the earth when bare ground is exposed inside the shelter. With those principles in mind it is possible for a survivor to construct a shelter that will maintain a constant temperature of plus 10 to 20 degrees Fahrenheit inside even though the outside air temperature is below zero.

Shelters are divided into those constructed within the tree line and those constructed on barren land to include the ice pack. The primary difference is that of building materials. Tree line shelters are constructed of pole frameworks and covered with boughs and snow. A few examples are the Thermal A-Frame, Thermal Wedge, and the Thermal Double Lean-To's. Barren land shelters are constructed of blocks cut from compact snow. Some examples of these shelters are the Fighter Trench and Para Snow House; a snow cave may also be dug in a snow drift.

It is important that all shelters be kept large enough to provide room for the survivor and equipment, yet not so large that it is difficult to heat. The entrance to all shelters should be completely sealed from the outside environment. A ventilation hole is necessary if a heat producing device such as a small stove is used in the shelters.

Water and Food

You need as much and sometimes more water to survive in the arctic than in a summer desert. Each day about one pint of water is lost through respiration, about one pint through perspiration and about two quarts through evacuation. A 2½% loss of body fluids without replacement results in up to a 25% loss of efficiency in working and thinking. A 10% loss of fluid usually results in death. A three quart loss per day, replenished by two quarts per day, results in a 10% loss in about five days. You must continually ensure that you drink three to four quarts of *warm* fluids each day to maintain your body fluid level and prevent dehydration. To maintain your body temperature in cold environments it is necessary to maintain an intake of energy producing foods. Daily caloric requirements increase from 3,500-4,000 calories to 4,500-5,000 calories per day. Once signals are constructed, firewood gathered, and you are safely sheltered, the daily caloric requirement decreases. During the first 12 to 24 hours of a survival episode, calories are provided by the meal eaten just before or during the flight. After that, one must fall back on survival rations and food procured from the land. A survivor's diet should consist of a high percentage of carbohydrates (General Purpose Rations— 870 calories per can) during the first few days thereby allowing the body to adjust gradually to burning larger proportions of fats and proteins.

Rescue and Survivor Responsibilities

The most important member of a recovery force may well be the survivor. Rescue doesn't just happen . . . it is made to happen by YOU, the survivor! By applying the basic fundamentals already discussed in this article, you will be alive to be rescued.

Virtually anyone and everyone is a source of rescue. Don't hesitate to attract the attention of anyone that is in or near your area. It is the survivor's responsibility to initiate contact with recovery forces. As soon as there is an emergency, transmit your distress call to anyone that will listen to you. If possible, let them know who you are, where you are, altitude, heading, and your full intentions. Do this while still in the aircraft. Transmit in the blind if contact cannot be made. Don't wait until you are on the ground relying on emergency transmitters which have limited range and battery life; especially with extreme cold conditions where the batteries may only last a few minutes.

Once on the ground, turn off all activated locator beacons to prevent the continuous tone from overriding all voice communications. Immediately establish a logical sequence of transmissions to effect voice contact. Conserve the battery life of the transceiver by using a Beeper-Talk-Listen-Cycle. To accomplish this transmit a continuous tone for 15 seconds, transmit your call sign two or three times, and then monitor 15 seconds listening for a reply. Repeat this cycle three times consecutively. If a reply is not received, turn off the transceiver and wait until such time as you feel someone will be within transmission range. Caution: When the transceiver is not in use, place it between layers of clothing to protect the battery from the cold. While waiting for rescue, mentally practice the vectoring technique in the event you are required to direct the recovery forces to your position.

Don't lose confidence in the rescue forces and attempt to walk out. Travel in the arctic is not recommended under most circumstances. The hazards and difficulties which may be encountered far outweigh the advantages of trying to return to civilization under your own power. The only reason you should travel is to locate a safer position or one providing more resources and then, only for short distances. A short distance for a survivor may be as little as 15 minutes walking time.

Use visual signals to enhance your chance of being spotted. An aircraft kept clear of snow serves as a ready made signal. Strip signals constructed from commercial or natural materials are designed to attract attention and carry a message. To be effective, a strip signal should be placed so it can be seen from 360 degrees by search aircraft and visible as far away as the naked eye can see. It should contrast against its background and have distinct, straight lines and sharp corners. The absolute minimum size for a strip signal is 18 feet long and 3 feet wide, and should be larger if it is to be seen from any distance. Snow signals can be stamped in the surface using proportionately larger dimensions. Be careful, this activity expends energy.

The arctic winter has many days with long hours of darkness and, therefore, some type of signal light will be highly beneficial, i.e., fire, flashlight, gyro-jet, MK-13 day/night flare, strobe light. All of these should be ready for use at a moment's notice and, except for fire, activated only when you are certain the search party can see the signal or upon request of the SAR personnel.

In order for the rescue forces to continue with a high rate of success in recovering downed aircrew members, the survivor must be trained, equipped, and prepared to accomplish the various tasks required to preclude being a liability rather than an asset. In the final analysis, mental attitude can determine the success or failure of a survival ordeal.

Questions or comments concerning the information contained in this article should be addressed to:
3636 CCTW
Current Operations Division (DOO)
Fairchild AFB, WA 99011
or AUTOVON 352-2339. ■

By CAPTAIN GORDON N. GOLDEN • Directorate of Aerospace Safety

■ There are times in our lives when perceived role and peer pressure become so strong that we are not able to objectively view our own actions and their impending results.

Somewhere, some time ago, maybe it was in Introduction to Sociology, I heard it said "The way we think and act is the result of the sum total of our experiences and our environment." Personally, I think we are not puppets of our environment. However, when you step back and look around, maybe there is some truth to the "product of our environment" theory.

An observation was made several years ago in the civilian community about the number of flying physicians involved in light aircraft mishaps. It seems that doctors as a group were involved in light aircraft mishaps way out of proportion to their numbers. The analysis finally centered on the doctors' perceived role. They could *never* be wrong. In a doctor's daily dealings involving life and death decisions, if he ever started to doubt that the actions he took were right, his psyche would not survive, the pressure and self-doubt would be too great. Therefore, all doubt about his professional actions was eliminated for survival.

This defense mechanism became a part of the individual's personality and was integrated into all of his thought processes. This "I can't be wrong" defense mechanism translated into aircraft mishaps usually as a corollary to the "get-home-itis" syndrome. Once the

Why Do I Do The Things I Do?

decision to fly to a destination was made, the pilot physician would press on despite deteriorating weather which was the usual scenario of a mishap. You see, once he had made the decision to go, he had to continue; it was part of his role.

"Well, that's a great piece of information," you say, "but how does that apply to me?" Macho Man has been a part of the pilot's image from the beginning of aviation. The word "pilot," especially if prefaced by "fighter," instantly conjures up the picture of a daring young man and his flying machine with his scarf trailing in the breeze. The image literally oozes danger, excitement, and adventure. It's part of the role we play as pilots.

A pilot has to have self confidence and a certain degree of aggressiveness or he won't make it as a pilot. The I'm-the-best-aviator-who-ever-raised-a--gear-handle attitude helps us maintain our individuality and makes us think for ourselves to a certain degree. That's one part of the environment we move in as Air Force pilots, the superior skill and cunning pilot role we all emulate.

Another part of our environment is peer pressure. Peer pressure is something we have all experienced in varying intensities throughout our lives. We usually conform to the group norms if we want to be accepted by the group. New pilots in a fighter squadron probably experience one of the more intense peer "pressure-cookers" that our society has developed.

A new fighter pilot (low time in that particular aircraft) comes into a squadron able to safely fly the aircraft and basically qualified to perform the mission, yet not long after this "new guy" arrives at the unit he discovers he will have to prove himself before he will be accepted into that particular group of the brotherhood of fighter pilots. Nobody, even a new guy who has not had time to gain proficiency, wants to be labeled the squadron "grape" or be a long-time resident of the bottom slot in the top gun competition.

The stage is now set. We have a fighter pilot with a strong self-image (possibly stronger than his abilities warrant) who is sorely tempted to press his self-established limits to gain the admiration of his squadron mates or avoid humiliation at their hands.

There's no problem with striving to improve ourselves, but when there is a mismatch between our perceived limits and our actual abilities, look out!

Take a look at a few indicators of this mismatch between perceptions and abilities. Some have figured in lost aerospace hardware and pilots.

Have you ever seen the pilot who:

- Won't knock off an ACT engagement, no matter what, until he gets a shot?
- Will do *anything* to keep from getting shot in an ACT engagement?
- Overshoots half his rejoins after takeoff trying to set a new squadron record?
- Consistently fouls on strafe passes?
- Charges the refueling boom to the point that the boomer gets jumpy?
- Continues the low level mission in deteriorating weather?
- Tries to salvage a poor roll in on a bomb pass?
- Takes a broken airplane for fear of being called a weenie?
- Calls "Judy" on a low, slow target with the gear horn blowing in the background?
- Flies an alternate mission when he's not really prepared?

Did you see anybody you know? Did you see yourself? We're all responsible for the problem:

- The new guy who's pressing his limits.
- The IP or flight commander who sees a gap between a pilot's abilities and his actions and doesn't say anything about it.
- The training officer who throws everybody into the top gun competition as soon as they walk through the door.
- All the guys in the squadron who ping on the new pilot every time he makes a false move.

Training for a tactical mission is by nature competitive, but the emphasis has to be put on increasing unit combat effectiveness, not personal prowess. If we can switch emphasis to the unit as a whole and help the new guy get up to speed instead of putting him through a trial by fire, maybe we can reduce some of our over-commitment losses. ■

Hydroplaning Made Easy

By MAJOR ARTHUR P. MEIKEL
Directorate of Aerospace Safety

■ Hydroplaning is easy. All you have to do is land an aircraft on a wet or icy runway and you will experience some sort of hydroplaning.

In reviewing past hydroplaning articles we find that the same information is often presented in slightly different format. The pictures and examples change, but the definitions and explanations are consistent and correct.

With all of this good information readily available, why is it that our aircraft keep leaving the runways at other than designated taxiways? To make better use of the information we have received over the years let's think of it in two categories: (1) How to stay out of a moderate or severe hydroplaning situation and (2) What to do when confronted by hydroplaning conditions.

The first category of information can better be described as education, facts, formulas and figures designed to teach JUDGMENT. Authors are reluctant to mention judgment for some reason, but a major portion of a pilot's pay is earned through the decisions he makes. If you are willing to make the decision to divert to an alternate, you may have selected the best defense against a hydroplaning mishap. Notice the phrase "willing to make the decision to divert." When an aviator is designated pilot in command, he is recognized as "able and responsible" to make a decision to divert. Idealistically, the decision is the pilot's; however, anyone who flies knows the pressure to stay on schedule or get the passengers/goods to their destination. To help us make a sound decision on whether or not to land, let's review what information is available from preflight through just prior to landing. Consider which information is most critical. As you scan the list, try to rank them according to what value you place on each item and how much it affects your judgment.

- **Coefficient of Friction (M=F/N)**
- **Definitions of Viscous, Reverted Rubber and Dynamic Hydroplaning.**
- **Tire Pressure ($7.7 \times \sqrt{p}$).**
- **RCR**
- **Runway Composition/Surface.**
- **Tire Condition.**
- **Current Weather Conditions.**
- **Consult with Supervisor.**
- **Aircraft Capabilities.**
- **Your Proficiency.**
- **Runway Environment.**

Coefficient of Friction The formula M=F/N for coefficient of friction gives you an abstract figure based upon friction force over normal force. This formula is nice to know but is unimportant if you already believe that braking effectiveness is a variable which is dependent upon, among other things, the runway surface condition. In other words, if you believe "it gets slippery when wet," you have learned this lesson.

Definitions The definitions of three recognized types of hydroplaning are meant to teach you that hydroplaning of some sort can occur from touchdown to O KIAS with very little moisture present or on a patchy runway.

Reverted rubber hydroplaning occurs when the pilot locks the brakes. During a prolonged skid, the tire slides on a layer of melted rubber or steam generated by friction on a wet surface.

Viscous hydroplaning occurs on wet runways with a smooth surface or one covered with melting ice or rubber deposits. During viscous hydroplaning a tire displaces only a portion of the moisture on the runway surface.

Dynamic hydroplaning occurs when an aircraft tire is completely separated from the runway by water. Dynamic hydroplaning is affected by the ability of the tire to break through the layer of water.

Tire Pressure ($7.7\times\sqrt{p}$) An Aircraft will continue to experience dynamic hydroplaning until it decelerates to a speed below $7.7\times\sqrt{p}$ (P equals tire pressure). During landing this is a good figure to be aware of so you will know at what speed you should begin to get improved braking effectiveness. Below this speed you still are susceptible to viscous and reverted rubber hydroplaning. For large aircraft, tire pressures are varied for different gross weights. Ask your crew chief the tire pressure on preflight. It is normally on his preflight checklist.

Tire Condition Tread patterns greatly affect the tires' ability to break through a limited amount of surface water. If you are flying with a set of "slicks," you are in much worse shape than if you have a good set of water diverting, deep grooved tires. Maintenance can prove that your "slicks" are good for at least two more landings. As aircraft commander, it is your prerogative to decide if they are acceptable for *your* next two landings. Change if necessary!

Runway Composition/Surface Another good mission planning task would be to investigate the runway composition and type of surface for your base of intended landing and your alternate. A concrete runway is more desirable than an asphalt one when you are trying to avoid viscous hydroplaning. In addition to determining the runway composition, the type of runway surface is also important. If a runway is grooved, it helps water escape from under the tire and prevent dynamic hydroplaning. It would also be good to know the drainage situation at your base of intended landing. Some bases near sea level have poor drainage and literally are underwater during a moderate rain. Other bases have porous runways and water disappears instantly. If this information is not available, or you lack personal knowledge, call the base operations officer or talk to someone who has operated out of the base. Unfortunately, this information isn't always available in the IFR Supplement.

Aircraft Capabilities Review your dash one, if you haven't done it lately, to refresh yourself on winter operations. Include crosswind limitations on an ice-covered runway. Aircraft capabilities include becoming intimately familiar with your antiskid system, braking system and a review of winter thrust reverse procedures.

Runway Environment Review your destination's environment with hydroplaning factors in mind. In addition to checking runway length, check to see if there is an overrun. Many civilian fields or combination civil/military fields don't have an overrun. Some flight manuals make special provisions for landing on runways without overruns. If the field services primarily airliners, expect that snow removal may not be as good as you are used to since most commercial aircraft are blessed with thrust reversers. Look at the runway gradient. If you have your choice due to a crosswind or very light wind, landing uphill may make a 500′ difference. Know the size of the "zero zone" (distance from the end to the first marker) at your destination. When you are hydroplaning past runway markers, it may help you to know *exactly* how much runway you have remaining, i.e., 6,000′ or 6,400′.

Consult with Supervisor After you've done all of your homework and are ready to go fly in less than optimum conditions, let your supervisor know what the latest conditions are and tell him your intentions. You will find that he is under the same pressures that you are. He also has to accomplish a mission and keep his aircraft in one piece. Get the benefit of his experience. A topnotch supervisor will let you know what he expects and remove any self-induced

☞

Hydroplaning Made Easy continued

pressure you might feel. Besides, he is getting paid to make decisions, too.

Your Proficiency Consider your capabilities as well as your aircraft's. If you have been filling the minimum number of squares in the last few months due to leave, DNIF or alert you may be putting yourself behind the power curve. I have seen pilots request that an IP be added to the flight orders due to forecast weather conditions. The request was honored and was considered by all to be good judgment.

Current Weather Conditions Right up to the time of landing, the weather must be monitored. A heavy shower over the runway while you are on final approach could cause you to delay your landing until the shower passes. Frontal passage may mean a big change in winds in a short time. A severe shower or abrupt wind change can quickly put you outside your aircraft limitations or remove the headwind advantage you might have counted upon.

RCR Runway Condition Readings give you a good estimate of what kind of braking action to expect. If you find yourself in a position where stopping distance is critical, request more information on the reading before putting a lot of confidence in it. How old is the reading? Was it taken right behind a snowplow? What is the RCR in your specific stopping zone? Has precipitation fallen since the last reading? The point is, don't rely on the accuracy of an artificial RCR value except for a planning factor. If you don't get the braking action you expected, go around.

Now that you have gathered the necessary information and if you made the decision to land, you are about to enter phase two. Let's consider what things you have to work with between the final approach fix and a full stop. Make a mental priority listing of the most important factors to you and your aircraft.

- **Reconsider**
- **Go-Around**
- **Firm Landing**
- **Aerodynamic Braking**
- **Braking Technique**
- **Which side of runway to land on**
- **Directional Control**
- **Landing Speed**
- **Asymmetric Thrust**
- **Differential braking**

Go Around I like the decision to go around the best. You can't go off the end of the runway if you still have the ability to take off. You may find that the information on which you based your decision to land was incorrect. The RCR you were given may have been incorrect or old. Water may have turned to ice. Precipitation could have increased while you were on final. You might have bounced on touchdown or been fast on final. All sorts of things could have gone wrong, gone wrong, gone wrong! Of course, the go-around must be done smoothly, correctly and in time. This requires some planning and coordination on your part. You have to convert the decision time, communication time, engine acceleration time, takeoff distance, rotation distance and obstacle clearance distance into a meaningful distance and speed. Planning can shorten decision and communication time but the other factors are pretty much constant. Your flight manual can provide you with some of the figures but you must decide how slow you can go at your weight and still take off. (For example: at 125 knots you may need 2,000′, at 100 knots you may need 3,000′, at 75 knots you may need 4,000!)

Reconsider After one attempt, you may find that you have better information to make a decision. Go back to step one even if it was only your proficiency that wasn't up to par.

Landing Speed Increases in landing speeds add distance to your ground roll and flare distances. Whether extra speed is due to pilot deviation, turbulence, configuration or gusts, the extra ground roll required to dissipate your ground speed may exceed runway available. If stopping distance is critical, a go-around due to excessive speed may be required.

Firm Landing Previous articles state that a firm landing can dissipate from 10 to 15 knots. If you are above your computed speed, a firm landing can result in a bounce and more runway behind you than you would like.

Braking Technique There are

two major points to consider. The first point is when to start braking. ASAP is about right. Don't use any delayed braking factor or wait until your normal braking point. If the runway is damp or partially snow covered, or otherwise doubtful, stop the machine as soon as you can. It is safer and will provide you with a better idea of your aircraft's capabilities. The other point to remember is how your dash one recommends braking on wet or icy surfaces. In general, you want to brake as hard as you can without locking up your tires. With your wheels locked, you can hydroplane to a much lower limit of your dynamic hydroplaning envelope. Releasing brakes occasionally will release inadvertently locked tires.

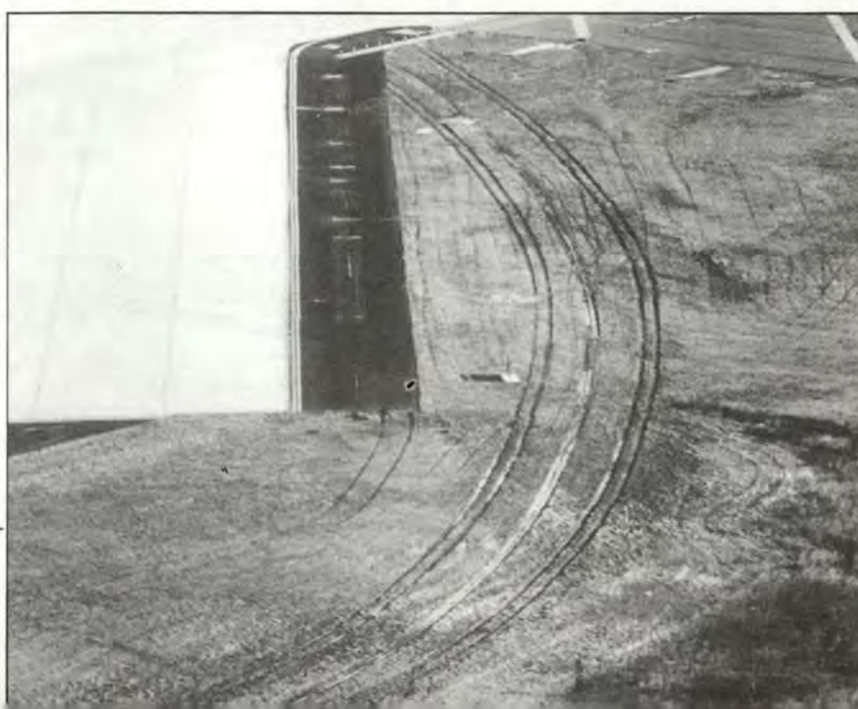
Aerodynamic Braking Every airplane is capable of some aerodynamic braking. As much as possible should be used to take the maximum advantage of headwind components. Some aircraft have limitations on aerodynamic braking due to poor controllability during crosswind situations. On other aircraft, crosswinds may cause normal braking to be uneven during aerodynamic braking.

Which Side of the Runway to Land On There are a lot of factors to consider in this decision. I'll simply try to list them and let you make your own decision. Landing in the middle of a crowned runway is normally the driest spot, however, a crosswind prevents water from running off the upwind side as quickly as the downwind side. If you move slightly off center, you run the risk of putting a set of main tires on the slippery painted center line. Moving slightly farther to the downwind side puts you on a side slope and a crosswind pushing you down that slope toward the short side of the runway. If your aircraft has a drag chute, you have another force helping you toward the side. If you land on the upwind half, you face the problem of your aerospace vehicle weather-vaning into the short side of the runway. When you slow to below the dynamic hydroplaning speed, directional control becomes a consideration as the aircraft starts to gain directional capability toward the near edge of the runway. At these slower speeds aerodynamic directional control is poor. On flat runways, there also is the problem of puddles or ice patches to avoid. As we discussed earlier, the depth of the water is a definite factor. Snowplows and sweepers sometimes leave patchy intersections or portions of the runway which make normal braking uneven. If wheels are locked crossing patchy areas, reverted rubber hydroplaning can result. Dealer's choice!

Directional Control Refer to your dash one for your best means of directional control. The rudder is usually the best means of keeping the aircraft where you want it. Use ailerons to counteract crosswinds for as long as possible. Even in large aircraft, ailerons play a greater role in steering than many pilots think. Improper use of ailerons can cause uneven braking, even at slow speeds, since it places uneven weight on the main landing gear. As for nose wheel steering, it is useful mainly in clearing the active runway after the aircraft is under control.

Asymmetric Braking/Thrust While asymmetric braking works better than nose wheel steering, in most cases the use of asymmetric thrust or braking means that you aren't using every means available to stop the aircraft. You probably planned on using all of your braking effectiveness and, at most, idle power. You are, in fact, increasing your ground roll, and possibly, should go around. Quite often asymmetric directional control occurs at relatively low speeds which are past the go-around point. One nice aspect of using asymmetric thrust is that a skidding tire won't be damaged as long as total hydroplaning occurs. The bad aspect is that you may be one hand short when looking outside the aircraft and trying to locate a throttle inside the cockpit. How proficient are most of us in taxiing an aircraft on an icy runway with throttles only? When was the last time you did it?

The next time you taxi clear of a wet or icy runway your sigh of relief will be because conditions were as you expected them to be and you knew you could stop. Gone are the days when you might have estimated and hoped that you would be able to stop. Hydroplaning is easy when you know how. ■

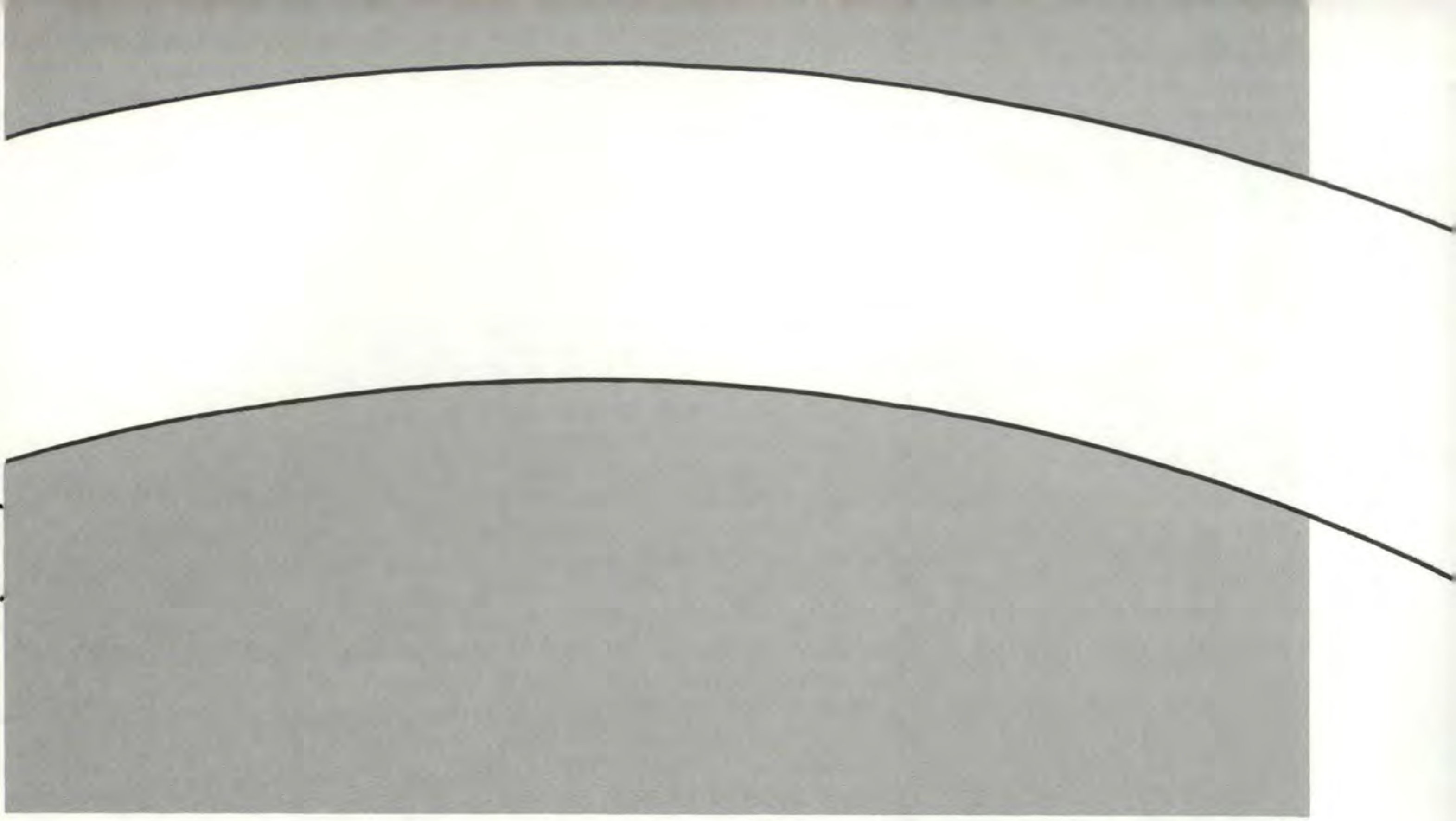


THERE I WAS

■ The range training officer had just advised me that I had killed the last of four adversary aircraft my element had engaged on a dissimilar air combat tactics mission on an air combat maneuvering instrumentation (ACMI) range. No shots had been fired by the opposition, and I was feeling rather good about how things had gone for me and my Eagle jet.

Partly out of sheer exuberance and partly for the benefit of my A-4 "partner" who had acted as a six-checker, while I worked the F-15's radar and weapons systems heavily, I figured one victory roll for each of the four kills I'd been credited with by the ACMI computer would be in order.

So, here goes . . . stick forward slightly to 1 G, or a touch less, out of the mild climb I was in, then stick smartly to the right, being careful not to go to max deflection (a dash one no-no in the Eagle if rolling more than 360°). One, two, (going almost too fast to count) . . . say, the nose is starting to move off its point, three . . . my God—I'd better knock this off . . . four . . . stick is centered laterally but the bird won't quit rolling! . . . Let's try just a touch of opposite aileron . . . No good, perhaps increase the roll rate. . . . You dummy, you must have induced an auto-roll . . . Let's see—are we positive or negative G? Damn, can't tell . . . Would estimate about ½ positive G 'cause I'm light in the seat but not hanging in the straps . . . OK, positive—here goes anti-roll rudder. . . . Jeez! That was obviously the wrong way. The roll rate is at least as fast as, even seems faster (. . . must have done 8 or 9 rolls by now and the nose is starting to drop below the horizon), but now I'm definitely *negative* G—the shoulder straps are cutting deep and the lap belt hurts. I guess that's *good* news. No doubt in my mind *now* which rudder to use . . . here goes.



Pro-roll rudder . . . It's still rolling. I believe it's rolling faster, but I *know* I've got the correct rudder in . . . Hope it works, would sure ruin my day if it doesn't . . . OK! It's slowing down its roll rate—looks like three rolls after getting all the pro-roll rudder I could achieve . . . Oops! What was that! As the Eagle stopped its rolling it did a negative 2½ G and a positive 7.3 G ya-ha maneuver with several smaller cycles of the same porpoise—all with the stick held centered. Thank God it's over.

After looking my beast over to ensure all was well, I decided I'd probably not do that again. I distinctly recall thinking how foolish I'd feel if I had rolled that way after splashing my fourth or fifth Flogger only to leap out because I couldn't recover from a condition I had induced.

I've since talked with a senior MACAIR test pilot and a USAF "golden arm" who has flown Eagles since the early days at Edwards. Both stated they'd never been in that particular flight regime, though the MACAIR pilot stated that he was aware of a great dislike by the Eagle for any high sustained roll rates at negative, or even *low* angles of attack (the dash one says so, too).

Flight conditions were: Approximately 400 KCAS, FL 230, approx .5 G, rapid roll rates. Roll-yaw coupling was apparent by the third roll. Approximate time of "maneuver" was 6 seconds. Best guess on total number of rolls was 12 to 14, altitude loss was 3,500 feet, and airspeed decreased approximately 50 knots. All three control augmentation systems (CAS) axes dropped off during the recovery. Internal wing fuel was within 50 pounds of balanced. I had 5,000 pounds of fuel remaining and a centerline tank.

Further study of the flight manual's Flight Characteristics section convinced me I really hadn't had an "auto-roll" as defined there (it always is a result of *high* AOA) but, rather, had experienced a particularly nifty example of roll and yaw coupling due to high roll rate, high airspeed, and very low angle of attack. I learned that waiting til coupling becomes evident may well be too late.

I hope the telling of this experience may keep some other aggressively exuberant Eagle driver from being an unwitting and unwilling passenger for one devil of a ride.

Thanks to the author of this (There I Was) story. It drives straight to the heart of this program. You may well save a young, eager flying officer from a worse fate and the Air Force a multi-million dollar hunk of readiness and combat potential. Thanks again. ■

Brig Gen Leland K. Lukens
Director of Aerospace Safety

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.

BACK ROW L TO R:
Maj Ricardo W. Mestre, Capt Thomas A. Wick, Maj Jerald D. Nelson, TSgt Tommy M. Thomas, CMSgt Arthur L. Kveck, SMSgt Leonard A. Crozier,

FRONT ROW L TO R:
SSgt James E. Hall, SSgt Robert L. Huntsinger, SSgt James E. Rodriguez, TSgt Michell K. Ritchie, SRA Robert C. Medina.

NOT PRESENT FOR PHOTOGRAPH:
SSgt David L. Rebholtz, SSgt Pete R. Mathewson, TSgt John H. Anthony, A1C Karl R. Myers.

■ On 16 January 1980 Major Mestre and crew departed Hickam Air Force Base, Hawaii, on a routine cargo/passenger mission to Andersen Air Force Base, Guam in a C-5A. The copilot, Captain Wick, was flying the airplane from takeoff through departure, which progressed normally until the landing gear retraction sequence. Just prior to the gear indicating up and locked, at about 100 feet AGL, two loud bangs were heard throughout the airplane. Immediately afterward, the number 2 engine fire light illuminated along with associated changes in engine instruments and a slight yaw. The copilot advanced all throttles, except number 2, to takeoff rated thrust and the pilot pulled number 2 engine fire handle. Major Mestre then took control of the airplane, at about 200 feet AGL, directed the copilot to discharge the primary fire bottle into number 2 engine, and called for the In-flight Engine Shutdown Checklist. Honolulu Tower reported smoke and flames coming from the left wing, as the pilot began maneuvering the airplane for an emergency recovery. A visual scan of the engine revealed the right blow-out door was missing and that flames, smoke, and sparks were coming from the engine. The pilot then directed the copilot to discharge the alternate fire bottle, and the engineer to discharge nitrogen into the left wing leading edge and number 2 pylon. The number 2 engine fire light remained

☆U.S. Government Printing Office: 1980—214/02

349th Military Airlift Wing (Associate) (AFRES) Travis Air Force Base, California

on, and fire was confirmed by visual scan. The copilot declared an emergency with the tower and completed the In-flight Engine Shutdown Checklist. While on downwind to the landing runway, at about 500 feet AGL, and approximately three minutes after takeoff, the left wing duct overheat warning light illuminated. The Pylon Fire Checklist was accomplished and nitrogen was continuously applied to the wing area until egress. The number 2 engine fire light remained illuminated and flame and smoke were visually confirmed from both the airplane and ground until after landing. The pilot elected to keep the flaps and slats lowered, guarding against a possible number 1 engine involvement, which would have extended flap and slat travel time, and lowered the landing gear on turn to short final. An uneventful landing was made, and the airplane was stopped on the runway center line with 5,500 feet remaining. The pilot pulled number 1 fire handle, called for egress of the passengers out of the right side of the airplane, and sounded the warning horn. Three loadmasters moved from the flight deck, through the cargo compartment, to the troop compartment, to assist the two passenger loadmasters in evacuating the 73 passengers, which included women, children, and infants from the airplane. The pilot and one flight engineer remained at their positions, started an APU to maintain communication with the troop compartment and tower, and shut down numbers 3 and 4 engines with the fire handles. The navigator, copilot, two flight engineers, two loadmasters, and two crew chiefs evacuated the six ACMs located on the flight deck, egressed through the crew entry door, and proceeded to the right side to assist in evacuation of the passengers. The passengers were egressed by means of two emergency egress slides, one of which would not open and had to be used as an apron chute, both held in place by eight of the crewmembers, now on the ground, and one firefighter. Six minor first-aid injuries were sustained by passengers egressing on the inflated slide. The Honolulu Fire Department, which met the airplane just after it had stopped, contained the fire to the engine and pylon area, but was unable to extinguish it until well after all the passengers and crew had been evacuated. When passenger evacuation was complete, the flight engineer and pilot egressed the airplane. The aircraft commander conducted a survey to determine that all 94 passengers and crew were accounted for. Major Mestre and his crew's superior airmanship, procedural knowledge, and exceptional crew coordination were directly responsible for the safe recovery of a valuable aircraft and all personnel on board. WELL DONE! ■

We're Changing
Starting with our NAME.

Beginning with January your old friend Aerospace Safety Magazine will become the Flying Safety Magazine

Beginning January when you think of flying safety

THINK OF THE **flying** SAFETY MAGAZINE