flying

SAFETY — JANUARY 1986

Winter Preflight

Cabin Fires

Could This Happen To You?

A Flying Legend Celebrates 50 Years of Service

See Safety Warrior Page 14

THERE I WAS

■ . . . on a routine missile site support mission. My copilot was at the controls, and we were flying four high-ranking base personnel to several sites when my conversation with the O-6 was interrupted. "We have a *fire* light."

I turned my attention to the instrument panel and saw the bright red warning light, but all other indications were normal. I thought, "Not another fire light. Now we'll be all afternoon sitting on the ground for another faulty warning system." I had no fewer than four previous fire warning indications, and they had all been glitches in the system.

Taking the controls of the H-1 I began a descent and instructed my copilot to advise Operations of our situation. While briefing our passengers of the fact that we would be making an unscheduled landing, I noticed a launch facility (LF) about one mile off the nose and decided to land at that government controlled facility to preclude any legal problems that could arise. Noticing the fire warning light had extinguished itself when I began the descent only reinforced my belief that it was "just the system." Approaching the LF, I adjusted my approach to land near the gravel access road to facilitate maintenance and perhaps expedite correction of our faulty warning system.

Having planned a normal approach to a hover, I began to add power to break our rate of descent. I was rudely awakened from my almost lackadaisical approach when the fire warning light again illuminated and our descent rate was not arrested. Salvaging what I could from the approach, power turbine speed began to bleed off as I increased power requirements beyond what was available. With the low rpm horn and warning light blaring and glaring and the now ever-present fire warning light, we made a rather firm but otherwise OK approach to a touchdown.

Securely planted on "terra firma," my copilot promptly egressed the cockpit to further evaluate the condition of our aircraft. After informing me of the black smoke and burning cowling, my copilot initiated passenger egress while I completed the emergency engine shutdown.

The MDR on the engine included the following discrepancies: Combustion case cracked; combustion liner sleeves worn and burned; first, second, and third stage turbine nozzles cracked; second stage turbine case cracked; seal rings burned; and the T5 harness burned.

It has been said that flying is not inherently dangerous, just terribly unforgiving. You can bet that the next time I have a fire light or any other abnormal indication, I'm not going to treat it like "it's just the gauge." ■

UNITED STATES AIR FORCE **flying** SAFETY MAGAZINE

AIR FORCE RECURRING PUBLICATION 127-2 | JANUARY 1986 | VOLUME 42, NUMBER 1

AFRP 127-2
Entered as a publication at the Second-Class rate (USPS No. 586-410) at San Bernardino Postal Service, 1331 South E Street, San Bernardino, CA 92403 and additional entries.

page 4

page 6

page 14

SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

SUBSCRIPTION — FLYING SAFETY is published monthly to promote aircraft mishap prevention. For sale by the Superintendent of Documents, U.S. 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 FLYING SAFETY Magazine. Contributions are welcome as are comments and criticism. Address all correspondence and, Postmaster: send address changes to Editor, FLYING SAFETY magazine, Air Force Inspection and Safety Center, Norton Air Force Base, California 92409-7001. 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 FLYING SAFETY without further authorization. Prior to reprinting by non-Air Force organizations, it is requested that the Editor be queried, advising the intended use of material. Such action will ensure complete accuracy of material amended in light of most recent developments. The contents of this magazine are non-directive and should not be construed as regulations, technical orders or directives unless so stated. Distribution: 1 copy for every 3.0 aircrew and aircrew support personnel.

Winter Preflight

LT COL JIMMIE D. MARTIN
Editor

■ Not exactly an awe-inspiring title, is it? I must admit I wasn't excited about writing an article about winter preflight. After all, it's been done before. What could I add to what has already been said? "It's cold and slippery, be careful out there."

Then I got to thinking. We have new pilots who don't have much experience in winter preflights. We also have experienced pilots who can use a reminder. I also decided it's much better to be sitting here at my desk *writing* about winter preflights than walking around in the cold and snow *doing* them. So here goes.

First, let me refer you to the Cold Weather Operations section of your Dash One for specific procedures that apply to your aircraft. This is a generic article aimed at aircraft and crewmembers in general and not specific aircraft.

Let's start this session with a test of your knowledge. There is only one question. When should your aircraft preflight start during cold weather?

a. Fifteen minutes earlier than during warm weather.

b. One hour earlier than during warm weather.

c. The last possible minute to prevent hypothermia.

d. The night before flying.

If you answered "d," you're correct. A last minute check of the weather forecast before going to bed will let you allow for delays you may encounter the next morning. If you answered "a" or "b," you're on the right track. If you answered "c," I'm glad I decided to write this article because you really need it. In any case, please read on.

Before you can fly, you have to get from home to work safely. This may mean taking time to scrape frost, snow, or ice off *all* your car windows before leaving. You may even have to shovel snow before you can get out of your driveway.

Before leaving home, make sure you're dressed appropriately for the weather. Dress warmly enough so you won't have to rush through your preflight to get out of the cold. Also, be sure you're dressed to survive in the terrain and weather conditions you will transit during the flight in case you have to bail out. It doesn't always happen to the other person. Don't count on the survival gear in the aircraft survival kit. It may land where you do and it may not, and you need to be dressed to survive for at least a short time in what you're wearing.

Make sure you leave home early enough to drive according to conditions. Driving too fast for conditions because you didn't allow time to scrape your windows or take care of some other delay may end your flight before you even get to the aircraft.

Plan to arrive at the squadron or Base Ops early enough to allow extra time for final preflight planning. Be especially careful to get the latest weather as well as runway, taxiway, and ramp conditions at home base and alternates. Remember, fast moving fronts in the winter can bring drastic weather changes in a very short time.

Complete all premission planning in time to leave early for your aircraft preflight. Once you arrive at the aircraft, resist the temptation to rush through the preflight so you can get out of the cold. An extra 10 or 15 minutes spent on the ground might just mean the difference between an uneventful flight and an airborne emergency.

Check the entire aircraft to make sure it is free of ice and snow. Don't assume a light covering of loose snow will blow off on takeoff. You might be right, but are you willing to risk your life on it? Loose snow sometimes conceals ice or hard-packed snow which may drastically alter aerodynamic properties and prevent safe flight. The only safe course is to remove *all* snow and ice from the aircraft.

During the walkaround, check the landing gear shock struts and actuating cylinders for dirt and ice. If they're dirty, have them cleaned with a rag soaked in hydraulic fluid. This will prevent strut seal damage. Also, ensure all limit switches are free of dirt and ice.

Look for leaks of any kind. Cold weather shrinks seals and "O" rings and may cause leaks. Small leaks may develop into large leaks if not detected. Also, be sure all water from deicing operations is wiped away so it doesn't refreeze on static ports or electrical connections. Check pitot tube, static ports, fuel vents, and drain cocks to ensure all are free of ice.

While checking control surfaces for freedom from snow and ice, also check hinges, guide tracks, etc., for ice buildup or water from deicing that could refreeze. Check tires, landing gear struts, accumulators, and fire extinguisher bottles, as appropriate, for adequate pressure.

Visually check engines for internal ice caused by water collecting in the bottom of the intake and freezing. If possible, see that all turbine wheels are free to rotate. The preheating of engines with hot air will result in a cooler and easier start. Before starting engines, check that chocks are firmly in place and not on ice. This will ensure they don't slip during engine start and warm-up.

When starting engines, expect higher than normal oil pressure and electrical output. As the engines warm up, the oil pressure should return to normal. Watch for a large, rapid drop in oil pressure after start. It may indicate a ruptured seal or broken oil line. Shut down immediately if you suspect a failure.

After start, allow extra time for all systems to warm up. Don't place heavy demands on brakes or other hydraulic systems while cold. Pump brakes with increasing pressure as the fluid warms up and cycle nosewheel steering and flight controls. This will circulate warm hydraulic fluid through the systems and warm seals and "O" rings.

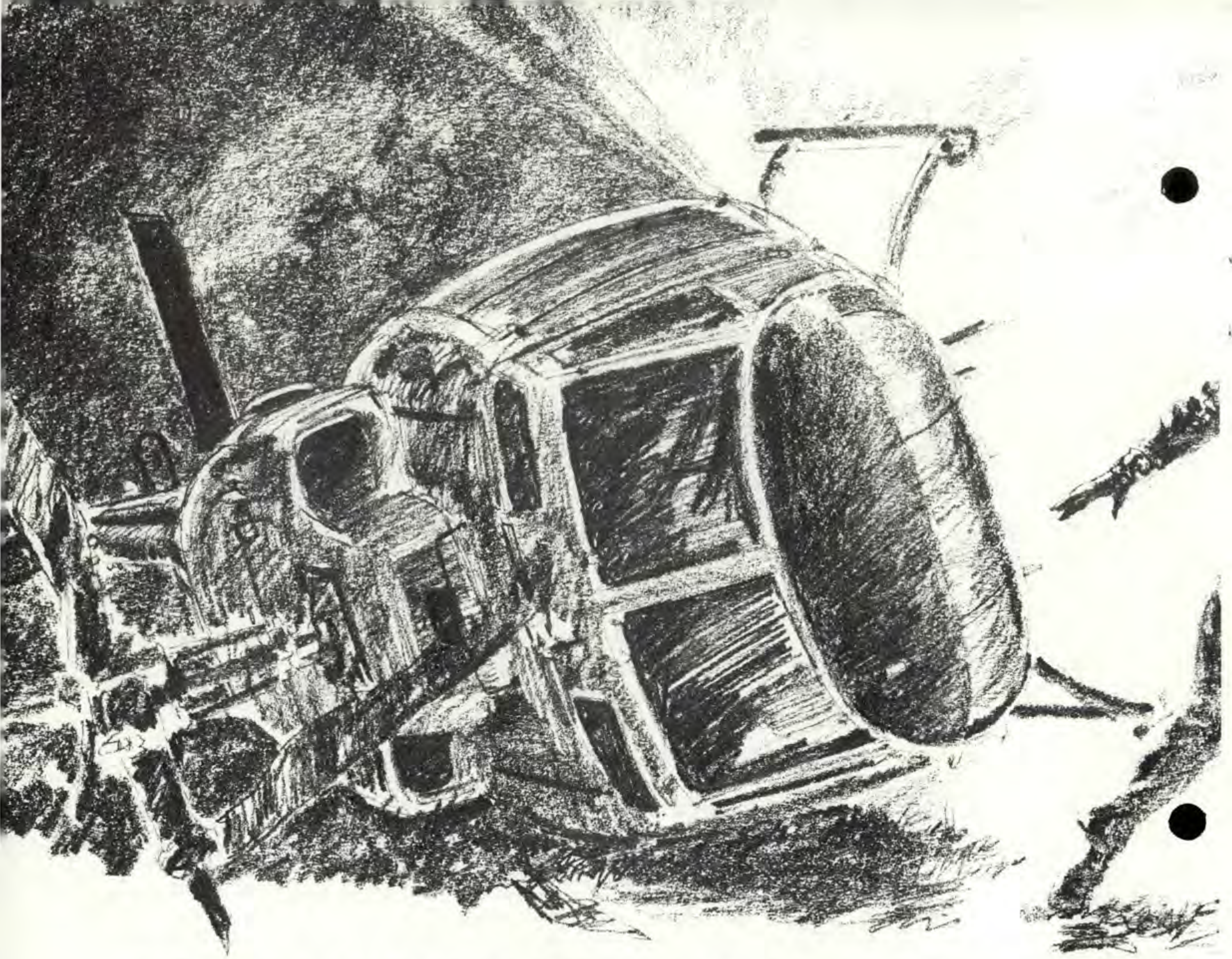
Just as you allowed extra time for everything else, also plan on taking more time to taxi to the runway. As you leave the chocks and while taxiing near parked aircraft, be careful with your jet blast. If you blow melted snow onto other aircraft, it will freeze on the cold surfaces. Taxi slower on snow and ice due to decreased nosewheel steering and braking effectiveness. Also, increase your spacing behind preceding aircraft to prevent blown snow and slush from freezing on your aircraft.

During taxiing, cycle the flight controls frequently to ensure freedom of movement. Also, operate the nosewheel steering in both directions to circulate warm hydraulic fluid through the steering cylinders and eliminate possible sluggish steering.

Before takeoff, ensure all instruments are warmed up and operating normally. Check flight controls for freedom of movement, and be sure the aircraft is free of ice and snow.

You may have noticed an emphasis on allowing extra time for everything. I hope so, because that's the key to a thorough winter preflight. Your chances of having an uneventful, safe flight are much better if you were extra careful with your ground operations.

Have a great flight. Come to think of it, I would rather be *doing* the flying than sitting here at my desk *writing* about flying. ■



■ The stage was set for a mishap long before the pilot got into the cockpit that night. On other missions, the pilot had gotten weather reports forecasting IFR and marginal conditions. He had gotten lots of reports like that. But he had continued into the deteriorating weather and had always made it. He had chanced it, and the weather had not been as bad as forecast.

The night before the mishap, the pilot had flown a similar mission and landed at the same airfield with the tower reporting IFR conditions. He had broken through a fog layer at 150 feet, 50 feet below decision height, and landed. He had made it again.

On the night of the mishap, the pilot, with a copilot and aidman,* flew the UH-1 to a nearby hospital, picked up a heart patient and nurse, and transported them to a medical center about 200 miles away. On the return flight, the pilot started seeing some low, scattered clouds. He got a weather report saying his intermediate stop (the hospital) was clear with 7 miles visibility and his destination (home field) was something less than 1,000 feet with fog and one-quarter mile visibility. He wasn't really concerned. The clouds appeared to be thin. He could see lights through the layer.

The intermediate stop was still clear when the helicopter arrived at 3 o'clock in the morning. The pilot hadn't used half of his fuel when he landed at the hospital and dropped off the nurse. He was told before he landed that his destination was partially obscured to obscured — 100-foot ceiling to partial overcast.

After dropping the nurse and her equipment, the pilot took off for his home field a few miles away. He planned to check the weather and try an approach. If he could not land, he would return to the hospital. He was told the weather was partial obscuration, 100-foot ceiling, and RVR was 1,000, which is below minimums. The forecast for the intermediate stop was OK, and the pilot thought it was ridiculous not to try an approach and, if necessary, a missed approach. He could see the ground all the time until he got closer to his destination.

The pilot elected to try to shoot an approach, seeing no harm in doing this approach. His auxiliary fuel had run out on the way to destination, and he had about 1,200 pounds remaining in the fuel tank.

*Comparable to an Air Force medical corpsman.

He Had Gotten Away With It Before

The pilot received vectors for an approach. The controller made him fully aware he was going below minimums. He elected to go ahead and try it because he had so much doubt about the weather he had been given.

The pilot could see the rabbit lights at the missed approach point. He didn't have the threshold lights in sight, so he did a missed approach. As he was initiating the missed approach, the copilot looked to the left, saw the runway lights, and told the pilot the lights were visible. The pilot decided to go around and try again. While being vectored for downwind, the pilot was told the intermediate stop had gone to 200 and a quarter and would probably go to zero/zero before he could get back there.

The crew got a report from one of the hangars that they couldn't see the helicopters from their hangar. The pilot decided to try one more approach and do it at a slower airspeed. He had 800 pounds of fuel left as he lined up for final. He did the approach and the same thing happened again. The runway lights were out to the left.

As the pilot started to do a missed approach, the copilot saw the runway lights. The pilot told the copilot to keep the lights in sight. The pilot slowed down to try to get some visual references outside. He couldn't see anything, so he decided to make another missed approach.

He pulled in power and did not compensate correctly with antitorque pedals. He looked at his airspeed and saw it dropping below 40 knots. The next thing the crew knew, the helicopter had hit the ground and rolled onto its right side.

After the crash, the pilot tried to call the tower on his survival radio. After two unsuccessful attempts, the pilot discarded the radio and tried to use his strobe light, which was inoperative. He then tried to use the radio in the helicopter. He was unable to connect his helmet to the cord jack in the darkness and could not locate his flashlight in the aircraft. The tower operator heard an emergency transmission on guard from the aircraft, but received no response when he tried to call back on guard. The operator heard a short sweep on an emergency locater transmitter and dispatched a crash truck to the approach end of the runway.

The crew could hear the crash truck driving up and down the runway. Because of the heavy fog and near zero visibility, rescue personnel could not find the helicopter or see its landing light which was shining up at an angle toward the tower. Seeing the crash truck was not able to find them, the pilot ran about one-half mile to a hangar. The tower was called, and the crash truck picked up the pilot at the hangar. The pilot directed the truck to the mishap site. They arrived at the site 23 minutes after the crash.

Mishap Behavior Pattern

This mishap is a classic example of a pilot who developed a behavior pattern in flying that led him to repeatedly take unnecessary risks and willingly and knowingly violate established procedures.

Following cancellation of his IFR clearance and landing at the hospital, the pilot left the hospital VFR when his destination was below IFR filing minima and forecast to remain so for the next 2 hours. There was no urgency to return to home station. The pilot could have remained at the hospital.

After arriving at his destination, the pilot did two approaches and missed approaches when weather was below that required for the procedure he requested. During the second approach, the pilot descended below decision height when neither the landing area nor the approach lights were clearly visible to him.

The mishap was caused by a violation of procedures. Pilots who lack the self-discipline to follow the rules must change their behavior or be taken out of the cockpit. —Adapted from *Flightfax*, Vol. 13, No 47. ■

CABIN FIRES

MAJOR RAY GORDON
Directorate of Aerospace Safety

■ Fortunately, aircraft cabin fires are extremely rare. When they do occur, however, they are killers. According to Dr. Harry Robertson of the International Center for Safety Education, Tempe, Arizona, only 5 to 18 percent of all crashes have associated fires; yet, 65 percent of all fatalities occur in those crashes which involve fire. How can you be a survivor? All it takes is the will to survive and a little planning.

Most of the information presented here is based on research material obtained from Federal Aviation Administration (FAA) testing for air carrier operations. Since the Air Canada DC-9 fire in Cincinnati on 2 June 1983, many tests have been conducted at the FAA's Technical Center in Atlantic City, New Jersey. Most of the data was obtained by setting airline seats on fire and allowing them to burn until the whole cabin was engulfed in flames. While these tests may not exactly simulate the impact of a cabin fire in a passenger-carrying aircraft, the results cannot be ignored. Many of the materials in the cabins of Air Force aircraft are similar, if not identical, to those used in airliners.

Once an aircraft interior is on fire, the smoke rises to the top of the cabin where it spreads to form a layer along the top of the cabin. The dividing line between the smoke above and the clearer area below is well defined. The temperature in the smoke layer can quickly rise to 1,000 degrees Fahrenheit while the temperature in the lower part of the cabin is still relatively low. It is possible to survive in, and escape through, the lower part of the cabin. Intense smoke may obscure ceiling and exit lighting or the intense heat may destroy it, plunging the cabin into darkness.

The FAA found that between 90 and 150 seconds after the cabin starts to fill with flames and smoke, a violent explosive inferno called "flashover" will occur. This "flashover" phenomenon provides enriched, superheated air to ignite other parts of the cabin. Escape is impossible. While the FAA is not sure why flashover occurs, they speculate the gases generated by the fire may reach such a temperature they themselves ignite and cause the sudden explosion.

So, if you assume the deterioration of the cabin is going to be gradual and constant, you will probably die. FAA tests have shown flashover is very predictable. You have to be out of the aircraft when that happens. You must know where the exits are, even in the dark. Count the number of rows of seats between you and the closest exits.

Another significant danger in cabin fires is toxic fumes. The most common of these compounds are carbon monoxide, carbon dioxide, and hydrogen cyanide. In the Air Canada fire, passengers who held wet cloths over their faces found it much easier to breathe. Though this still does not reduce the carbon monoxide concentration, it still provides some degree of protection against water-soluble toxic products.

Many fatalities in air carrier fires are due to these poisonous gases rather than by contact with fire. Although a 100-percent oxygen source will prevent breathing of toxic gases, commonly used passenger diluter-demand oxygen systems (which are designed to provide oxygen for emergency depressurizations only) will mix smoke-filled ambient cabin air with whatever oxygen is provided. The oxygen provided to these systems is dependent on cabin altitude and does not provide any oxygen below 10,000 feet.

Toxic gases will also react with water in your eyes, forming acids that will cloud your cornea and make it impossible to see. This makes it even more important to be able to find the exits by feel rather than by sight.

The most important action you can take is *plan to survive*. Passenger testimony is full of phrases like, "I planned my own escape," and "I knew I had to get myself out."

These are some points to consider in developing your own plan:

- Don't rely on anyone else to help you out of the aircraft. It is actually more common for passengers to "freeze" in a life-threatening emergency than to panic. Act as soon as the aircraft comes to a stop. Your action may even help others to escape safely.
- Wear clothing which will afford protection. Long sleeves and long pants, wool or leather clothing, multiple layers, close weaves, and light colors are preferred. "Fuzzy" materials, tight fitting clothing, very loose clothing, and high-heeled shoes are dangerous.
- Listen to the safety briefing and read the safety information card. Be observant. Count the number of rows of seats to the closest exits. Have alternate exits in mind in case your primary exit is obstructed or if there is fire just outside the exit. Sit next to an exit if possible. Know how to open the exits.
- Know what kind of oxygen system you will be using. If it does not provide 100-percent oxygen, do not use it when smoke is present. Hold your breath if possible. If you can't, take shallow breaths through a wet cloth, grab a breath from a dead airspace like inside your clothing, inside the lavatory, or near the floor.

As crewmembers, it is imperative to fight an airborne fire as soon as it is detected. To do this, proper respiratory protection, immediate access to firefighting equipment, and fast and effective smoke elimination procedures are required.

When was the last time you and your crew practiced an emergency egress with no help from Crash Rescue? Can your crew act quickly and effectively to fight a cabin fire? Plan to survive — *now*! ■

During cabin fires, the same pressurized fuselage which allows us to fly comfortably at altitude also traps the heat and toxic smoke with us. The results can quickly become devastating.

Expect confusion, heat, choking smoke, and darkness to accompany a cabin fire. Your survival depends on having an informed plan of action that gets you out of the aircraft as quickly as possible.

A QUIET

This article concerns two pilots who were winging their way back home on a routine flight. Before it was over, it was anything but routine.

■ It was a quiet Sunday afternoon as we were preparing to depart Mountain Home AFB, Idaho. This was to be our second leg of a two hop T-33 return flight to Cold Lake after a quick gas and go at Mountain Home. The aircraft had been performing well and the weather had been good on the first hop, so we had no reason to expect anything different on the second leg.

We were looking forward to just another pleasant Sunday afternoon flight. To further set the scene, we had a T-33 with a travel pod and a full (677 gallons) fuel load. The front seater was an inexperienced T-bird driver with less than 50 hours in the aircraft while the back seater was highly experienced with more than 1,000 T-bird hours.

Since it was a Sunday, there was no weather forecaster on duty at Mountain Home; however, telephone weather briefings were available for aircrew. We filled the telephone briefing square — the only significant weather was a group of isolated thunderstorms approximately 35 miles to the north of the field.

As we walked out to our airplane, however, we noticed a large dust cloud to the west of the field that appeared to be moving in our direction. Afternoon thundershowers and associated dust storms are not at all uncommon in the Mountain Home area, and the normal result is the nuisance of a muddy canopy.

As the transient alert crew was preparing to start us, one of them warned that we'd better expedite if we wanted to beat the rapidly approaching dust storm. We quickly started the engine and called for taxi clearance. Ground control cleared us to taxi and asked if we would accept an intersection takeoff. Since the first 2,000 feet of the active runway was under construction, anything other than an intersection takeoff would require back taxi along the active. There was 7,500 feet remaining at the intersection, and experience on 5,000-foot runways seemed to indicate that 7,500 feet was plenty.

Just to be sure, the back seater took a quick look at the checklist charts and confirmed that an intersection takeoff would give us about 2,000 feet to spare, even with a 20-knot tailwind.

The approaching dust storm was still off to the west of the field, and the windsock was absolutely limp. When we took all of this into consideration, an intersection takeoff looked like a reasonable option, so we accepted it.

We taxied behind a Lockheed Electra and held short while he took the active for takeoff. As the Electra was climbing out shortly after liftoff, the backseater noticed that he lost altitude and then recovered. The Electra was on a VHF frequency so we didn't hear his conversation with tower, but tower did relay to us that the Electra had encoun-

SUNDAY

tered a wind shear after takeoff that decreased his airspeed by about 10 knots, which accounted for his abrupt loss of altitude. As we took the active, we noted that the wind was still calm at the intersection, but the dust storm was now very close.

Before we started our takeoff roll, we talked about the possible impact of a 10-knot decreased performance wind shear after takeoff and decided that we would keep the aircraft on the ground until 10 knots faster than normal takeoff speed. That way, we'd still have flying speed if the airspeed suddenly decreased by up to 10 knots. So far, it still looked like just another quiet Sunday afternoon cross-country.

The initial takeoff roll was normal, and we had about 90 knots with over 3,000 feet of runway remaining. About this time, however, it ceased to be just another quiet Sunday afternoon flight.

Tumbleweeds were rapidly crossing the runway in a right quartering tailwind direction, and our acceleration appeared to slow. The airspeed indicator reached about 95 knots and just didn't seem to want to move anymore. As the 1,000-foot remaining marker went by, all plans to rotate 10 knots faster than normal were abandoned. When the nose seemed slow to rotate, the front seater aggressively rotated the aircraft in an attempt to get airborne prior to the end of the runway.

As the aircraft became airborne, the back seater immediately recognized aircraft buffet and decreasing airspeed and jettisoned the tip tanks without any hesitation. His prompt action is probably the only thing that could have kept the airplane flying at this time. It was still an agonizingly long time before the airspeed finally started to increase in level flight at uncomfortably low altitude.

We immediately recovered at Mountain Home, and after ensuring all appropriate actions were taken with respect to flight safety matters and aircraft serviceability, completed our not-so-routine trip back to Cold Lake in three hops and without tip tanks.

There are several things that could be considered as lessons learned from our experience. First, using all available runway probably would have been helpful, especially after we determined that we wanted to take off 10 knots faster than normal (the old adage about runway behind you).

Next, decreased performance wind shear can be a significant factor in any airplane. It's hard to predict, but there were clues such as the prominent dust cloud, the Electra report, and the predicted thunderstorms. The shears can be extremely localized as evidenced by the calm winds at the intersection and the gale at the departure end, so don't ignore the clues just because winds are reported calm.

Finally, be ready to jettison stores immediately if the situation calls for it. The quick action by the back seater in this case almost certainly saved a crew and an aircraft. If the tanks had not been jettisoned, the aircraft might not have been in the air long enough for even an immediate ejection. — Courtesy *Flight Comment* No. 4 1985. ■

Riding The Waves

LT COL JIMMIE D. MARTIN
Editor

■ An O-2A FAC was on an exercise mission. While flying on the lee side of a ridgeline, he encountered a severe downdraft that exceeded the climb performance capabilities of the aircraft. The aircraft entered an accelerated stall and crashed.

■ A civilian pilot flying at 12,000 feet reported a sudden loss of 5,000 feet before the descent could be stopped.

■ A commercial airline pilot at FL 350 reported indicated airspeed variations of 80 knots.

■ A C-141B on a low-level tactical airdrop mission during an exercise performed an evasive maneuver while crossing a ridgeline. The aircraft encountered turbulence that caused the loadmaster to fall to the floor. He was incapacitated with neck, shoulder, and wrist injuries. Two of the four pallets they were preparing to drop raised off the floor and stacked their leading edges on the preceding pallets.

■ You filed a flight plan to Norton AFB. From what you've seen, the air traffic seems light today, but you've been given a 40-minute ATC delay for traffic.

■ Why didn't the weather forecaster put out a warning about this turbulence? Why didn't the pilots recognize its existence? Why has your clearance been delayed so much longer than usual? What does your traffic delay have to do with these other events?

The simple answer to all these questions is mountain waves. Obviously, this answer is too simplistic, and I will provide more details in the following paragraphs. I know all you pilots have studied mountain wave effects, but do you *really* know all you need to know about them? Read on to discover why they are so hard to forecast and so hard for you to anticipate.

Most of the early research on mountain waves was done by glider pilots in the late 30s and 40s. All glider pilots are familiar with the strong updrafts provided by wave action. This is especially true in southern California. In fact, the sailplane altitude record of 46,267 feet was set near Mojave on 25 February 1961.

Generally speaking, mountain waves are a result of wind flow over a mountain. The term is used rather loosely to describe any turbulence encountered near high terrain.

Actually, this is an oversimplification. It's true that airflow perpendicular to mountains or other obstructions will produce some turbulence or wave action downwind. But, true mountain waves are a product of both airflow across high terrain and certain atmospheric conditions. The atmospheric conditions may dampen out the turbulence or amplify it. When the waves caused by the airflow over a mountain extend well past it and increase vertically, you have a true mountain wave.

The severity of the turbulence encountered will depend on the following factors:

■ Wind speed and direction and how much each varies with height.

■ Temperature lapse rates and stability of the atmosphere.

■ Size and shape of the obstacle.

These key ingredients affect the formation of mountain waves in the following ways:

■ **Wind speed and direction in relation to altitude.** The ideal wind conditions for wave formation are winds that increase in velocity with altitude from ground level to the top of the mountain and then remain strong and steady at higher alti-

This picture shows typical wave clouds. The edges of cap clouds are visible over the mountains at the right edge of the picture. Rotor and lenticular clouds appear downwind.

tudes. The strongest waves are formed when the wind direction remains nearly constant and the wind speed steadily increases with height throughout the troposphere. Also, the wind direction should be within 30 degrees of perpendicular to the ridgeline.

■ **Temperature variation.** Mountain wave development is very dependent on the temperature profile of the atmosphere. The temperature profile that supports strong wave development has three divisions. The upper and lower levels of the atmosphere will have weak stability while the midlevels will be very stable. Flow in the middle layer will be disturbed over the mountain and the wave will develop. Since the upper and lower levels are unstable, they won't dampen the waves and will allow them to increase in amplitude and continue farther downwind. (See Figure 1.)

■ **Size and shape of obstacles.** Wave length and amplitude depend partly on the size and shape of the obstacle. As shown in Figure 2, under the same atmospheric conditions, obstacles of the same height but of varying width produce different wave patterns. There is a complex relationship between the obstacle characteristics, wind speed, and temperature. To generate a significant downwind lee wave pattern, a resonance effect must develop between the obstacle and the wave. This is demonstrated in Figures 2A and 2B. The smaller hill produces the best wave in this case, because, for the given atmospheric conditions, the size and shape of the smaller hill better resonates with the natural wave. So, the largest mountains or ridges may not produce the strongest lee waves. In general, the obstacles with a cross section that fits the natural wavelength of the airstream (based on wind speed and temperature conditions) produce the strongest lee waves.

Two successive ridges can also affect the lee wave development. The size of the downwind wave depends on whether the two ridges are in phase with the wavelength. Figure 3 presents two extremes. In 3A, the ridges are exactly in phase with the wavelength and the wave amplitude doubles downstream. In 3B, we see the opposite effect; the two ridges are out of phase, and the downwind lee waves are canceled out.

It's important to realize a complex relationship exists between the variables involved in creating mountain waves. Atmospheric conditions that are only slightly different may cause radical differences in mountain wave effects. Not only is it difficult for you, the pilot, to anticipate mountain waves, it's also difficult for the weather forecaster to predict them. This is another excellent reason for PIREPs. (See "Why Pilot Reports?" *Flying Safety*, Sep 85.)

If there is enough moisture in the air, mountain waves may produce some characteristic cloud types. These clouds, when present, can help you recognize areas where mountain waves are present.

Cap Clouds These clouds hug the tops of the mountains and appear to flow down the lee side. They are associated with strong downdrafts on the lee side.

Rotor or Roll Clouds These often appear as lines of cumulus parallel to the ridgeline on the lee side. Their base is about the same height as the ridge with tops usually 3,000 to 5,000 feet higher. Depending on atmospheric conditions and wind strength, one or more lines of roll

continued

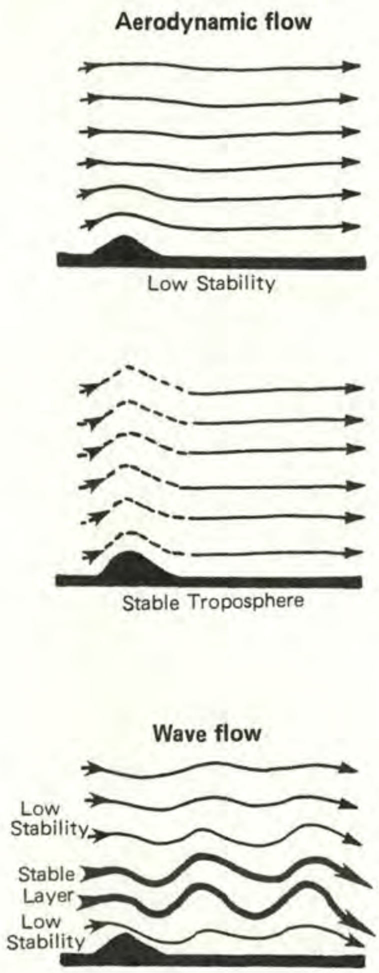


Figure 1

Figure 2

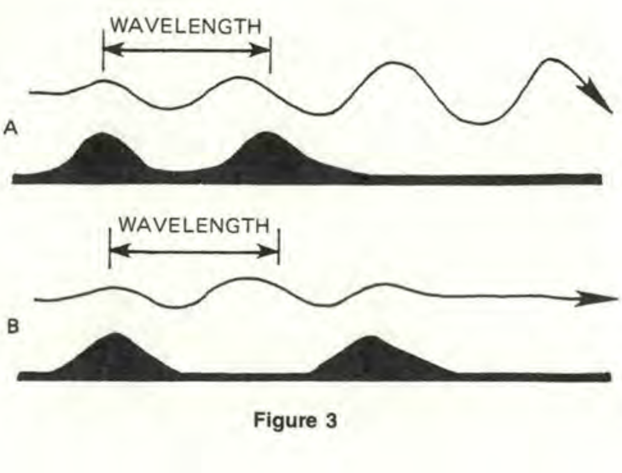


Figure 3

Mountain wave effects aren't always this visible. The presence of severe rotor turbulence has two very obvious clues in this photo — clouds and dust storms extending up to 30,000 feet.

When there is enough moisture in the air, lenticular clouds such as these can warn you of mountain waves. Expect moderate to severe turbulence, and avoid flying through or near these clouds.

Riding The Waves

continued

clouds may appear downwind.

Lenticular Clouds These identify the crests of the waves. They are lens shaped, usually have a smooth appearance, and may extend to 40,000 feet. There may be one or more lines of lenticular clouds downwind. The clouds generally have a smooth laminar flow through them, but you may encounter moderate to severe turbulence on either side. However, the smooth laminar flow can break down and produce severe turbulence throughout the wave. When this happens, the clouds will usually have jagged, irregular edges, especially at high altitudes.

What does all this mean to you? Mountain waves affect aviation in several ways, and you need to keep them in mind. Most significant are vertical aircraft separation problems, severe rotor turbulence, and high altitude CAT.

Air traffic controllers must provide safe separation for aircraft on an IFR clearance. FAA regulations require them to separate aircraft below 29,000 feet by 5 miles horizontally and 1,000 feet vertically.

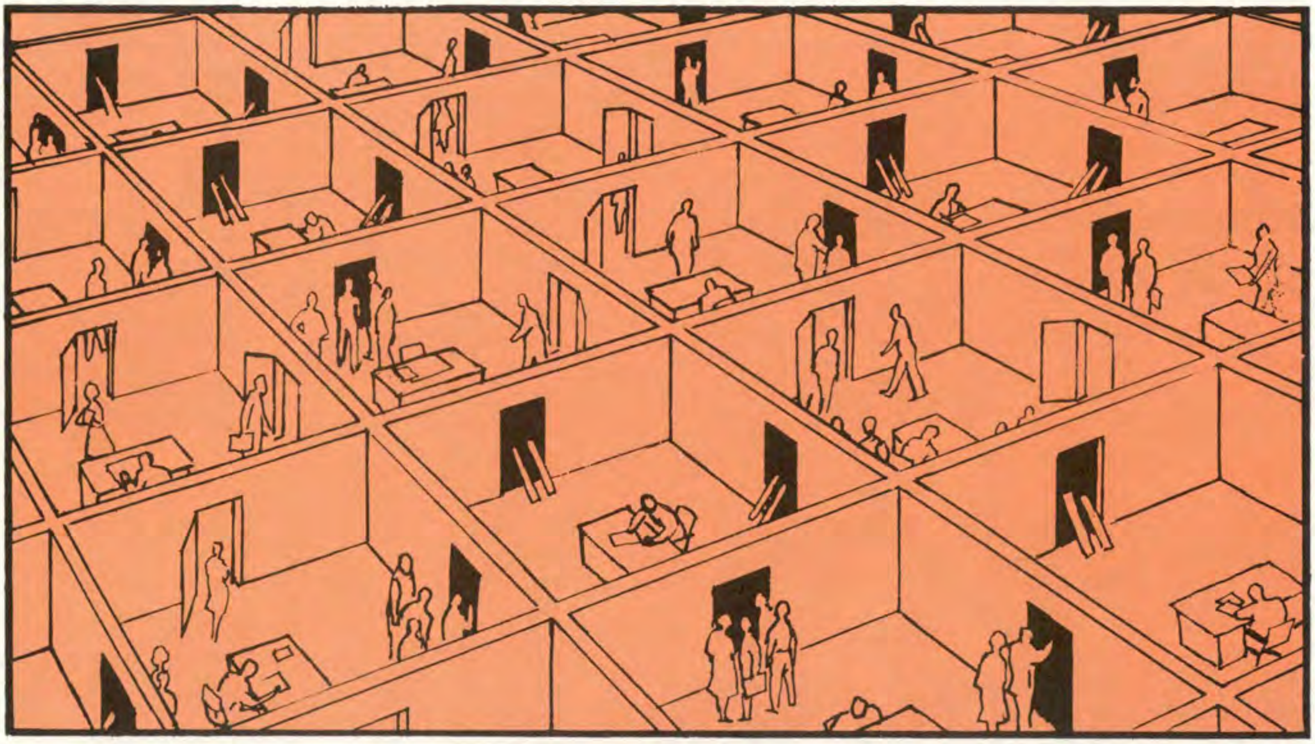
Problems arise when mountain wave up and down drafts significantly impair the pilot's ability to maintain assigned altitude. On strong mountain wave days, pilots can lose altitudes by as much as 2,000 to 3,000 feet or more per minute, thereby jeopardizing safe separation distances. VFR pilots flying under cloud bases and through passes have fallen dangerously close to the ground or crashed because of their inability to recover from downdrafts. This places an extra burden on controllers trying to provide safe and legal separation distances. As aircraft randomly and uncontrollably change altitudes, standard 1,000-foot separations must be amended by as much as 3,000 feet for an extra margin of safety. This also places restrictions on the number of aircraft which can safely be moved through the airspace and explains the ATC delay on your clearance.

Rotor turbulence is another problem over the mountains, especially the southern California mountains in the winter. Even though it occurs sporadically and may be localized over some ranges, it can be widespread and devastating in the lee of the Sierra Nevadas. Low-flying aircraft along this route may lose control by encountering undetected rotors. Many times the pilot's only clues to the presence of rotor turbulence are the massive dust storms kicked up when the rotor wave touches the desert surface.

High flying jets using the air routes downwind from the Sierra Nevada range and other ranges during a strong mountain wave are susceptible to CAT. The vulnerability comes from the jet's autopilot trying to maintain altitude during wave conditions near the tropopause. Jet encounters in a tropopause warped by mountain waves create turbulence dangerous to anyone moving around in the aircraft. Some pilots who have encountered this type of CAT say it's like running into a brick wall. The location of severe wave CAT is extremely difficult to forecast. It's even harder for the pilot to predict or spot before flying into it. Now a brief review of the main points we have covered, and a few suggestions on how to avoid problems from mountain waves.

- Remember the telltale cloud formations aren't always present in mountain waves. A better clue may be any wave-like fluctuation in airspeed, altitude, or temperature.
- True mountain waves depend on a complex interrelationship of factors that are infinitely variable and very unpredictable.
- If possible, fly around areas where wave conditions exist or may exist. If it isn't possible to go around the area, fly over it at an altitude at least 50 percent higher than the height of the mountains.
- Don't fly through the strong downdrafts on the lee side of the mountain.
- Don't fly through the rotor clouds because they are the areas with the most turbulence.
- Don't fly through high lenticular clouds, especially if their edges are ragged or they are fragmented.
- Don't fly near the tropopause in mountain waves.
- If it's necessary to penetrate mountain wave areas, do so at the recommended turbulence penetration airspeed for your aircraft. ■

Part of this material was taken from the National Weather Service, Western Region Bulletin Numbers 85-26, 85-27, and 85-29.



We're All In This Together

GUY MANGUS
Directorate of Aerospace Safety

■ Many labels have been pinned on the Twentieth Century by historians, sociologists, and pundits of every description. Depending on whose viewpoint you subscribe, this century has been described variously as the Nuclear Age, Age of Flight, Computer Age, Space Age, and so on. However, if we could move to a vantage point several centuries hence, there is a strong likelihood we could find the Twentieth Century referred to as the "Age of Specialization."

The fact is that in a complex world, specialization gets the job done. Nowhere is this more apparent than in the flying business. Pilots, navigators, crew chiefs, loadmasters, weapons, avionics, sheet metal, and fuel specialists — the list of specialties is mind boggling. So, what does this have to do with safety? Plenty.

Safety, a specialty in itself, has been further subdivided into flight, ground, weapons, nuclear surety, and system safety disciplines. These areas of specialization were created in obvious recognition of the fact that safety had become too complex to be entrusted to general practitioners! This is all well and good. But, for all the gains achieved by specialization, there is an attendant hazard. Simply put, it is the failure of specialists in one area to relate to specialists in another area. Lack of communication is the pitfall of specialization.

The failure of specialists in one area to communicate with those in another provides the source or root cause for many mishaps. Nowhere is this more evident than in flightline operations and maintenance. It is fundamental human nature to stake out a piece of turf and label it as your own. We zealously guard against intruders in what we view as our proprietary interest or territory. In so doing, human nature betrays us and leads to failure or even disaster.

Who among us has not heard of the mishap involving an egress specialist who was checking an ejection seat, decided to take a smoke break and left the cockpit, with the seat unpinned, thereby creating a situation where minutes later another maintenance specialist entered the cockpit and inadvertently activated the ejection seat with fatal results?

What we must all realize is that the flightline is common turf. One specialty does not "own" it to the exclusion of others. Safe mission accomplishment is dependent upon error-free performance by each specialty in concert with all the others. The right hand must know what the left hand is doing. The only way to ensure this is to establish effective dialogue among all participants.

As specialists in any area relating to the flying mission, it is incumbent upon us to make certain the lines of communication are open. We ought to have a clear understanding of not only our own role, but that of all the others required to accomplish the mission. You can't leave safety to the safety specialists. They can't hope to do their job in isolation. Remember, we are all in this together. See you on the flightline! ■

NEW SERIES

SAFETY WARRIOR

■ This month we begin a new feature — Safety Warrior. This is our version of the Air Force Project Warrior. Each month we will feature an article or story about the past. Each one will give us a sense of where we came from and where we are now.

The first US military aircraft mishap occurred 17 September 1908. The IP was Mr. Orville Wright, and the student pilot was Lieutenant Thomas Selfridge. Lieutenant Selfridge was fatally injured. Subsequent investigation traced the cause to a modified propeller that cut the guy wires supporting the horizontal stabilizer.

We don't have guy wires anymore, but we can still learn from the past. There are many universal truths in aviation ranging from aerodynamic principles to human factors. George Washington once said, "We ought not to look back unless it is to derive useful lessons from past errors, and for the purpose of profiting by dear-bought experience."

Look back with us now as we review the history of an aircraft many people claim was the safest ever built. While that may be disputed by others, no one can deny it has a history that is hard to beat.

50 YEARS OF

LT COL JIMMIE D. MARTIN
Editor

The 50th anniversary of the first flight of the Douglas DC-3 was marked 17 December 1985 as manufacturer representatives, aviation fans, and supporters celebrated the event at Santa Monica Airport near the former site of the Douglas Aircraft facility in Santa Monica.

The DC-3 has been described as a legend in its own time and among man's greatest developments in this century. With 1,500 to 2,000 still in service at the 50th anniversary of its first flight, it is also one of the most enduring.

The maiden flight of the DC-3 — then known as the Douglas Sleeper Transport (DST) — was on 17 December 1935. This date is significant in that it was the 32d anniversary of the Wright Brothers' famous first flight at Kitty Hawk, North Carolina. Both flights proved to be major milestones in aviation history.

Another similarity between these two flights is that they were virtually unnoticed. There was no fanfare, no photographs of the first flight of the DC-3. To company officials, it was just a routine introduction of a new model. It was a modest beginning for a legend.

The DC-3 was the first airliner which could make money for the operators by just transporting passengers. It was just what the airlines needed for growth, and the growth was phenomenal.

AVIATION FAME

From the introduction of the DC-3 in 1936 until the start of World War II in 1939, US air travel increased 500 percent. The DC-3s and their forerunner, DC-2s, carried nearly 90 percent of all US air traffic and were operated by 30 foreign airlines.

The first military derivative of the DC-3 was a single C-41 delivered to the US Army Air Corps (USAAC) in October 1938 for use as a staff transport.

With the beginning of war production, military derivatives of the DC-3 were designated C-47 in the USAAC and R4D in the Navy and Marine Corps. Many civil DC-3/DST aircraft were pressed into service by the US armed forces following the outbreak of war to help meet military transport demands. This mixed fleet had many variations in power plants and equipment and received an assortment of designators. These included C-48, C-49, C-50, C-51, C-52, C-68, C-84, and R4D2.

To make the DC-3 passenger transport into the C-47 cargo plane, Douglas designed modifications that included a large double cargo door with an integral passenger door, beefed-up floor with tiedown fittings, folding bench-type seats along the sides, a navigational astrodome aft of the flight compartment, and stronger landing gear.

Other changes were made as an aid to mass production to keep pace with the military demand for C-47s. Additional assembly lines were set up at new factories in Long Beach, California, and Oklahoma City, Oklahoma. Production at all facilities accelerated rapidly ultimately reaching 573 planes per month or 18.5 per day.

Operating in all the battle zones throughout the war, C-47s performed a variety of supporting roles such as cargo and staff transport, training and communications, and medical evacuation. Airlifting supplies and troops was the principal job.

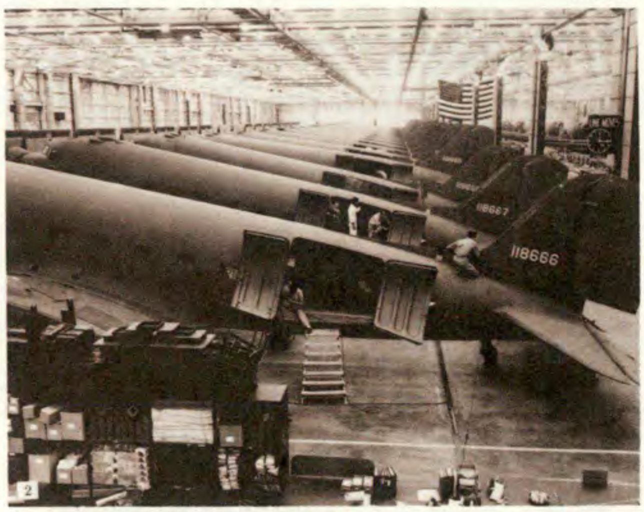
With the press of wartime emergencies, demands often were placed on the C-47 that were far beyond its design limits. The aircraft originally was designed for a gross takeoff weight of 24,000 pounds; military loads grossing 30,000 pounds were common in wartime, occasionally reaching 35,000 pounds. It was said of the C-47, you could wreck one, but you couldn't wear it out!

Military use of the "Gooney Bird," as it was also known, remained high. C-47s were pressed into service during the Korean War. They flew general transport, airborne missions, and medical evacuations throughout the conflict.

In Viet Nam, Gooney Birds were flown by the USAF not only as transports, but also in electronic reconnaissance, psychological war-

continued

Bigger, faster, safer and more economical than existing equipment, Douglas DC-3 reduced United States transcontinental trip to 15 hours and was the airplane in which thousands of passengers made their first flight.



Affectionately called "Gooney Bird," C-47 and R4D derivatives of Douglas DC-3 transports were the mainstay of the United States Troop Carrier Command during World War II and were lauded by General Dwight Eisenhower as one of the four most important weapons in the war.

fare, and night attack roles. "Puff the Magic Dragon," the name given the AC-47D, had three General Electric 7.62mm Miniguns installed in the cabin set for side-firing out the left side of the aircraft, aimed and fired by the pilot. At 6,000 rounds per minute per gun, each attack Gooney could pulverize a target and could loiter over a target area for hours.

Many other tasks again demonstrated the versatility of the aircraft. Equipped with very large floats with retractable wheels, it became an amphibian (XC-47C); and on skis, it served in both the Arctic and Antarctic becoming the first aircraft to land at both the North Pole and the South Pole. It has taken off from an aircraft carrier, leaping into the air like a rocket from the thrust of jet-assisted takeoff (JATO) bottles attached to its belly.

"Equipped with very large floats with retractable wheels, the C-47 became an amphibian (XC-47C); and on skis, it served in both the Arctic and Antarctic."

The venerable DC-3 celebrated its 50th birthday in December. From 1935 to 1945, the Douglas Aircraft Company built 10,629 of the aircraft. In addition, 146 DC-3s were remanufactured as Super DC-3s with the last one being delivered to the US Navy in 1953. Including the building by foreign countries, the total DC-3s built is close to 20,000 aircraft.

While the number of DC-3s operating in Russia is unknown, an estimated 1,500 to 2,000 still are flying in the rest of the world. A survey by the English organization, "Friends of the DC-3," determined that some 500 aircraft were in service with various military forces around the world in early 1985. In addition, they counted 400 being flown by civil airlines. The Douglas Aircraft Company believes that an additional 1,100 can be found in museums and with private operators, parachute jumping clubs, aircraft collectors, and others.

After a half-century of flying throughout the world, through three wars, and a police action or two, the DC-3 fleet still adds to its legend for durability and service. Its record of dependability and achievement, which far surpasses its design limits, serves as a tribute to Donald W. Douglas and his team who conceived it.

For thousands of World War II servicemen, the C-47 is remembered as the first aircraft they ever flew in. It carried them between duty stations, on the way to combat, perhaps to hospitals to mend from wounds, then to new assignments — or homeward for furlough or mustering out of the service. To them, the C-47 was and is a symbol of dependability and efficiency — the best of modern industrial technology at work.

For thousands more who were the pilots, navigators, loadmasters, ground crewmen, the C-47 was the aircraft in which they learned the aviation trade. To them, it was and always will be the most rugged, most reliable, most forgiving, most useful — best — airplane of all time. Get a C-47 crewmember talking about his memories, and there emerges a feeling for the aircraft that borders on love. They make the legend live! ■

Information and photos obtained from the McDonnell Douglas Corporation.

One important role of the wartime C-47/Dakota that won a lasting place for it in the hearts of thousands of wounded servicemen was aeromedical evacuation missions. The aircraft carried many on the first leg of a homeward journey.

"Puff the Magic Dragon," the name given the AC-47D, had three General Electric 7.62mm Miniguns. At 6,000 rounds per minute per gun, each attack Gooney could pulverize a target and could loiter over a target area for hours.

What You Don't Know or Don't Do Can Hurt You

BRIAN P. LAUFFER
and
BOB O'BRYAN
Life Support Specialists

■ The art of surviving in the wilderness is one you may be forced to learn by self-teaching, but it comes easier if planned with an experienced instructor. It's easier when the experience is one from which you can escape by simply walking away. The worst time to try to learn how to survive is when your life depends on it, when you're scared, hurt, lost, cold, thirsty, hungry, exhausted and, if that's not enough, alone.

The average time for successful rescue of downed crewmen is 7 hours. Within the first hour of rescue personnel becoming aware of your situation, a full scale search is underway and everything that can be done to find you is being done, but your recovery is based on several facts and some basic survival truths.

One very important and obvious fact is the extent of any injury you receive during the survival situation. Being injured is unpleasant to think about, but it's better to learn now how to quickly stop serious bleeding, immobilize an injured limb, dress wounds and treat burns rather than wait until it is life-threatening. A downed crewman's first concern is treatment of injuries. The survival manual, AFM 64-5, covers this treatment in basic terms on pages 2-2 through 2-9 (see Figure 1), but you may want more information than it contains. Read those pages and see if that's enough information about this vital subject to satisfy you. Know what is in your first aid kit and how to use it.

Next on your priority list of action will be to tell everyone and anyone where you are. If your parachute has an emergency locator beacon (do you know where it is and how it works?), it has been sending a distress signal since the chute opened. The beacon's signal is line-of-sight, so get it to high ground if necessary and if you can. You must turn it off to use your emergency radio from the survival kit. Do you know how to get the beacon out of your chute and turn it off? Don't forget to remove the flexible antenna from the pack and keep it handy in case you break the telescopic one. Do you know how to get the flexible antenna out of the parachute?

The survival kit has a number of items in it for you to use to draw attention, which is exactly what you

continued

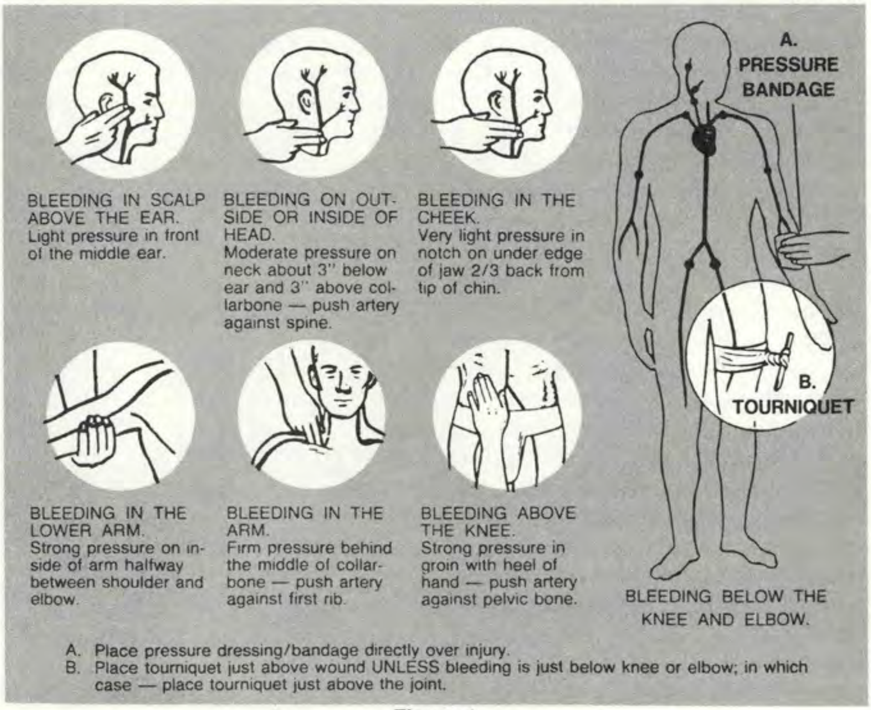


Figure 1

What You Don't Know or Don't Do Can Hurt You! continued

will be doing until the moment of your rescue. The emergency radio is important for this, of course. Can you operate it with one hand? Either hand? In the dark? It has a Morse code system with the full code on the radio's backside. Have you practiced using it?

Another valuable tool is the signal mirror. It's more than just a means to check your face and head for injury. Its flash has been seen for 30 miles, and its power source is unlimited. Can you flash SOS with it? It is line-of-sight also, but anywhere sunlight can get in, the flash can get out. Even in forested areas, keep flashing at every possible moment.

The radio and signal mirror may be line-of-sight but the whistle isn't. The sound of a whistle will carry far beyond the range of a shouting human voice, and is a very distinct sound not found in nature, especially when blown in three short blasts every few minutes. In a sense, it too has an unlimited power source. Anyone in a survival situation who does not hang it around their neck and blow it often is forgetting or ignoring a good survival technique. There may be someone within a few hundred yards that cannot see your signal mirror flash or hear your radio transmissions. The wilderness is not always empty of humans, and they can get into the most remote areas.

There are a number of flares in the survival kit: They are day/night smoke/flare and pengun type. Is there a best time to fire one? Should you wait until you hear an aircraft or see someone? Should you load the pengun and have it handy at all times? Will a shot from the pengun protect you from a threatening animal? Can you write in the snow with a smoke flare? What would you write?

The parachute material is purposely multicolored. Do you know how to design any signals with it? (See Figure 2.) It's a good idea to spread that chute completely out flat and stake it down in the open or over small trees and bushes. It can't be seen if wadded up and forgotten. A multicolored circle of that size can be seen from a very high altitude, especially if it contrasts with the terrain. There are 28 lines, each about 22 feet long, on it. That's 616 feet of line that can help you to form straight patterns and sharp angles over which to drape natural materials and canopy for signaling or shelter.

Firebuilding is something you will want to do right away, especially if night is rapidly approaching. Firebuilding is a very important skill, and building a successful fire quickly can be rewarding in heat, light, smoke, and protection. There are plenty of matches in the survival kit, and every one is worth its weight in gold. Don't use one without preparation and consideration of its value. Do you carry anything on your person for firebuilding in case the survival kit is lost? In this day of many nonsmokers, that's a crucial point. There are other fire starting methods of course (see Figure 3), but they aren't easy. Ever try one? If fire fuel is plentiful and close, build three fires. Lay them out in a triangle large enough for you to center among them. You'll stay warm on three sides then. Keep some material handy such as nylon from the parachute pack or canopy to throw on the fire when you want it to smoke as a signal. The fiberglass of the hardpan kit also burns and smokes, as will the flying helmet and its visor. You know, of course, that anything you need for another purpose (such as the helmet to keep your head warm) should not be sacrificed without a lot of thought about it.

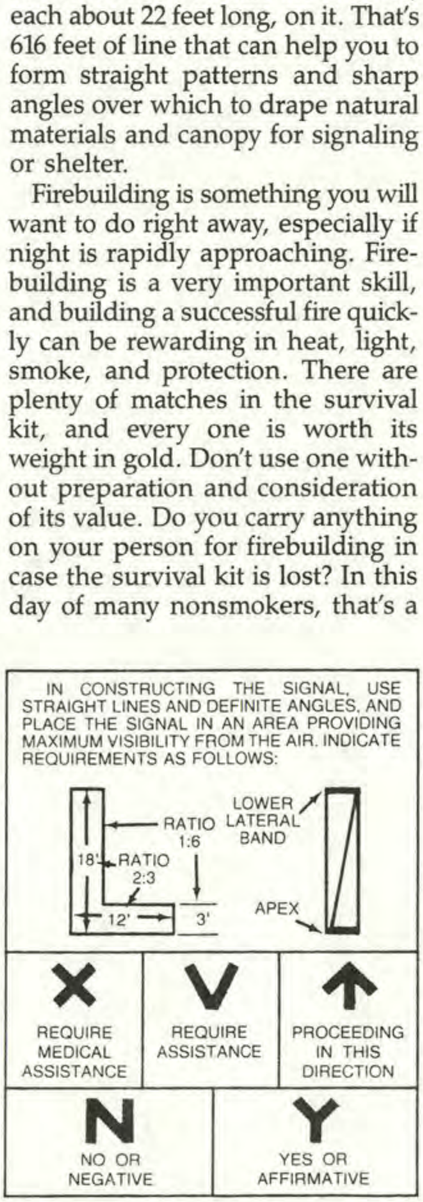


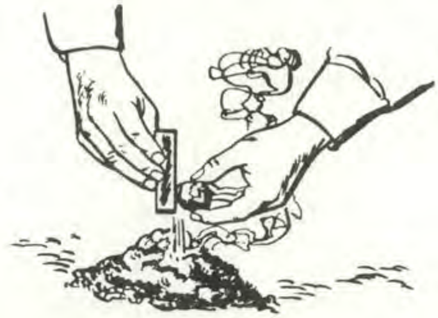
Figure 2

If you are not rescued within the first few hours, you have some serious problems you need to get to work on right away. Hypothermia, dehydration, and the urge to travel head the list. The urge to travel (save yourself, find help) can be overpowering. If you can't resist traveling, assess your condition, location, equipment, and time very carefully. Remember, rescue parties are going to where you were, not to where you are going. Leaving the crash site, the search area or landing site is to leave behind the very things they will be looking for. Have you trekked in the wilderness? Know how? How to maneuver on steep terrain, snow, and ice? Ford a stream safely? Pack and carry properly? How to avoid fatigue? How to follow a true (and clearly marked) course so those who will be following you will find you? Stay put if you can and avoid making the situation worse for you and Rescue.

Hypothermia is a real and almost unrecognizable danger in any outdoor situation, especially in temperate to cold climates where you may be affected by it before you realize it.

continued

FLINT AND STEEL



This is the easiest and most reliable way of making a fire without matches. Use the flint fastened to the bottom of your waterproof match case. If you have no flint, look for a piece of hard rock from which you can strike sparks. If no sparks fly when it is struck with steel, find another. Hold your hands close over the dry tinder; strike flat with a knife blade or other small piece of steel with a sharp, scraping, downward motion so that the sparks fall in the center of the tinder. The addition of a few drops of gasoline before striking the flint will make the tinder flame up — FOR SAFETY, KEEP YOUR HEAD TO ONE SIDE. When tinder begins to smolder, fan or blow it gently into a flame. Then transfer blazing tinder to your kindling pile or add kindling gradually to the tinder.

One way to start a fire is with flint and lint ball.

1. Imbed a 1/4-inch piece of lighter flint (pyrophoric alloy-large size) in a 1/2"X1/4"X2" piece of soft wood or plastic. Flint should be imbedded close to one end and centered.
2. Wind 2- to 3-feet of 8-strand flax (linen) harness maker's thread at the end opposite the flint.
3. To use, unwind about 1 inch of linen, and on a smooth dry surface, scrape the strands of linen into a ball of lint using the sharp edge of a knife.
4. Place lint ball in contact with flint. With the sharp edge of the knife, use pressure and strike a spark directly into the lint ball. Lint will quickly blaze.

One of the distinct advantages of this piece of equipment is its usefulness, even after complete immersion in water. The linen dries very quickly and 5 minutes of air drying after a thorough wetting is sufficient to make it usable.

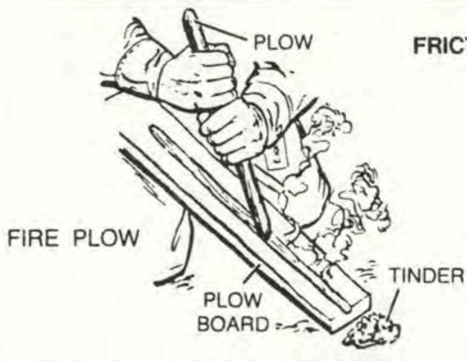
BURNING GLASS

A convex lens can be used in bright sunlight to concentrate the sun's rays on the tinder. A 2-inch lens will start a fire most any time the sun is shining. Smaller lenses will work if the sun is high and the air clear.

ELECTRIC SPARK

If you have a live storage battery, direct a spark onto the tinder by scratching the ends of wires together, to produce an arc.

FRICTION



Run plow back and forth in groove with a steady but increasing rhythm until smoke in tinder indicates a spark.

Hand holding drill socket is braced against left shin. Wood dust piles on tinder as drill spins.

Use a thong of dry rattan or other long, strong fiber, and rub with a steady but increasing rhythm.

NOTE:
Split bamboo or soft wood makes a good fire saw. Dry sheath of coconut flower is a good base wood.

Figure 3

What You Don't Know or Don't Do Can Hurt You! continued

Dehydration can quietly steal your ability to function in only a few hours. The body uses almost three quarts of water per day in routine activity, and few of us purposely replace it with fresh water intake in that amount. Watch out for your urine turning dark, headaches, and nausea. Only a 3 percent loss of body fluid can rob you of 33 percent of your efficiency. Drink your fill at every opportunity, and collect as much as you can when you can. Don't eat snow: Melt it and drink the warm water.

Any survival situation can present you with every conceivable opportunity to be creative and wise, but the opposite is always at hand. The survival rescue literature is full of hair-raising tales of gross ignorance and unreasonable fear of the wilderness. There is no substitute for preparation. Prepare emotionally by finding out what frightens you, and study the fear to separate it from fiction. Prepare to defend yourself against the weather and elements with proper dress and equipment. Stay prepared physically. If you can't face a few moments of hard exercise in civilization, what chance do you think you have out there?

Get rid of the *idea* that it can't happen to you! Of course it can happen to you. Think about that the next time you sortie out without your flying jacket or hooking up your survival kit or wearing that survival vest or putting a signal mirror, pack of matches, pocket knife or a few other items in pockets. They will be with you when you get on the ground even if the survival kit isn't.

At least be sure someone knows when you are leaving, where you are going, and when you will be back. Know the terrain over which you fly and the expected weather conditions for the areas below for the next 24 hours. Fly safe and be prepared to stay that way. — Adapted from Northrop T-38 *Service News*, May 1985. ■

Personal survival kits, such as these two examples, are easy to make and easy to carry in your pocket.

Do you want to get something off your chest? Can you add to an article we've printed? Mail Call is your chance to have your say about safety. This is your magazine and we welcome your inputs, so let us hear from you.

Safety Awards

Reference *Flying Safety* June 1985 Safety Awards on the back cover. Not to belittle in any way Captain John J. Kelly's feat in saving the lives of all on board the stricken HH-53H, but to say that "this is the first known catastrophic loss of a tail rotor in which everyone survived" is not just stretching the facts, but absolutely mangling them.

Of my personal knowledge, one of my flight school classmates lost his complete tail rotor assembly in flight and not only lived to tell the tale(!), but put the ship down without further damage — and he was a student pilot not yet rated. This occurred in the Year of Our Lord 1953.

The following year, one of my squadron mates (actually, being Army, we were a Company) had his tail rotor and gear box depart unexpectedly — both he and his passenger survived unhurt.

My present flying partner had a structural failure, and his rotor chewed half way through the tail cone before the drive shaft broke — no injuries and no further damage to the helicopter in this case either.

If someone would care to do the research, I'm sure there are literally hundreds of tail rotor failures saved without loss of life in Army records.

Incidentally, although the Army no longer practices antitorque failures to the ground, I instruct in the real (civil-

MAIL CALL

EDITOR
FLYING SAFETY MAGAZINE
AFISC/SEDF
NORTON AFB, CA 92409-7001

ian) world, and I assure you no student of mine gets out the door without demonstrating proficiency in landing the helicopter after a simulated stuck pedal or tail rotor failure.

CW4 Robert T. Waid, Jr.
CA AVCRAD
Fresno, CA

We appreciate your comments about our Flying Safety *magazine article on Captain John F. Kelly winning the Kolligian Trophy. You are correct in stating the Army has experienced many tail rotor failures in which the helicopter was saved without loss of life.*

Our item concerned an Air Force HH-53 model aircraft. Although we didn't specifically identify the helicopter model in the sentence you referenced, we meant this was the first known catastrophic loss of a tail rotor in the Air Force HH-53 model aircraft in which everyone survived.

Again, thanks for your interest in the Air Force Flying Safety *magazine and for correctly pointing out that our statement didn't apply to all helicopters. —Ed.*

Well Done Award

I have just finished screwing myself out of the ceiling after reading the Well Done Award narrative describing Captain Albert S. Wickel's F-106 emergency (June 1985 *Flying Safety*).

Before I go any further, I must say that Captain Wickel did, indeed, demonstrate exceptional skill and knowledge. However, how about a word of praise for the exceptional skill and knowledge demonstrated by the unnamed air traffic controller?

It is, in fact, true that Captain Wickel would be the recipient of whatever ultimately occurred, but in my mind, his Well Done should be a shared award with the controller that assisted, nay, guided him home.

SMSgt Richard F. Redhill
1931 ISW
Elmendorf AFB, AK

The controller in this case may deserve consideration for a Well Done. However, I call your attention to AFR 900-26, Section I, on Well Done Award procedures. An individual's unit must initiate a Well Done nomination through command channels to AFISC. Without such a nomination, no person can be considered for an award.

As an aside, air traffic controllers are seldom nominated for the Well Done Award. They are eligible, so perhaps you should work within your command to increase participation in the program. —Ed.

An Ill Wind

Your September 1985 article entitled "An Ill Wind" was very good, but it contained some misleading information concerning the capability of windsocks to display wind speed information. Most major airports, civilian and military, follow the advice of the FAA as set forth in Advisory Circulars (ACs). I don't think that any standards apply to the smaller public and private fields. The last time I looked, Sporty's Pilot Shop was offering windsocks calibrated at two different speeds.

In any event, there's a new Advisory Circular (AC 150/5345-27C) that came out on 19 July 1985 concerning windsocks. It says in the change summary that it "changed the specification for wind cone assemblies to provide for full extension in a 15 knot wind."

That's only half the value as stated in your adaptation of the *Aviation Safety Digest* article. I checked here at Castle AFB, and we have both sizes of the 15 knot sock in use. Travis AFB is in the process of ordering new 15 knot socks, also. They currently have none on the field. One can only guess as to the status of all the other fields around the country.

I couldn't lay my hands on the old AC 150/5345-27B to see what the old specification was, so I can only wonder at how many nonstandard installations there might be out there just waiting to trick the uninformed aviator.

To carry the problem one step farther, I checked into ICAO Annex 14 which covers standards and recommended practices for aerodromes. Chapter Five covers visual aids for navigation, which includes wind socks and landing Ts. ICAO standards don't appear to be calibrated to any speed at all and only need to provide a "general indication of the wind speed." So what we may learn about windsocks might only apply here in the states.

Please feel free to use all or any portion of this letter in your Mail Call section if you think it appropriate. Accurately informing the flying community is the main concern.

Major Greg Fonner
93BMW/SIFC
Castle AFB, CA

OK, Major Fonner, you got us. I had a hard time finding AC 150/5345-27C, but I was finally able to confirm your information. It seems the safest course is to just use the wind sock to estimate the wind direction. The other visual clues given in the article could be of some help in estimating wind speed. One last tip. If the wind sock is on the ground, land somewhere else because the wind sock is supposed to withstand a 75-mph wind. Thanks for your letter. —Ed.

OPS

Fuel Dump

■ Shortly after takeoff, the FB-111's left engine oil pressure gauge began fluctuating. After the left throttle was reduced to idle, the oil pressure stabilized at 15 psi. The pilot proceeded to the fuel dump area to adjust his fuel load to 10,000 pounds for a single-engine landing. When the fuel wouldn't dump, the pilot found the fuel dump "A" circuit breaker out. After he reset the breaker, normal fuel dump began. At 12,000 pounds of fuel remaining, the navigator turned the fuel dump switch off, but fuel dump continued. The pilot headed for home field 50 miles away, and the navigator pulled the fuel dump circuit breakers at 7,300 pounds remaining. The dump rate lessened, but fuel usage remained high. The aircraft landed safely with 3,300 pounds of fuel remaining, 12 minutes after the initial attempt to stop fuel dump. The fuel dump "A" valve had failed open.

Take One — Action

An OA-37B taking part in a motion picture was cleared to land at a civilian airport. The smooth touchdown was followed by aerodynamic braking to 90 knots.

After lowering the nose, the pilot started braking and immediately felt the right brake grab. The aircraft yawed approximately 30 degrees right and started skidding. The pilot tried to correct the aircraft to the runway heading using the left brake, but was unsuccessful. The aircraft continued its skid and departed the runway, stopping on the infield grass where the pilot performed an emergency ground egress.

Investigation revealed the right main tire had blown during the landing rollout for unknown reasons, possibly due to excessive brake pressure being applied.

Hot Root

Start up and systems checkout had been uneventful for the F-16A until about 3 minutes after engine start. At that time, the crew chief noticed smoke coming from the wing root. The crew chief signaled for help and directed the pilot to shut down. After engine shutdown, the smoke stopped and no fire was evident. Subsequent inspection revealed four wiring harnesses had chafed against a nut plate. There was extensive damage to the wiring. The nut plate and nut had melted and a V-shaped area (1" x ½") of the frame had been melted.

Won't Unstick — Oops!

As a small corporate jet was holding No. 8 for departure in line with large airliners, 30-to-40 knot winds buffeted the controls. After 15 minutes of holding the controls, the

TOPICS

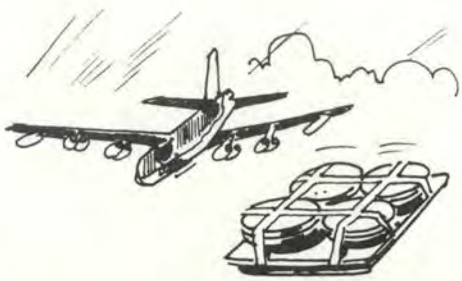
pilot decided to let the autopilot hold them. The pilot didn't realize the wind loads caused the autopilot to roll the trim to the forward stop. Takeoff trim had already been set and wasn't rechecked when finally cleared for takeoff. The aircraft reached takeoff speed plus 15 to 20 knots and still wouldn't rotate, so the pilot made a high-speed abort using 4,500 feet of runway. Strong headwinds and 7,000 feet of runway provided an adequate safety margin in this case. The pilot said, ". . . sure glad it wasn't a 3,000-foot runway! Autopilot does a great job of holding controls, but if you use it, put 'TRIM' at the end of the checklist." — (Adapted from ASRS *Callback*, Aug 85)

Stubborn BUFF

A B-52G was scheduled for a training mission that included an in-unit requalification for the pilot. Everything was normal until water injection was lost on two engines during takeoff necessitating an abort.

The crew decided to burn down fuel to a dry capable takeoff weight. Approximately 1-½ hours later, a normal dry takeoff was made. Passing 400 feet, the "OFF" and "ATTITUDE" flags appeared in both the pilot's and copilot's Attitude-Director Indicators. At the same time, "OFF" flags came into view on both the pilot's and copilot's Horizontal Situation Indicators. The IP assumed control of the aircraft and continued the climb to 15,000 feet using the standby instruments.

The mission was terminated, and the aircraft spent approximately 2-½ hours burning down fuel for landing. Once down to landing weight, the IP flew an uneventful, no-gyro surveillance approach. In spite of all the crew's efforts, this apparently was not their day to fly. At least it was VFR.

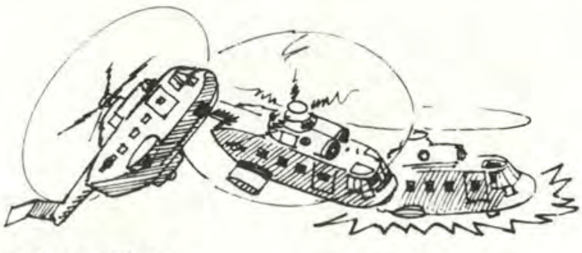


Standby for Score

A B-52 was being ferried from a TDY base to home station. The flight included low-level navigation and bombing. The mission was uneventful until the en route low-level bomb run.

After the first release, the bomb bay doors wouldn't latch closed. The crew left the bomb bay doors closed for the rest of the bomb runs and continued to home station.

After landing, some skin damage was found on the aft bomb bay doors and panels on the underside of the fuselage. They also discovered a cargo pallet (with eight engine inlet covers secured to it) was missing from the bomb bay. Wonder what their score was?



Time Sure Flies When . . .

A CH-3E was performing a hover check. As it lifted off, it began an uncommanded nose up right bank. The pilot applied left forward cyclic with no results. He neutralized the cyclic and checked for AFSC malfunctions. AFSC indicated normal so he again put in left cyclic. This time the aircraft responded and went into a left roll. The pilot applied right cyclic with no results. He neutralized the cyclic and tried again. The aircraft responded and began to roll right. As it reached a level altitude, the pilot forced it onto the ground before it could roll farther right. Whew! Total flight time — approximately five seconds.

continued

OPS

Secret Emergency

Shortly after the F-15 two-ship flight checked in with the Center, the wingman notified his leader he had a utility "A" hydraulic problem and would be RTB. After clearance from lead, the pilot notified Center he was starting a left-hand descending turn back to base. Center gave him clearance to descend and sent him over to Approach Control. From the pilot's conversation with his flight lead, Center had determined the aircraft had "a pressurization problem or something" and passed this information to Approach Control during pre-handoff coordination. But, the pilot didn't declare an emergency with the Center nor directly inform them he was experiencing any difficulties.

The Eagle driver checked in with Approach Control, again without indicating he was experiencing any problems, and then requested permission to go off frequency to talk to the Supervisor of Flying (SOF). He did declare an emergency with the SOF, then returned to Approach Control. At this time, Approach Control asked him if he was having any difficulties. The pilot replied, "Negative, we have the problem under control."

Approach Control then vectored the aircraft for the ILS to Runway 05. During the vectoring, a 747 departed the nearby international airport on Runway 32. Approach Control, unaware of the potentially serious nature of the F-15's utility "A" failure, gave the aircraft a 20-degree change of heading to slightly extend his final approach and preclude any flightpath conflict between the two aircraft. The F-15 pilot, unable to accept the vectors because of the hydraulic problem, stated he would make a visual straight-in, and Approach Control cleared him for the approach. Upon contacting the Tower, the pilot stated his was an emergency aircraft. The rest of the approach was normal. Talk about luck!

Nozzle Burnthrough

An F-16 and an F-5 were mixing it up during the third engagement of a DACT sortie when the F-5 pilot called "knock it off" and informed the other pilot that the F-16 was on fire. The F-16 pilot had terminated afterburner prior to the KIO call, but steady flames persisted for about 35 seconds. The fire began to subside but continued intermittently for another 25 seconds. The pilot had no indications of fire in the cockpit. After-landing inspection showed damage to the nozzle section but no fuselage damage.

Low Level Attack

A flight of two F-4s were targeted against a deployed communication flight for a simulated air attack during an ORI. After the attack on an unmanned radio jeep, ground personnel discovered the jeep's antenna was damaged. Subsequent investigation revealed the antenna was probably damaged by wing vortices generated during the F-4s' pullout over the jeep. But, they did find a small, unexplained dent in one F-4's right drop tank. Could it be . . . ?

TOPICS

Don't Destroy the Evidence!

In a recent incident, an aircraft tire lost a major portion of its tread during landing rollout. The tire remained inflated. Unfortunately, after a discussion with all concerned parties, the decision was made to taxi the aircraft to its parking spot with the damaged tire still installed.

Benefiting from 20-20 hindsight, we can see that this decision cost us an opportunity to more completely preserve the evidence that could lead us to the cause(s) of the incident. Taxiing on the damaged carcass reduced the possibility of that tire providing clues to the reason(s) it failed.

We lost another opportunity, in this particular case, by failing to provide the investigators with the other half of the failure surface — the tread that was thrown. The MDR process needs *all* the evidence. Again, it could have been of use in the effort to pinpoint the reason for the failure.

Last, but not least, another important element of information lost unnecessarily was the pressure in the failed tire. While it may have been difficult to determine initial tire pressure, the MDR process could have fairly accurately estimated it. Now it's impossible to eliminate servicing as a cause. If a situation like this arises again, get that pressure. We need to give the MDR folks at Ogden ALC all the info we can.

The point here is that in peacetime, there are not many valid reasons to taxi an aircraft on a severely damaged tire, especially if the tire could be analyzed for the reasons for its failure. When opportunities exist to gain data for the investigation of a failure (failed parts or tire pressures?), we must make sure all the data are collected.

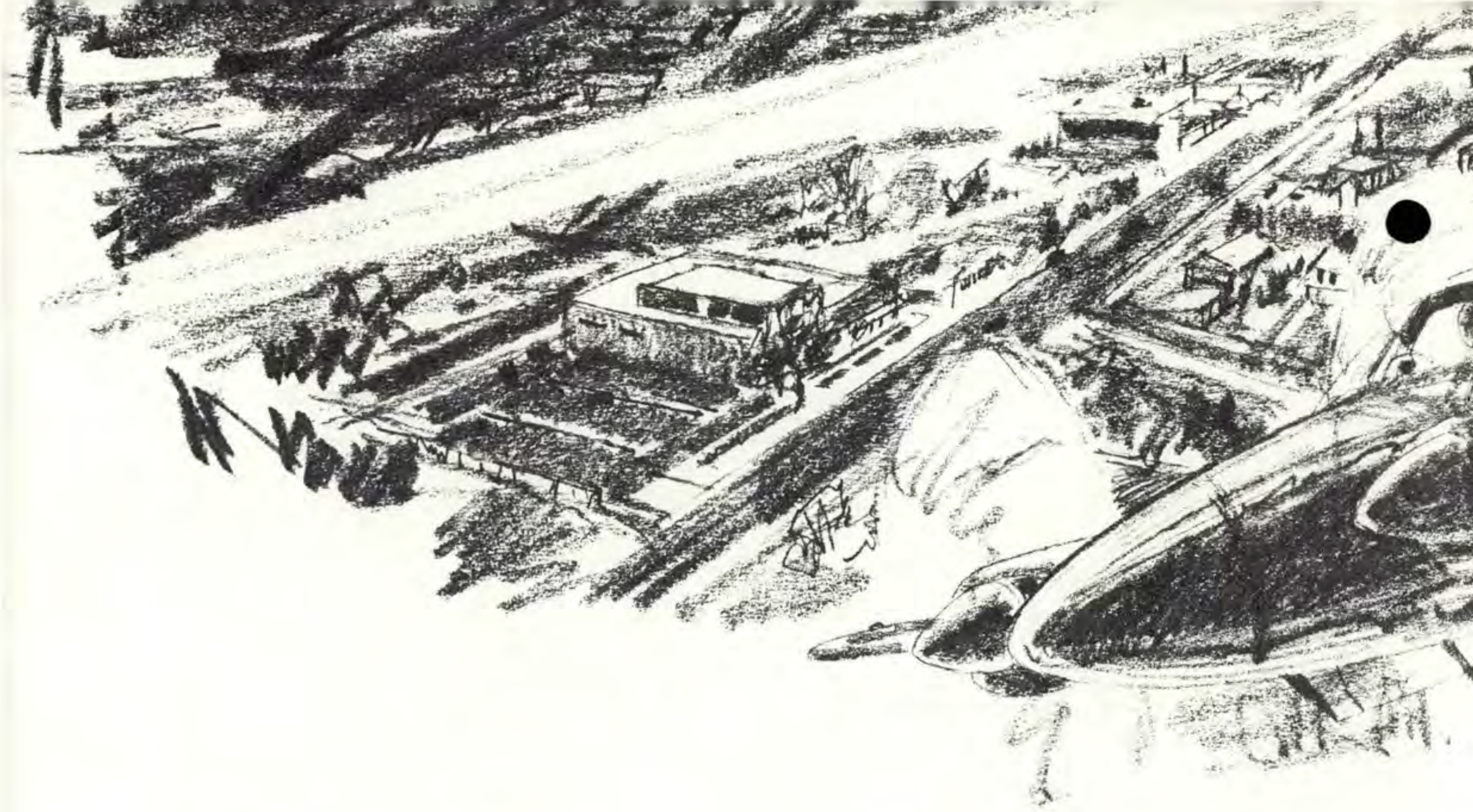
Don't fall into the trap of believing tire failures are no big deal and shouldn't concern you. Even if they don't cause aircraft losses, they cost big dollars — your dollars. A recent incident totaled over $40,000 in damage due to a tire failure. What are you doing to help stop or reduce tire failures? Are you saving, getting, and forwarding *all* the evidence in your SR/MDRs? — Lt Col Harold W. Robertson, Directorate of Aerospace Safety.

Simulated, SIMULATED

The T-37 IP briefed his student the next pattern would be a simulated single engine. While the IP was clearing on downwind, the student pilot switched the stick to his left hand and used his right hand to shut down the left engine. The IP didn't see what the student was doing in time to prevent the engine shutdown, but he quickly took control of the aircraft. After restarting the left engine, he decided to call it a day and landed the Tweet.

OOPs! Wrong Aircraft!

The pilot was practicing stalls during a dual training flight when he inadvertently entered a spin. He quickly identified the spin condition and executed spin recovery procedures — aileron in direction of spin, rudder opposite, and stick full aft. While this may have worked in the fighter aircraft he had flown previously, it doesn't work in Aero Club Cessna 152s. Several turns later and many feet lower, the instructor was able to overcome the pilot's control inputs and recover the aircraft. A phenomenon called negative transfer of training occurs when pilots revert to previously learned procedures. Old habits are tough to break, especially in a stress situation. — AFMPC/MPCSOR, Randolph AFB TX ■



Could This Happen To You?

This account of a near mishap was written by the Army copilot involved. He tells how his complacency led to a near disaster.

■ It was about 1930 when the call came to operations. Some courier material had to be delivered to an airfield 50 miles away as soon as possible. There were only two pilots at the airfield, myself and another officer who had stayed later than usual to catch up on some end-of-the-month paperwork. Since it would have taken some time to get two other pilots to fly the mission, we decided to do it ourselves.

Although we had both been on duty since early that morning, the individual who was to be the pilot had not flown that day and I had flown only 4 hours that afternoon. While we weren't in danger of passing out from exhaustion, we had put in a long day and were tired. Of course, we were irritated at having to perform this relatively simple flight at such an inconvenient time.

We called the weather forecaster and he told us our destination was reporting clear, with 5 miles visibility in haze, and calm winds. The flight would be a piece of cake — 20 minutes up, 5 minutes on the ground, and 20 minutes back. We might still have time for a few hands of bridge before turning in for the night.

Our flight plan was filed with company operations, our preflight accomplished, and we completed an engine runup. After receiving takeoff clearance, we left the airfield, climbed to 3,000 feet, and headed toward our destination.

The outbound flight was uneventful. We had just enough time to have a quick cigarette before contacting the destination tower for landing instructions. The pilot, anticipating instructions, positioned the airplane for a straight-in approach. About 10 miles out, I called the tower, was cleared for the straight-in approach, and told to report gear down and locked. The approach was normal in all respects.

The gear was lowered about 2 miles out. After checking it, I called the tower, reported gear down and locked, and received clearance to land. Full flaps were put down about one mile out, the props were put full forward on short final, and the pilot greased it on. "Not bad for an old man, sir," I said, drawing a smile from him.

The tower cleared us to the ramp and said personnel were waiting for us. That was good news. We wouldn't have to shut down. The pilot taxied to where a captain stood waiting, swung around, and throttled back to 1,000 rpm on both engines. As I opened the door and climbed out onto the wing, I saw the flaps were still full down.

Clutching his hat to his head and

bending forward, the captain struggled through the propwash and reached the wing. Above the engine noise, we concluded our business. He left with the courier material and I stuffed the signed receipt into my pocket, clambered back inside, and locked the door.

Taxi clearance was given by the tower. As we rolled toward the runway, I told the pilot the flaps were still down. As he flicked the switch to the UP position, he grinned sheepishly and muttered something under his breath. He stopped short of the runway, made a quick mag check, ran through a pretakeoff check, and told me he would make a no-flap takeoff.

As we taxied into position for takeoff, I noted 25 minutes had elapsed since departure from our home field. The pilot said, due to the reduced visibility, he would be going on the gauges after takeoff and told me to keep us cleared.

As we rolled down the runway, I scanned the gauges, noting all indications in the green. If our takeoff roll was longer than usual, I figured it was due to not using any flaps. After liftoff, at the pilot's command, I put the gear handle in the UP position. Within a few seconds, I saw the correct indications and told the pilot the gear was up. "Are you sure?" he asked.

Realizing something must be wrong, I quickly rechecked the gear and again told the pilot it was up. "Something's wrong!" he exclaimed. A scan of the instruments showed we were climbing at 100 knots and about 200 to 300 fpm. Both engines sounded good, and the gauges showed they were still developing takeoff power. Both cylinder head temperatures were normal. All instruments and gauges were in the green, but the airplane felt sloppy and the rate of climb was far less than it should have been.

The pilot rolled into a very shallow right turn and said we were going to return to the airfield and land. He told me to request clearance from the tower. I looked out the right window to clear the turn and was about to begin my transmission to the tower when I saw what our problem was.

There, reflecting light from the rotating beacon, were the wing flaps, still in the full down position. Turning quickly, I saw the flap switch was in the UP position. Immediately I knew what was wrong. A flick of my wrist lowered the circuit breaker panel cover and a quick glance confirmed my suspicion. The flap motor circuit breaker had popped.

I can't recall the exact comment I made at the time, but I know it was uttered in pure disgust. How could we have been so careless and sloppy? If either of us had glanced out the side windows prior to takeoff, we would have certainly seen the flap setting.

After I reset the circuit breaker, I glanced out the window, saw the flaps coming up, and told the pilot what I had done. I told him the flaps were coming up and that everything would be OK in a few seconds. From the time the pilot rolled into a shallow right turn until I saw the flaps coming up, only a few seconds had elapsed. In fact, the airplane had turned only about 30 degrees.

A scan of the cockpit showed our airspeed back to normal. The pilot was still concentrating on the instruments. Satisfied all was well once more, I slouched down in my seat and absentmindedly gazed out the window. What a stupid mistake, I thought. How could anyone be so careless? Oh, well, nothing serious had come of it and I would certainly be more careful in the future.

Suddenly my train of thought was interrupted by a red light

continued

Could This Happen To You? continued

flashing by slightly above and just beyond the wingtip. That jerk didn't miss us by much, I thought, snapping erect and looking toward the rear, trying to see the offending aircraft.

Seeing nothing, I turned in my seat and was reaching for the mike button on the yoke to tell the pilot of our miss when I became aware of two things almost at once. The altimeter was flashing past 200 feet, and we were indicating approximately a 1,200 fpm rate of descent.

Reacting instinctively, I grabbed the yoke and pulled back hard and fast. As G forces pressed me down in the seat, I glued myself to the instruments. I was aware of a blur of lights passing beneath and a feeling of sheer terror as I waited for us to crash.

Then, miraculously, we were climbing. As a wave of relief washed over me, I looked at the pilot. He was looking at me with a dazed expression on his face. His state of confusion was made more apparent by his first comment, a rather shaky, "What happened?"

What happened? Well, it was rather simple. On a routine flight in VMC, we had almost killed ourselves by diving straight into the ground. Why and how had it happened? We discussed this at length as we flew back to the airfield.

After takeoff, the pilot went on the gauges and remained there. During climbout, he trimmed the airplane for a climb. As he started his turn, the flap motor circuit breaker was pushed in and the flaps came to the full up position. While we were turning and the flaps were coming up, the airplane transitioned from a climb to a screaming dive.

How did this happen? The pilot, obviously, was not making any kind of an instrument cross-check, yet his undivided attention was focused on the instrument panel. Apparently, he had been staring at something. So much so, in fact, he had practically hypnotized himself. Fatigue obviously had something to do with his condition. Although this was his first flight that day, he had been on duty for 14 hours before the incident.*

As we discussed what happened, he could not remember what he had been looking at. He was not asleep in the full sense of the word because his eyes were open. He was an experienced and very proficient pilot. He took pride in his work and was one of the most dedicated, hard-working men I have ever known. He was the most respected officer in our company and was accepted as one of the more proficient pilots.

This near mishap was entirely my fault. A copilot has certain duties to perform in any aircraft. On this flight, I failed to perform mine. This near mishap was due entirely to lack of attention and completely unprofessional performance on my part.

No checklist was used! I should have used a checklist and called each item off for the pilot to check. His decision to use no flaps for takeoff was entirely acceptable and normal. We were using a long, 4,000-foot runway, and the pilot was planning to fly on the gauges.

When he told me a no-flap takeoff would be made, I should have made a visual check to ensure the flaps were up. If I had, the problem would have been discovered and the whole incident probably would never have happened. Once airborne, proper attention on my part would have averted the near-miss. Instead, I was sleeping at the switch and a near disaster resulted.

I would never have believed that something like this could happen. While I was looking out the window, the airplane transitioned from a climb to a dive. I was unaware of any change in gravity. *I felt nothing*.

Although the horizon was poorly defined, I was looking at the lights on the ground. Daydreaming? Perhaps, but I was looking at the lights on the ground while I was daydreaming. Yet *I saw nothing*!

Certainly, as the airplane assumed a nose-down attitude and airspeed began to increase, there must have been a resulting increase in wind noise. Yet *I heard nothing*!

What were the major mistakes that contributed to this incident? The flight surgeon would probably conclude that fatigue and possibly smoking at night were contributing factors. I think failure to use a checklist, gross inattention and, above all, complacency were major factors. Perhaps you feel something else was to blame.

Could something like this happen to you? You better believe it can! Complacency is an indiscriminate killer. You can learn from my mistake. —Adapted from *Flightfax*, Vol. 14, No. 3, 1985. ■

*Air Force policy for the maximum crew duty day is 12 hours.

☆U.S. GOVERNMENT PRINTING OFFICE: 1986 — 678-032/21022

UNITED STATES AIR FORCE

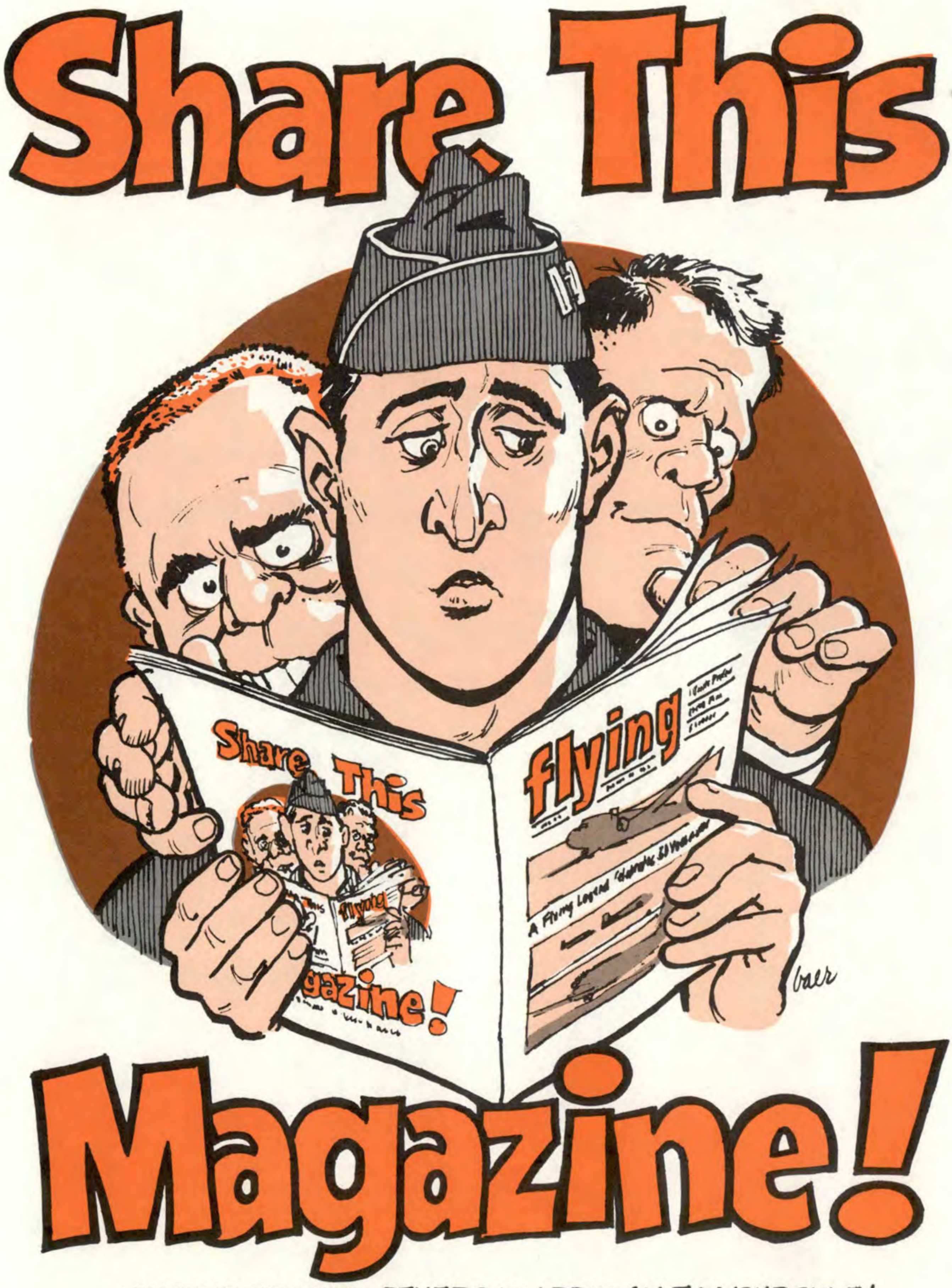
Well Done Award

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.

MAJOR
Ron Blatt

9th Strategic Reconnaissance Wing
Beale Air Force Base, California

■ On 25 February 1985, Major Blatt was flying a local training flight in a U-2. Approaching the runway for a normal touch-and-go landing, his aircraft experienced rapid, uncommanded, full nose-up trim. He immediately initiated a go-around from only 10 feet above the runway. This condition demanded extreme forward yoke force and an absolute minimum flying airspeed — a truly fatiguing situation. Initially, hydraulic pressure remained steady; however, tower personnel reported fluid trailing behind the aircraft. As the extreme forward force began to tire him rapidly, Major Blatt configured the U-2 for landing. He selected full flaps and approached the landing threshold. The approach required him to make critical pitch adjustments by carefully varying the amount of forward pressure on the yoke at a time when he could barely maintain sufficient force on the yoke to prevent a disastrous pitchup. The landing was flawless, and Major Blatt stopped the aircraft just as the hydraulic pressure dropped to zero. Postflight inspection revealed a disintegrated hydraulic line coupler leading to the elevator trim motor. The entire hydraulic system was depleted through the coupler as hydraulic fluid sprayed out the back of the aircraft. Major Blatt's quick thinking and decisive actions resulted in the safe recovery of the aircraft and demonstrated his outstanding airmanship. WELL DONE! ■



IT'S PRINTED FOR OTHERS IN ADDITION TO YOURSELF!