flying

SAFETY

MAY 1987

There's A Better Way ...

Human Body Clocks

For The Thrill Of Flying

Taxi Tales

THERE I WAS

■ This happened to two experienced, mission-ready crews, one with 750 hours and the other with 500 hours. It was a beautiful, clear and a million day, absolutely no weather. The flight was a BFM ride.

The first engagement was briefed to start from a 1 V 1 intercept with the first contact assuming the role of the fighter and the other aircraft limited to level two maneuvering until the fighter passed the 3/9 o'clock line. The setup started as planned with both tallyhos achieved at the 4-mile point, with the fighter picking up the target in the 2 o'clock position. The fighter turned in on the target without a radar lock because of effective jamming.

At this point, the pilots of the fighter *and* the target aircraft then experienced a deadly and convincing illusion. Both pilots thought the other aircraft did not have a tallyho and was, in fact, *turning away,* presenting the tail cones to each aircraft. In actuality, both aircraft were turned nose on to each other and rapidly closing with each pilot trying to achieve a heat tone.

At approximately 6,000 feet, both pilots realized the conflict and each aggressively maneuvered left so as not to cross flight paths. The aircraft passed *well* within 1,000 feet of each other.

Lessons learned? Both pilots had a tallyho. Neither aircraft had a radar lock (not until it was of no use)! Both pilots experienced the same illusion.

All I can say is be aware of this problem. If you've got a radar lock, check out the closure rate, and if you do encounter this illusion, maneuver very aggressively! ■

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There's A Better Way

. . . 80 to 90 percent of all controlled flights into the terrain could be prevented. The technology is already available, and here's what we are doing to use it.

PEGGY E. HODGE
Assistant Editor

■ The pilot strains to see his wingman and the two bandits over his left shoulder as he extends out of the fight. Unknown to him, he enters a steep dive. He descends through 10,000 feet, and he, along with his new fighter aircraft, disappears into the ocean.

■ Half-way across the continent, another pilot dutifully follows his leader into the weather for a radar trail climb above the clouds. He carefully finds the other three aircraft in front of him on the radar display confident in the thought he has maintained proper distance. Suddenly, he breaks out of the clouds, but instead of blue sky, he sees only trees and rocks. He makes a desperate bid to avoid the ground, but it is too late.

■ On another day, an experienced instructor pilot turns hard into his wingman who is trying to attack from behind. The student wingman pulls into the vertical to avoid overshooting but is surprised because he is easily able to remain behind his instructor. He calls several shots but gets no reaction from the other aircraft as they both enter a steep dive. He calls for the flight to recover but his leader does not hear — he is unconscious from the high G forces. Soon he is gone.

These mishaps, and many more like them, have all actually happened — mishaps where *good* pilots fly *good* aircraft into the ground. We have always had to live with this danger — all part of being an aircrew member. Or is it?

The members of the Advanced Fighter Technology Integration (AFTI) F-16 Joint Test Force at Edwards AFB, California, don't think so. They have been flight testing an automatic recovery system for the past 2 years — a system that promises to make many of these mishaps something we will not have to deal with in the future.

CFIT Mishaps

Roughly one out of every four fighter aircraft lost is due to the type of mishap narrated above, i.e., controlled flight into terrain (CFIT) — mishaps where the pilot inadvertently hits the ground. "We don't have the technology available today to prevent *all* of these mishaps," says Major John D. Howard, Project Pilot at the AFTI/F-16 Test Force. "We went instead for what we call the 80 percent solution. We tried to use simple altitude sensing systems available today to prevent as many of these mishaps as we can."

According to members of the test force, the AFTI/F-16 auto-recovery system can prevent 80 to 90 percent of future fighter mishaps due to CFIT. If project officials are correct, that would translate into around five aircraft and lives saved each year in the Air Force.

Ground collision avoidance systems (GCAS) are being developed today to handle CFIT mishaps. Most of these mishaps result from the pilot losing track of where the ground is and where his aircraft is headed. Typical examples are the pilot that is distracted during low level flying and starts a shallow descent toward the ground, or the pilot who is well above the ground during air-to-air flying but is looking behind him and doesn't realize he's in a steep dive.

"The difference between the AFTI/F-16 GCAS and other ongoing efforts is that we use an automatic recovery," said Mark A. Skoog, Lead Flight Dynamics Engineer on the AFTI/F-16 Program. "Other systems are designed to warn the pilot. We do that also, but, if the pilot does not react, our system will wait until the last possible moment and then take over and recover the aircraft."

In recent years, there has been much publicity on a new, although smaller, category of CFIT mishaps — those caused by G-induced loss of consciousness (GLOC). Because the AFTI/F-16 GCAS automatically recovers the aircraft, it can be used to prevent ground collision during GLOC.

Simple Altitude Sensing

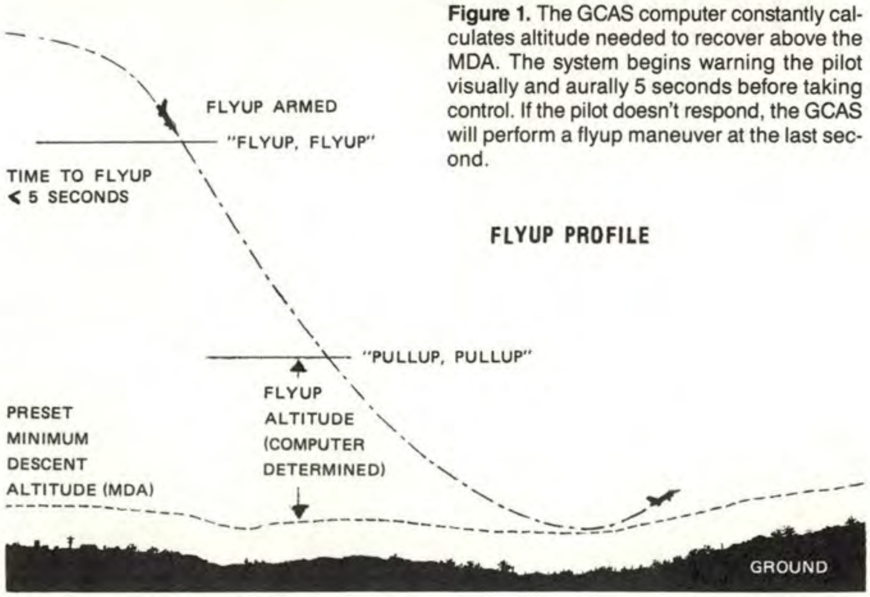
"We decided to use the simple altitude sensing systems available on most of our aircraft," explained Major Howard. "That way we can better transition the system to any other aircraft. It turns out that by just using the altimeters available on today's aircraft, tied to a computer to make the necessary calculations and to an automatic flight control system to fly the recovery, we can get the 80 percent solution right now."

During flight tests of the AFTI/F-16 at medium to high altitudes, the AFTI/F-16 GCAS is built around the simple barometric altimeter available on *all* aircraft. It also uses information from the radar altimeter during low altitude weapon delivery tests. The pilot controls the auto-recovery system operation by setting mean sea level (MSL) and above ground level (AGL) altitudes,

continued

The AFTI/F-16 has been a test bed for many innovations. One which promises immediate dividends is the ground collision avoidance system.

Figure 1. The GCAS computer constantly calculates altitude needed to recover above the MDA. The system begins warning the pilot visually and aurally 5 seconds before taking control. If the pilot doesn't respond, the GCAS will perform a flyup maneuver at the last second.



There's A Better Way continued

or floors, that he does not want to descend below.

During flight, the GCAS continuously compares the aircraft flightpath (altitude, airspeed, and attitude) to the set floor altitudes. According to Mr. Skoog, "The GCAS is always calculating how much altitude it would take to roll the aircraft wings level and pull 5 Gs to get the aircraft back to level flight. The pilot is given audio and visual warnings as the GCAS senses the aircraft running out of altitude. When the GCAS has just enough altitude to recover, it takes over."

The Auto-Recovery Maneuver

The actual maneuver the aircraft performs is very simple. When the auto-recovery is commanded, the aircraft rapidly rolls to wings level and pulls 5 Gs back to level flight. If the system has been keyed off the AGL floor, the maneuver ends with the aircraft in a shallow climb where the pilot resumes control. The pilot is reminded to take over by the voice warning which announces "you've got it."

If the auto-recovery was keyed by the MSL floor, the aircraft transitions to an altitude hold mode after the recovery — waiting for the pilot to regain his ability to control the aircraft. This may take up to 24 seconds for GLOC or an indefinite time for spatial disorientation.

Ability To Override

One of the important parts of the AFTI/F-16 GCAS is the pilot's ability to override the automatic controls. The pilot is always capable of completely overriding the automatic controls and can temporarily disconnect the system with a paddle switch on the control stick. Switches are also available in the cockpit for the pilot to completely turn off either or both minimum altitudes.

The ability of the pilot to override and turn off the system is considered important because the automatic recovery would not be wanted when the pilot is aware and can prevent flying into the terrain himself. He would also want to turn the system off to intentionally descend below the floor altitude.

Audio and Visual Warnings

The AFTI/F-16 GCAS audio warnings are computer generated voice commands similar to other GCAS systems. The pilot hears "pullup, pullup" prior to the recovery and "flyup, flyup" when the GCAS actually takes over. Unlike other systems, however, "pullup, pullup" is spoken every 5 seconds after the flyup until the pilot resumes control of the aircraft.

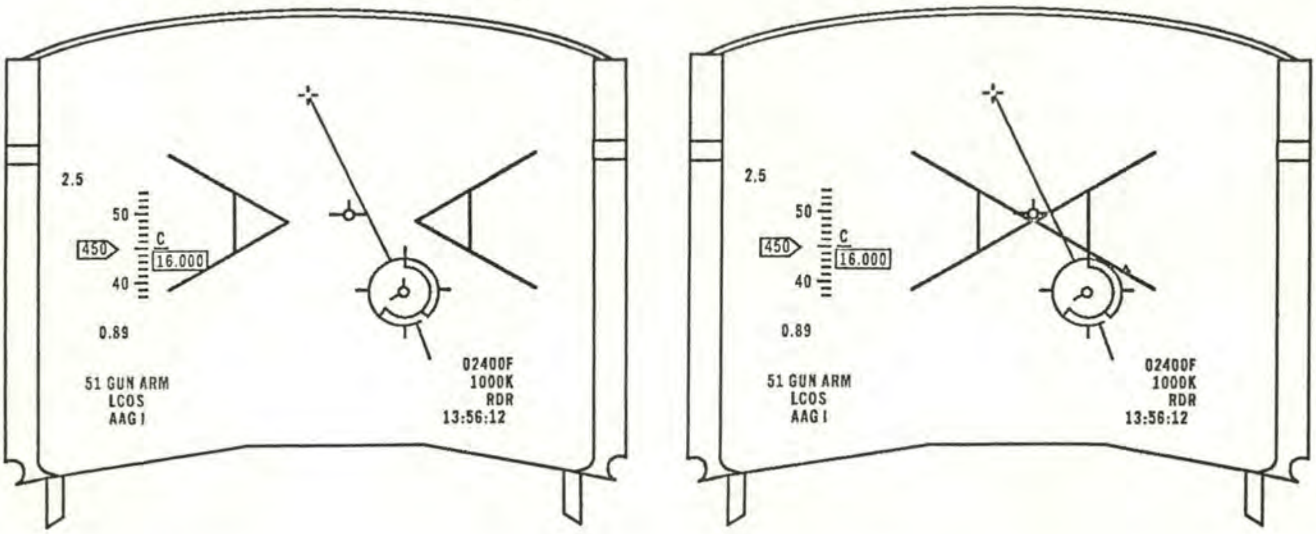
Centrifuge studies at the Aerospace School of Medicine at Brooks AFB, Texas, show voice commands to be the best way to get the pilot to wake up and resume control of the aircraft after GLOC.

The traditional GCAS visual display is a "break x" — where a flashing "x" appears in the head up display (HUD) to warn the pilot to recover. "The problem with this type of display is that it appears suddenly and does not give any trend information," said Major Howard. "A pilot is expected to rapidly understand the warning and maneuver correctly."

The AFTI/F-16 program elected, in-

Rather than have a flashing "break x" suddenly appear in the headup display to direct a flyup, the AFTI/F-16 uses two chevrons. The chevrons appear 5 seconds prior to flyup and move together to form a "break x" at flyup.

A. Headup Display, 5 Seconds To Flyup **B. Headup Display At Flyup**




Ground collision avoidance systems are especially important for fighter aircraft with a history of controlled flight into the terrain.

stead, to split the "break x" into two chevrons that appear in the HUD at 5 seconds to flyup. They move smoothly together to form the "break x" at flyup. Members of the test force say this display has met with universal approval from pilots who have flown both displays.

GCAS Operation

AFTI/F-16 project pilots envision that when implemented on production aircraft, the pilot's operation of the GCAS will actually begin prior to takeoff. The first action will be to set the minimum altitudes. One will be the AGL altitude which works with the radar altimeter. The typical floor project pilots at Edwards AFB, California, set is 150 feet AGL.

The other altitude set will be the MSL floor. A typical altitude to set would be one that provides 5,000 feet clearance from the general terrain. Around Edwards AFB, pilots set 7,500 feet MSL.

In a manner similar to other safety systems (such as the ejection seat), the pilot will turn on the GCAS before takeoff. The pilot will be able to turn on either the AGL or MSL floors independently or together. But they won't arm right away, they will go to standby.

On takeoff leg, after raising the gear and flying above the minimum AGL floor set, the AGL auto-recovery will arm. This will provide the aircrew protection during flight phases such as radar trail departures, instrument approaches, low level navigation, and weapons deliveries.

During climb to altitude, the MSL auto-recovery will arm as the aircraft goes above the set MSL floor. The GCAS will then provide protection in the air-to-air environment. Over flat terrain, such as in many of the weapons delivery ranges used for training, the MSL auto-recovery could also provide protection at low altitudes.

Upon return for landing, the pilot will turn the MSL floor off, but may leave the AGL floor on for protection during marginal weather. For landing, the auto-recovery will go to standby when the gear is put down, although some visual warning will still be available.

Plans For Production

A derivative of the AFTI/F-16 GCAS is the top candidate under consideration for new F-16 aircraft produced within the next several years. F-16s currently flying will also probably be outfitted with a similar system. A warning only system will soon be going into the A-10. Another aircraft that is a possible candidate for the auto-recovery is the F-15. The Navy has also expressed interest in the AFTI/F-16 GCAS for possible use on the F/A-18, F-14, and A-6.

Each aircraft will have a unique arrangement for GCAS. All of the arrangements will, however, consist of three parts. The first is a computer to calculate when the auto-recovery is required. The second is an automatic flight control system with 5 Gs of authority to provide the auto-recovery feature. Finally, there must be the appropriate visual and audio warnings and controls for the pilot to operate or override the system. Implementation of the GCAS is easiest on aircraft with digital flight controls such as the F/A-18, or block 40 and later F-16s. Implementation on other aircraft will take more extensive modifications.

Future GCAS Systems

"A comprehensive system that can prevent all controlled-flight-into-terrain mishaps is not feasible right now," according to Lt Gregory W. Bice, a flying qualities engineer on the AFTI/F-16 project. Systems based upon a digital data base — where all the terrain the aircraft is going to fly over is digitized and entered into computer memory on board the aircraft — are being developed for future aircraft. "This type of system will be able to cover the remaining 10 to 20 percent of CFIT mishaps we cannot cover with current technology," said Lt Bice.

For now, we have the 80 percent solution. Major Wayne Edwards, an F-16 pilot from the Tactical Air Command at Nellis AFB, Nevada, has flown the AFTI/F-16 and puts this GCAS system in perspective: "Far too often we wait for the perfect system. Saving 80 to 90 out of 100 is pretty good." ■

HUMAN BODY CLOCKS

Is there a best time to sleep? Or fly?

LT COL FREDERICK V. MALMSTROM
Washington ANG

■ My interest in the effects of the time of day on human moods and work efficiency goes back several years to when I was a much younger B-52 aircrewman. It wasn't the flying that got me down nearly as much as the weekly alert cycles.

Despite heroic attempts of the alert facilities manager to brighten the place with good food, potted plants, and pool tables, there was no escaping the fact that pulling alert could, at times, be depressing. Some of us would go into "power sleeping" modes, some would get frequent headaches (remember the large bottle of free aspirin?), and still others would suddenly reverse their schedules, sleeping days, and staying awake nights watching TV.

Despite a great deal of idle time on alert, I found it nearly impossible to get up enough motivation to write that paper for Squadron Officer School. Was my reaction to alert cycles normal?

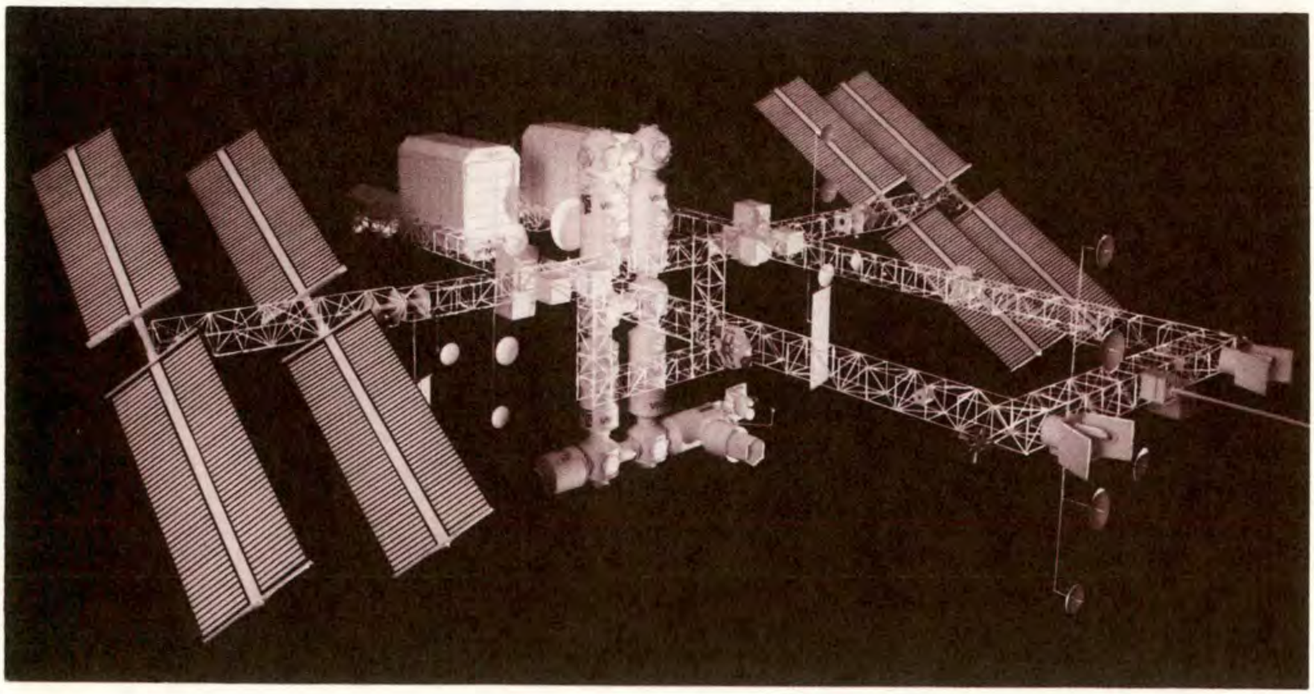
Some Early Psychological Studies

In the 1950s and 1960s, there were a lot of paper-and-pencil studies on extended space flight and its effects on human behavior. In these studies, psychologists attempted to predict space flight behavior by applying what was known about the effects of isolation on prisoners and arctic explorers.

The original group of psychologists never wintered over at the South Pole, nor did they spend time in solitary confinement, but that didn't stop some of them from guessing the outcomes of extended isolation. Some guesses were pretty good, and some — well — weren't so good. A few experts actually predicted outright cannibalism, mutiny, and assorted manic-depressive behaviors.

Thankfully, most of the extreme predictions never came true, but we learned some valuable lessons about why they didn't. First, the original data were predicted from some very abnormal populations; pilots, navigators, and loadmasters are not inmates of penal institutions. And second, many of these dire predictions were drawn in the

People assigned to the space station of the future will be cut off from the normal daily time cues of sunrise and sunset for months. How will this affect their efficiency?



absence of our present knowledge of the complex and cyclical nature of human physiology.

The Space Station Analog

Sometime in the 1990s, the US is expected to orbit its first permanent space station, and some pretty basic questions about the cyclical efficiency of human operators still aren't fully answered. Humans will be confined in orbit for months at a stretch, cut free from the normal daily time cues of sunrise, sunset, tides, and rush hour traffic.

Is there a "best time" to launch? Or sleep? Or fly? How long should a workshift be? Can we refine the answers to these questions before we send our astronauts into orbit?

The 24-½ Hour Day

The answers to these kinds of questions come from various sources. One such study comes from Charles Czeisler, now of Brigham and Women's Hospital in Boston. Several years ago, he followed the daily behavior of persons voluntarily shielded from normal daily time cues over several months. In other studies, the National Science Foundation has sponsored several wintering-overs in Antarctic Research Stations.

Several conclusions are now clear from these kinds of studies: First, there is a very wide spread of human cyclical behaviors. And second, there are a great many factors which can influence these cyclical behaviors, moods, and work efficiency.

The chart is adapted and redrawn from sleep research reported in 1980 by Charles Czeisler in the journal *Science*. This "typical" subject lived without knowledge of time from day 5 to day 83. Czeisler monitored his sleep periods (shown by the black bars) and wake cycles. Beyond day 5, the subject was allowed to "run free" by choosing his own sleep-wake cycles.

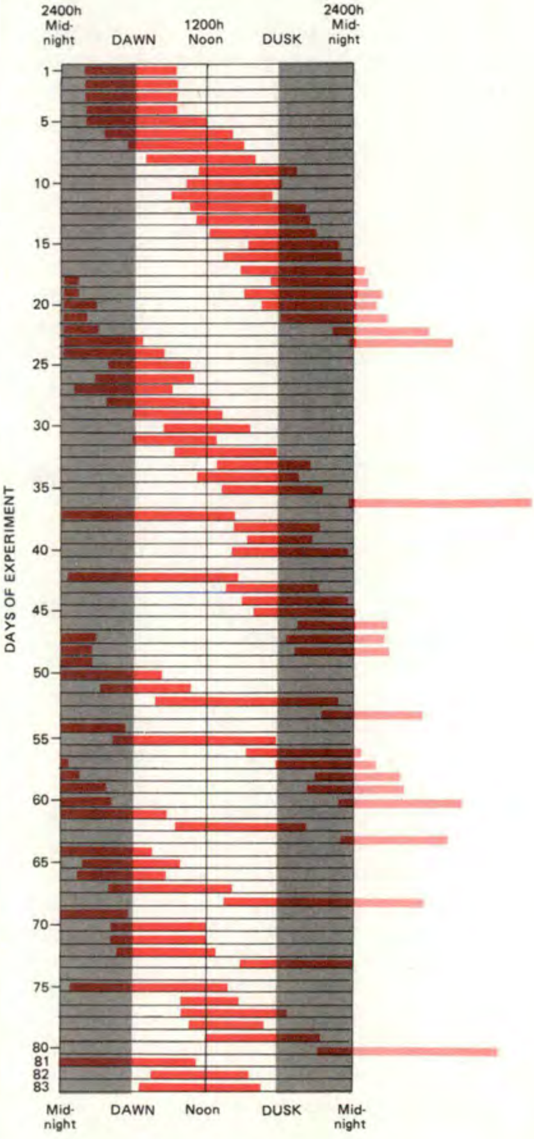
It's obvious that in the absence of enforced reveille and taps, the subject's own natural 24-½ hour day (also called a "Circadian rhythm") takes charge — and very quickly, too. It took this man only 10 days to reverse his normal sleep-wake times, and just 9 more days before he was temporarily back in phase with the outside world.

After 83 "real" days, the subject believes he has lived only 73 personal days. In fact, near the end of this experiment, the subject is living only 7 personal days for every 10 "real" days. Clearly, it doesn't take long for the free-running body to get out of synchronization with real time.

To those of us who like to spend a weekend "catching up" on our sleep (and who doesn't?), what we may really be doing is desynchronizing our bodies just in time to synchronize with those Monday morning blahs. continued

People wintering over in Antarctic Research Stations have seen the effects of losing their normal daily time cues.

This chart below shows how quickly our sleep cycles change if not regulated. The bars depict time spent sleeping. After following a normal pattern for 5 days, the subject was allowed to set his own sleep and wake cycle. You see rapid departure from the norm. NOTE: As the bars drop off the right side, they wrap around to the left. We have shaded in the full length of the bars on the right to get a true picture of the pattern.



HUMAN BODY CLOCKS

Is there a best time to sleep? Or fly? continued

Your Moods Vary, Too

It should come as no surprise to anyone to learn our moods, activity levels, body temperature, and alertness vary in regular daily rhythms, too. One popular theory is that what normally drives moods and alertness cycles is the core body temperature. For most people, body temperature actually varies regularly about a degree Fahrenheit or so.

The subject described in Figure 3 has a naturally varying body temperature between 98.6 degrees F to 97.6 degrees F. For this subject, and for most of us, when body temperature is lowest, or a little bit after, we're at our sleepiest. At high noon, our body temperature is at its highest, and we're then as alert as we'll ever be.

Simultaneously, our moods are at a high peak. Oddly enough, it was also discovered what really controls how long we sleep is not how long we've been awake, but what time we went to bed. If you go to bed when your body temperature is low, you'll sleep for less time and feel just as refreshed.

Sunlight Versus Artificial Light

Fortunately, we don't ordinarily drift off our normal sleep-wake cycles. We *do* have alarm clocks and regular work schedules — all of us except the long-haul aircrews and those pulling alert cycles.

There is another even more increasingly accepted theory that what regularly resets the body temperature (and, therefore, the sleep) cycle is exposure to bright sunlight. Somehow, as little as 30 minutes exposure to bright light at the right time resets certain chemical transmitters in the central brain, and then you're off and running again on a regular 24-hour day. Indoor lighting, by the way, is about 50 to 100 times dimmer than sunlight, far too dim to reset your sleep or your temperature clock.

Somehow, as little as 30 minutes exposure to bright light at the right time resets certain chemical transmitters in the central brain, and then you're off and running again on a regular 24-hour day.

And, incidentally, exposure to sunlight is now theorized to affect many other widely varying disorders such as alcoholism, migraines, hyperkinesia, and blacklung disease. (See the June 1985 *Smithsonian* magazine.)

The Strange Case of the Blind Man

In 1977, L.E. Miles in *Science* reported the case of a blind man who was, several times a year, going through regular episodes of daytime sleepiness, depression, and nighttime insomnia. It was subsequently found this man had a natural circadian rhythm of 24.9 hours, a rhythm which obviously could not be reset by exposure to light.

More recently, Dr. Charles Czeisler, in the August 8, 1986, *Science*, offered dramatic evidence that exposure to bright light is probably all that's required to reset the biological clock.

Czeisler and his colleagues exposed a 66-year old healthy woman to intense artificial light from 8:00 p.m. to midnight for one week. However, by the end of the second day of the experiment, they had already tricked her body into thinking it was dusk when it was actually midnight.

And, the Antarctic?

Exposure to only dim lighting, murky skies, or 6 months of darkness at the South Pole can lead to some very profound personality changes. A National Science Foundation research team found that as little as 6 weeks isolation at the darkened South Pole station would leave many colleagues with the raw edges of their patience exposed. It

As little as 6 weeks exposure to dark conditions at the South Pole produced some radical personality changes.

The National Science Foundation's 16-man, one-woman research team at South Pole Station. Thirteen months of close contact does not allow much escape from colleagues.

Inside the Geodesic Dome at South Pole Station. When the high-intensity lights were replaced, work efficiency and mood improved significantly.

would frequently take some very trivial conflicts to launch a few people into some quite foul moods and rages.

I can't be certain exposure to sunlight conditions will improve everyone's moods, but I do know that when the National Science Foundation team repaired and replaced the previously neglected quartz-halogen high-intensity lighting system in the South Pole Station Geodesic Dome, the work productivity and moods of the research team increased markedly.

Likewise, Arthur Winfree of Purdue University tells us that transoceanic travelers indicate exposure to direct sunlight helps a lot by emphasizing the contrast between night and day, improving their mental set. After all, we humans are *daytime* animals.

Age, Alcohol, and Tobacco Don't Help, Either

In 1980, C.R. Soldatos in *Science* also reported that, far from making people nervous wrecks, withdrawal from cigarettes actually improved the sleep patterns of 50 regular smokers. That's a plus.

Curtis Graeber of NASA/Ames more recently reported alcohol consumption among long-haul pilots actually significantly *decreased* the quality of their sleep. Likewise, Graeber noted the older long-haul pilots are much more susceptible to sleep disorders than the younger ones.

These findings clearly indicate the older long-haul pilots who both drink and smoke are asking for desynchronized body rhythms and the associated sleep disorders — and, of course, decreased alertness. My advice to aircrews (especially us older ones) is to save that carousing for *after* those long trips, not during the layovers.

Is a Free-Running Sleep Cycle "Bad?"

Desynchronized sleep cycles aren't necessarily bad. In fact, the National Science Foundation experiences at the South Pole Station suggests those on free-running schedules were actually more productive than those who weren't.

However, most of us have to fit into the regular day-night schedule of the temperate zones. My estimate is if you're your own boss and can choose your own work schedule, then a free-running sleep or temperature cycle may actually be a plus.

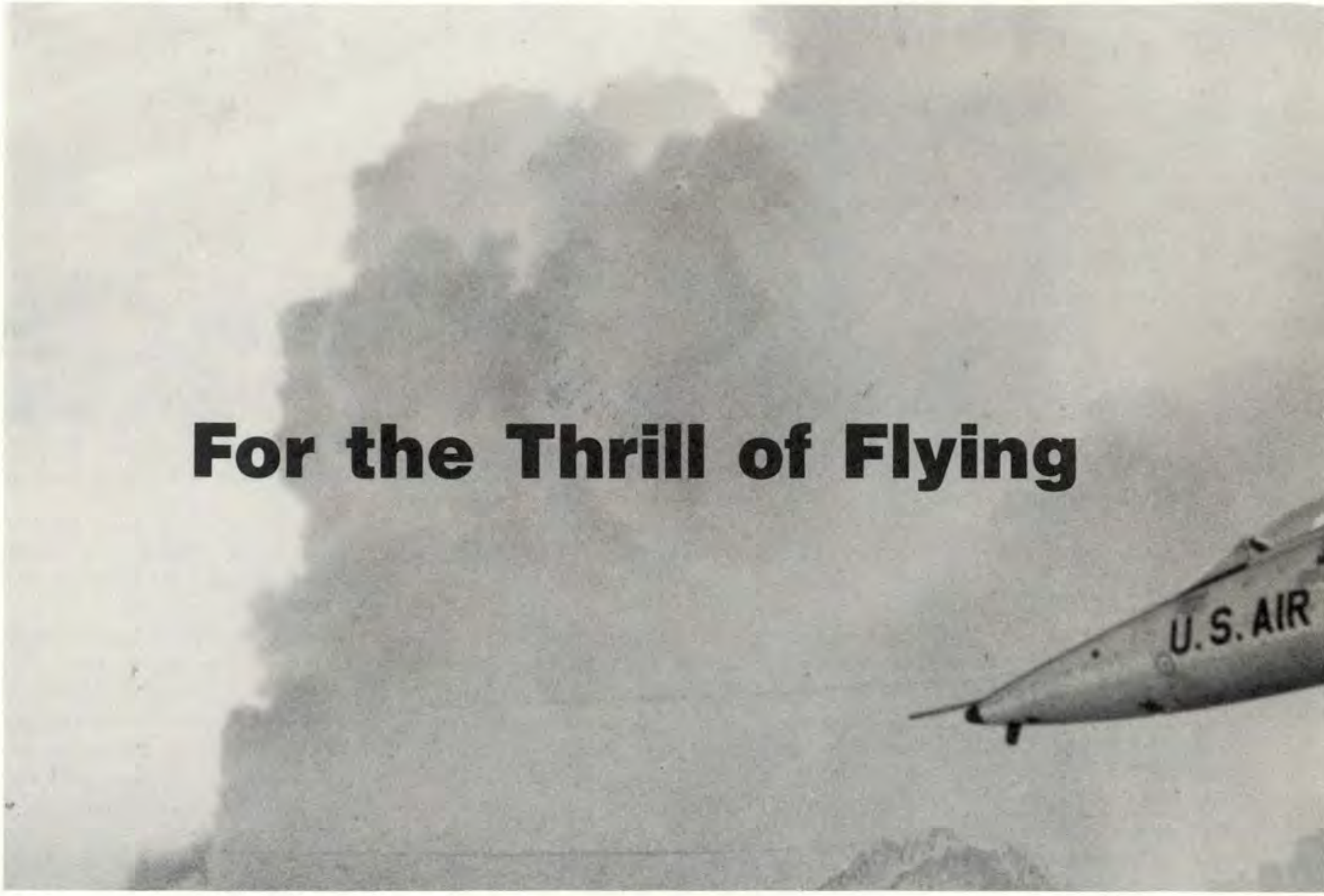
What *does* bother me is that constant switching from the daily sleep-wake schedules to desynchronized sleep-wake schedules may be very stressful, indeed. The long-haul aircrews are essentially desynchronized persons living in a synchronized world, and such a topsy-turvy world seems to be especially hard on the older aircrews.

Charles Czeisler and his colleague, Alfred Lewy, have recently suggested light can be used to minimize the effects of that old nemesis, jet lag. For example, aircrews might minimize jet lag from east to west travel by getting an hour of sunlight exposure in the evening. Similarly, the same aircrew could minimize jet lag effects from west to east travel by getting sunlight exposure in the morning.

My advice is that regular rest, good exercise, abstinence from alcohol and tobacco, and, yes, exposure to sunshine on those long trips will go a long way towards maintaining your well being. And that goes doubly for you folks pulling alert, too. ■

Photos courtesy of winter-over crewmembers.

For the Thrill of Flying



CAPTAIN DALE T. PIERCE
919 SOG
Duke Field, FL

■ Over a period of years, I've observed the Air Force refining its efforts to promote flight safety as a way to ensure it can continue to accomplish its mission in an increasingly complex environment. I've grown more and more aware of the efforts to ensure reliable flying machines and of the pressures placed upon aviators and managers of aviators to fly safely and smart. I've also observed hundreds of flyers in their day-to-day efforts to do their part in accomplishing the Air Force mission. It seems some aviators fly safely and smart as a matter of course, while others seem to fall short of the mark despite the best efforts of those who lead them.

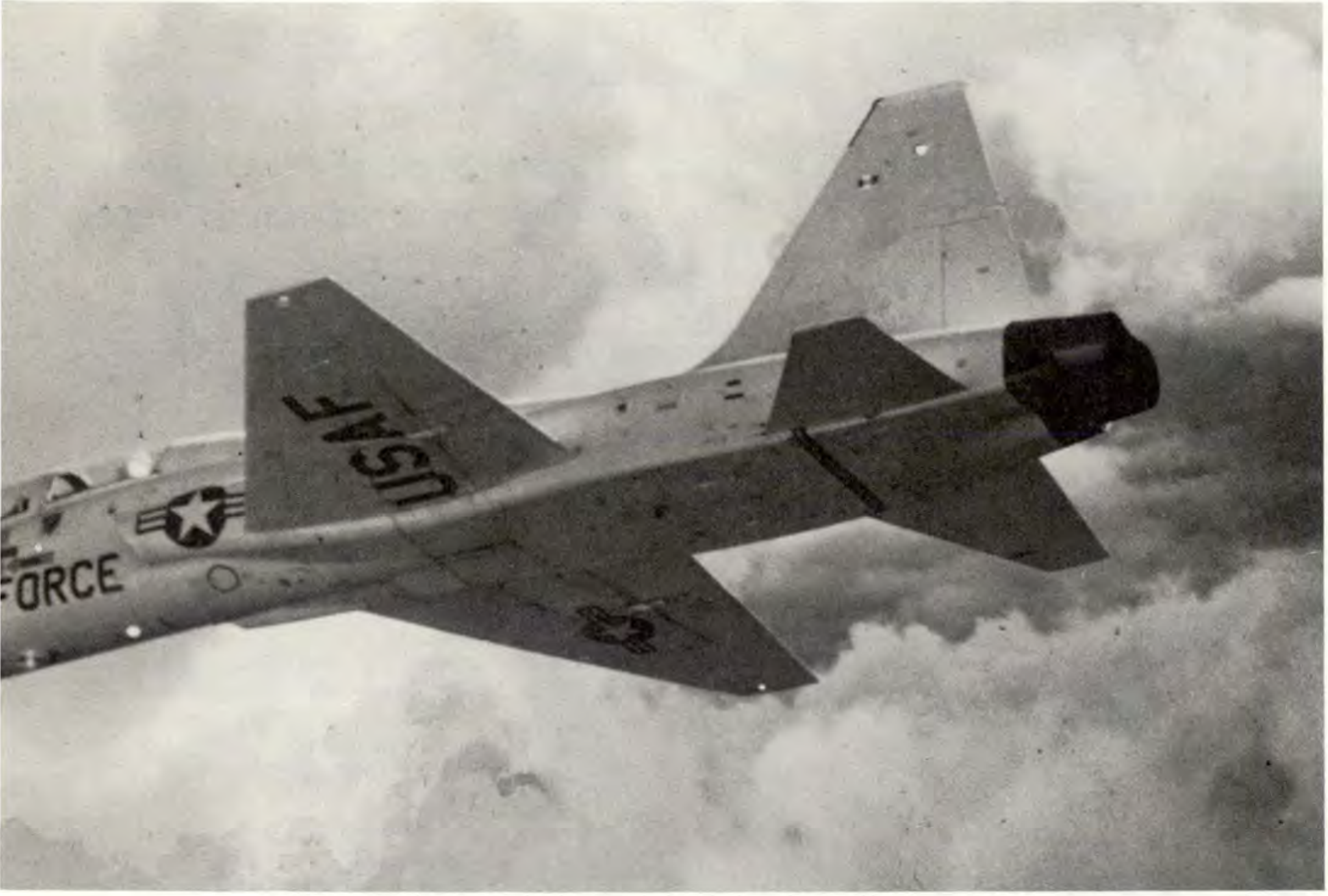
Individual flying skill doesn't seem to be the primary differentiating factor. Perhaps the difference between these two groups of flyers lies not in their abilities as flyers, but rather in their love of flight itself. Perhaps those who love to fly most need the least pressure to fly safely and smart. If you'll bear with me for a couple of minutes, I'll share my thoughts with you.

I really love to fly. Being somewhat introspective, I've sometimes wondered how I came to fly in the first place. I suppose I've always watched in wonder as aircraft passed overhead, felt excitement at just climbing aboard an aircraft, and gazed in awe at the indescribable beauty of the clouds when viewed from the air. Perhaps my flying was inevitable.

As I look back, the events in my life could have led to no other logical conclusion. If I could go back and do it all over, I wouldn't change a thing.

Today, flying still seems like a miracle, a divine gift. To rise like a great phoenix from the ground below, climbing beyond the rainbow to soar like an eagle above the clouds in the peacefulness and beauty is something that can be experienced, yet remains incomprehensible. It can neither be adequately described, nor fully appreciated. Yet, as I look around me at others who fly, I am puzzled.

What puzzles me is the mystery of those for whom the thrill of flight has gone. Those for whom flight, in and of itself, has lost its appeal. Those who continue to fly in search of the thrill that has long since passed from them. Those who find it necessary to add something to what used to thrill them, yet still feel an emptiness. Does flying closer to the ground, gaining an intensified sensation of speed, fill the emptiness? Does flying closer to those beautiful but deadly anvil-shaped clouds make the clouds more beautiful? Does flying at the G-limits of a vintage aircraft, as



though the aircraft were fresh off the assembly line, give the feeling that somehow the "Grim Reaper" has been dared and defeated? Somehow, these additions fail to satisfy and only serve to frustrate and further insulate from that which is sought. Only a reawakening to that which thrilled us first, can fill the emptiness.

Flying is the means by which the Air Force accomplishes its mission. We who fly its aircraft are the most fortunate aviators in the world. We are paid to accomplish a mission and to ensure, through our efforts, the Air Force can continue to accomplish its mission. While doing this, we are welcome, and encouraged, to experience the thrill of flying for its own sake. We are not, however, expected to make things more exciting when we've become bored with "just flying."

Do you remember when you flew just for the thrill of flying? Do you remember your first takeoff, those first sights from the air, and the thought that nothing could be better than this? It really doesn't get better. The best is the best. However, as we mature in our ability to appreciate what flying offers us, the flying experience can grow to a fullness that will give us pleasure as long as we live. We must learn to enjoy flying for what it is.

Failing to accept it for what it is, expecting ever more excitement, will eventually cause it to fall short of our expectations. Flyers who allow this to happen soon know the emptiness felt by those who went before them. I hope those for whom the thrill has gone can be reawakened to that which thrilled them first. I also hope, in the absence of that reawakening, it never turns against them when they least expect it.

Next time you are flying and the sound of the engines fades into unawareness, try to remember the thrill you felt the first time you flew. Try to remember the first time the sound of the engines faded into unawareness, and in the imagined silence, you gazed at the indescribable beauty all around you. Finally, try to remember why you started flying and the lessons you learned that have enabled you to be where you are today. Going back to the basics isn't limited to flying skills, it includes remembering and regaining the sincere appreciation and respect for flying we all had when we started out.

Fly safely because you appreciate the inherent risks involved in flight. Fly smart because you respect the way flying is unforgiving of any inability or neglect. Fly remembering how you've longed for the thrill of flying since as far back as you can remember and as recently as yesterday.

Fly safely, fly smart, and fly for the thrill of flying. ■

INTRODUCING
A New Feature
TEST YOUR JUDGMENT

What Would You Do?

■ This month we start a new feature. We will present you with an actual emergency situation that has been reported to AFISC and ask you to put yourself in the crew's place. Then we will ask you to choose a course of action to deal with the emergency. And finally, we will tell you what the crew really did and what the results were.

We hope this will stimulate some thought and discussion of possible emergency situations you may encounter. If you know of a real life close call, emergency, or mishap that would be appropriate for this feature, please send it to us. Entries published will be anonymous, so don't worry about incriminating yourself if you took the wrong action.

SAFE OR UNSAFE?

When the A-10 pilot configured the aircraft for landing, the right main gear indicated unsafe. The flight lead assumed a chase position and said the gear appeared to be down. The pilot accomplished all checklist procedures for unsafe gear, but was unable to get down and locked indications for the right main gear.

He flew an ILS approach to landing. Upon touchdown, the right main gear indication changed to safe.

What Would You Do?

a. Breathe a sigh of relief and taxi to parking.
b. Stop on the runway and have the gear pins installed.
c. Clear the runway and have the gear pins installed.
d. Something else.

What the Pilot Did

The pilot decided to play it safe and stopped straight ahead on the runway to have the gear pinned (option b). When crash response people arrived, they found the right main gear was slightly underextended, and they were unable to insert the gear pin.

They placed the aircraft on jacks and raised it very slightly to take the weight off the gear and installed the safety pin. They removed the jacks and the pilot taxied to parking.

Good heads-up action by this pilot prevented a possible collapsed gear while taxiing in. "Better safe than sorry" sure fit in this case.

Not all decisions are cut and dried. That's where your good judgment comes in. Option c might even be the best choice under some circumstances, such as another emergency aircraft on final that must land immediately. Just keep thinking and sharing your thoughts and experiences with other crewmembers. ■

Send your real-life submissions to:
What Would You Do?
Flying Safety Magazine
AFISC/SEDP
Norton AFB CA 92409-7001

FSO's CORNER

Annual Privileged Information Briefing

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

■ A few weeks ago, Major Richard A. Morris, Chief, MAC/IG, Safety Inspection Branch, told me about a briefing guide developed by the folks at Ramstein Air Base, Germany. It is used to satisfy the IMC 83-2 to AFR 127-2, the USAF Mishap Prevention Program, requirement for an annual privileged information handling briefing. Being constantly on the lookout for FSO's Corner material, I wrote to the 322d Airlift Division safety folks at Ramstein for detailed information. In response, Major Robert Bolton, the Director of Safety for the 322d, sent me a note and a copy of the briefing guide.

Major Bolton explained the briefing guide is provided annually to all subordinate organizations in the form of a one-page letter. It cites the basis for the requirement and goes on to explain the concepts of executive privilege and limited use as it applies to mishap investigations and associated messages and reports.

In each organization, the content of the letter is briefed to all members. Using the briefing guide makes the requirement to accomplish the briefing easy to satisfy and ensures thorough standardization so all pertinent areas are covered. (It can also serve to demonstrate the desire and capability to meet the annual briefing requirement when MEI time comes around.)

The FSO's Corner needs your ideas. What are you doing in your program that could help other FSOs if they knew about it? Call me (Dale Pierce) at AUTOVON 872-7450 or send your name, program idea, and AUTOVON number to 919 SOG/SEF, Eglin AFB Aux Fld 3, Florida 32542-6005. ■

IFC APPROACH

By the USAF Instrument Flight Center, Randolph AFB, TX 78150-5001

DD Form 1801 (Revised)

CAPTAIN JOHN W. GOUGH
USAF Instrument Flight Center

■ Getting used to the new DD Form 175? Hold on to your hats, because now there's a new DD Form 1801, "DOD International Flight Plan," which you can expect to see 30 July. I'm going to explain the rationale for the new form, discuss differences between the old and the new 1801, and, finally, I'll review some basic instructions for filling out the 1801.

Why A New Form?

Remember 2 years ago when an urgent change notice (UCN) came out describing write-in changes to the 1801? Those resulted from the International Civil Aviation Organization (ICAO) changing the basic format of the international flight plan. Our UCN was a bandage until we could revise the 1801 into a new form. This new form will be easier to work with, and, hopefully, more accepted at those out-of-the-way places we often frequent.

When comparing the two forms, you'll notice some basic differences. The new 1801 is shorter and has an altogether different look more closely resembling the ICAO flight plan. The FIR boundary portion of block 13 is removed and now goes in block 18.

We added an additional line in the Route of Flight block so you don't have to worry about microscopic printing on those long missions. Five additional lines were added to block 18 to compensate for the FIR boundaries. The Pilot's Preflight Check and Base Ops Use blocks are deleted. Finally, all those changes in last year's UCN are incorporated in the new form, so write-in changes are no longer necessary.

Filling It Out

Now that you're acquainted with the new form, let's run through filling one out. As pilots, we only fill out blocks 7-19.

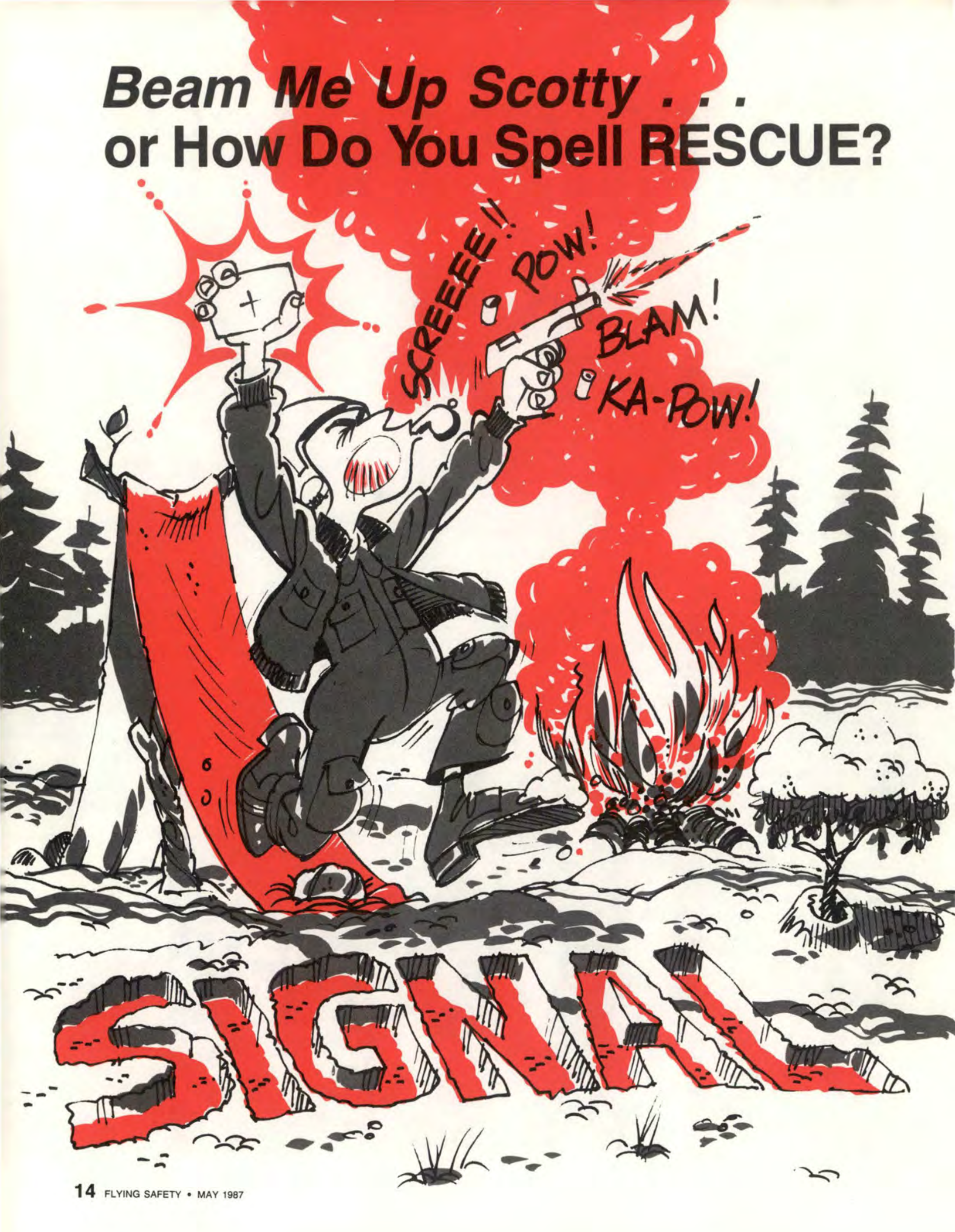
- Blocks 7 and 8 are the same.
- Block 9 is to be used only to show the number of aircraft in the flight if you are in formation. If you're solo, leave it blank.
- For block 13, use your block out time (the time you plan to start taxiing).
- Don't forget to put an "N" before your four digits for cruising speed in block 15. Route is self-explanatory.
- For block 16, the ICAO defines "total EET" as, ". . . the time at which it is estimated that the aircraft will arrive over that designated point, defined by reference to navigation aids, from which it is intended that an instrument approach procedure will be commenced, or, if no navigation aid is associated with the aerodrome, the time at which the aircraft will arrive over the aerodrome." Note that a block for a second alternate aerodrome is also added.
- FIR boundaries are included in block 18.
- The rest of the form remains the same.

Now You Know

This should help you understand why we changed the 1801 and recognize the differences between the old and new form. You might want to review General Planning before filling out the new 1801, as I've just touched on those areas that changed.

If you have any questions or suggestions regarding the new 1801 or any FLIP product, feel free to contact us at the USAF Instrument Flight Center, Aeronautical Information Division, AUTOVON 487-5071. Enjoy, and fly safely. ■

Beam Me Up Scotty . . . or How Do You Spell RESCUE?



Our lives may one day depend on our knowledge and ability to effectively construct a good signal.

SSGT JOHN MULLEN
3636 CCTW
Fairchild AFB, WA

■ Oh, I have slipped the surly bonds of . . . oops." Thus has begun more than one aircrew member's survival situation. In these circumstances, the ability to use a variety of signaling devices can mean the difference between a speedy rescue and a prolonged survival emergency.

Since our highly technological society has not perfected the "Transporter" and calls of "Beam Me Up, Scotty" have, as yet, remained unanswered, the responsibility for using effective signals rests heavily on the survivor's shoulders. Signaling is nothing more than drawing attention to yourself. There are innumerable methods of accomplishing this task, some much more effective than others.

Take the case of the family of snowmobilers out for a weekend jaunt on their high-powered machines. Becoming stranded and finding themselves in a life-threatening emergency were the last things on their mind. They had made no provisions for an emergency, let alone signaling.

Luckily, the lives of this group did not depend on their feeble attempts to signal rescue aircraft with a "Flick of their Bics." Ground searchers located them — dehydrated, hypothermic, and suffering from varying degrees of frostbite. The conclusion of this story might have been much different had they carried something as simple as a signal mirror.

Signaling Measures and Devices

Signal Mirrors Signal mirrors have been responsible for more rescues than any other signaling device. Improvised mirrors may be fabricated from any shiny surface; for example, polished metal aircraft parts, glass, or aluminum foil. They have the distinct advantage of being reusable, which means they may be used periodically to scan the horizon even when rescue aircraft are not seen or heard. Another advantage of this signal is its ability to be used directionally; a real plus in a tactical situation when the use of other signals might give away the survivor's location.

It takes practice to use a mirror effectively. Lessons learned from search and rescue exercises, such as "Red Flag" at Nellis AFB, Nevada, have detailed the difficulty downed aircrew members had in directing the flash of mirrors towards fast moving aircraft. The ability to use the mirror with confidence, and to direct the flash through 360 degrees, can only come with constant practice.

Ground-To-Air Strip Signal Another type of signal you may use is the ground-to-air strip signal. This type of signal visually disrupts the earth's surface to let rescuers know someone is in distress. Your signal should look like it was intentionally made, not a freak of nature. This is accomplished by using letters of the alphabet which are universally recognized as distress symbols. Your signal should have very straight angular lines, and you should make the signal as large as time and materials permit.

The *contrast* of your signal to the surrounding background is the key to its success. Construct it where it will have 360 degrees of visibility from the air. One preferred location for your signal would be a large open meadow, with no large trees which may nullify its effectiveness by casting shadows upon it. The tops of barren ridges or mountains, across streams, or any conspicuous location are preferable. You may have taken meticulous care in the construction of a signal and it may be as large as Texas, but if the location is unsuitable, all of your efforts may have been wasted.

You may use many materials to construct effective signals. You can cut parachute material to shape, but don't candy-stripe several colors together as this detracts from the sig-

continued

Knowing **where** to place your signaling device is most important! The location must be suitable.

nal's overall effectiveness. Instead, use solid colors which contrast well with the background you are in.

If other colors are used, they should border the existing signal, accenting, but not detracting from it. Secure the parachute strips with rocks, stakes, or by making a framework. Such efforts will pay dividends should strong winds occur, which might otherwise nullify your signal's effectiveness. Orient your signal east and west — it will cast a shadow most of the day. Remember, you want your signal to work 24 hours a day. You will need to check it periodically to ensure wind, snow, sand, or debris have not covered or damaged it.

Use those materials which are available near your signal site to conserve time and energy. You may tramp out snow around your desired signal shape. When you do this, take special care to tramp out only those areas which will enhance your signal. Snow piled on the side of your signal will cause a shadow and effectively increase its visual size. Additionally, you may use dirt, sod, rocks, boughs, or burned logs in the same way. If you happen to be in an area with high grass, you can cut or trample it into a desired shape.

International Distress Symbols There are five internationally recognized distress symbols. They are:

- A "V" which means you require assistance.
- An "Arrow" which means you proceeded in the direction the arrow indicates.
- An "X" which indicates you need medical assistance.
- A "Y" or "N" which mean yes or no, respectively.
- The old familiar SOS may be used, but three letters may be more difficult to construct. One effective signal is usually better than several hastily constructed ones.

Fire and Smoke Fires during darkness and smoke during daylight hours can be used to draw attention. Keep in mind the contrast of your signal to the surrounding background is the key to a successful signal. In a heavily forested area, you can make white smoke by piling evergreen boughs, moss, damp wood, or vegetation on a fire.

When the background consists primarily of snow, you may want to use a black smoke signal. Burn petroleum products such as aircraft fuel, tires, foam rubber, or plastic to get this color of smoke. You should wait to use expendable signals until you see or hear rescuers.

Other Common Signals Other common signals are three blasts of a whistle, three shots fired from a weapon, beating a stick on a tree, or simply shouting for help.

Making Signals Work

Remember the things that will attract attention: Contrasting signals, out of the ordinary sights, movement, and unusual noises.

When all is said and done and your signal has been constructed or readied, how will you know if it is good enough? The survivor should ask these questions: Am I willing to stake my *life* on this signal? Is there anything I can do to improve it? Most likely, these questions will lead you to make constant improvements and additions.

Your signals are certainly not limited to the ones mentioned. Your signal need only attract attention! One pilot floating in a life raft off the Marianas sighted numerous planes, but was unable to attract their attention. Despondent, with thoughts on family, good food, and a comfortable bed, he vowed to keep trying.

Several days later, he sighted a large bird on the horizon, and his thoughts immediately turned to food. In his weakened state, he envisioned turkey dinner, with all the trimmings. Sitting very still, he waited, and the bird landed on his head. At that moment, a plane approached on the horizon, and the survivor excitedly waved the albatross — 7-foot wing span and all — to attract attention. Thus ended his survival episode.

All of us will not be lucky enough to have an albatross appear at just the right time. So, the time and effort put into constructing a signal become even more important. By putting forth the extra effort to select an appropriate signaling site, using available materials and techniques, you can return from a survival situation to continue your high flight. ■

4486th Fighter Weapons Squadron Activated

The 4486 FWS evaluators observe GBU-24 (LLLGB) loaded on F-111, marking the first operational employment of the LLLGB by a first-line TAC unit.

CAPTAIN RICHARD F. HAWTHORNE
Chief of Maintenance, 4486 FWS
Eglin AFB, FL

■ It's a world where you, a pilot or aircraft maintainer, deploy as part of a 90-person support package with 7 fighters to a simulated combat environment.

It's a world where you, as a maintainer, build up and deliver live-fire missiles while sweating under a realistically hectic schedule, and then load them onto aircraft — all under the scrutiny of a team of evaluators.

It's a world where you, as a fighter pilot, fly high-performance aircraft to deliver, under simulated attack, precision-guided munitions to their ground targets: Numerous armored tanks scattered across the range area.

It's the world of the Air-to-Ground Weapons System Evaluation Program at Eglin AFB, Florida, the only one of its kind in the Tactical Air Command (TAC).

TAC's interest in evaluating combat-ready fighting units with air-to-surface precision guided munition (PGM) capabilities has been formalized with the activation of the 4486th Fighter Weapons Squadron, under the direction of the USAF Tactical Air Warfare Center, Eglin AFB, Florida. The Air-to-Ground Weapons System Evaluation Program (A/G WSEP) has been created in accordance with COMTAC Oplan 90 to realize this interest using a "cradle to grave" perspective.

Tactical units deploy here to demonstrate their ability to safely and effectively break out, build up, check out, deliver, upload, and employ munitions. This includes the aircrew ability to defeat electronic air and ground threats while proceeding to deliver PGMs during "first look attack" on realistic, tactical targets.

The unit's evaluation is not intended to be an operational readiness inspection type, by-name report card, but rather, a snapshot look at the reliability, maintainability, and overall cohesiveness of the Tactical Air Force's PGM program.

Safety, tech data compliance, and quality of performance have proved critical for success in A/G WSEP. However, other important lessons learned are:

- Technical order short falls and/or inefficiencies.
- Realistic, full-up unit training programs.

Anticipated growth, after our first year of operation:

- Ten evaluations will be conducted this year. (Five evaluations were conducted last year.)
- Future growth to 20 evaluations per year.
- Increasing PGM inventory expended during evaluations to include AGM-88 (HARM), AGM-45 (SHRIKE), and AGM-65D (IR MAVERICK) from current PGMs expended: AGM-65A/B, GBU-24 (LLLGB), and GBU-10/12 (LGB).

All aspects of combat reliability, starting with maintenance procedural discipline through aircrew proficiency, must mesh to ensure our success when, or if, we are tasked to accomplish the bottom line mission, "fly, fight, win." ■

Safety Warrior

The First Test

LT COL JIMMIE D. MARTIN
Editor

■ The Army's interest in airplanes slowly grew in the early 1900s. More men were assigned and more aircraft were bought. But, progress was slow. The aviators experimented with many new concepts.

They practiced dropping bombs from aircraft, taking photographs, firing guns, and developed the radio. In spite of this progress, to most of the senior leadership, the airplane was still just a toy. In fact, in 1914, the US ranked 14th among the nations of the world in terms of money spent for military aviation.

Aviation was not a regular duty until Congress passed a law in July 1914 establishing permanent manning for the Aviation Section of the Signal Corps. The act set the manpower at 60 officers and 260 enlisted men.

Prior to this time, people had been returned to their regular duties in the infantry, cavalry, etc., after spending 4 years in the Aviation Section.

While the act made aviation duty a little more permanent, problems still remained because there was no career for officers in aviation after making captain.

This particular problem was not solved until the National Defense Act was passed in June 1916. The act raised the authorized officer strength from 60 to 148 and gave the President the power to set the enlisted strength. The Aviation Section was authorized one colonel, one lieutenant colonel, 8 majors, 24 captains, and 114 first lieutenants.

One of the officers who was forced to leave flying after spending over 4 years in the Aviation Section was Benjamin Foulois. In 1912, he was returned to the infantry. But, with flying in his blood, Foulois was determined to return to aviation.

He managed to get himself assigned to the Aviation Section in January, 1914, as a troubleshooter for the commandant of the new aviation school at San Diego. His first task was to reduce the high accident rate at the school.

He promptly began instructing the students in engine overhaul and repair. As the young fliers became familiar with the operation of their engines, the school's casualty rate dropped to nearly zero.

His second task was an order from the War Department to establish the Army's first tactical air squadron. Foulois personally organized the 1st Aero Squadron at San Diego in 1914 and 1915. The squadron had 10 pilots and 8 training aircraft, and Captain Foulois was the first commander. It was not long before the squadron was tested in the Nation's first use of airplanes in a military campaign.

Deployment

The campaign was in Mexico. On 9 March 1916, the Mexican revolutionary bandit, Pancho Villa, crossed the border and raided Columbus, New Mexico. Seventeen Americans were killed in the raid, and Brig Gen John J. Pershing was ordered to organize a force to protect the border and punish Pancho Villa. The 1st Aero Squadron was assigned to support General Pershing.

The squadron left San Antonio on 13 March, and arrived in Columbus on 15 March. The unit deployed 11 officers, 82 enlisted men, one civilian mechanic, a medical officer, and 3 hospital corpsmen. Their equipment consisted of 8 Curtiss JN3 aircraft, 12 trucks, and one automobile.

They were in for a rough time. Not only was their motorized equipment only about half of what they needed, but their aircraft were in poor condition and not designed for the conditions they encountered. The planes didn't have the power to fly at the high altitudes required (up to 12,000 feet) or the capability to operate effectively in the poor weather conditions they encountered.

Into Mexico

The only reconnaissance flight into Mexico from Columbus was made on 16 March by Capt Dodd with Captain Foulois as his observer. On 19 March, the unit moved to Casas Grandes, Mexico, and an operating base was established at Colonia Dublan. All eight aircraft departed for Casas Grandes on 19 March, but none of them made it. One aircraft had to return to Columbus for an engine adjustment. Four landed at Las Ascencion, Mexico. The other three became separated in the night and landed at Ojo Caliente, Janos, and Pearson, Mexico.

The next day, the four aircraft that had landed at Las Ascencion, the one that had landed at Janos, and

continued

General "Black Jack" Pershing, leader of the Mexican Punitive Expedition, inspects troops in full field packs as he readies his force to protect the border and punish Pancho Villa.

Mexican Expedition–1916

The expedition's men and equipment began arriving in Casas Grandes on 19 March to begin the search for Pancho Villa. Setting up their operating base at Colonia Dublan, these troops were making history — it was the first time aircraft were used in a U.S. military operation.

The expedition's aircraft made a very poor showing. Besieged with engine problems, high winds, dust storms, and cracked propellers, only two of the original eight aircraft were left in a very short period.

The mechanics and ground crew lived crudely off the land. For the first time in history, logistics were not supported by horses, but were carried by trucks and trains.

The equipment was weak — but the expedition's pilots were very dedicated and very daring.

Safety Warrior

The First Test

continued

the one that had returned to Columbus all arrived safely at Casas Grandes. The aircraft that landed at Pearson was so badly damaged on landing that the pilot had to abandon it and walk to Casas Grandes.

The last pilot finally flew into Casas Grandes 2 days later on 22 March. Grounded by a leaking fuel tank, he had been unable to continue until he encountered an Infantry motor truck convoy near Ojo Caliente. He was able to get gas from the convoy and returned to his aircraft to finish the flight. After just one recon flight and one deployment to a forward operating base, the squadron was down to seven aircraft.

Forward Operations

On 20 March, Captains Dodd and Foulois attempted a flight to locate troops moving south who needed supplies. But, the pilots encountered strong downdrafts and whirlwinds, and the aircraft was unable to gain enough altitude to cross the 10,000 foot mountains and had to turn back. The same day, another aircraft was caught by a whirlwind while landing and was destroyed. Now the squadron had six aircraft.

The next day, they were able to locate the troops, and supplies were sent by truck. But, two aircraft were unsuccessful on 22 March in attempting to locate another troop column due to adverse weather conditions. They encountered strong downdrafts and whirlwinds that at times forced the aircraft down to within 20 feet of the tops of trees. The following day, on 23 March, they located the troops, but couldn't return to base until 25 March because of high winds, dust, and snow storms.

Problems, Problems

The lack of sufficient engine power, high winds, dust storms, and snow storms weren't the only problems the aviators faced. The dry atmosphere of the mountains caused problems with the wooden propellers. The glue dried out, and the layers came apart and warped. To try to save the propellers, they were removed as soon as an aircraft landed and kept in a humidifier until the aircraft flew again.

The aviators were also shot at by Mexicans, were personally threatened, and had their planes damaged by mobs when they had to land somewhere other than home base. On one occasion, Captain Foulois was arrested after he stopped rurales from firing at one of his aircraft. It took the intervention of the military governor of Chihuahua to get him released.

New Aircraft

Captain Foulois asked for new, more powerful aircraft on 22 March and continued to petition for them as the situation deteriorated. He didn't receive any until 20 April, when they took delivery of four Curtiss N8 aircraft. By that time, the squadron only had two of the original eight aircraft left.

The new aircraft were also inadequate for Mexican service, but they were the only ones immediately available. By 25 May 1916, these aircraft had been replaced with 12 Curtiss R2s — better, but not good enough. The planes were troubled by defective propellers, engine parts, and faulty construction. Every one of them required modification and extensive maintenance.

The Results

The accomplishments of the 1st Aero Squadron in Mexico have been both condemned and praised. During the period from 15 March to 15 August 1916, the squadron flew 540 flights totaling 346 hours and covering 19,553 miles. The pilots who flew the missions were constantly exposed to personal risk and personal suffering. The enlisted men worked day and night under primitive conditions to keep the aircraft operating.

They laid the groundwork for the organization and employment of aircraft units under operational conditions. They also helped in the future development of safer aircraft designed to meet the needs of the mission. Their experience was vital in preparing to meet the second and bigger test — World War I. ■

For more information on this extremely interesting period, I recommend *The United States Army Air Arm, 1861 to 1917*, by Juliette Hennessy, and *Foulois and the US Army Air Corps* by John F. Shiner, both published by the Office of Air Force History. Most of the material for this article came from these two books.

Taxi Tales

LT COL JIMMIE D. MARTIN
Editor

■ A transient C-141 with a new copilot and IP at the controls was taxiing to parking. As they neared their assigned parking spot, a wing-walker was deployed to help them taxi past a parked aircraft. Both pilots were watching the right wing to make sure it cleared the other aircraft. As a result, they didn't see the Transient Alert Follow-Me vehicle turn left. As soon as they saw the vehicle bearing off to the left, the crew initiated a left turn.

Suddenly, the concrete buckled, and the left main gear sank into the ramp. As the Starlifter came to an abrupt halt, the confused crew wondered what had happened. They were still on the ramp and not even close to the edge. Had they inadvertently found a weak spot in the ramp no one knew about?

No, they taxiied onto a nonaircraft-strength area of the ramp. The situation was a little unusual in that the area was a 30-foot wide strip with aircraft-strength surfaces on either side of it. The weight of the C-141 exceeded the capabilities of the concrete in this area, and the tires broke through the ramp.

How could the pilots have avoided the problem? Just by following the Follow-Me vehicle? That would have prevented this particular problem. But, they could also have paid attention to the double yellow lines they crossed before starting their turn. The pilots not only didn't notice the lines, but also didn't know what the lines meant when they were later asked about them.

Do you know what double yellow lines on an airfield mean? Several other pilots who were informally interviewed after this mishap didn't know. These markings identify the junction of aircraft-strength pavement and nonaircraft-strength pavement. You normally see these stripes along the edge of taxiways and ramps, but as you can see from the above mishap, you may also

continued

It's important to understand and occasionally review AFR 88-16, "Standards for Marking Airfields." It could prevent an embarrassing mishap like this one.

Airfield markings demand our attention — especially when we're operating at a strange field.

TAXI TALES

continued

find them in other places.

Air Force Regulation 88-16, "Standards for Marking Airfields," gives the guidance for all airfield markings. If you haven't read it lately, take a look. The introduction of AFR 88-16 says, "The main purpose of airfield markings is to provide guidance to pilots for the safe and effective operation of their aircraft." The markings can't fulfill their purpose if you and I don't know their meaning.

Strange fields aren't the only place we can get into trouble while taxiing. Consider the following, more serious mishap.

Tale # Two, or Wounded Eagle

Two F-15s were taxiing back to parking after a routine training mission. The pilot of the lead F-15 saw a fuel truck parked outside the double yellow lines along the edge of the taxiway. The pilot maneuvered his aircraft to the right of the yellow centerline of the taxiway to ensure his wingtip cleared the truck. However, he didn't warn his wingman of the obstruction.

The pilot of the second aircraft was taxiing on the centerline and was involved in completing his after-landing checks. He felt a thump and checked both sides of the aircraft. Only then did he see the fuel truck and noticed his wingtip had struck the parked truck. He stopped the aircraft 137 feet past the point of collision.

The operator of the fuel truck was sitting in the truck completing forms as the first F-15 taxied past. As the second F-15 approached the truck, the operator realized a collision was inevitable and made a hasty exit on the passenger side. He sustained minor contusions and abrasions from the fall to the ground and the flying glass from the collision. The driver's compartment of the truck was now occupied by a 1½ foot long section of the F-15 wingtip that had been torn off.

There were several mistakes evident in this mishap. You might say a chain of mistakes. Had any one of them been corrected, the mishap would not have happened.

First, let's look at the actions of the fuel truck operator. He didn't understand the taxiway and ramp markings. Consequently, he didn't know his chosen parking spot created a hazard to taxiing aircraft. But, when the first F-15 had to alter his taxi route to the right, the operator should have recognized the need to move the truck.

How about the pilot of the lead F-15? He violated the general taxi procedures listed in AFR 60-11, "Aircraft Operation and Movement on

Everyone operating on the flightline — whether maintenance or operations — needs to understand airfield markings — this was clearly *not* a good parking spot.

the Ground or Water," which says "Aircraft must not be taxied within 25 feet of an obstruction unless a marshaler is used," and "Aircraft must not be taxied within 10 feet of an obstruction."

The pilot should have stopped on the taxiway until the truck was moved or a wingwalker assigned. Failing that, he should at least have warned his wingman of the hazard instead of assuming the wingman would see it for himself.

Finally, the wingman. What could he have done to avoid this mishap? First, he could have performed his after-landing check in a more appropriate place. He was performing the check just after completing a 90-degree turn into a congested area.

He positioned the nosewheel on the yellow taxi stripe and thought this gave him wingtip clearance on the double yellow lines along the edge. In reality, his left wingtip projected 6 feet past the double yellow lines. Since the fuel truck was parked about 4½ feet outside the lines, the pilot deposited 1½ feet of the Eagle's wingtip in the truck's front seat.

Tale # Three, or Play It Again, Sam

In a similar case, a transport aircraft's wingtip struck a stepvan parked on the ramp. The van was parked outside a dashed white line on the ramp, and the aircraft was taxiing past with its nose tires on the yellow taxi line. In this case, the crew thought taxiing on the yellow line would guarantee wingtip clearance from anything on the other side of the dashed white line. The stepvan driver also thought the dashed white line designated a safe parking area.

In reality, the dashed white line was a local designation that was originally intended to identify the edge of the ramp control area. It had subsequently been replaced by red security markings and served no purpose. But, many aircrew members and flight line vehicle drivers thought it represented a point where minimum taxi clearance was available.

Just as in the F-15 mishap, an additional factor in this one is distraction. The crew had just received an amended taxi clearance and was performing the taxi checklist while in a very congested area.

What's The Point?

I could cite many more examples, but I think these are enough to illustrate my point. Too many of us don't know all we should about airfield markings. The result has been taxi mishaps ranging from minor to serious. At the very least, a taxi mishap is embarrassing and carries a stigma. It seems to lead to the question, "If the pilot can't even taxi, how good can he or she fly?"

We've all heard the phrase "You have to fly the aircraft from engine start to engine shutdown." We all admit that is true, but just what does it mean? It means you first learn all you can about how to perform an operation before you do it. You don't fly an ILS approach without knowing what all those little lines and numbers on the approach chart mean. In the same way, you can't taxi your aircraft safely if you don't understand what all those markings on the airfield really mean.

Be sure you're familiar with all the Air Force regulations as well as the command regulations that relate to taxiing an aircraft. Just because you read them when you went through pilot training or when you checked out in your current aircraft doesn't mean you know them. Most of us aren't blessed with a photographic memory and have to review things from time to time. Only you can know if you're really up to speed in your knowledge. Make sure you are.

Know the Dash One taxi procedures and restrictions. Know the hazards associated with various weather conditions. Know the turn radius of your aircraft.

You don't make a formation takeoff or fly an approach in weather down to minimums without focusing your complete attention on the task at hand. The same thing applies to taxiing an aircraft. Don't divide your attention between taxiing the aircraft and running checklists or filling out forms while you're in a congested area. Concentrate on getting the aircraft safely through the hazards, and save the checklists for a more appropriate time and place.

Don't let a taxi mishap ruin your whole day and maybe bring your professionalism into question. Taxi safely so you can continue to fly safely. ■

Distraction "clipped" this Eagle's wing. A congested taxiway is *not* the place to perform your after-landing checklist.

OPS

Low-Level Hazard

■ A C-130 was being flown on a day low-level tactical qualification RTU mission that included a copilot evaluation. The copilot was on the top crew bunk unrestrained while awaiting his evaluation.

The aircraft encountered turbulence, and the copilot struck his forehead on the light toggle switch as he changed positions. He suffered a laceration, and the instructor navigator administered first aid. The aircraft commander aborted the low level and returned to base. The copilot was treated at the emergency room and released.

Be aware of the danger of flying low level or during turbulence without being strapped in. Use proper restraints to avoid problems.

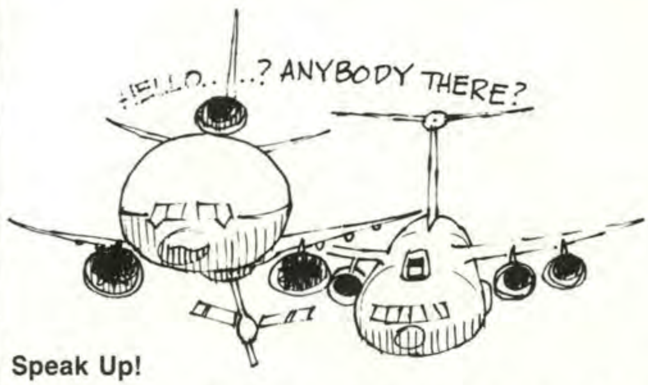
Murphy at Work

Just after the KC-135 rotated for takeoff, an unsecured carton on the cargo deck began to slide aft. The carton contained five glass soft drink bottles. The carton turned over, and all the bottles began to roll toward the rear of the aircraft. The crew chief, who was seated in an airline type seat, leaned over to stop the first bottle as it passed, but he was unable to reach it. He raised the seat arm rest so he could lean over farther and stop the other bottles.

As he leaned out to try for another bottle, his flight suit caught on the seat belt and released the buckle. The crew chief fell out of the seat and landed on a passing bottle. Due to the climb angle and acceleration rate, he was unable to regain his balance and tumbled toward the rear along with the bottles. In the process, his left leg struck the support leg of a troop seat, and both bones in his lower leg were fractured.

As soon as the acceleration rate and climb angle allowed, a second crew chief went to the aid of the stricken crewmember. The pilot declared an emergency and returned to the base. The injured crew chief was hospitalized for 2 days and required 6 weeks of recuperation.

Murphy is quick to exploit any lapse on our part. Be aware of innocent looking things that can become a serious hazard. Make sure everything is secure before takeoff. Also, don't get overeager in trying to correct a previous mistake and create an even more serious hazard.



Speak Up!

A KC-10 was refueling a C-141 at night during a higher headquarters (HHQ) directed mission. Since the refueling formation consisted of three tankers and six receivers, radio silent procedures were used to reduce communication conflicts.

The boom operator established contact with the C-141 receiver at an estimated boom extension of 12 feet with an elevation of 26 degrees. However, the tanker signal system did not indicate a successful contact had been made. The boom operator attempted a normal disconnect, but it was unsuccessful. The boom operator then initiated an independent disconnect system disconnect at 6 to 8 feet of boom extension, and the boom disengaged and retracted to zero feet extension.

The receiver continued to close and struck the boom ice shield before the operator could raise the boom. The receiver pilot didn't know the C-141 had

TOPICS

struck the boom ice shield until the boom operator terminated refueling.

At no time during this sequence of events was radio silence broken to give verbal instructions or declare a breakaway. These were skilled, experienced crews who should have been able to see the hazardous situation developing in time to prevent it.

Why didn't they? Maybe it was because they were overly motivated to complete the HHQ mission. Maybe they didn't want to break radio silence and interfere with the other refuelings in progress. I'm sure they thought they could hack it. We can try to second guess them forever and never really arrive at an answer.

The important thing to learn from this mishap is that safety is paramount on peacetime missions. We all want to do our job to the best of our ability and complete all requirements. But, we can't let that zeal overcome our best judgment and compromise safety. The mission can be flown another day (or night), and we, and our aircraft, will be around to fly it.

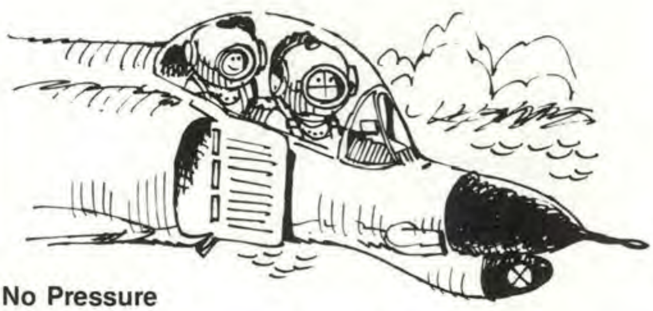
Oxygen Action

The T-33 formation was at FL 260 when the No. 3 pilot experienced his personal hypoxia symptoms. He selected 100 percent oxygen, declared an emergency, and descended to 16,000 feet. This altitude allowed him to remain VFR above the clouds.

He started feeling better after about 3 minutes and was almost fully recovered after 5 minutes. However, he didn't feel the oxygen regulator was really giving him 100 percent. Another member of the flight suggested he activate his emergency oxygen bottle. Upon following this advice, the pilot immediately experienced a full recovery from hypoxia. He then obtained permission to deviate from course to descend clear of the clouds for a VFR recovery and uneventful landing.

There were no equipment discrepancies, and the cause of the hypoxia symptoms couldn't be determined. But, take a look at the heads-up way this emergency was handled by those involved.

- First, the pilot took immediate corrective action as soon as he noticed symptoms of hypoxia. He descended as low as he could and still maintain VMC because he didn't want to go IMC without full control of his faculties.
- Second, he received appropriate advice from flight members. Following that advice completed his recovery from the effects of hypoxia.
- Third, the pilot then continued to play it safe by making a VFR descent and recovery even though the hypoxia symptoms had cleared up.



No Pressure

An F-4G crew was flying as No. 3 in a four-ship Red Flag mission. During the climb to FL 250, the pilot was flying with his oxygen mask off. At FL 230, the pilot noticed symptoms of hypoxia and checked the cabin pressure and found it read 19,000 feet. He put his mask on and selected 100 percent oxygen and emergency.

The pilot notified the flight lead and declared an emergency with the center. The element descended to 8,000 feet and returned to base for an uneventful landing. The pilot recovered from the hypoxia symptoms en route.

The pressurization problems resulted from a failed rear cockpit canopy seal and a front cockpit canopy seal regulator. Oxygen samples were normal.

Neither crewmember felt a loss of pressurization. That's because the cockpits never pressurized. Both crewmembers failed to check the cabin pressure during the climb check and after level off. Also, the pilot failed to check the cabin pressure before removing his mask.

Pressurization systems are great, but they do fail. Don't take them for granted. Make those checks.

tech topics

RC-135: IMPROPER INSTALLATION

The RC-135 crew was airborne en route to a forward operating location when they noticed fuel consumption was suddenly above normal. Further checks revealed No. one engine fuel flow was higher than normal even with the engine at idle. The crew shut down the affected engine, declared an emergency, and performed an uneventful three-engine landing. After taxiing clear of the active runway, ground personnel saw fuel streaming from the No. one engine.

Once the remaining engines were shut down, maintenance personnel found a B-nut securing the elbow from the fuel pump bypass line to the base plate was stripped. Further investigation revealed the B-nut securing the elbow to the base plate was safety wired incorrectly, allowing the nut to back off.

Specific torque values for B-nuts are contained in applicable maintenance technical orders. If no specific values are listed, use the general values in TO 1-1A-8.

Insufficient torque can result in a nut loosening under vibration, with a joint separation and complete system failure.

Overtorquing will induce stress into the fitting, sleeve, and B-nut which can cause cracking.

During any maintenance operation, take a good, hard look not only at those B-nuts, but also at any safety wire to ensure it is correctly installed. Detecting and correcting an impending maintenance or material failure will increase the reliability of the entire system.

Debrief: A Critical Moment

■ So there you are in debrief, filling out the aircraft forms, while the ops van is parked outside waiting to return to the squadron. It's really a routine process for both the maintenance debriefer and the pilot. Or is it? Consider the following recent mishaps and how they illustrate the necessity for a completely objective debrief of, in this case, engine anomalies.

In both mishaps, the pilots advanced the throttle but received no increase in thrust. The backup fuel control was ultimately selected when turning off the electronic engine control (EEC) had no effect.

During the debrief, both pilots used the term "loss of thrust" to describe the problem to maintenance specialists. As a result, the loss of thrust fault isolation tree was used to troubleshoot the problem. The problem, however, could not be duplicated, and the EEC was removed and replaced in accordance with tech order guidelines.

On a subsequent mission, both aircraft experienced the same malfunction. During this next debrief, the problem was identified as improper engine response to throttle movement. This objective debrief led maintenance to the new fault isolation tree, and subsequently, replacement of the unified fuel control.

Without a doubt, debriefing engine anomalies can be extremely critical. Typical buzz words such as loss of thrust, compressor stall, and AB blowout should not be used unless the operator is absolutely sure the terminology is an accurate description of the problem. Instead, debrief facts such as the RPM, FTIT, nozzle vibrations, noise, smoke, flames, throttle movement, etc.

If you are not sure, say so. If the discrepancy cannot be specifically identified with the debriefer, there should be no hesitation to ask for a system specialist. The system specialist, such as the engine or flight control technician, can run multiple fault isolation trees to determine the true cause of the problem.

Since debriefing is a two-way street, what can the debriefers do? Knowledgeable, professional debriefers can guide the inexperienced pilot to provide a proper writeup in the 781A. Debriefers, if not knowledgeable on the system with the anomaly, shouldn't hesitate to call upon their maintenance coworkers, especially 7-level technician/supervisors, to listen to what the pilot has to say and to ask the right questions. The key is to communicate clearly with one another. That way, the pilot can be specific in documenting the 781A, leaving little doubt as to the nature of the problem for the maintainers to correct.

One last thing. I can safely say from experience that no airplane driver ever minded taking the time to chat about a discrepancy, even if it meant phoning him or her at home just as the spouse is putting dinner on the table.

FOR WANT OF A BOLT

Some 35 minutes after takeoff, one of our fighter pilots experienced an uncommanded right roll. A visual check by the wingman confirmed a hardover right rudder. Although the pilot completed all required checklist items, the flight control anomaly remained. The pilot declared an emergency and landed successfully.

The investigators discovered a non-flight control 7/16-inch bolt installed in the rudder control horn. The improper bolt also wasn't cotter keyed.

Once the incorrect nut worked off over time and the bolt fell out, the rudder mechanism went full right, causing the right hardover rudder condition.

Flight control bolts have a self locking ring to prevent the bolt from coming out should the nut come loose. If the proper bolt had been installed, this flight mishap could not have occurred.

Think about this mishap the next time you're installing hardware items on aircraft and remember the importance of using the correct bolt.

Also, for those responsible for inspecting the work of others, remember that more than a cursory visual check may be required, especially when looking at flight control areas.

TEETER TOTTER

The load crew began preparing the missiles for the integrated combat turnaround. One load crewmember installed the upper wing to the AIM-7 missile, which was still on the trailer with an AIM-9 missile above it on the M-9 adapter (Christmas tree). During the final preparation for loading, the team chief and MJ-1 bomb lift truck operator attempted to remove the AIM-7 sparrow from the trailer.

With the sparrow missile secured to the bomb lift by tie down straps, the driver began backing the MJ-1. Suddenly, the AIM-7 upper wing contacted the AIM-9, knocking it off the trailer adapter. The load team chief, still positioned next to the trailer, grabbed the front of the falling AIM-9, but the tail heavy missile fell to the ground.

Load crews know the wing installation on an AIM-7 missile during preparation is dependent on the type of loading exercise implemented. Once in a while, it's a good idea to review our procedures to ensure proper clearances are considered when removing missiles from their trailers.

This $3,000 mishap was the result of poor judgment on the part of the load crew who, although forgetting about clearance for just a moment, was soon reminded of it. One thing we know for sure is that ready or not, gravity is going to get in its licks.

DOWN THE INTAKE

During the cockpit strap-in, the fighter pilot dropped his line-up card on the cockpit floor along the left side of the ejection seat. The crew chief quickly loaned the pilot mechanical fingers from his consolidated tool kit (CTK). After retrieving the card, the pilot returned the mechanical fingers to the crew chief.

When the left engine was started the weapon systems officer (WSO) saw something flash by his cockpit and go into the left intake. After the pilot shut down the engines, maintenance people inspected the left intake and found pieces of mechanical fingers. Once the engine was removed and torn down, further investigation revealed severe damage throughout the compressor and excessive damage in the hot section.

You've probably already guessed what happened in this mishap. The crew chief placed the mechanical fingers on top of the left vari-ramp while he completed strapping-in the pilot and stowing seat pins.

Possibly due to the pressure of trying to get the mission launched on time, the crew chief was distracted momentarily and forgot the mechanical fingers. Perhaps a quick inventory of the CTK prior to engine start could have prevented this $115,500 mishap.

The eagerness of both the pilot and the crew chief to get on with the mission is understandable, but not when it might, as it did, lead to a mishap.

continued

CARTRIDGE ACCOUNTABILITY

A weapons load crew arrived at the F-15 to perform a 30-day T-169 check on station number four. The aircraft forms indicated all stations were dearmed. During his walk-around, the weapons crew chief found all station breeches were safety wired and sealed, indicating all stations were dearmed.

With everything appearing to be in order, the load crew proceeded with the T-169 test. After the load crewmember in the cockpit depressed the emergency jettison button, station number two's aft breech cart fired!

Investigation revealed this aircraft had been previously dearmed by another load crew, but they did not ensure all carts were removed from the jet. Also, the aircraft maintenance unit cart inventory did not reveal the missing cart. Furthermore, the load crew chief did not ensure the pylon pin was inserted to the second detent, which would have electrically safed the pylon and would not have allowed the cart to fire.

This incident differs from the usual "didn't use the checklist" explosive mishap in that established cart accountability procedures were also ineffective. The next time you're tasked to dearm an aircraft, (1) check to ensure you have all of the required carts from each station, and (2) adhere to established cart accountability procedures. ■

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MAIL CALL

"TIME"

■ Being a Cat H reservist means that I see *Flying Safety* here at Rockwell, and then only about 3 or 4 months late. However, I was impressed with your article "Time" in the November issue.

While I was in the F-111, the scenario of being late to the range, or late to the tank, or just late to take off was a common one. The Aardvark's maintenance was not known to produce high sortie rates. During those years, I developed a concept to keep me from missing something stupid on those frantic "catch-up" preflights. I simply told myself and my students, "The farther behind I get, the slower I'm going to go!"

Needless to say, some of the squadron and wing commanders I flew with didn't always react to that thinking. But I was always able to show them that thinking about it slowed you down just enough that you didn't miss anything, not really enough to make a difference. You're so jazzed up at that point, that thinking slow merely returns you to control.

So, if the subject comes up again, remember, take a deep breath, ignore the hysterics going on around you, and "The farther behind I get, the slower I go."

Thomas B. Clingerman, Major, USAFR
Program Manager, Rockwell Intl
Solon, Iowa

Thanks for your letter and kind words. You're absolutely right about the necessity to avoid a frantic catch-up effort. Too many mishaps have been caused by hasty actions.

"TIPS FROM THE FIELD"

In the October 1986 issue under Tech Topics "Tips From The Field," SSgt Rachel suggested modifying tools to give them some insulating qualities. Let me point out that AFOSH Standard 127-66 dated 1 May 1984, paragraph 10-2(e), specifically prohibits the self-modification of tools to provide insulation.

I agree with SSgt Rachel that some insulation is better than none. However, there are companies that make insulated tools for electronics applications. McMaster-Carr Supply Company catalog number 90 lists several insulated tools, such as insulated screwdrivers and assorted wrenches on pages 2060 and 2061.

I am quite sure with a little research, shop personnel can order the proper, safe tools for the job.

SSgt Robert T. Updike, USAF
17th RW/MASQ
RAF Alconbury, UK

Sometimes "Tips From The Field" generates better ideas. Your tip is an even safer one, because AFOSH Standard 127-66 does state, "Tools will not be taped nor otherwise self-modified to provide insulation except as required by TOs, manuals, handbooks, or other directive USAF guidance." Thanks for the information. Other tool users take heed. ■

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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.

CAPTAIN

James E. Blackmon

7th Tactical Fighter Squadron
Holloman Air Force Base, New Mexico

■ On 13 June 1986, Captain Blackmon was flying as No. 3 in a flight of four F-15s. Following a right pitchout for landing, as he was rolling out on inside downwind, he felt and heard a large explosion in the aft section of his aircraft followed by failure of the control augmentation system (CAS). Shortly thereafter, the right engine fire voice warning activated, and the aircraft began an uncommanded right roll to 90 degrees.

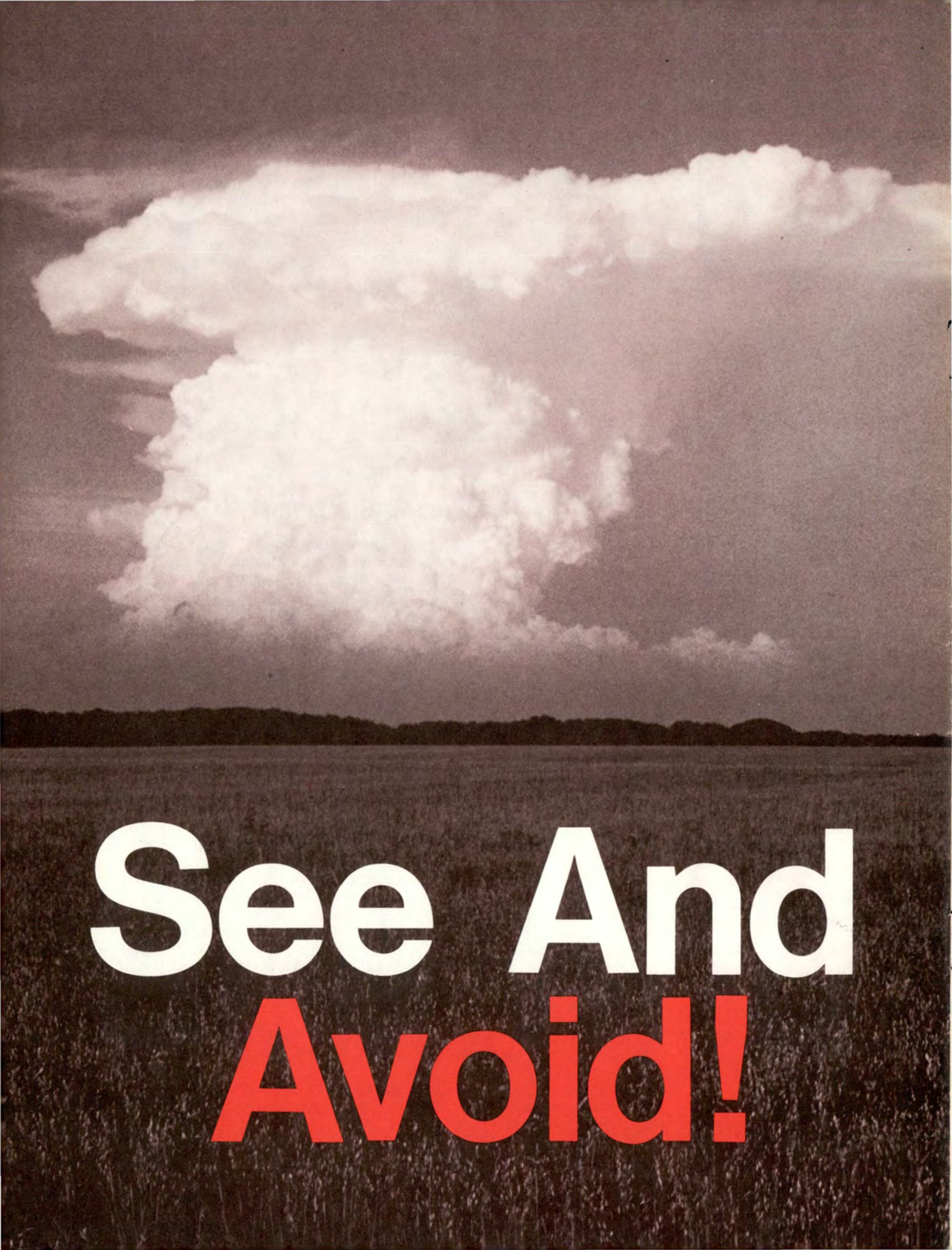
Captain Blackmon reduced the right throttle to idle, tried unsuccessfully to reset the CAS, and applied full left stick and three-quarters left rudder to level the wings. As the aircraft slowly rolled back to level, he used appropriate checklist procedures to shut down the right engine and discharge the fire extinguisher.

Having flown across the runway threshold in his efforts to control the aircraft, Captain Blackmon told the tower he would now extend his pattern for a left base turn to final. Approaching the turn point, the aircraft once again began an uncommanded right roll followed by illumination of the airframe mounted accessory drive overheat light, right engine bleed air light, and many other caution lights. His wingman told him fire was now visible burning through the top of the right engine bay.

Captain Blackmon considered ejection, but through superior airmanship, maintained control of his burning aircraft and prevented its loss over a densely populated area. He was able to turn his marginally controllable aircraft to final, lowered gear and flaps, and made a precise landing in the first 500 feet of the runway.

Upon touchdown, Captain Blackmon used maximum braking to stop the aircraft about 50 yards from the waiting fire truck. He quickly shut down the left engine and egressed the aircraft. The fire continued to burn fiercely. The firefighters finally extinguished the flames over 12 minutes later.

Throughout this emergency, Captain Blackmon demonstrated exceptional flying skills while maintaining his professional composure. WELL DONE! ■


See And
Avoid!