flying

SAFETY

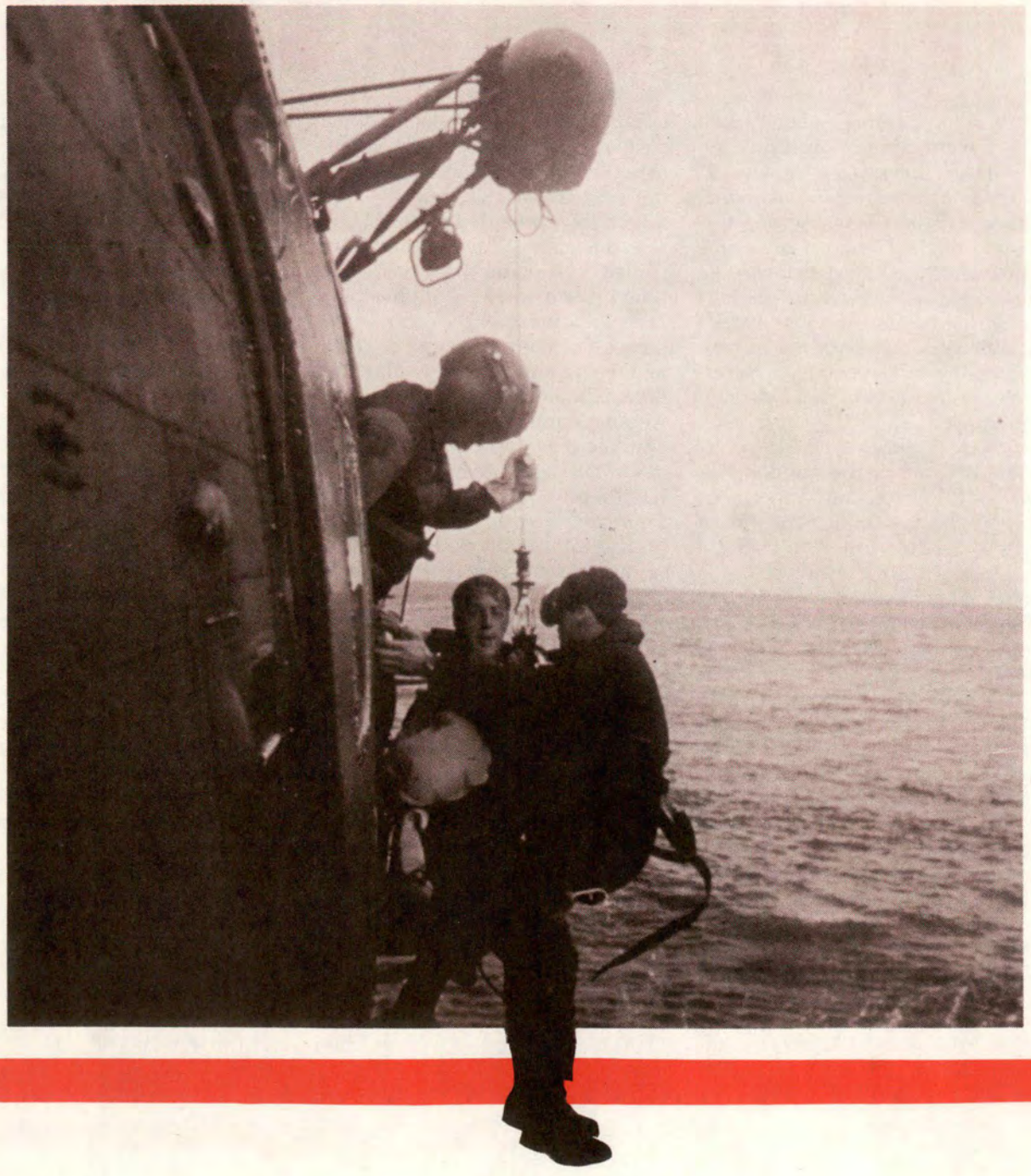
APRIL 1988

The Receiving End

Murphy Gets An Assist

"Maybe" Fire Light

The Microburst



THERE I WAS

■ My copilot and I were tasked with ferrying one of our unit's aging UH-1F Hueys to the "boneyard" at Davis-Monthan AFB, Arizona. Although I had been looking forward to the trip, I had also become a husband just 2 days before — so the timing wasn't exactly perfect! Nonetheless, the previous week's exhaustive schedule of matrimonial planning and execution, at the expense of flight time, had bolstered my anticipation of the trip ahead. No offense, Sue.

The first leg of the mission was uneventful. The crew chief, our only passenger, occupied himself with the latest issue of *Hot Rod* magazine, while the two of us up front kept our current status in compliance with that intended by our thorough flight planning. So far, so good.

The second leg proved to be a little bit more exciting. Shortly after crossing a mountain pass at 12,000 feet, our single-engine helicopter suddenly made an uncommanded 20-degree left yaw as nearly every light and horn in the cockpit came on (or so it seemed)! Our airspeed dropped to about 60 knots, and the aircraft quickly developed a 3,000-foot-per-minute rate of descent. Since our initial cruising altitude was a subjective 500-feet AGL, mother earth was now screaming toward the skids. Recognizing the engine failure, the copilot (now my best friend!) immediately established an autorotation and turned the aircraft into the wind.

I forcibly discarded my map, as I was navigating this leg, and confirmed the engine failure. By the time I was mentally and physically in a position to take the controls, we were plummeting through 200 feet, and it was almost time to start the flare. I did not feel time and altitude would permit a change of controls and told the copilot to continue the autorotation to the ground. He made a beautiful landing in the desert scrub brush as I backed him up on the controls. It was the perfect recovery from a very critical in-flight emergency.

I've always believed only a fool survives a serious in-flight emergency without putting a few things into his or her "experience" bag. Read on for some things you can throw into your experience bag to prevent later use of the ol' luck bag!

ALWAYS BE PREPARED! The in-flight emergency has no compassion. It doesn't care if you haven't studied your EPs since your last checkride, if you have a wife or husband and three kids, or if you were just recently married. It can happen at ANYTIME — at 20,000 feet in clear blue skies or during that low-level run down the gunnery range. Don't get preoccupied with the miscellaneous activities while in the cockpit (navigating, eating, etc.). Your primary job is to fly that multimillion dollar bird. So keep up your guard!

It also follows that chapter 3 of your Dash 1 deserves some extra attention at regular intervals. Know each emergency from its first in-flight indication to your final recovery on the ground. The best pilots take NOTHING for granted!

Before heading out to slip the surlies, cover as much as you can during the preflight briefing. That "routine" checklist might just save your butt. Make sure each member of the crew understands his or her role in the event of an emergency.

For those of you who fly with an extra pilot next to you in the cockpit, work at maintaining good crew coordination. Let your copilot know that, aside from monitoring the standby AC loadmeter, he or she may have to recover the aircraft if things start going wrong. If possible, discuss your intentions prior to execution — a little adrenaline can impair any pilot's judgment. Also, call out any emergency indications you encounter. We want everyone operating from the same page of the Dash 1.

Finally, keep in mind that there are two kinds of pilots — those who've had in-flight emergencies, and those who will. ■

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SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, OSAF

PURPOSE — *Flying Safety* is published monthly to promote aircraft mishap prevention. 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 mishap stories are fictitious. The contents of this magazine are nondirective and should not be construed as regulations, technical orders, or directives unless so stated. **SUBSCRIPTIONS** — 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. **REPRINTS** — Air Force organizations may reprint articles from *Flying Safety* without further authorization. Non-Air Force organizations must advise the Editor of the intended use of the material prior to reprinting. Such action will ensure complete accuracy of material amended in light of most recent developments. **DISTRIBUTION** — 1 copy for every 12 aircrew, aircrew support, and maintenance personnel. Air Force units must contact their base PDO to establish or change requirements. AFSP 127-2 is 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.

The Receiving End

E. JEFF JUSTIS, JR.
Col USAFR (MC) (FS)

■ There are many axioms that apply to instrument flying. Two of the most important are: (1) Never begin a descent unless you know your exact position, relative not only to "nav" aids but to terrain; and (2) always know that your target altitude is a safe one.

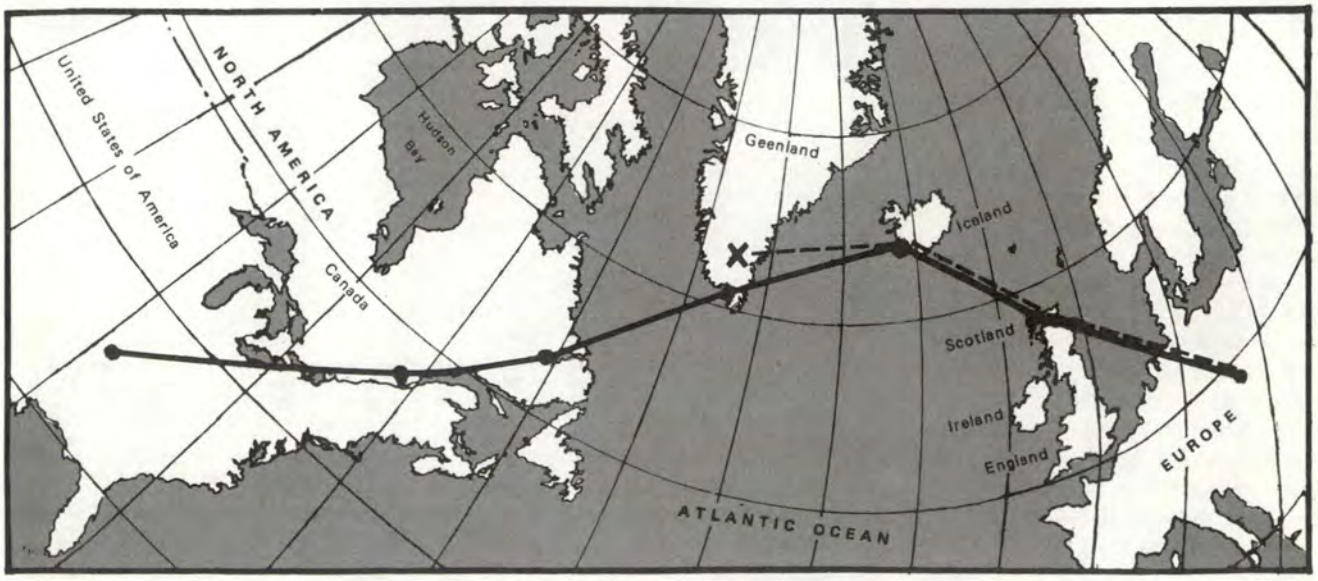
Many approach mishaps we read about are probably related to noncompliance with these commonsense rules. Unfortunately, the crew involved in a collision-with-the-ground mishap is usually not available to explain or help us understand why this occurred. Fortunately, I survived such a mishap, and I am thus able to explain how I found myself on the receiving end of search and rescue.

As 30 June 1986 dawned gray and dismal in Iceland, my wife and I anticipated an uneventful flight to Narssarssuaq, Greenland, in a little over 4 hours in our Twin Comanche with a range of 6½ hours. Nondirectional beacons (NDB) on Iceland and Greenland were to be our primary means of navigation. We were not blessed with sophisticated navigational systems such as INS or Omega, and I had no nav sitting behind me to keep me straight or even to run a few celestials.

I had an inexpensive Loran-C on board, but on the flight across from Canada 3 weeks before, it had proved useless for the flight out from Canada over Greenland or on to Iceland. I even had a high frequency transceiver, but I had found it somewhat useless for effective communication.

Thus, we were flying primitively — much as our flight crews during

In spite of simple navigational equipment, the flight to Europe had been completed with no problems. However, the return trip 3 weeks later was another matter. A series of unexpected events resulted in a deviation from course and an unscheduled stop on the Greenland icecap.



This view of the west coast of Greenland with the icecap in the background was taken on the way to Europe. It's spectacular scenery but not an inviting place for an en route stopover.

The pilot's first indication of trouble was a terrible vibration from the left engine. As the propeller came to a stop and folded back toward the nacelle, he thought he had hit another aircraft.

World War II had flown. You might remember that a flight of P38s crashed somewhere on the island of Greenland en route from Canada to Europe in the forties. I had flown to Europe once before in a light airplane even less well equipped than the Twin Comanche we were currently flying, and the confidence of past success spurred us on.

Without my awareness, several events were conspiring against us. A low pressure system off the southern tip of Greenland was kicking up stronger southerly winds than forecast. This same low was blowing warm, moist air over the massive Greenland icecap, condensing into a thick ground-hugging stratus. The NDB at Narssarssuaq and at Simultac on the west coast of Greenland near Narssarssuaq, although quite powerful and capable of being received all the way from Canada on an eastbound flight, was apparently reflected by the land mass and atmospheric conditions sufficient to make reception impossible on a westbound flight. Thus, I was trying to navigate by two off-track NDBs north and south of my proposed track.

After 3 hours of flying, the coast of Greenland became visible, rising out of the blue waters of the North Atlantic. We were cruising at 9,000 feet, but soon I had to climb to 12,000 feet to cross, what I assumed, was the southern tip of Greenland. No landmarks were distinguishable as we crossed the coast of Greenland, and about that time, we entered the clouds, climbing to 12,000 feet. For the next 45 minutes or so, we were in IMC with no visible icing in the clouds and no lateral track guidance.

I was flipping frequencies on my single ADF, trying to receive one of the strong beacons on the east coast — to no avail. I kept retuning the strong beacons on the west coast when, without warning, I was unable to receive even these previously reliable signals. For whatever reason — failure of the preamplifier in the belly-mounted antenna or precipitation static — I had lost my only navigational aid.

I made an assumption that was not correct. I assumed I was on track, and based on my time and distance, I should have been nearing, if not over, the west coast of Greenland by this time. Fear of flying out past the west coast of Greenland to the North Atlantic once more with insufficient fuel, perhaps, to find my way back to Narssarssuaq, probably prompted my subsequent decision.

I made some attempt to determine a safe target altitude by looking at the ONC chart I was carrying. I realize now many of the altitudes shown for the icecap of Greenland are approximate only and, since the icecap is constantly changing, it would have to be somewhat inaccurate. I based my decision to descend on a presumed position based more on hope than on fact. Thus, I set myself up to be on the receiving end.

I had lost communications on VHF frequencies after I had determined that no DF facilities were available and having tried to raise the USAF facility at "Sob Story" further to the north. I felt as if I had run out of options or, at least at the time, I was unable to think of any. (Since then, of course, I have considered over and over many other decisions I could have made at that time.) I slowly retarded the throttles to begin a gradual descent to 9,000 feet which was the initial approach altitude in the Narssarssuaq area and which I thought would bring us beneath the overcast.

At about 9,300 feet, still in IMC, I began to round out my descent, bringing in a little power. Suddenly, I felt a terrible vibration coming from the left engine. I looked out to see the engine shaking wildly and the prop jerking.

My first thought was catastrophic engine failure, and I automatically pushed full throttle. At about that time, I noticed that the left prop had stopped turning and was folded back strangely against the nacelle. I realized that I had hit something, but my first thought was that I had hit another aircraft. About that time, I felt a sudden jerking deceleration that threw me back and forth against the glare shield. Then, there

continued

With nothing but ice and snow in sight, the arrival of the rescue helicopter was especially comforting to the stranded travelers.

The Receiving End

continued

was silence except for the blowing snow and sleet clicking against the wind screen.

There was no outside visibility beyond my wingtips. If not for the silence and the lack of motion, I would have thought we were still airborne. Then I noticed snow piled up underneath and beside the left nacelle. We had crashed in the middle of the largest glacial icecap in the world outside of Antarctica and, as the realization of this struck home, I became concerned for my wife who was sitting immediately behind me. For whatever reason, we had both survived this crash with only minor injuries, in an intact airplane decelerating from 165 knots to 0 knots.

My electrical system was inoperative, but with a hand-held transceiver, I was able to get a relay, indicating our plight, from a passing jet to Gander Center. Within about 3 hours, while I was outside the aircraft trying to troubleshoot the electrical system and after the weather had begun to clear a little, I heard the drone of a C-130 that was a part of our U.S. Air Force Search and Rescue Squadron based at Woodbridge, England, and deployed for a 2-week tour to Iceland.

Someday, I would like to meet the great crew of that aircraft and thank them for their efforts in our behalf. My ELT had provided a position through the SARSAT/COSPAS satellite system. I was able to communicate with the crew through my hand-held transceiver and was comforted by the fact they were preparing to drop a survival sled to us. Fortunately, we were able to save the government a little money by indicating this was unnecessary unless a problem developed with the helicopter landing in the area.

About an hour later, directed by the C-130, a Sikorsky H-61 helicopter operated by the Danish government out of Narssarssuaq rescued us from the barren wastes of the Greenland icecap. As we were lifted past the Twin Comanche and back to civilization, I realized how grateful I was to the men and women of the U.S. Air Force Search and Rescue Teams and to the people who man the satellite coordination centers throughout the world.

Hopefully, my experience will provide some food for thought next time you make an approach or begin a descent. Believe me, I don't think I'll ever make an instrument approach without confirming my position two or three times and checking my target altitude for any possibility of obstruction or terrain in the area, because an unexpected arrival can certainly result in your being on the receiving end of search and rescue. ■

With rescue a reality, the author's wife, Sally, could begin to relax once aboard the helicopter with the Danish rescue crew.

The author and his wife a day or two after their amazing survival show little adverse effects except for a swollen nose and lip.

Common Sense, HISTORY, and Perspective

This is the second of a three-article series by Lt Col Jim Christol. This month's article deals with acquiring the *history* of aviation lessons learned to supplement your own cup of knowledge.

LT COL JIM CHRISTOL
Directorate of Aerospace Safety

■ One of the most important areas in mishap prevention is the genuine acceptance and realization that the next mishap could be yours. I have seen mishaps cover the gamut of grade (airman to general) and experience levels. In fact, even our top pilots are involved in mishaps (collision with ground, midairs, gear-up landings, wing tip taxiing incidents, etc.). This historical perspective serves to reinforce the fact that all of us are vulnerable to a mishap, so we must frequently review basic airmanship skills and constantly guard against complacency.

In addition, you can supplement your aviation knowledge by sharing aviation stories with one another. Seek out the "old heads" and learn from them. Read articles in safety publications — there are plenty of issues in the squadron. Learn from our allies that fly the same type of aircraft. Read Blue Four News and reports from our safety investigation boards that are available to you.

Learn from aviation mishaps in the civilian world through publications that are widely available today. Finally, pay close attention to the new people in your organization; give them a chance to share their stories, and keep the door open for their creative ideas on safe, effective mission accomplishment.

The rest of this article describes some Time-Sharing common Air Force mishaps and "close calls." The examples used are real and are presented in the following framework: Time-Sharing, Unexpected Situations, and Trail Departures.

Time-Sharing

History tells us (that at times) Air Force pilots fly perfectly good aircraft into the ground and into each other. Fiscal year 1988 has already produced "statistics" that bear this out. As you well know, one of the key elements to positive mission success is to maintain a high degree of situational awareness (SA) throughout the flight.

The amount of time spent looking outside your aircraft versus the amount of time reacting to various stimuli inside the cockpit varies depending on the situation. This is called time-sharing, and many successful aviators plan and fly their missions with a very disciplined approach to time-sharing. Time-sharing is simply a solid technique that prioritizes your attention on the things that enhance your survival and promote mission success.

■ **Air Combat Maneuvering** In a scenario where your medium alti-

continued

Common Sense, HISTORY, and Perspective continued

Low altitude flight is especially lethal. Too many excellent pilots have flown into the ground because they didn't time-share appropriately. Don't get too comfortable in this environment and think you can spend a lot of time doing things other than avoiding the terrain.

Most Air Force midairs occur between members of the same formation or with prebriefed attacking aircraft. Don't become so engrossed in the fight that you cannot maintain situational awareness.

tude two-ship is exposed to attack by bandits with stern aspect ordnance from multiple axes inside 10 miles, it is prudent to look outside more than 90 percent of the time. Visual lookout techniques and tactical formations go beyond the scope of this article. Suffice it to say that you are "busy" enough to just survive in this scenario. The remaining time can be spent with glances at your radar scope, altimeter, fuel quantity and balance, and other cockpit instruments.

Even though this is a nice day with a good horizon, remember that highly proficient pilots have had severe spatial disorientation during high angle-of-attack maneuvering, experienced g-induced loss of consciousness, misjudged aspect angle resulting in midair collisions, or flown into clouds in violation of established rules of engagement (ROE) with fatal results.

■ **Low Altitude** This regime is especially lethal since the ground or water probability of kill is nearly 100 percent. Time-sharing is dependent upon altitude, weather, mission, and type aircraft. Most pilots are well aware that the closer they fly to the terrain, the quicker they approach spending 100 percent of their effort avoiding that terrain to survive. Other factors such as type of terrain, sun angle, moon illumination, shadows, tactical formation, airspeed, threat, and weather compete for the pilot's attention.

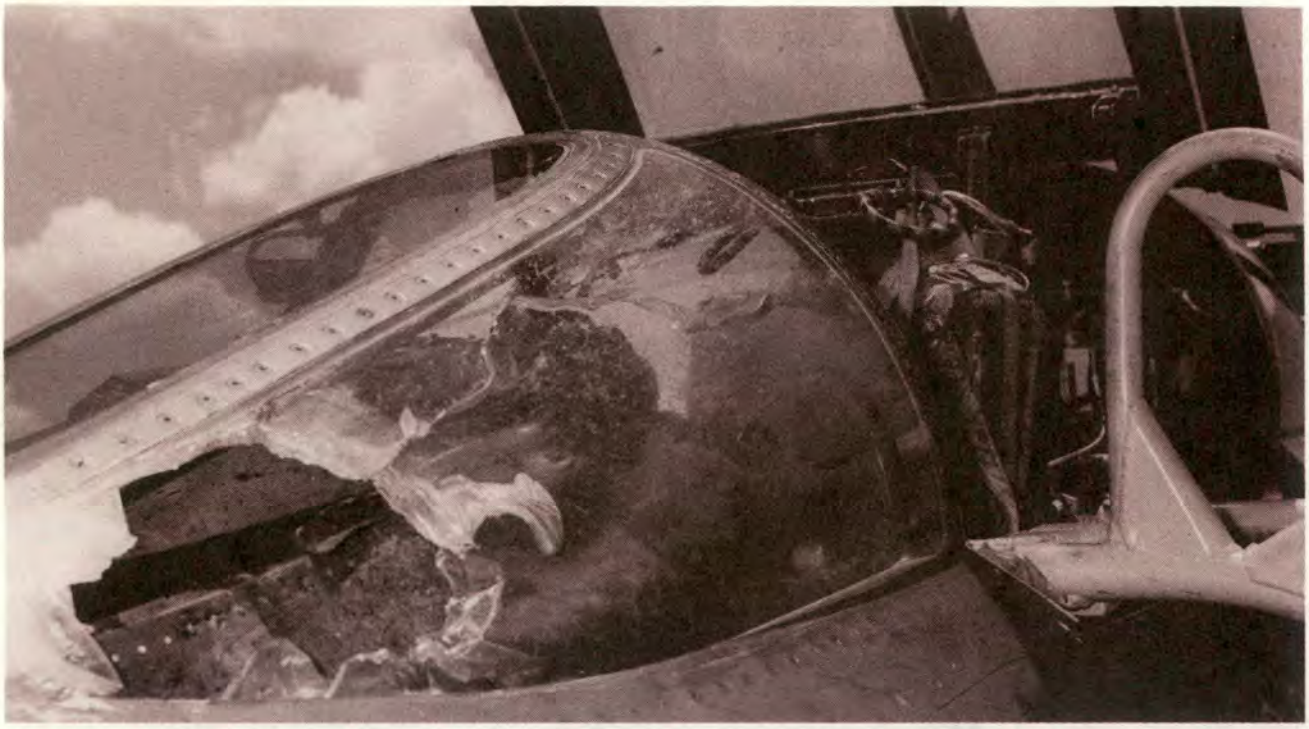
Once established on a low-level mission, the typical pilot spends more than 90 percent of the time looking (terrain, onboard TFR, other terrain avoidance avionics equipment) to ensure the aircraft does not impact the ground.

Now, if other factors occur that compete for attention, or when established on the final target run, the pilot must make a disciplined decision based upon the situation. A slight climb may be in order; however, a descent could be the choice in a wartime scenario to enhance survival. Those that descend are now at a point where even more effort is devoted to terrain avoidance.

The low altitude environment is a stressful place to fly. Treat it with respect and *force* yourself to time-share appropriately. Remember that highly proficient pilots have flown into the terrain while *watching their students* reposition for a briefed low altitude exercise or *watching them* perform low altitude ridge crossings. Others have focused too much on the threat at 6 o'clock and ignored the upcoming ridge line. There have been defensive turns at low altitude that started nose low (in violation of established peacetime ROE) and ended in ground impact.

Recent mishaps during low altitude tactical formation maneuvering demonstrate the importance of clearing the new flightpath. Too much time was spent trying to maintain perfect formation position or checking "6." The big picture was lost and midair collisions or flight into rising terrain resulted. One aircraft impacted the water while descending in a possible effort to regain line abreast position. These mishaps occurred either during or just after rolling out of tactical turns.

Routine low altitude intercepts have led to disaster for a combination of reasons, but the bottom line was pilot diversion from the prima-



Bird strikes are a serious hazard. The risk is much greater at low altitude. Most bird strikes occur below 3,000 feet, so remain above that altitude if possible, especially during migration seasons. Also, the impact force increases dramatically with speed. Each time your airspeed doubles, bird impact forces quadruple, so fly at the slowest practical airspeed.

ry time-sharing task of terrain avoidance. One pilot flew into the water at a shallow impact angle one night while performing a low altitude intercept against a slow mover. Could the light from a nearby buoy have contributed to this pilot's time-sharing breakdown? In another case, a controller's "insistence" on the presence of a target, combined with a light from a radio tower, contributed to another night low altitude fatality.

■ **Instrument Cross-Check** Your habits were developed early on in pilot training; however, as you go to new weapon systems, you often find an instrumentation array that is different (round dials, vertical tapes, location of attitude indicators, types of attitude indicators and altimeters). To make matters more challenging, the attitude indicator may have migrated in your type aircraft from one location to another, based upon which "block" of aircraft you're flying that day.

In addition, the HUD competes for your attention during certain portions of the mission. The F-15 HUD has different symbology from the HUD in the F-16. These items can add up to "trouble" when combined with an actual instrument approach. A night weather approach with plenty of reflections inside the canopy makes you a strong candidate for spatial disorientation.

The solution is to rely on your own well-disciplined instrument cross-check. This is that same cross-check that you practice in the simulator (assuming the instrumentation is the same).

Time-share primarily on the control instruments. AFM 51-37, *Instrument Flying*, discusses the role of the HUD in instrument flying. You can markedly improve your instrument proficiency by flying frequent instrument approaches in the simulator and flying "precise" instrument approaches when you return to base.

Time-sharing is an excellent way to approach mission priorities, and it enhances your SA. It is an extremely valuable briefing aid. A *disciplined* approach to time-sharing is a proven technique used successfully by many of the high SA pilots in your squadron. Use it in your briefings. Try it; you'll like the "long term" results.

Unexpected Situations

■ **Bird Strikes** Did you know Air Force aircraft experience approximately 2,500 bird strikes each year? Many bird strikes are severe enough to cause considerable damage, and a few result in Class A mishaps. Do you have a personal game plan on what your actions will be in case of a bird strike? Quick action will be required in the event of a high speed bird strike while at low level. Keeping your helmet visors down while in the low level arena is part of a solid game plan.

Plan your missions to avoid bird strikes. The use of hi-lo-hi profiles and holding for range, route, or approach clearances above 3,000-feet AGL are excellent techniques to minimize bird exposure. Remember that birds also fly at night. Virtually our entire fixed-wing fleet has been affected by bird strikes.

Therefore, you should know at what speeds your canopy and windshield should be able to withstand the "typical" 4-pound bird, as well as what your engines have been designed to withstand. This information is always available at your safety shop.

continued

Common Sense, HISTORY, and Perspective continued

Habit patterns can be helpful as well as harmful. A habit pattern that reminds you to check gear and flaps on final may save you from landing with the gear up, if you forgot to lower it at the proper time. But, if your normal habit patterns are interrupted at a critical time, you may be glad you have afterburners, or wish you did have, to get you out of the resulting problem.

■ **Inflight Emergencies** Although aircraft emergencies are not entirely unexpected, they are never welcome. History tells us we will be faced with our fair share of operations- and logistics-related mishaps again this year. Review the January or February 1988 issues of *Flying Safety* magazine for a look at what your aircraft mishaps were in Transition Year 1987 and what is forecast for 1988. Your airmanship and knowledge of previous mishaps in your type aircraft may make the difference in future statistics.

Remember the L-1011 aircraft that crashed into the Florida Everglades more than 10 years ago? The crew was so preoccupied with an unsafe landing gear indication that they allowed the aircraft to impact the terrain at night. While holding at low altitude, they engaged the autopilot. The autopilot held the "attitude" (very slightly nose low turn) but not the "altitude." Think about that the next time you engage the autopilot in your aircraft.

■ **Habit Pattern Interruption** This is usually the culprit in gear-up landings and other embarrassing checklist omissions. One successful technique is to always look again at the safe gear indications as you approach the overrun or runway for landing . . . Always!

Tower, GCI, and RAPCON controllers and RAPCON can interfere dramatically in your habit patterns — if you let them.

For example, a two-ship pitched out at night several years ago for full-stop landings. The tower controller noted only one rotating beacon after the pitch and "directed" the lead aircraft to turn on the beacon.

By this time, the lead aircraft was in the final turn. The pilot was looking for the switch as his aircraft went low and slow in the pattern. He saved his own life at the last moment by recovering from an unusual attitude, lighting the afterburner, and struggling out from the "weeds" on short final.

In another case, two highly experienced fighter pilots were returning to base VFR when a controller called them on guard and informed them they were in an unauthorized area. Since the fighters were low on fuel, they tried to work their way around the clouds and away from the unauthorized area. The result was fatal as both aircraft impacted the terrain.

One of our allied fighter pilots also found himself in an unauthorized area one day, and he followed the controller's snap vector out of the area. He entered IFR conditions and impacted steeply rising terrain.

How many times have you heard stories or actually had a RAPCON or Center controller give a descent that would result in terrain impact if followed? People make mistakes. To minimize the effect of others' mistakes on your life, a helpful technique is to develop a *questioning attitude!* Will that altitude take me below the minimum vectoring altitude? Do not blindly follow altitude or heading changes that will put you and your aircraft in jeopardy.

■ **Disorientation and Lost Wingman** Once again these are not entirely unexpected — after all, we brief these items frequently. How-

ever, as in the case of in-flight emergencies, these situations are not welcome. Excellent techniques to deal with these areas consist first of *telling* someone you are "disoriented" or are lost wingman, and then *following through* with the appropriate lost wingman procedures using a "highly" disciplined instrument cross-check. In this situation, more than 90 percent of your time-sharing should be on the primary attitude indicator.

Our Air Force history is full of mishaps attributed to spatial disorientation — many of them beginning from a lost wingman situation. Formation takeoffs into low ceilings have been lethal to wingmen.

Once you are lost wingman — believe your instruments! You may have to concentrate entirely on the main attitude indicator to keep from becoming severely "messed up."

While on the wing, if you feel disoriented — mention it right away to your leader. His answer to you describing aircraft attitude, altitude, airspeed, and intentions generally goes a long way in bringing your senses back into synchronization. Flight leads, once a lost wingman event occurs, begin a dialogue with your wingman as soon as possible.

Trail Departures

We lose pilots performing these departures because they do not time-share appropriately. Think about how you would perform this departure single-ship. Now you are No. 3 of a four-ship trail departure at night and in the weather. The briefed interval is 20 seconds, with all climbing out at the same power setting and same airspeed. Everyone flies the same published or briefed departure routing.

If everyone flies this departure precisely, the aircraft should be in perfect position. Sounds like an instrument maneuver — the cross-check is exactly what you would do single-ship except for the following three areas that *divert* the pilot's attention from the precise task at hand during trail departures:

- Adjusting radar scope.
- Trying to lock on.
- Looking outside to acquire a visual on preceding aircraft.

A properly flown trail departure should leave you in perfect position for an expeditious join-up to visual formation once on top of the weather. But, don't become engrossed in getting and maintaining a radar lock on the aircraft ahead of you. Your primary attention should be directed to flying a precise instrument departure.

Pilots tend to time-share inappropriately due to these diversions and end up in unusual attitudes with subsequent disorientation. Since they are on departure (low altitude), they do not have enough time to sort it out and recover or eject prior to ground impact.

Some basic thoughts — there is no reason to lock on, especially at low altitude when your primary task is precise aircraft control and terrain avoidance. Also, the radar should already be adjusted prior to takeoff. With that in mind, there will be no "need" to acquire the preceding aircraft visually until the flight lead calls for a join-up. An occasional glance at the radar scope should show the preceding aircraft. If not, no problem — just call that you are "not tied" and continue to fly your precise instrument departure.

Trail recoveries also require precision. One day a four-ship was established in radar trail, IFR, performing a TACAN full stop. Just prior to arrival at the final approach fix, No. 3 observed No. 4 directly above his aircraft less than 50 feet away. No. 4 had locked up No. 2 in error. I was told the debriefing was quite interesting. Treat trail departures and recoveries with care and precision. Do not be spring-loaded to lock on at "any cost."

This article has attempted to impart to you some of the *history* of our aviation experience. Hopefully, I've given you some ideas on how to learn from the mistakes of others. The application of common sense and history to mission planning and employment can decrease your mishap vulnerability. It is especially helpful to frequently review basic airmanship skills and guard against complacency. Remember, the next mishap could be yours! ■

The words "radar contact" from approach control are very comforting during a weather penetration and approach. But don't let your guard down. You must remain aware of terrain elevation and obstacles in the area and keep track of your position. Make sure the headings and altitudes given you will not place you in jeopardy.

Murphy Gets an

LT COL JIMMIE D. MARTIN
Editor

■ It's time for our annual reminder about Murphy. Most of you are familiar with this troublemaker. But for those of you who were born yesterday, Murphy is the sponsor and chief advocate of what is referred to as Murphy's Law. Put very simply, it states, "If anything can go wrong, it will."

Recent research indicates Murphy does more than just come up with laws and corollaries to explain how things happen. This mischievous imp actually maneuvers people and situations to fit his clever sayings, thus proving their validity. In fact, Murphy has been so busy lately that he has had to enlist the help of his brother and sister to keep enforcing his law. Let's look at just one recent example of these busybodies at work.*

The Problem

While maneuvering between 13,000 and 14,000 feet, an A-10 instructor pilot (IP) began to feel his personal hypoxia symptoms. He selected 100-percent oxygen on the regulator and received no oxygen or air at all. He selected emergency pressure and nothing happened.

A quick check of his regulator showed the supply lever was turned on, and there were 4.5 liters of liquid oxygen (LOX) on board. However, the oxygen pressure was zero. He went back to normal on the regulator which enabled him to breathe ambient cockpit air. He didn't use the emergency oxygen bottle, or take off his mask.

The IP began an immediate descent to below 10,000 feet, declared an emergency, and made an uneventful straight-in approach and landing. The problem turned out to be that the oxygen supply line from the LOX converter to the oxygen regulator in the cockpit was disconnected. To get to the bottom of the problem, we will need to go back several days.

Phase One

The flight was on a Wednesday morning. The previous Friday night, Senior Airman Roger, the crew chief who was working on the aircraft, got an unexpected assist from Murphy's sister, Molly. The next day marked the beginning of a 3-day weekend, and Airman Roger knew the aircraft wasn't scheduled to fly until Wednesday. He wanted to make sure it stayed in good shape.

Perky Molly Murphy was an energetic, persuasive young lass who could persuade a dead stump to

*Although fictionalized, this account is loosely based on an actual physiological mishap.

Assist

grow a new tree. She convinced Airman Roger that if he disconnected the oxygen supply line from the LOX converter, it would keep the LOX from leaking out over the 3-day weekend. (This, of course, was not true.) But, being a dedicated (albeit not too smart) crew chief, he disconnected the line.

Now, disconnecting the oxygen supply line requires a "red X" writeup in the AFTO 781 grounding the aircraft. But, Molly kept Airman Roger busy finishing the other tasks involved in putting the aircraft to bed until the 781 writeup completely slipped his mind. As a result, no one but Airman Roger and Molly would know the oxygen supply line was disconnected. No one would be alerted to check the line. Now the stage was set for our mishap the following Wednesday morning. Murphy congratulated his sister on a job well done.

Phase Two

On Tuesday night, another crew chief was scheduled to preflight the aircraft and service it with LOX in preparation for Wednesday morning's scheduled flight. Murphy had to work fast to keep his plan operating. Since he was tied up with other projects, he sent his younger brother to handle this one.

Brother Murphy was a little nervous because this was his first solo assignment. He had always had big brother there to help him out. He knew this was a critical mission and was proud that his brother had enough faith in him to send him alone. He decided to use his specialty, the old "You've done this a million times. You know it by heart and don't need a checklist." That's why his nickname was "Checks."

He got to the aircraft just in time for the LOX servicing. He was surprised how easy it was to get the crew chief, Sergeant Bill, to lay the checklist aside. This was critical to his success because the checklist called for checking the security of the oxygen supply line Airman Roger had disconnected. He was able to distract Sergeant Bill enough that he forgot to check the line, and it remained disconnected.

Checks Murphy continued to mislead Sergeant Bill and led him to forget the required "red X" writeup in the 781 annotating that panel F-2 had been opened for LOX servicing. Another missed chance to have someone else check on this critical area. Checks was elated — he really had Sergeant Bill's confidence and things were going his

continued

Murphy Gets an Assist continued

way. He was glad Sergeant Bill was also doing the preflight because this was going to be tricky.

The preflight checklist called for not only checking the LOX quantity gauge in the cockpit, but also checking the oxygen supply pressure gauge for between 60 and 145 PSI. Checks had to play this just right. He knew he wouldn't be successful in getting Sergeant Bill to skip both cockpit oxygen checks because they were too ingrained in his memory. He was a very experienced and conscientious crew chief. Checks had to let him check the quantity, but not the pressure. That way Sergeant Bill would remember checking the oxygen and be satisfied he had done his job correctly.

Checks' timing was perfect on this one — the best he had ever done. Just as Sergeant Bill looked at the LOX quantity, Checks turned off the electrical power. By the time Sergeant Bill got the power back on, he had forgotten about checking the oxygen pressure. He finished the rest of the checks, signed off the forms, and left. Checks was so excited over his triumph that he was about to burst, but he played it cool as he told his brother about it. He made it sound like just another routine assignment.

Phase Three

Now it was up to Murphy himself to complete the final step in this complicated plan. He would deliver the coup de grace himself. The pilot would have two opportunities to discover the oxygen problem and undo all the work Murphy's team had done. These were both in the PRICE check. He would notice the lack of pressure on the oxygen pressure indicator and also would receive no air at all when he selected 100-percent oxygen. Obviously, Murphy wouldn't be able to distract him twice during the same check. He would have to get the pilot to skip the entire PRICE check.

He decided to throw a few delays in the pilot's way so he would have to rush his checks. Causing the engine to stall in the flightline shuttle was Murphy's first delaying tactic. Then spreading a little oil and hydraulic fluid at appropriate places on and under the aircraft slowed things down while the aircraft was checked out. By the time the pilot got in the cockpit, he was really rushing to get ready to go with his student who had no delays at all with his aircraft.

When it came time for the PRICE check, the pilot just checked the blinker and pressed on, thinking that since he was breathing OK, his connections were obviously good. Soon he was taxiing out with his student and looking forward to a successful mission. But Murphy knew better.

As the two A-10s took off, the Murphys toasted their success. It had been tough to cause all those people to make just the right mistakes at just the right time. Yes, they had worked well as a team. Murphy remembered how large a family he had. What if he began training other members of the Murphy clan? Just think how much they could do. Hmmmm.

The Moral

Take fair warning from this story. Beware of the Murphy clan. Don't be complacent. Even though you've done the PRICE check a thousand times and never found a problem, keep doing it. Use your checklist, and make the proper entries in the AFTO 781. Don't let Murphy talk you out of it. We all have to work together to outwit the Murphys. ■

The Checklist

CMSGT AUGUST W. HARTUNG
Directorate of Aerospace Safety

■ One of the most reliable protections against possible maintenance mishaps, especially those involving explosives, is the use of a checklist. We're reminded in safety publications, at commanders' calls and our unit roll calls, how a checklist, if properly used, provides an assurance of continuity and completeness.

Yet, a large number of maintenance mishaps in the Air Force can be attributed to a failure to use the checklist. Not only have aircraft and equipment been damaged, but some of our folks have even died. And that's sad. It's sad because these are the same people who thought they were saving time or reducing their workload.

Let's review the following mishaps and see if these aircraft maintainers saved time or reduced their workload.

■ Our first mishap began at Hurry Up AFB, in the end of runway (EOR) quick check area. There, one of their jet fighters developed a fuel leak in the standpipe area of the centerline fuel tank. The aircraft ground aborted, but no one documented the fuel leak in the AFTO 781. Maintenance folks downloaded the centerline tank, resealed the standpipe, and reinstalled the tank, all without ever removing the impulse carts or making an entry in the AFTO 781.

Sometime later, a weapons crew was dispatched to decart the jet. But due to an electrical storm in the area, the crew did not accomplish the task. After an hour passed, the weather cleared, but a different weapons crew was dispatched, not to decart the jet, but rather to perform a jettison check on the centerline station.

The crew consisted of a very experienced NCO and a relatively new airman. Although the NCO had a checklist, he didn't review the aircraft forms or ensure the applicable cartridges were removed.

With assistance from two aircraft mechanics, the weapons team hooked up the headsets and communication cords and applied external electrical power to the jet.

The weapons NCO stood on the ladder and directed his assistant in the cockpit. When the airman actuated the center station jettison switch, the impulse carts fired, jettisoning the centerline tank. Fortunately, a tank dolly, located directly underneath the centerline tank, prevented damage to the tank and injury to personnel.

■ Our second mishap involves the inadvertent jettison from a fighter/bomber at No Checklist AFB.

This mishap began with the dispatch of a weapons crew to EOR to meet an aircraft returning with four hung inert 500-pound bombs on station 4. Once the team installed the applicable station 4 electrical and mechanical safing pins, the aircraft taxied to its parking spot and shut down.

After picking up a munitions trailer, the crew reported to the same aircraft and downloaded the four bombs. In preparing to troubleshoot the weapons system, the team chief directed his assistants to dearm the jet. A few minutes later, when he asked if station 5 was safe, the team chief was shown some carts that an assistant was about to put into the cart can. There were no further words exchanged.

Just as the crew began preparing for a functional check of station 4, they were interrupted while the aircraft was fueled.

After the aircraft was fueled, the weapons crew began a functional check. When a team member depressed the stores jettison switch, the BRU-3A bomb release unit from station 5 jettisoned to the ramp. At no time did the team chief physically check station 5 for the presence of a safing pin or assurance the carts had been removed.

Knowing the risks involved, are we really saving time by not complying with every step in the checklist? By skipping steps, are we actually reducing the workload?

The obvious answer is no! Time and time again, the checklist is an effective tool in protecting equipment from damage and people from injury or death. All we have to do is adhere to the procedures that have already been worked out. ■

USAF SAFETY AWARDS

THE SECRETARY OF THE AIR FORCE

SAFETY AWARD

AIR NATIONAL GUARD

The Air National Guard had the fewest number of Class A aircraft mishaps, the fewest aircraft destroyed, and the lowest mishap rate in its history during 1987. The rate was 12 percent lower than the previous record low which was achieved in 1981. The command flew more than 330,000 hours and 208,000 sorties in 19 different weapon systems while performing diverse, total force operational tasks involving tactical fighter operations, air defense, air refueling, tactical airlift, and reconnaissance attesting to an effectively managed aircraft mishap prevention program.

Ground safety accomplishments were also impressive, resulting in significant reductions in military and civilian injuries and no on-duty ground mishap fatalities.

AIR FORCE SYSTEMS COMMAND

The Air Force Systems Command achieved a significant reduction in its Class A aircraft mishap rate compared to the previous 2 years and did not have a Class B aircraft mishap. This record is particularly impressive when considering that flying operations were conducted in a test mission environment featuring one-of-a-kind aircraft, unique aircraft configurations, and missions designed to test the limits of a system's capability.

In weapons safety, there were no Class A or Class B explosives, air launched missile, or space mishaps. The nuclear surety program also had outstanding accomplishments.

In ground safety, there were no on-duty military or civilian fatalities for the second consecutive year.

Significant reductions in military and civilian injuries further enhanced the command safety posture.

THE MAJOR GENERAL
BENJAMIN D. FOULOIS
MEMORIAL AWARD
AIR TRAINING COMMAND

The Major General Benjamin D. Foulois Memorial Award is presented to the Air Training Command in recognition of the most effective aircraft mishap prevention program of all major commands during 1987.

The Air Training Command had a zero Class A aircraft mishap rate for 1987, a feat unique in Air Force history for such a large flying command, and for only the second time in its history, the Air Training Command did not experience a single aircraft mishap fatality.

These impressive achievements, while flying more than 478,000 hours, 389,000 sorties, and 1,312,000 landings training future aircrews for the Air Force, attest to the professionalism and strong commitment to flying safety that exists throughout the Air Training Command.

THE CHIEF OF STAFF
SPECIAL ACHIEVEMENT AWARD
UNITED STATES AIR FORCE ACADEMY

The United States Air Force Academy did not experience a Class A aircraft mishap during 1987; the second consecutive year of mishap-free operations and the sixth year of zero Class B aircraft mishaps. The command flew more than 22,800 hours and 18,100 sorties while performing a flight training mission for the Academy cadets. These accomplishments attest to safe operational flying training for the future Air Force leaders.

TACTICAL AIR COMMAND

The Tactical Air Command achieved a Class A aircraft mishap rate of 2.2 mishaps per 100,000 flying hours, nearly equaling the record low 2.1 rate of 1985, but the Class B aircraft mishap rate of 0.4 was more than 60 percent lower than the Class B rate of 1985. The command flew more than 562,000 hours and 365,000 sorties in 18 different types of aircraft. More than 80 percent of the hours flown were in fighter/attack aircraft performing a demanding combat training mission. These accomplishments attest to the professionalism and total commitment to safety of the men and women of the command.

"MAYBE" FIRE LIGHT

CAPTAIN GREGORY S. BARCLAY
906th Air Refueling Squadron
Minot Air Force Base, North Dakota

■ The crew was on its last leg of what had been a long TDY to the Pacific. Arriving in Guam during the ORI, losing a lot of flying time, and pulling several days of strip alert were only a few of the good deals on this TDY. We were now completing a 5-day stopover in Hickam which included billeting in downtown Honolulu. This was a good way to conclude our long trip.

The day we were to deploy home was a long one. It started out with us acting as the spare tanker for an important mission. If either the primary tanker or the receiver were to encounter maintenance problems, our redeployment would be delayed until the mission was a success. After an early show time and a successful mission by the primary, we were ready to upload passengers and fly home.

All activity from preflight until just prior to takeoff was normal. As usual, we were departing Hawaii at a heavy gross weight, so we carefully reviewed the takeoff procedures one last time, completed the taxi checklist, and prepared for the departure.

I called for the before-takeoff checklist, started water, and pushed the throttles to takeoff rated thrust (TRT). I found the No. 4 engine required full throttle to reach TRT, but this didn't warrant an abort, so we pressed on. After a long takeoff roll, we started a climb to FL 350. Following water runout, I had the right-seat pilot set military rated thrust (MRT) due to our slow rate of climb. All throttles reached MRT except No. 4 which fell about .02 short on the EPR.

Fifteen minutes later while passing through FL 200, the crew noticed a flicker and very faint glow from the No. 4 fire light. Suspecting a circuit problem because of the flicker, the navigator reached up and jiggled the fire test switch, and the glow immediately disappeared. The same thing happened once more during the climb, and again the problem was solved by actuating the fire test switch.

I elected to continue the climb to FL 350 and investigate further. After reviewing engine fire in-flight procedures in the Dash 1, I had the boom operator visually inspect the No. 4 engine, and there was no evidence of smoke or fire. All engine instrument indications were normal, the fire light was no longer illuminating, and the fire test switch was actuated with normal results through the level off and cruise portions of the flight. Intentional throttle movement had no apparent effect on the dim fire light.

After a lengthy discussion with the crew and the senior crew chief, we concluded the momentary faint glow and flicker were due to a circuit problem and not an actual fire. In addition, my boom operator had witnessed the same indications on

a flight at his previous duty station, and faulty circuitry had been the cause. None of us, except the boom operator, had ever experienced this type of thing before, and all of us interpreted the Dash 1 as saying an illuminated fire light was, as the name implied, a bright red light.

The remainder of the flight was normal. I monitored the engine instruments the whole time, and there was nothing different about the No. 4 engine. After we landed and started offloading our gear, I was asked to come and look at the No. 4 engine. I was shocked to see a hole burned in the cowling approximately 6 inches by 2 inches. I was thankful the damage wasn't worse.

I was then bombarded with questions concerning the indications I had, and an investigation was started. I gave maintenance a detailed description of what happened and asked what they would have done under the same set of circumstances. The response I kept hearing over and over again was that they would have done the same thing.

This didn't justify my actions by any means because we did have a fire, and the assessment of the problem was wrong. Further discussion with other crewmembers in my squadron confirmed most did not believe a fire light would illuminate dimly, and their reaction to the situation would have been the same.

After the cowling was removed, a hole in the diffuser case 4 inches by ½ inch was discovered. The engine was removed and disassembled locally by FMS propulsion specialists. The fuel manifold was ruptured in the vicinity of the burned-through area of the diffuser. There were no previous trends in the engine condition monitoring program. The No. 4 engine fuel manifold apparently caused a burn through of the engine diffuser case and engine cowling.

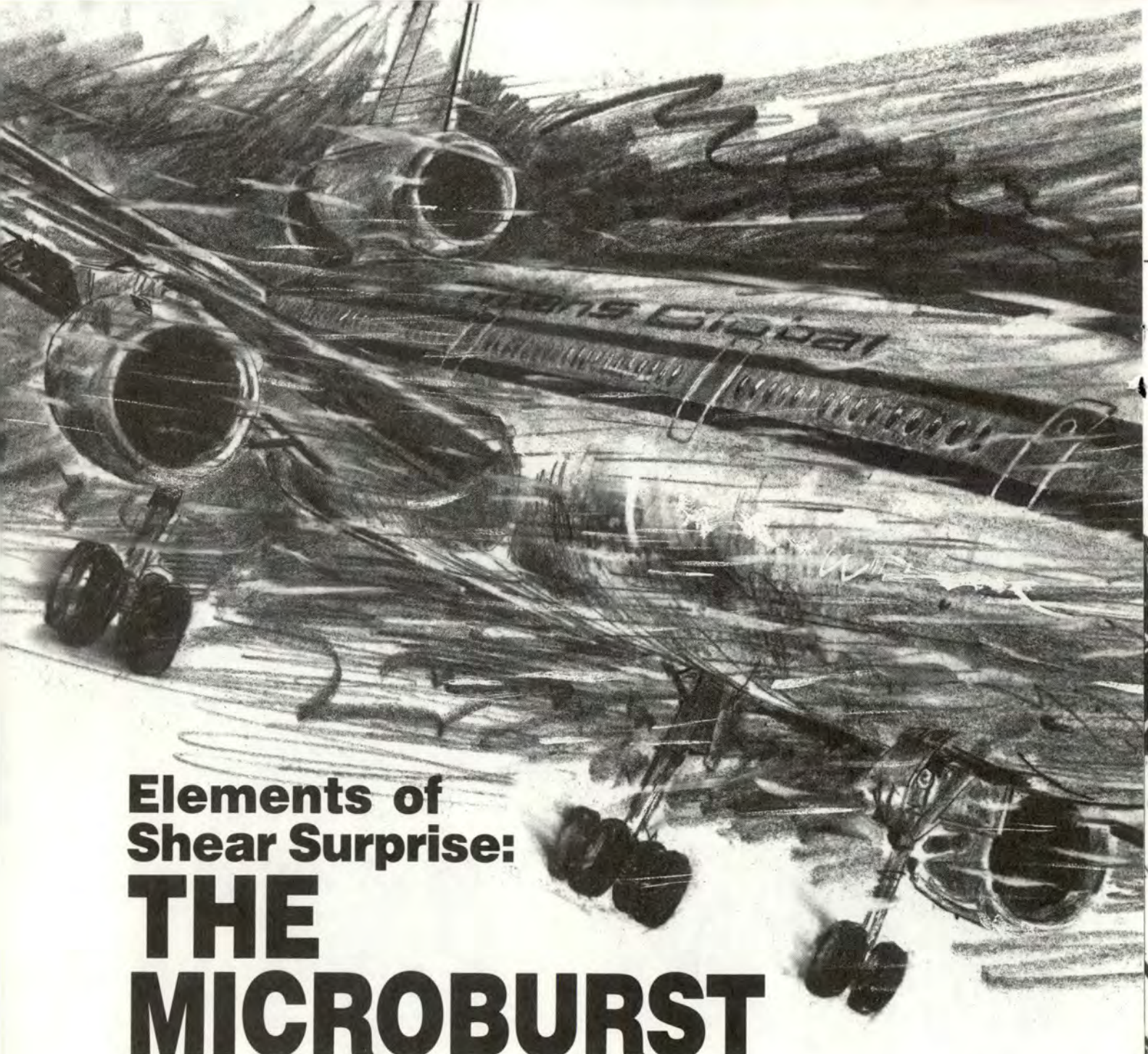
After much discussion with FMS, I learned a glow or intermediate condition by the fire light can indicate fire. In fact, I was informed that if a match is held to the fire sensing circuit, the brightness of the fire light will vary depending on the intensity of the heat. This information was new to me and to many others conducting the investigation.

As a result of this incident, our safety division decided to submit a change to the Dash 1 describing this rare occurrence. The warning or caution will read somewhat as follows: The fire warning light may indicate less than full bright under conditions of moderate overheat; however, any level of illumination of the fire warning light shall be treated as a fire.

In addition, safety recommended the fire warning light system should be improved to provide a bright light any time the detection system indicates an overheat condition. As to why we didn't continue to get a fire light or any other indications can only be speculated. What probably happened is that the fire burned through the cowling, and the subsequent airflow cooled the fire detect sensors enough to extinguish the dim fire light.

In summary, this was a learning experience. I incorrectly analyzed the problem, but the result was something we can all learn from. I'm thankful it only took a minor incident to learn a valuable lesson rather than the loss of an airplane and lives. Be a pessimist when it comes to potential emergencies, and the decisions you make probably won't be wrong — especially when they concern engine fires. Remember, there is no such thing as a "maybe" fire light. ■

This picture shows the bulge and burnthrough of the engine diffuser case. The damage was located just aft of the compressor and just forward of the combustion cans. The split was approximately 1/2 by 4 inches. Photo by Major Brian Nealy, 5 BMW/SE.



Elements of Shear Surprise: THE MICROBURST

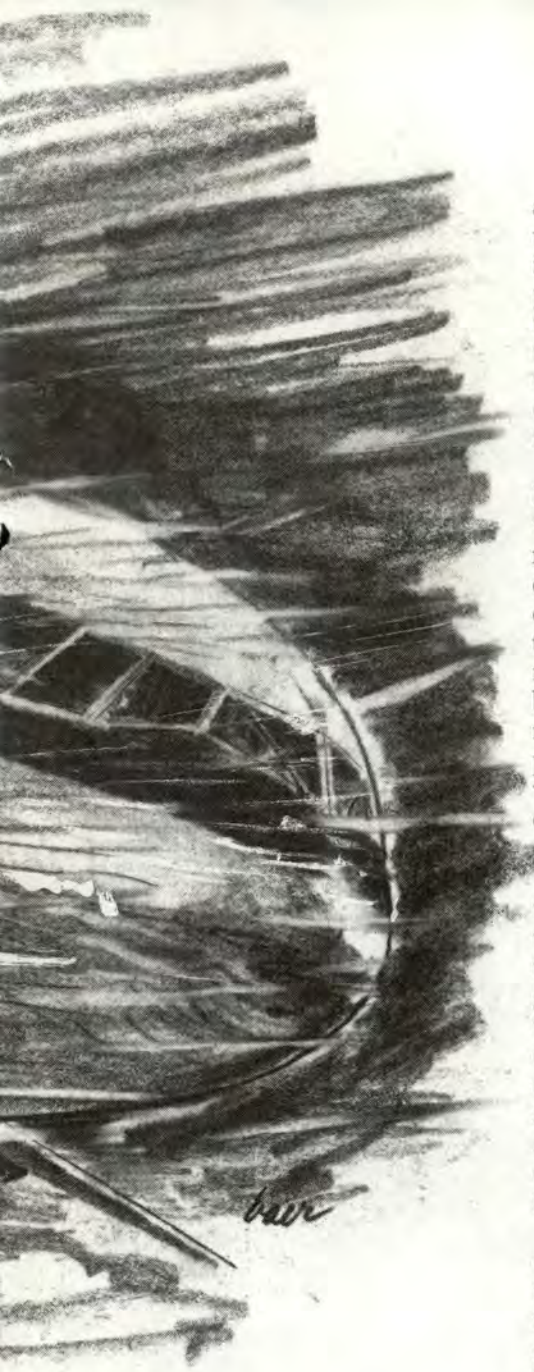
The following story was adapted from NASA's *ASRS CALLBACK*. There are many safety lessons involved including copilot syndrome, wind shear, complacency, etc. See how much you can learn from it. Ed.

■ It is rare that a "classic" report comes along, one with every ingredient of good reading: Drama, meticulous attention to detail, and implicit safety lessons for all pilots. We were fortunate to receive one such report recently. It is a First Officer's account of an air carrier's encounter with the most dreaded form of wind shear, the microburst. In addition to its many other merits, this report offers a needed (and solemn) reminder that in spite of all technology can do to make weather predictable and avoidable, the elements can surprise — sometimes fatally.

Approaching from the west, we observed, visually and on radar, an extensive area of scattered thunderstorm cells in the vicinity of the airport. The area extended from west-southwest of the airport to the south. Once handed over to approach, we were able to make extensive visual deviations around cells and remain in the clear.

ILS approaches were in progress to runways NO-L* and NO-R,* although the ATIS NOTAMed NO-R closed. The weather at the airport was 92 degrees F, ceiling 4,000 broken, visibility 4-miles haze, wind

*To maintain confidentiality, the runway orientation is described as north (NO) or southwest (SW).



from the south at 8 knots. As we continued our descent into the airport, we were in the top of the haze at 8,000 feet and were then relying exclusively on radar to avoid cells.

The ride was smooth until below 4,000 feet where we were in continuous light chop. There was extensive discussion between ourselves and approach regarding which runway we were being vectored to. It switched between NO-L and NO-R twice with us finally flying a west downwind to NO-L.

I was flying the aircraft with the autothrottle and autopilot engaged using flight level change and heading select modes. We had another pilot in the jumpseat, and the captain had him call the tower to get the most current field conditions while we were being vectored. Tower reported throughout the incident that the field was "in the clear."

Both the captain and I had our EHSIs (electronic horizontal situation indicator) selected to the map mode with wx radar display in addition to the dedicated weather radar display between us. We agreed to fly the approach at a faster-than-normal airspeed, and the airspeed bug was set to 140 knots (V_{AP}+10) rather than 126 knots (V_{TH}+5) as per normal procedures. We were vectored and joined the NO-L localizer about 3 miles from the outer marker (LOM).

Approaching the LOM, we captured the glide slope and were established in the landing configuration, gear down and flaps 25 degrees. At that point, I told the captain I was going to manual flight, disconnected the autothrottle and autopilot, and flew referenced to the flight director/ raw data on the ADI. As we passed over the LOM, tower cleared us to land NO-L, reference traffic on short final.

We queried tower as to weather conditions, and they responded that the field was in the clear, although there was lightning to the southeast. Tower asked the airplane in front of us if it had encountered any wind shear. They made an indecisive response which we interpreted as a negative.

At approximately 3 miles on final, we were approaching a pronounced rain shaft on localizer and on glide slope. Before entering the rain, our indicated airspeed increased (over a 1- to 2-second interval) from 140 to 185 knots. We began to get above the glide slope as we entered the rain. Shortly after entering the rain shaft, we had an instantaneous indicated airspeed decay from 185 to 120 knots. (I cannot overemphasize the rapidity with which it moved!)

I applied maximum thrust (levers to forward limits), called for flaps 15-degrees, and attempted to maintain altitude. The captain raised the gear, selected 15-degrees flaps, and called missed approach. We got a momentary configuration warning (gear not down and flaps beyond 20 degrees). I don't believe the GPWS (ground proximity warning system) ever sounded.

The captain observed the altitude decrease to 1,200 feet MSL (approach end NO-L 639 feet elevation). He was also closely monitoring the IVSI (instantaneous vertical speed indicator) during the recovery. We exited the northeast side of the rain shaft slightly offset to the right of runway centerline beyond the approach end of NO-L.

The captain gave a very explicit warning to the tower regarding the area we had transited. The aircraft behind us (another carrier) abandoned the approach when we called missed approach. We were handed back to approach who gave us instructions to the VOR to hold. Approach advised that they were changing to runway SW approaches and that we could expect vectors for an ILS. From what we could see, there was a large cell sitting on the south portion of the airport, and we decided to divert.

The reporter concludes the narrative with further observations on those harrowing seconds between application of full thrust to the engines, and the aircraft's exit from the rain shaft.

My perception of the elapsed time once we encountered the airspeed loss is slightly skewed. With maximum power, flaps 15-degrees, and gear up, we were descending at approximately 400 feet per minute. It seemed we were in this situation for a "long time." With hindsight, it was probably between 5 and 10 seconds until we exited, but I can't be any more explicit.

I had expressed my reservations about the approach to the captain before we crossed the LOM, although not as forcefully as I should have. We discussed the incident at length later that evening and were both convinced during the encounter, that an uncontrolled impact with the ground was imminent and *was going to happen*. I will strive to avoid similar circumstances for the rest of my career. ■

Safety Warrior

The Berlin Airlift

LT COL JIMMIE D. MARTIN
Editor

■ "Friday, Black Friday, Friday the thirteenth of August, 1948, is a date many of us who served on the Berlin Airlift wish we could forget." So begins General William H. Tunner's description of the Berlin Airlift in his book, *Over the Hump,* published by the Office of Air Force History.

Background

After World War II, Germany was divided into four zones of Allied occupation. The American, British, and French zones covered the western two-thirds of the country while the Soviet zone covered the eastern third. Although Berlin was deep inside the Soviet zone, it was also divided into four sectors because of its importance as the capital city and center of German culture. The Western allies were granted access to Berlin by one railway; one main highway for motor convoys; a canal for barge traffic; and three air corridors, each 20 miles wide. However, only the air corridors were guaranteed in writing.

Relations between the Western allies and the Soviets deteriorated in the years following the 1945 agreements. The final issue that led to the Berlin blockade was currency reform to control the runaway inflation. After the western allies agreed to make the Deutschemark the only legal tender in Berlin, the Soviets suspended all surface traffic into Berlin from the west on 24 June 1948 due to "technical difficulties."

The only way left to supply the

needs of the 2½ million people in West Berlin was by air — a feat the Soviets and many other people thought was impossible. Except for the "Hump" airlift of World War II, no one had been successful in providing resupply solely by air. And the "Hump" airlift had not had the restrictions of Berlin. This was indeed a severe test for the U.S. Air Force, still in its first year as a separate service.

The Airlift Begins

General Lucius Clay, American Military Governor of Germany and Commander, United States Forces in Europe, began the airlift as a temporary measure. Knowing that coal would place the greatest burden on the airlift, General Clay telephoned Major General Curtis LeMay, commander of USAFE, to ask if he could transport coal by air. General LeMay's answer was, "Sir, the Air Force can deliver anything."

Prior to the blockade, West Berlin had imported 13,500 tons of supplies per day. The Air Force had 102 C-47s in Europe and 2 C-54s. The C-47s could carry 2½ tons, and the C-54s had a 10-ton capacity. The British had 60 C-47s, which they called the Dakota, and 50 Yorks, which could carry a little over 8 tons. The French were heavily involved in Indo China and couldn't spare any aircraft.

The airlift began on 26 June, and in the first 48 hours, delivered 80 tons of flour, milk, and medicine to Berlin. The Americans dubbed the airlift, "Operation Vittles," while the British named their airlift, "Operation Plane Fare." The estimated basic subsistence level for Berlin was 4,000 tons per day, and General Clay estimated the maximum airlift capability at 700 tons per day. The shortfall was covered by a 30-day stockpile of supplies accumulated in Berlin before the blockade started.

By 7 July, the airlift had reached a level of 1,000 tons per day. By mid-July, the Americans were delivering 1,500 tons per day, and the British were adding 750 tons per day to the total. But still, there were problems.

Operation Vittles was enthusiastically reported by the press. Ironically, some of the things they praised actually indicated an inefficient operation. Newspapers told of pilots who continued flying despite exhaustion. Many were flying twice as many hours as they should. Desk officers went to the flight line whenever they could and found planes sitting there waiting for them. In spite of the excellent job being done by the officers running the airlift, General Tunner felt the job should be done by professional airlifters.

As he put it, "The last place you should find this type of activity is in a successful airlift. The actual operation of a successful airlift is about as glamorous as drops of water on stone. There's no frenzy, no flap, just the inexorable process of getting the job done."

General Tunner Takes Over

At the end of July, General Hoyt Vandenberg, Chief of Staff of the Air Force, put General Tunner in charge because of his experience in running the "Hump Airlift." With a handpicked staff of 20 officers and a secretary, General Tunner left for Berlin, expecting to be back within 90 days.

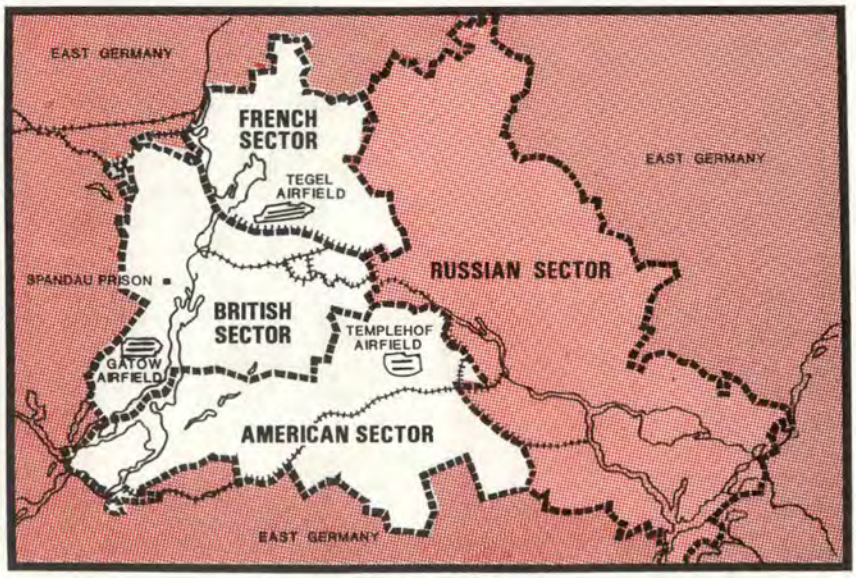
When he arrived in Berlin, he described what he saw as ". . . a real cowboy operation. Few people knew what they would be doing the next day. Neither flight crews nor ground crews knew how long they'd be there or the schedules they were working. Everything was temporary."

It was obvious to General Tunner that although more aircraft were needed to meet the required tonnage, there was a limit on the number that could be used because of the limited airspace in the corridors and scarce ramp space. "We were going to have to shoot for a high

continued

After World War II, Germany was divided into four zones of occupation. Berlin was similarly divided, and the western allies were guaranteed access. However, the three air corridors were the only peaceful way to supply West Berlin during the Soviet blockade.

GERMANY (1948-49)



BERLIN (1949)

utilization rate for each plane, rather than a large number of planes themselves. This would be the headache of my maintenance men."

Maintenance The existing maintenance schedule was impossible. The maintenance operation was housed in crowded facilities and was responsible for both routine maintenance and for major periodic inspections. There was a serious shortage of tools and spare parts in the theater.

Eventually, these problems were solved by performing periodic inspections at depot and allowing German mechanics to work on the aircraft. However, it took the personal intervention of the Secretary of the Air Force, Stuart Symington, to complete the solutions.

Airspace The American corridor was the longest of the three. A spur of the Harz Mountains required a climb to 5,000 feet. The Central Corridor was restricted to one-way traffic out of Berlin. The terrain was low and flat all the way, and the distance was shorter. The North corridor was also short and over flat country.

"Simple arithmetic showed that we would be able to get a higher rate of utilization out of our planes by using the two shorter corridors, in one and out the other. The tonnage that required a 1½-hour trip from Rhein-Main required only a 1-hour trip from the RAF bases at Fassberg and Celle; thus two planes based at Fassberg could do the work of three based at Rhein-Main. As I have already noted, the two northern routes lay over low and level country. We could come in on the deck if we wanted to." After much negotiation, General Tunner succeeded in setting up a combined British-American airlift operation using the two northern corridors.

Airfields All planes were required to land at two airfields, Templehof in the American Sector and Gatow in the British. These fields were 4 minutes apart by air and in the midst of a checkerboard of Soviet fields. Both Templehof and Gatow were inadequate and were eventually improved through a combination of American ingenuity and German hard work. Improvements included the addition of runways and aprons. Also, a new airfield in the French sector, Tegel, was built from scratch.

Just as it had on the Hump Airlift of World War II, the versatile C-47 provided the backbone of the Berlin Airlift. Over 100 Gooney Birds flew around the clock carrying supplies in and bringing out finished products manufactured in West Berlin.

Schedule The schedule was ragged with frequent delays. General Tunner eliminated the turnaround delays by requiring the pilots to stay with their aircraft in Berlin. While the aircraft was being unloaded, the crew was given ops briefings, weather briefings, etc., at the aircraft, and a mobile snackbar (operated by pretty German Red Cross girls) supplied coffee and doughnuts and other snacks. The turnaround time dropped to 30 minutes.

He also standardized flightpaths and times. "What we needed on this run was one standard and constant set of flight rules to govern all planes at all times . . . I thus decided all planes under my command would fly a never-changing flight pattern by instrument rules at all times, good weather or bad, night or day."

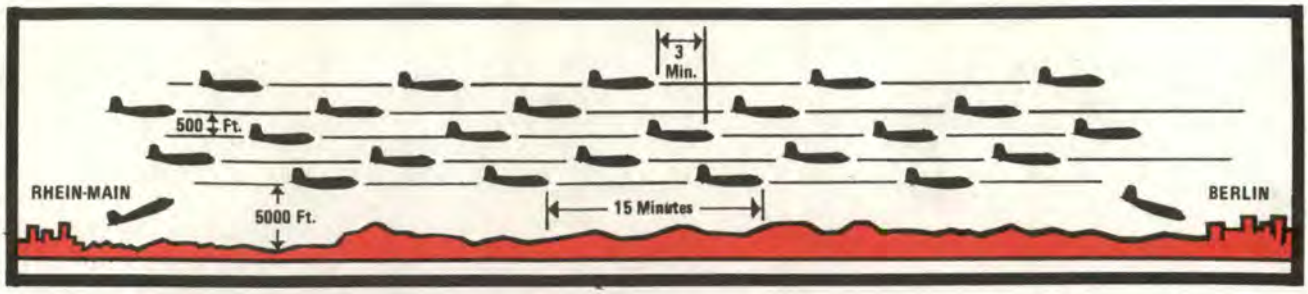
The timing was set up with takeoffs at 3-minute intervals because it was an ideal cadence of operations with the control equipment available at that time. This was based on the fact there are 1,440 minutes in a day. In a 24-hour period, there would be 480 landings at an airfield. That meant every 90 seconds there would be an aircraft either taking off or landing. "It is this beat, this precise rhythmical cadence, which determines the success of an airlift. This steady rhythm, constant as the jungle drums, became the trademark of the Berlin Airlift. . . ."

Black Friday When the Berlin Airlift was 7 weeks old and General Tunner had been the commander for 15 days, he was flying to Berlin in a C-54 to attend a ceremony honoring this efficient, smooth-running operation. While they were en route, the weather closed in and both the tower operators and ground control approach operators lost control of the situation.

One C-54 crashed into a ditch off the departure end of the runway and caught fire. Another C-54 pilot blew both tires on landing to avoid running into the fire. A third pilot landed on an auxiliary runway that was still under construction, sliding in the rubber base until he finally ground looped the aircraft.

With all the confusion and planes still arriving at 3-minute intervals, air traffic control began stacking the aircraft up. By the time General

Maintenance was one of the biggest problems of the Airlift. In the beginning, there was a shortage of qualified mechanics, spare parts, and tools. Some of the mechanics actually had to buy their own tools.



For safety and efficiency, the aircraft were separated by time and altitude. They were spaced 3 minutes apart for takeoff and landing. The five flight levels were later reduced to two, but the spacing remained at 3 minutes.

Tunner's aircraft arrived, the stack reached from 3,000 to 8,000 feet and was still building. The air was filled with radio calls from worried pilots near panic who were trying to find out what was happening.

Things weren't much better on the ground. A traffic jam developed as aircraft left the unloading line at 3-minute invervals for takeoff and were told to hold. The controllers were afraid to clear them for takeoff because they might hit the aircraft milling around overhead.

General Tunner grabbed the mike and said, " 'This is 5549, Tunner talking, and you listen. Send every plane in the stack below and above me home. Then tell me when it's OK to come down.'

"There was a moment of silence, then an incredulous-sounding voice said, 'Please repeat.'

" 'I said: Send everybody in the stack below and above me home. Then tell me when it's OK to come down.'

"He got the message that time. 'Roger, sir,' he answered."

General Tunner felt the real success of the airlift stemmed from that Friday the 13th. Out of that incident came another one of his new, unconventional rules:

"If a pilot should happen to miss his landing for any reason whatsoever, he would continue straight out on course and return the 200 to 400 miles to his home base. . . . If the ceiling was over 400 feet and visibility a mile or better, he would come in. If the ceiling was less than 400 feet, visibility less than a mile, he would simply shove forward his throttles, breathe a sigh of regret at missing the hot coffee and doughnuts and pretty girls in the Red Cross truck, and proceed for home base.

"I stated publicly that I would reduce to copilot status any pilot who failed to land with ceiling and visibility *greater* than 400 feet and a mile, and that I would court-martial any pilot who did land with ceiling and visibility *less* than 400 feet and 1 mile. I never did court-martial any pilot or reduce anyone to copilot status on these counts — I never had any intention of doing so in the first place — but the message got across."

People and Pounds To improve morale while increasing tonnage, General Tunner appealed to the American spirit of competition and instituted daily quotas for the units. Each unit's accomplishments were printed in the Airlift's daily newspaper, the *Task Force Times*. It worked! Tonnage steadily increased far beyond predictions and morale also improved.

The last great push came on Easter Sunday, 1949. In that 24-hour period, they flew 1,398 flights and carried 12,941 tons of coal. That was averaging close to one flight for every one of the 1,440 minutes in the day. Throughout the entire operation, flying safety remained paramount. There was not one mishap or injury.

The End of the Blockade

General Tunner summed up the achievement. "It was that day, that Easter Sunday, I'm sure, that broke the back of the Berlin blockade. From then on we never fell below 9,000 tons a day; the land blockade was pointless. A month later, May 21, 1949, the Soviets grudgingly reached the same conclusion and ended it. Surface traffic began to move.

"We continued the airlift at more or less full capacity for 3 more months, building up a stockpile of reserves in the city just in case the Soviets might start the blockade again, and then gradually began to let down. By September 1, it was all over. In a total of 276,926 flights, the Airlift had hauled 2,323,067 tons into Berlin."

The official cost estimate for the American contribution was $300,000,000, although General Tunner felt it was much lower. However, he concluded, "Whatever the cost, the Airlift had done its job, and West Berlin was free. We had shown the world what the free nations could do."

Not only had they shown the free nations could complete an airlift operation considered impossible, but also that they could do it safely. "Never, from the very beginning of my command until the end, had I subordinated flying safety to any other phase of operation. Despite our round-the-clock operation and the miserable weather conditions, our accident rate on the Berlin Airlift was less than the overall average for the United States Air Force.

"Of the total number of lives lost on the Airlift, 72 in all, of whom 35 were American, the great majority resulted from nonflying accidents. One of the many journalists who visited us, on looking at our accident figures, burst out: 'Why I'm safer on the Berlin Airlift than I am flying between Washington and New York!' " ■

FSO's CORNER

Command Support

CAPTAIN DALE T. PIERCE
919th Special Operations Group
Eglin AFB Aux Fld 3, Florida

■ Command support is a term that should ring true to the ears of any FSO. Without it, a flight safety program cannot exist. This fact was recognized by those who drafted the unit effectiveness inspection (UEI) guidelines.

Evidence of command support is sought by inspectors on most UEI teams, and rightly so. The flight safety program, after all, is the commander's program.

Despite this, in some organizations, command support is not always forthcoming, in abundance or otherwise. To make things even more frustrating for the FSO, in these situations, command support tends to ebb and flow as commander perceptions dictate, not necessarily as required by the FSO or the program.

I contend that command support for the flight safety program can, and should, be managed by the FSO, just as he or she manages other aspects of the program. The FSO should work toward aligning commander perceptions with flight safety program requirements. This management of command support will include at least one form of upward communication. You know, that stuff they told you about in college.

For the FSO, upward communication boils down to keeping the commander informed of your programs, goals, and requirements. This doesn't mean bypassing the director of safety (if you're at wing level). It does mean ensuring the commander knows about your program and what you need to manage.

I found out about a program that serves this purpose from the Tactical Air Command Inspector General's FSO. He thought it was an excellent idea. The program was created by the FSO at the 474th Tactical Fighter Wing (TFW). In addition to informing the wing commander, his program has the additional benefit of informing operational commanders at the squadron level as well.

Here's how his program works. Each of the three operational squadrons in the 474 TFW hold a pilot meeting every Friday. During these meetings, recent mishap messages are briefed, local trends are presented, and any current problems are discussed.

Minutes from these meetings are forwarded by the squadron FSOs to the wing FSO. At the end of the month, the wing FSO consolidates the 12 sets of minutes, adds such things as spot inspection trends, and anything else that might be of use or interest to the commanders, and publishes a monthly safety summary.

This Safety Information Line goes to the 474 TFW/CC and the three operational squadron CCs. Through this medium, information flows "upward" to the commanders, in a reasonably condensed form.

Remember, you can only obtain effective command support for the flight safety program from an informed commander. If your commander doesn't know what you are doing and what you need, he can't help you.

Captain Bill Rusk provided this month's FSO's Corner idea. He's the FSO at the 474 TFW at Nellis AFB, Nevada, AUTOVON 682-7394.

The FSO's Corner needs your ideas. What are you doing in your program that could help other FSOs if they knew about it? If you have a better way of doing business, call me (Dale Pierce) at AUTOVON 579-7450 (SMOTEC) or send your name, AUTOVON number, and a brief description of your idea to 919 SOG/SEF, Duke Field, Florida, 32542-6005.

Quote of the Month: "Landings are required, takeoffs are optional." Unknown ■

Command support begins with the weekly squadron safety meetings conducted by each of the three flying squadrons. The minutes of these meetings form the foundation of the Safety Information Line which goes to the wing commander and squadron commanders.

MAIL CALL

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

There I Was

■ We received several inquiries on the "There I Was" article in the Feb 88 issue. The questions centered around, "Why is ATC shutting down engines on training flights?" and "What did shutting down the right engine have to do with the hydraulic pressure for the gear which is powered by the left engine?"

The article was obviously written about the olden days. ATC does not fly this type of profile or shut down engines on training flights today. It has been at least 15 years since these things have been a part of the training.

We apologize for any misconception or concern this story may have caused. The story was a new arrival in our office and was printed because of the bottom line message — *plan your mission to allow for the unexpected.*

Our goal is to promote flying safety, not to embarrass or confuse anyone. We try to ensure all articles reflect current operations or add an explanatory note when they don't, but we sometimes miss as we did in this case. Please read these stories for the safety message, not for commentary on operating procedures, aircraft systems, etc.

Keep on reading and let us know when we hit (or miss) the mark. We're here to help you improve flight safety throughout the Air Force. ■

What Would You Do?

Wait For The Forms Or Fly?

■ After filing a flight plan to take off as a two-ship, one of the jets was delayed for oil sample results. With crew rest time running short, lead launched and returned to home base.

Due to delays in receiving the oil sample result and air traffic control clearance, the remaining pilot, now out of crew rest, gave the aircraft forms to the transient alert (TA) folks, while another pilot was sent from home base. Although the two pilots talked about problems the jet had, the aircraft forms were never discussed. In addition, a shift change took place at TA.

The new pilot walked to the jet and asked for TA's assistance. Now it was dark and, because of a local exercise, the field was in a blackout condition. With takeoff time quickly approaching, the pilot performed his preflight walkaround, yet the forms were still nowhere to be found.

What Would You Do?

a. Climb into the jet, start engines, and head for home without the forms.

b. Abort the mission until the forms can be found.

What The Pilot Did

The pilot climbed into the jet, started engines, and flew home without the forms (option a). But a post flight inspection revealed some 781 forms in the aux air doors area, while the rest of the forms were found along the runway at the transient base.

The forms had apparently been stored between the centerline tank and the bottom of the jet. Yet neither pilot nor the TA crew saw them during the launch or quick-check inspection.

Obviously, option b was the correct choice. Sometimes we may get the feeling that it's OK to press a little. Rules and common sense, so we may think, can be altered slightly to accomplish the mission.

Yet, accepting an aircraft and flying it without having reviewed the forms is not the safest course of action. In this and many other cases, good procedures and common sense can prevent potentially costly outcomes. Be smart and fly safely. ■

Send your real-life submissions to: What Would You Do? *Flying Safety* magazine, AFISC/SEPP, Norton AFB, CA 92409-7001

OPS TOPICS

Another Cargo Spill

■ A C-5 onloaded three Hobart generators at an Army airfield. The loadmasters verified that the fuel tanks were less than half-full by checking the fuel gauges. During the After Takeoff Climb Check, the crew discovered one of the generators had leaked about 1 gallon of fuel onto the aircraft cargo floor.

They cleaned up the spill with vermiculite, and the aircraft made an uneventful landing. The leak was caused by a loose fuel cap. Apparently, someone had failed to reinstall the cap correctly after checking the fuel level prior to shipping the generator.

Athough not required, loadmasters should consider checking fuel tank cap security on anything shipped on their aircraft.

T-37 BRAKES

A T-37 crew, setting out on the first sortie of a cold November day at a Texas training base, felt they could expedite canopy defog during taxi by using a higher-than-normal power setting, approximately 75 percent (normal taxi takes approximately 50 percent). Approaching the active runway, the IP, in the left seat, discovered his brakes had failed. The FP tested his and found they were also out.

An IP in another T-37, taxiing behind the mishap aircraft, told the crew there was fire coming from the left wheel assembly. The IP notified the RSU of the problem as the aircraft rolled onto the runway. Fortunately, there was no conflicting traffic, and the aircraft stopped on the runway. The crew was able to egress safely, and a quick-thinking RSU observer grabbed a fire extinguisher and put out the fire.

Anyone who has flown the T-37 knows the brake system leaves a lot to be desired. A review of mishap data indicates the brakes have a nasty habit of failing completely if they are misused. At least one other incident where the pilot was taxiing at a high power setting to aid canopy defogging has resulted in total brake failure and a fire. Other incidents where pilots have used excessive braking during taxi have resulted in similar failures.

Intentionally taxiing at high power settings and using the brakes to control speed is bad technique in any aircraft. In the T-37, you're really asking for trouble. Heat buildup from this or other misuse of the brakes will damage disks and seals, resulting in loss of hydraulic fluid and possible fire.

Major Wallace W. Coates
Directorate of Aerospace Safety

Hazardous Lights

During takeoff roll in a C-130, the emergency exit light over the right side escape hatch fell out of its mounting bracket. The light struck a passenger, lacerating his head.

The problem actually started the day prior when the C-130 left home station. The same exit light fell out on takeoff. The loadmaster picked it up and handed it to the crew chief who told him to just put it back.

The light fell because it was not safety wired as specified in the tech order. This is a recurring problem in the C-130 with possibly serious consequences.

Maintenance is working the problem. In the meantime, loadmasters should check for safety wire on the exit lights during preflight. If you find one that isn't safety wired, get it fixed before takeoff. ■

MAINTENANCE MATTERS

MECHANICS AND SURGEONS

■ Following an operational flight at a deployed location, a routine basic post flight (BPO) was accomplished on a tanker. During the BPO inspection, a maintenance specialist discovered a locally manufactured tool attached to the aileron control cables in the right wheel well.

The last known maintenance in the wheel well area was the removal and replacement of a frayed flight control cable during the last scheduled phase inspection at Home AFB. The locally manufactured tool, a "phenolic cable block," was used to prevent the control cable from slipping off the control rollers during cable removal and installation.

Although both individuals had signed off the maintenance action in the forms as "complete," neither the specialist nor the supervisor inspecting the work saw the "cable block" tool during the required visual inspection of the entire cable run. Furthermore, the maintenance

specialist failed to ensure all tools in the consolidated tool kit were accounted for.

Even though no damage occurred and flight control problems were not encountered because of the tool, the potential for a serious mishap did exist.

Tool control is a continuous inventory of the equipment, especially those items locally manufactured, we use to perform maintenance. It evolved over time because we proved far too often that tools left inside aircraft after the work is done, contributed to mishaps.

Surgeons have similar control procedures for their equipment. Hopefully, you're not due any surgery. But if you are, the analogy of a surgeon's tool control to your own program becomes more meaningful. Think about it.

HAZARDOUS CARGO SPILL

What you don't see, unless you read the message traffic every day, are the dozens of flight mishaps involving hazardous cargo spills aboard our cargo aircraft. Often they can lead to bigger and worse happenings. (See "Six Minutes to Eternity," *Flying Safety*, July 1987.) The following high accident potential mishap is a classic example.

While deployed to another installation, a jet fighter maintenance crew had to send one of their aircraft engines back to home base. After the maintenance folks certified the engine was drained, it was loaded aboard a C-141.

Once airborne with the engine and passengers, the C-141 aircrew discovered the engine they were transporting was leaking fuel and fumes in the cargo compartment. To the best of his ability, the loadmaster absorbed the spill with buckets and absorbent material.

The pilot and flight engineer went on oxygen and ventilated the fumes from the aircraft at maximum air conditioning capacity. Because of the fear of possible fire with mixing of fuel fumes and oxygen, the passengers did not go on oxygen.

After landing, the aircrew and passengers were feeling nauseous. A flight surgeon was on the scene and administered first aid.

So how does this affect aircraft maintainers? Simple.

Since the business of maintaining aircraft is global, many airplane fixers find themselves deployed away from their home units. And it is this same group of people who are often faced with the task of preparing cargo for airlift shipment.

In mobility, tactical, or contingency operations, certification of hazardous materials will be accomplished by the qualified specialist or technician who actually prepares, packs, or inspects the item for air shipment. AFR 71-4, Preparation of Hazardous Materials for Military Air Shipment, requires that currency in hazardous materials preparation will be assured through unit training programs.

If, for whatever reason, we don't have trained technical experts on our deployment team to certify hazardous shipments properly, then we should seek assistance from the host unit.

Whether it be shipping aircraft engines or powered aerospace ground equipment such as hydraulic test stands, all such items have the potential to become hazardous if not properly processed in accordance with the regulation.

The mission of the Air Force requires us to travel all over the world. As the Air Force constitutes a vital security shield for all of us, so, too, can a knowledge of proper safety precautions constitute an important "weapon" in our arsenal — reducing our high accident potential mishaps and further protecting our people.

Knowledge of proper safety precautions concerning shipment of potentially hazardous cargo can bring immense dividends to all of us, especially those who fly aboard our transport aircraft. ■

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 Mishap Prevention Program.

FIRST LIEUTENANT
James D. Reed

SECOND LIEUTENANT
Mark D. Kelly

80th Flying Training Wing
Sheppard AFB, Texas

■ On 20 April 1987, Lieutenants Reed and Kelly were leading a two-ship T-38 low-level student training mission and suffered multiple bird strikes at 420 knots. Two birds struck the front canopy — one obscured the right side of the windscreen while the other penetrated the forward canopy just aft of the canopy bow near the 12 o'clock position. The bird and broken canopy shards struck Lieutenant Kelly in the face and chest and left him momentarily incapacitated and his helmet visor broken and bloody. The aircraft also sustained at least four other strikes — one in each engine and two on the fuselage.

As briefed, Lieutenant Reed immediately began a zoom climb while observing severe compressor stalls on both engines. The wingman assumed the lead and directed a turn to the nearest field, 40 miles away. In the turn, it became obvious that thrust was so limited it would be impossible to maintain level flight.

During this time, Lieutenant Kelly, partially blinded by canopy fragments in his eye, monitored the engines and conducted checklists. En route to the divert field, the crew determined they did not have enough altitude to maneuver to the active runway and coordinated for an opposite direction landing.

On final, Lieutenant Reed, in the rear seat, was unable to see the field because of obscuration to his windscreen and the forward canopy. Lieutenant Kelly spotted the runway and indicated he had recovered enough to make the landing. He lowered the landing gear at about 3 miles and maintained a steep glide slope to minimize the thrust required. When the landing was assured, he lowered the flaps and made a smooth touchdown approximately 1,200 feet down the runway. The maximum altitude during the emergency was less than 2,500 feet, and the time from the bird strikes to touchdown was about 9 minutes.

The professionalism and superior airmanship of this crew, despite injury and serious damage to the aircraft, prevented the loss of a valuable Air Force aircraft. WELL DONE! ■

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UNITED STATES AIR FORCE

Well Done Award

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

MAJOR

David A. Bina

388th Tactical Fighter Wing
Hill AFB, Utah

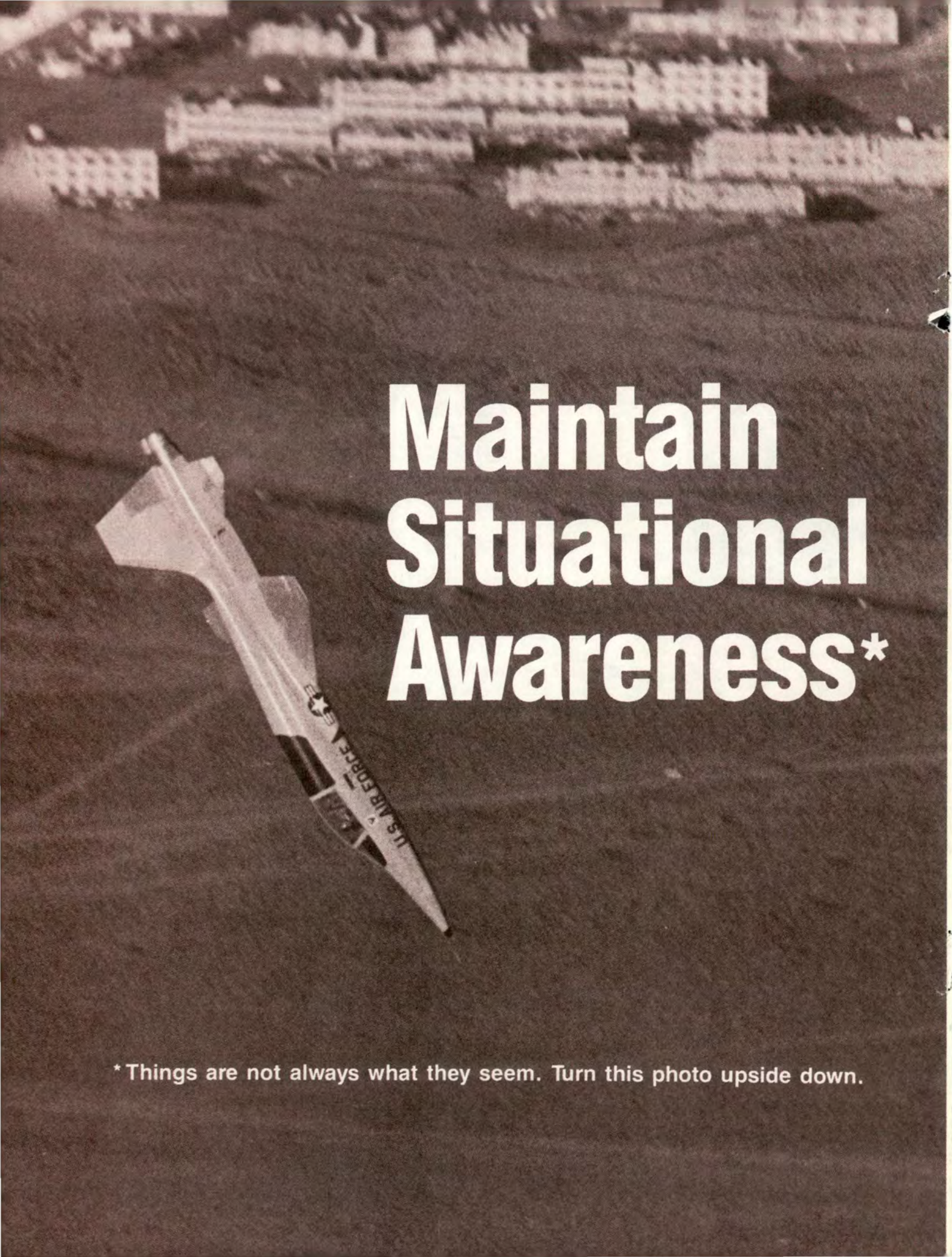
■ Major Bina was leading a three-ship F-16 surface attack mission on 20 March 1987 when he discovered his engine would not respond to throttle inputs. A cable failure had forced the power into midrange afterburner and made control of engine thrust impossible.

The weather at Hill was unsuitable for recovery so he elected to go to Michael AAF, a primary emergency field for the range. He sent the No. 2 aircraft home, kept No. 3 as chase, and coordinated the emergency with the SOF. He set up a 3- to 4-g orbit over the field with speed brakes out to keep the speed down to 350 knots.

Major Bina had to overcome several significant problems. First, his distance from Hill AFB made radio communications with the SOF difficult. Second, Michael AAF tower was not manned on Fridays. He had his wingman descend and check runway status, cable status, and low altitude winds. Third, pilot fatigue would become a problem. As fuel weight decreased, more gs were required to keep the airspeed under control. Coordination with the SOF and General Dynamics lasted approximately 20 minutes.

Fatigued, low on fuel, and with all options to solve or minimize his problem exhausted, he began the forced flameout pattern and landing using a high g spiral from 24,000 feet. After turning on the EPU and JFS and lowering the landing gear, he shut off the engine with the fuel master switch. Despite his fatigue and the strange field, his landing was perfect, and he stopped the aircraft safely before reaching the cable.

Major Bina's execution was flawless. He avoided the traps that have caught so many others unaware. Despite the problems involved, he remained cool under pressure, made correct decisions, and safely recovered the aircraft. His superior performance saved a valuable combat aircraft. WELL DONE! ■


Maintain
Situational
Awareness*
U.S. AIR FORCE
*Things are not always what they seem. Turn this photo upside down.