flying

SAFETY

OCTOBER 1990

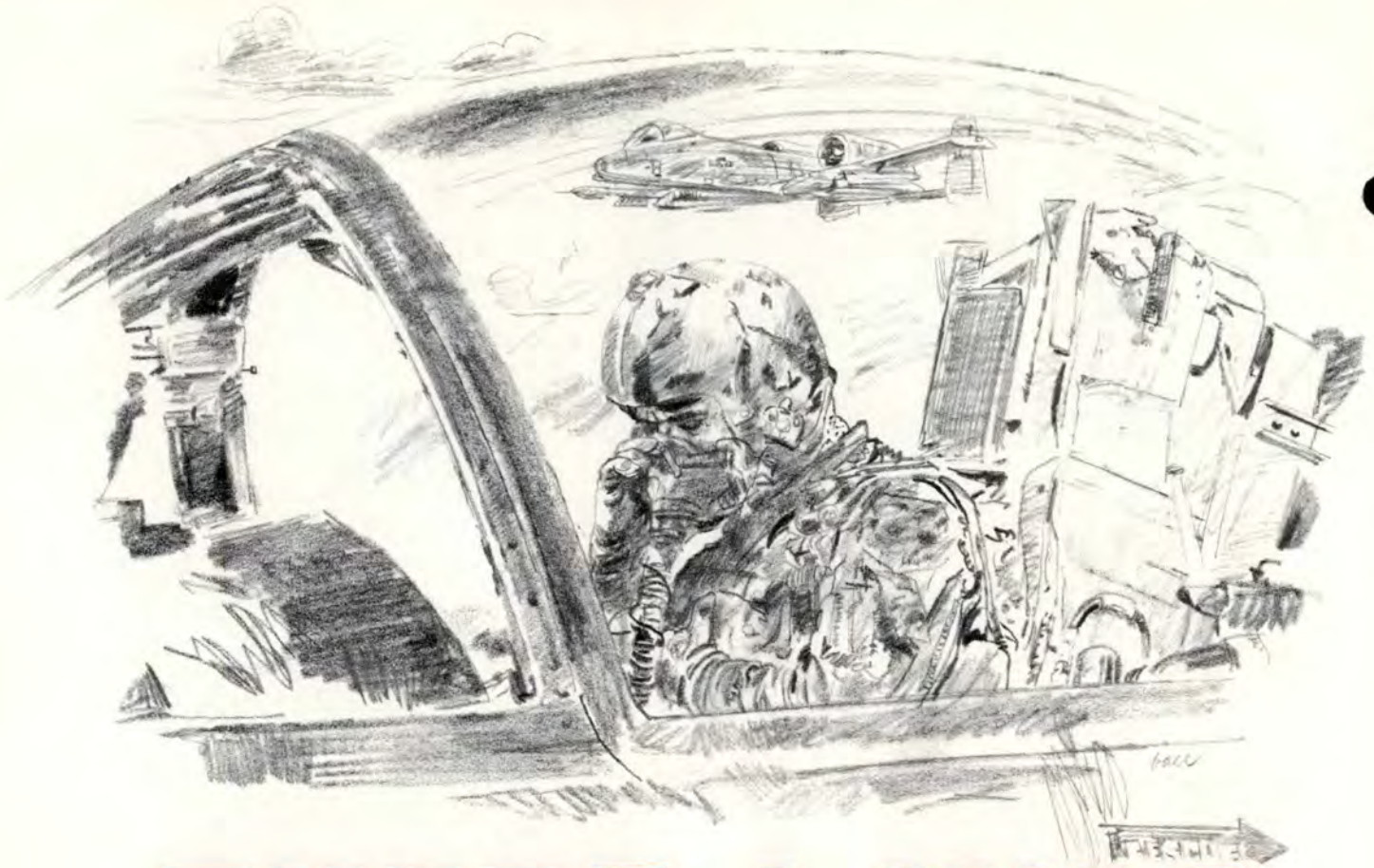
Low Level Turning and Looking Mishaps

FATIGUE — A Catalyst For Tragedy

Separation is a Four-Letter Word — C-O-P-E

I Fly Jets — What Makes Me Tick?

FLYING AND THE HUMAN ELEMENT



THERE I WAS

■ I'm on a headquarters staff and fly the A-10 as a mission support pilot, with a goal of accomplishing mission-ready, level A events. Sometimes those squares are hard to fill, especially night air refueling. I hadn't gotten one the previous training cycle, so when the opportunity arose to stay over at a Reserve unit after a 3-day training conference to do some night flying, I eagerly volunteered.

My first flight was scheduled to be a night air-to-air refueling the evening of the last day of the conference. It had been 3 weeks since my last flight, so the unit agreed to move my takeoff time up to allow a nondemanding day sortie prior to the night mission. The briefing started immediately after the conference and covered local area procedures and both missions. We finished with just enough time for a quick snack from Kentucky Fried® before stepping to the jets.

The first mission was uneventful and included a maximum altitude en route cruise of 6,000 feet. We landed at a nearby air base for a taxiback to await our night takeoff. As we waited, I noticed a little indigestion which I attributed to the hasty snack on top of a full day's work.

At sunset, we took off and climbed to rendezvous with the tanker in the MOA overhead the base. With a "tally ho," we initiated a turning rejoin on the tanker, joining a mile in trail at 10,000 feet. As we waited for the preceding flight to complete, I experienced a sharp pain in my upper abdomen. Through a little vigorous massage, I felt like I got the "gas bubble" to move, the pain dissipated, and we continued on to 12,000 feet and joined on the tanker. I didn't notice any more discomfort as we completed two refuelings, RTB, and individual instrument approaches and landing at our original departure base.

I had no further discomfort until during the mission debrief. Though not intense, the pain got my attention. I declined an invitation to join some of the guys for dinner, planning to go back to my hotel and take care of the "gas" problem. As the night progressed, so did the pain. It was now accompanied by chills, aches in my joints, and extreme tenderness in my abdomen. I imagined all sorts of horrible things, but knew I needed to see a flight surgeon the next day.

I went to the squadron early to

continued on page 2

UNITED STATES AIR FORCE

flying

SAFETY MAGAZINE

AIR FORCE SPECIAL PUBLICATION 127-2 | OCTOBER 1990 | VOLUME 46, NUMBER 10

CONTRIBUTIONS

Contributions are welcome as are comments and criticism. No payments can be made for manuscripts submitted for publication. Address all correspondence to Editor, *Flying Safety* magazine, Air Force Inspection and Safety Center, Norton Air Force Base, California 92409-7001. The Editor reserves the right to make any editorial changes in manuscripts which he believes will improve the material without altering the intended meaning.

page 6

page 10

page 20

SPECIAL FEATURES

2 Low-Level Turning and Looking Mishaps

6 Fatigue—a Catalyst for Tragedy

10 Separation is a Four-Letter Word . . . C-O-P-E

14 A Problem Solved

16 Trouble at Altitude!

20 I Fly Jets—What Makes Me Tick?

25 the Long Steel Pin

REGULAR FEATURES

IFC There I Was

24 Dumb Caption Contest Thing

27 Maintenance Matters

28 Ops Topics

29 Dumb Caption Contest Winner

PURPOSE — *Flying Safety* (USPS 586-410) is published monthly by the USAF, Norton AFB CA 92409-7001, 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 non-directive 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** — One copy for each six aircrew members. One copy for each 12 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 at San Bernardino Postal Service, 1900 W. Redlands Boulevard, Redlands, CA 92373 and additional entries. **POSTMASTER**: Send address changes to *Flying Safety*.

THERE I WAS

continued

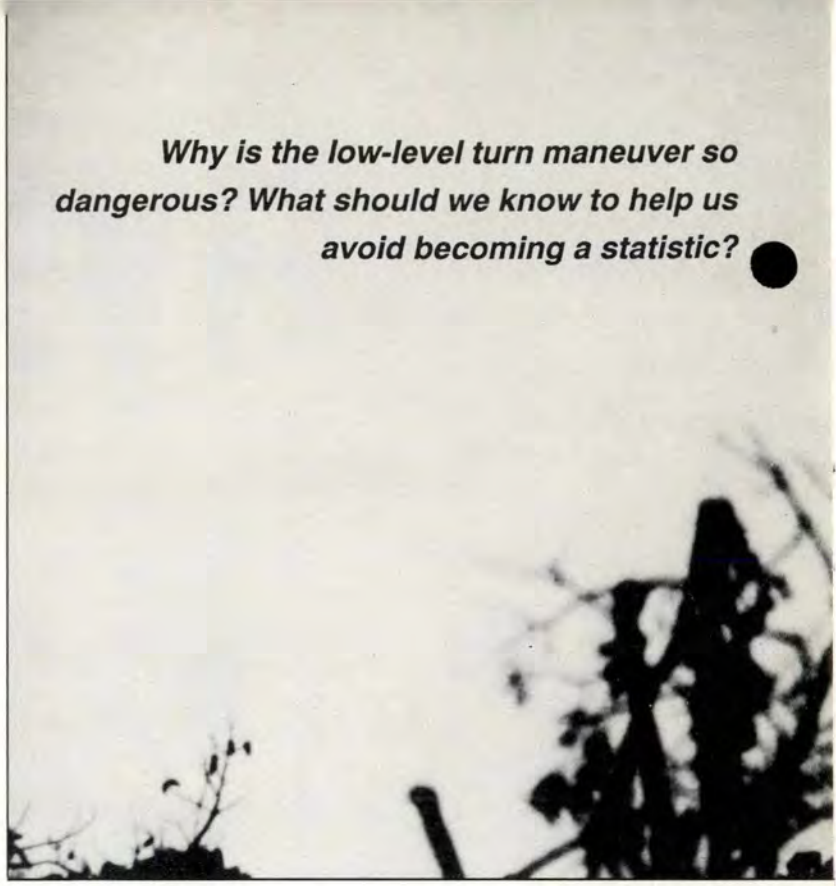
take myself off the schedule and inquire about seeing a doctor. None of the Reserve flight surgeons were on station, and those in the local area couldn't see me until later in the day. So I chose the third option of going to the nearby air base to see their flight surgeon. I chose to drive myself the 70 miles, and the roughness of the road aggravated my discomfort with every bump.

The doctor saw me almost immediately, and after a preliminary exam, sent me to the lab and x ray while he called Brooks about possible physiological symptoms. They had discounted the bends due to the low altitude. Then the lab reports came in. An hour later, I was in surgery to remove my perforated appendix.

As I sit here in the hospital recovering, I think about the big part luck played in this incident. Luck that the refueling hadn't been at FL 180. The difference in gas expansion from 10,000 feet to FL 180 is significant and could have meant the difference between a slight tear in my appendix and a major rupture. Luck that I was able to safely drive myself to the nearby air base rather than accepting the offered ride. The jostling of the open road could have further aggravated the appendix, with catastrophic results. And lucky that I'll have another chance to see my family when I get out of here and back home.

If you have the choice, don't choose luck as your wingman or teammate. And, if you find yourself by chance paired with luck, don't depend on it. Choose the cautious approach. Know your limits, and live within them. No matter how important the training square, it can always be rescheduled. And no matter what the ops officer says, a PQI code change won't kill you. ■

Why is the low-level turn maneuver so dangerous? What should we know to help us avoid becoming a statistic?



Low-Level Turning and Looking Mishaps

LT COL TERENCE LYONS
Chief of Aerospace Medicine
HQ Human Systems Division
Brooks AFB, Texas

DR KENT GILLINGHAM
Chief, Spatial Orientation Function
USAF School of Aerospace Medicine
Brooks AFB, Texas

MAJOR CARL THOMAE
F-16 IP and Low Altitude Training Phase Manager
162 TFG, Arizona ANG
Tucson, Arizona

DR WILLIAM ALBERY
Chief, Combined Stress Branch
Harry G. Armstrong Aerospace Medical Research Laboratory
Wright-Patterson AFB, Ohio

■ Maneuvering in the low-level flying environment is an extremely dangerous activity. According to recent US Air Force Inspection and Safety Center (AFISC) statistics, at least 25 Class A mishaps involving fighter/attack aircraft in low-level turns have occurred since 1982. The ingredients are the same in almost all of these mishaps: Clear weather and good visibility; low altitude; aircraft banked 60 to 80 degrees in a turn; greater than 1 G on the pilot (2 to 5.5 Gs); and pilot looking out of the cockpit for an adversary, a wingman, or some other object of visual attention.

For an unexplained reason, the aircraft overbanks during the turn, and, as a result, the nose slices toward the ground. Presumably, the pilot is looking somewhere other than over the nose of the aircraft and does not detect the nose slice, and collision with the ground occurs. Even though it is estimated less than 1 percent of total fighter/attack flying time is spent performing turns in the low-level environment, 6 percent of Class A mishaps occurred in that regime, and all of those were fatal.

Why is low-level turning so dangerous? There are two answers—one based on the physics and aerodynamics of low-level flight, and the other based on a frailty of our orientation senses which predisposes us to develop undetected overbanks and descent rates.

Aerodynamics of Low-Level Turns

In the US Air Force's training videotape, "How Low Can You Go?", Capt Milt Miller discusses the physics and aerodynamics of low-level turns. He demonstrates how dangerous a low-level turn is. In straight and level flight at 500 feet and 480 knots, if a 1-degree unrecognized descent develops, the time until impact is 35 seconds. In a 4-G turn at 500 feet, if a 10-degree overbank develops, the time to impact is only 5.8 seconds. Compared to flying straight and level even at 100 feet, where a 1-degree unrecognized descent results in a 7-second "time to die," a 4-G turn at 500 feet is still the more dangerous maneuver.

Visual comfort level is not a reliable indicator of safety in low-level flight. During low-level turns, the pilot has only 1 to 1.5 seconds to look safely anywhere but out the front of the aircraft. So, in a level turn, at 500 feet, where do you look? ANSWER: Out the front for nose slicing toward the ground. How about with an adversary at 6 o'clock? ANSWER: The same—out the front for nose slice. The task of maintaining aircraft control is paramount and takes precedence over other mission tasks.

What Capt Miller is unable to explain is why pilots tend to overbank their aircraft while making the turn. Does the fact the pilot's head is rotated while his aircraft is in a turn

continued

and pulling Gs predispose to an overbank? Yes!

G-Excess Illusion

The *G-excess illusion*, or *G-excess effect*, is an exaggerated sensation of body tilt caused by a greater than 1-G force on the otolith organs of the inner ear (figure 1). Remember the balance organs in the inner ear consist of two parts: (1) The semicircular canals, which detect angular accelerations and, in flight, are responsible for false sensations of turning such as occur in the graveyard spin and graveyard spiral, and (2) the otolith organs, which detect linear accelerations and gravity and are responsible for false sensations of pitch or bank attitude such as occur during takeoff into weather or during sustained turns. The G-excess illusion also results from stimulation of the otolith organs by G forces, but it involves a different mechanism.

What happens is the additional G force (that amount greater than the normal 1 G) augments the response of the otolith organs, causing the perception (illusion) of an excessive amount of pitch or bank. Let us imagine you are sitting upright in a 1-G environment and you tip your head back 30 degrees. As a result of this change in head position, your otolithic membranes slide backward the appropriate amount for a 30-degree tilt relative to vertical—say, a distance "x."

Now, suppose you are sitting upright in a 2-G environment and you again tip your head back 30 degrees. This time your otolithic membranes slide backward more than distance "x" because of the doubled G force acting on them. You had initiated only a 30-degree head tilt, however, and expect to perceive no more than that. The unexpected additional perceived tilt due to the extra slippage of your otolithic membranes is, therefore, referred to as your "immediate environment."

When a pilot's head is tilted up in a G-pulling turn, the G-excess effect causes a false perception the aircraft has tilted backwards. In the absence of overriding visual cues, the pilot can make dangerous attitude control errors to correct for the G- excess illusion. If the pilot is looking at the 9 o'clock level position while in a left turn, for example (figure 2), the G- excess effect would create the illusion the pilot's direction of gaze is above the actual direction; i.e., the aircraft is in less of a bank than is actually the case. The pilot would then compensate for the illusion by overbanking.

But the G-excess effect and the illusion of underbank do not necessarily disappear as a result of the compensatory overbank. The same phenomenon can occur again and again—as long as the G load is maintained. Thus, even though the initial perceptual error may be small, the accumulation of erroneous compensatory control inputs can result in a rapidly developing severe overbank and the accompanying earthward velocity vector.

How much excess G is needed to cause a G-excess illusion? Not much. Laboratory studies of the magnitude of the illusion in the 1- to 2-G range reveal perceptual errors

Figure 1
Inner Ear Human Balance Sensors

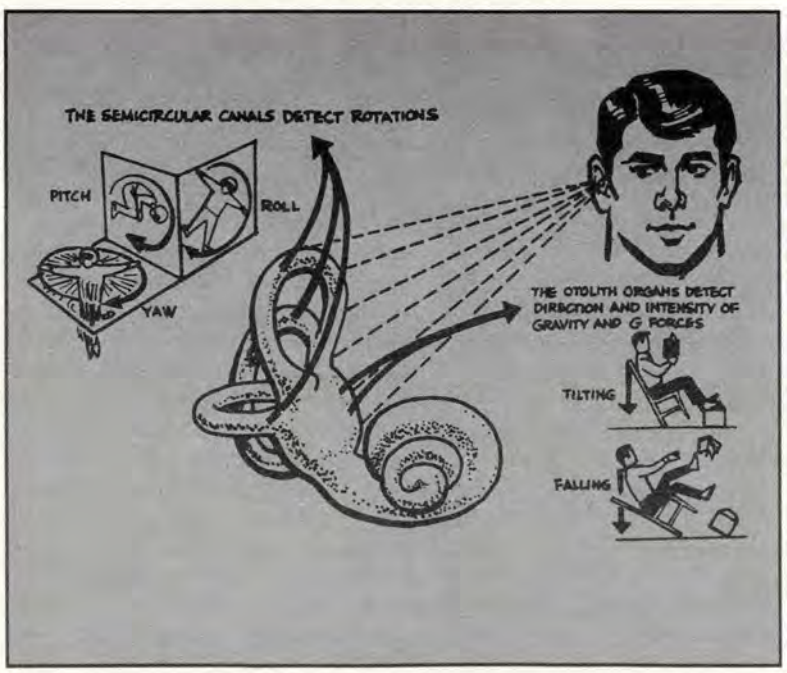
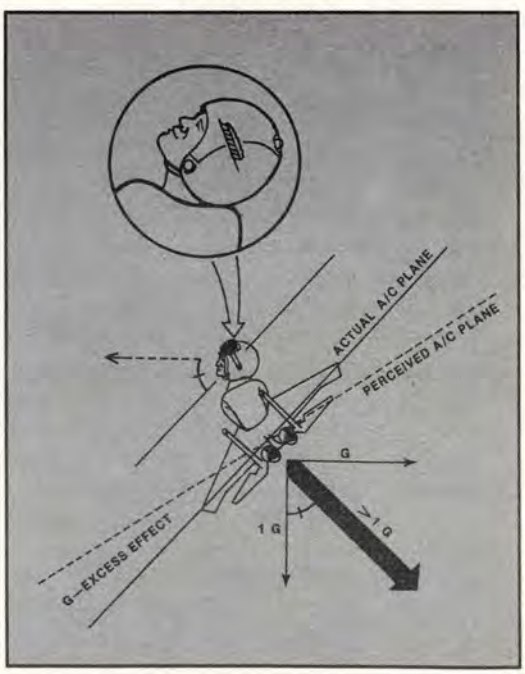


Figure 2
G-Excess illusion



The treacherous G-excess illusion and the unrelenting aerodynamics of the low-level turn make turning and looking anywhere except out the front of the aircraft a potential death act.

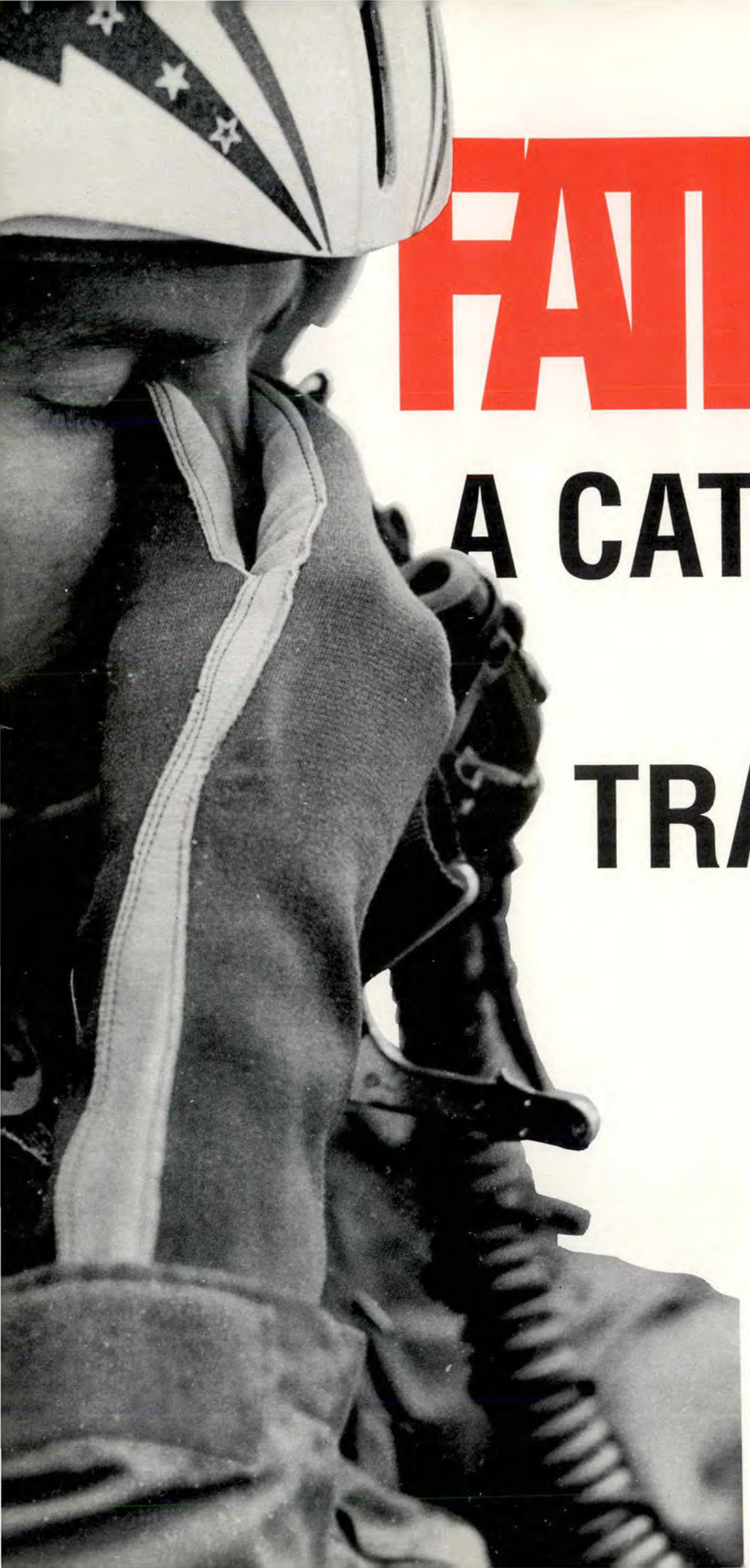
on the order of 10 to 20 degrees at 2 G and about half that at 1.5 G. In-flight studies confirm those values. In one study using a piston twin-engine aircraft, blindfolded pilots were placed in a 1.4-G level turn (45^{0} bank) with their heads facing the inside of the turn and elevated 45 degrees (to face the horizon) and were instructed to maintain the level turn. Within half a minute, these pilots developed an average overbank of 13 degrees and an average descent rate of 1,750 fpm.

In another study using a jet fighter, test subjects were asked to make head movements during a sustained 2-G turn. Some of the test subjects reported pronounced illusory sensations of change in aircraft attitude—as much as 90 degrees for one subject. These sensations were not due to a Coriolis effect because at 2 G, the turn rate of the jet was too low to cause a significant Coriolis illusion.

The Important Point

The important point to take home from this discussion is the treacherous G-excess illusion and the unrelenting aerodynamics of the low-level turn conspire to make turning and looking anywhere except out the front of the aircraft a potential death act. When flying in this regime, if you must look over your shoulder for an adversary or down in the cockpit for a switch, do it quickly, after verifying you are not descending. *Expect* a false sensation of change in aircraft bank or pitch attitude. And most important, get your gaze back out the front of the aircraft immediately and *control* the nose position relative to the horizon. To do otherwise creates a condition conducive to one more low-level turning and looking mishap. Or, stated more directly: First, fly the airplane—or you'll bust your butt. ■

The only way to simulate the G-excess illusion on the ground is in the Vertifuge trainer located at Brooks AFB, Texas. It is currently used for research as well as for some aircrew training. An advanced disorientation trainer is forthcoming.



FATIGUE

A CATALYST FOR TRAGEDY

Chronic fatigue feeds on dedication, ambition, overconfidence, job pressures, not knowing your own limits, and a reluctance to say "enough"....

DOROTHY SCHUL
Editorial Assistant

■ Tired? Tense? Depressed? In debt? Got problems? You might be the perfect candidate for chronic fatigue. What's so bad about that? You may be suffering from chronic fatigue and not know it!

Don't confuse the everyday fatigue we all experience after a hard day's work with chronic fatigue. Chronic fatigue happens when the body must perform mental or physical tasks without receiving the proper rest, nutrition, and recreation. It can be as much psychological as physical. When there is no opportunity to recuperate properly, fatigue accumulates and causes a person's performance level to deteriorate. This may come on so gradually, so insidiously, the person is unaware of it happening. It becomes a catalyst for tragedy because it may not be apparent to the flier until a serious error is made.

Perhaps you are so involved with family problems, a physical ailment, career goals, money problems, job frustrations, or overwork you are unaware of the serious side effect. Once you have chronic fatigue, a vicious circle begins. For example, proper and adequate rest is a basic human requirement, but the person with chronic fatigue may have insomnia. Good nutrition is essential, but there may be a loss of appetite. One needs to be rational, patient, and calm, but many times chronic fatigue causes irritability, apprehension, and even irrational behavior.

Behavioral scientists have identified some effects of chronic fatigue for the crewmember. (See "Chronic Fatigue in Crewmembers.") You may or may not be able to eliminate the factors causing chronic fatigue, but much can be done to control the effects. To properly contain or eliminate the problem, there are three areas to look at—physiological, psychological, and pathological.

Physiological

Chronic fatigue can be combatted with exercise, rest, and nutrition. Studies have proven pilots in good physical condition are more mentally alert, have a greater capacity for work, are more cheerful, and have a brighter outlook on life than those who neglect their physical condition. Under pressure, they are more productive and have much better recuperative powers than those less physically fit.

A person requires the proper amount of rest. When finding yourself in an abnormal, fatigue-producing situation, the answer is to adjust your sleeping period to compensate—that is, lengthen it, if possible. If you are frequently changing from day to night work, a sleep deficit may gradually accumulate. However, the quality of your sleep is probably more important than the quantity. Try to ensure your sleeping area is well ventilated, comfortable, and quiet.

Nutrition is vital. Well-balanced meals eaten at proper intervals will prevent hypoglycemia. The human body is a machine which works on the energy manufactured from the food it consumes. A body needs fuel just as an aircraft does, and it has to be the right octane, too. The human body works on the glycogen stored in the liver and produced by glucose, a first cousin of lactose, or blood sugar. Carried by the blood, glucose—or blood sugar—is a highly desirable item to have floating around in one's insides. In fact, if the blood sugar level drops below a certain point, anybody is in trouble—*anybody.*

Drink plenty of fluids. Because of the low humidity level in most aircraft, a person should consume approximately 8 ounces of fluid for every 30 minutes of flight. Note: A couple of cups of coffee may increase your sense of well-being and even mildly stimulate mental activity. Too much coffee, however, causes body dehydration. For example, for every 4 cups of coffee consumed, 5 cups of body fluid will be lost.

We've all heard what alcohol does to us. It causes dehydration, and its effects can be long lasting. It takes 3 hours to burn up 1 ounce of alcohol. Alcohol usually means parties and late nights which also lead

continued

CHRONIC FATIGUE IN CREWMEMBERS

Performance Effects

- Reaction time is increased.
- Instrument scanning patterns break down.
- Increased willingness to accept lower standards, sloppiness, carelessness.
- Deterioration in timing, slow to respond.
- More attention spent on individual task components to the exclusion of others, with a tendency to neglect relevant cues.
- Missed radio calls.
- Mistakes made on simple, well-learned tasks with blame placed on the aircraft and not on the crewmember.
- Nonobjective and unreliable responses.
- Reduced attention span.
- Important elements overlooked in a task series.
- Slow movement and increased effort required to carry out work.

Physiological Effects

- More aware of and more time spent thinking about physical discomforts.
- Complaints of cramps or stiff muscles.
- Visual field begins to narrow.
- Forgetfulness and unusual preoccupation.
- Irritability, fault-finding, impatience, temper flareups, grouchiness.
- Increased reliance on caffeine or alcohol with change of sleep habits or nightmares.
- Depression, withdrawal, anxiety, fearfulness, confusion, sense of failure.
- Tenseness, unable to relax, restlessness
- Increase of psychosomatic illnesses such as headaches, heartburn, constipation, diarrhea, vague chest pains, shortness of breath.

OUT OF SHAPE?

These shortcomings have been identified ("Human Factors in Air Transportation" by Ross A. McFarland) in individuals in poor physical condition:

- A greater percentage of oxygen consumed performing a task.
- More rapid pulse and breathing rate during work.
- Higher systolic blood pressure during work.
- Smaller stroke volume of the heart.
- Higher blood lactate level during work.
- A slower return of the pulse rate and blood pressure to resting values after exercising.

to fatigue, headaches, upset stomachs—the classic hangover. End results are poor judgment, lack of mental awareness, and subnormal behavior when trying to fly.

Psychological

The easiest thing to say, yet the hardest advice to follow, is to leave your family, career, and money problems on the ground. We all know emotional stress and preoccupation with life's difficulties reduce a person's ability to perform skilled tasks. A mind burdened with anxiety, worry, frustration, and apprehension makes concentrating on necessary tasks almost impossible. Emotional stress has been cited as a contributing factor in a significant number of aircraft mishaps. Mental conflict has long been known to cause fatigue. Research indicates mental stress may make a person more susceptible to certain diseases.

Crewmembers simply cannot afford to carry serious emotional problems with them in the aircraft. They must learn to cope with their problems and, at least while flying, be in a state of emotional and physical well being. It's not easy, but it must be done if we want to decrease human factor mishaps.

Pathological

In simple terms, pathology refers to disease. Fighting diseases and the effects of medication designed to cure them can cause excessive fatigue. Most Americans have from one to six colds a year. Numerous articles on self-medication, flying with colds, etc., have been published, but crewmembers continue to do it. The side effects of antihistamines (drowsiness, dizziness, nervousness, upset stomach, blurred vision, overstimulated body functions) are widely known.

Add to these the effects of a cold

Everybody's An Expert

If there is any one thing everyone is an expert on, it is on being tired. And as usual, prevention is better than cure.

- Recognize you may have a problem which could affect your performance. Use the self-discipline and good habit patterns you have developed throughout your flying career.
- Maintain good physical and mental health. Exercise adequately, get proper rest, eat a balanced diet, and abstain from excessive consumption of alcohol and tobacco.
- Have a plan. Chronic fatigue is an individual and subjective phenomenon. Only you know how tired you are. Be willing to exert additional effort to overcome the effects.

Include your own symptoms of chronic fatigue when assessing ability to perform the mission.

Supervisors need to watch their aircrews for symptoms of fatigue and intervene when necessary.

itself (blocked sinuses, breathing difficulties, aches and pains, low energy levels), and you are compounding an already serious problem. Add fatigue to the antihistamine and cold effects and you no longer have just a serious problem—you have a possible mishap looking for a place to happen.

You've heard the cure for this many times before, and it's actually quite simple. Drink plenty of fluids, get lots of rest, eat well, see the flight surgeon, and don't fly! Let the *doctor* give you the proper medications and decide when you're ready to assume flying duties.

A Catalyst for Tragedy

Chronic fatigue can be a catalyst for tragedy. It needs to be dealt with in the same practical manner as other known hazards such as wind shear or lightning. There are mishaps where the cause has been partially or solely due to pilot fatigue.

Only *you* know how really tired you are.

Pilots and other flight crew may be subject to both a greater variety and increased amounts of fatigue and stress than those of the terra firma workforce.

Pilots and other flight crew may be subject to both a greater variety and increased amounts of fatigue and stress than those of the terra firma workforce.

David C. Edwards, in his book "Pilot, Mental and Physical Performance," says: "... there is a great deal that could be done to minimize fatigue. It demands a careful design of work in relation to the events of life and environment. Only rarely, however, does one have that kind of control. Perhaps it shouldn't all be removed. Fatigue *is* one of life's experiences and human curiosity will perhaps resist following too rigid a personal schedule for any goal. It also serves a biological purpose that should not be ignored. At the very least fatigue gives a background of experience against which one can compare and enjoy the feelings of being full of energy and rested."

Currently, the best instrument to assess fatigue is the individual experiencing it. Like hypoxia, we all have our own symptoms for chronic fatigue. We must know these indications and be willing to take the additional effort to overcome them. Supervisors need to become actively involved by watching for symptoms in their aircrews and intervening constructively when necessary. And by the way, that includes evaluating themselves, also. Mid-level supervisors are the ones most likely to be victims of chronic fatigue. Playing "iron man" as a supervisor sends exactly the wrong signal to the troops.

Prior to every mission, each aircrew should include fatigue when assessing their own personal capability of performing the mission. There is a point beyond which you may not be safe. What you need is something upon which to base a personal go-no-go decision.

Ask yourself what the worst problem you could encounter might be and then decide if you could handle it. Yes, you go—No, you don't. It's tough asking to be removed from the flying schedule, especially in a unit where the "can do" attitude is strong. But the consequences can be a lot tougher. ■

SEPARATION IS A FOUR-LETTER WORD:

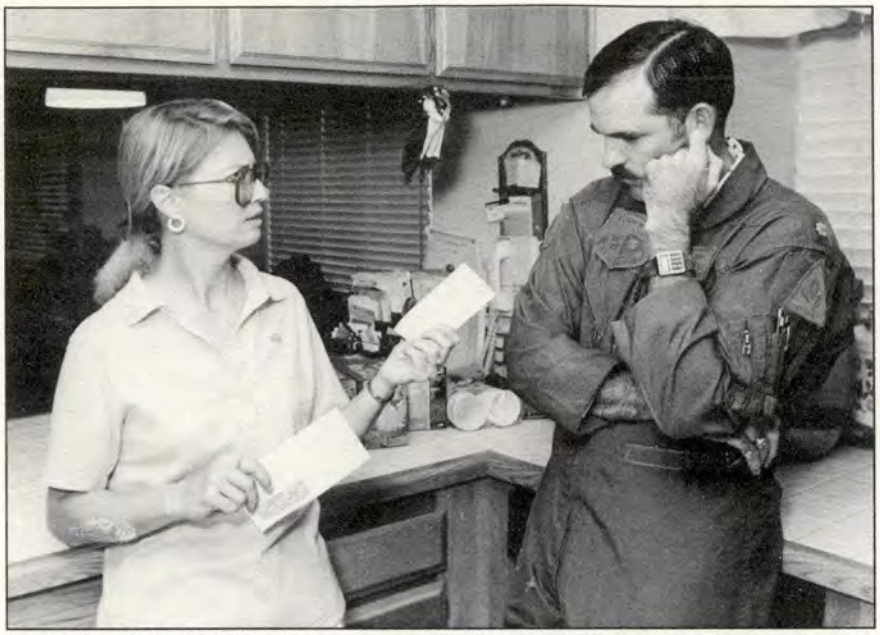
C-O-P-E

Regardless of the circumstances, there is an emotional process military families experience when "duty calls." This article is written to help the military member who must respond and the families left behind to better understand this process. Perhaps this awareness will lead to more effective coping skills and smoother transitions for the individuals faced with separations.

"How much do we tell our spouses while they're deployed?"

"What do I say to the people at work when they criticize our presence in Saudi Arabia?"

"Will my kids remember me when I get home?"



The prospect of a TDY often places stress on the family unit. It's surprising to most of us that a TDY is often preceded by family arguments and some emotional turmoil and upset.

MAJOR (DR) JOYCE TETERS
Directorate of Aerospace Safety

■ These are just a few of the questions I have been asked by active duty and family members confronting the realities of our recent deployment to Saudi Arabia and other areas in the Middle East.

As we well know, life during a TDY is difficult for everyone involved. If the family is lucky, they will be given lead time to prepare for the separation. However, in our most recent situation, notification and departure were swift and unexpected, leaving many families to cope in the aftermath.

Predeployment, or "Let's Get This Over With"

Every family member must prepare for the inevitable separation, no matter what the circumstances. I often find couples and children have a great deal of guilt relating to this time. Why? Because often the time is accented by the expression of angry feelings, and families do not understand why they have these feelings. After all, shouldn't they feel sad the active duty member is leaving, and shouldn't they want to be close and intimate prior to the departure?

It would be nice if this was the case, but the reality is it becomes too painful to say good-bye if they allow these feelings. Usually, by the time the family says good-bye, the sad, painful feelings are "tucked away" and have been replaced by an emotional distance.

This emotional distance has been achieved within the family by an increase in arguments among the members and irritability over little things which ordinarily would not bother them. This negative attitude allows family members to "pull away" emotionally from each other and prepare for the separation.

If the active duty member does not leave at the expected time, the emotional distance remains, and often spouses express a desire for the individual to leave—a "let's get this over with" attitude prevails. Once prepared for the separation, it is very difficult for families to "throw their feelings" back into the family situation. To do this places families on an emotional rollercoaster which is simply too difficult for everyone involved.

Many other feelings are present for the family members as they prepare for the separation. Anger, resentment, fear, and inadequacy on the part of the spouse are prevalent as they feel left behind to take care of everything. Occasionally, the night prior to the deployment, spouses may be surprised to see an

As parents with responsibilities and demands, we can lose sight of how a separation can upset the balance of our children's lives. Even short trips can affect their emotions and functional routines.

Separation is a Four-Letter Word . . . C-O-P-E continued

expression of sadness and fear from the military member preparing to deploy. This doesn't mean there is anything wrong with the individual—only that they feel strong enough emotionally to express these feelings to their spouse. Rest assured, by the time the active duty member leaves the house physically in the morning, they will be prepared to leave emotionally. All of the feelings seen the night prior will be carefully "tucked away" again, and what others will see is a cool, confident warrior, prepared to do the job they were trained to do.

The most important point to remember regarding the predeployment stage is the feelings seen in the household prior to the active duty member leaving are *normal*, and the majority of families facing separations experience them. This is not to imply *all* families do, or that your family is not normal if you don't experience the feelings mentioned in this article. However, many families experience the emotional phases mentioned, and it is important to realize you are not alone in facing the separations. Others are going through the same thing.

Deployment, or "Hey! I'm Doing Okay!"

Of course, everything which can go wrong at home does go wrong while the military member is deployed. For example, the car which was supposed to give you an endless number of trouble-free miles breaks down the day the active duty member leaves. Children get sick or get into trouble. Washing machines go on the blink, basements flood, etc., etc., etc. Yet, spouses manage all of these problems. In addition, they take care of the everyday household chores. In some cases, there is a full-time job outside of the home to be handled. They must provide emotional support for other family members, answer questions for curious neighbors and coworkers, and try to find some time for themselves.

Initially, the families may experience confusion and feelings of being overwhelmed. However, usually these feelings go away as most families begin to realize they are managing just fine. Generally, the spouses have mixed feelings as they start to enjoy their new freedoms and take pride in their accomplishments. However, managing everything and being solely responsible for the activities of the family begins to take its toll.

Spouses eventually start to experience both mental and physical fatigue. They may find themselves having little energy to face the day. Subsequently, they begin to realize they are not superhuman and cannot do it all, and they begin to prioritize their needs, organize their households, and develop a support system.

The military member who is TDY often feels frustrated and lonely at first, but, in time, this is reduced as they throw themselves into the work situation and direct their energy into supporting the mission. Eventually they begin to set up a systematic approach to their daily lives which provides security and reduces their anxiety. Great sacrifices are made in the name of operational readiness. "Accomplish the mission" is the watchword.

Murphy's Law was undoubtedly invented when Murphy went on a TDY. Anyone who has experienced any kind of separation has many charming anecdotes to tell in retrospect. But while you're going through it, it is a different story, and there is little that seems humorous.

Separations and financial crises go hand in hand. It just never fails—the spouse leaves, and it's trouble in the pocketbook.

As the active duty members now prepare to return home (if they feel as though they have sacrificed a great deal, faced and overcome exceptional odds during the TDY), their attitude smacks of "the great warrior" is returning. And they expect to be treated as such. This attitude may create problems upon their return to the home front.

Postdeployment, or "Yay! They're Finally Home!"

As the military members are expecting a hero's welcome home, they may have lost sight of the "heroes" at home who have also sacrificed and survived without them. Therefore, when the active duty member and the family meet for the first time in several weeks, they may have separate viewpoints and differing expectations.

For example, families may have pride in their independence and may not be prepared to give this up just because the active duty member has come back. Family members may also be concerned the TDY member may not accept the changes which have occurred during the separation. On the other hand, the active duty members tend to believe time has stood still while they have been in the Middle East, and only as they approach the return date do they begin to realize that change has occurred. Then, fear sets in along with many questions about acceptance from the family. There is a realization the family will never be the same again.

Those normally dependable (and necessary) items *naturally* break at the most inopportune time! These kinds of things can cause our stress and fatigue levels to rise which can lead to further problems.

Consequently, the emotional distance seen prior to the TDY remains in place. The immediate excitement experienced upon returning is quickly replaced by a guarded attitude on the part of all family members as they prepare to renegotiate their standing. Often there is bickering and arguing again as couples face the everyday problems of living. Intimate moments may be clouded with fear as couples struggle to become reacquainted with each other.

Families can anticipate problems as they face reintegrating as a family following the TDY. Homecoming should be a special time. However, it will not be a time to remember if everyone involved is not patient, sensitive, and caring.

If each family can view these differences as opportunities for growth, the differences diminish, and the individuals begin to concentrate on solutions which will enhance their family relationships. ■

After the happy homecoming, there may still be some lingering stressors which may be difficult to get beyond. Everyone involved should be patient, sensitive, and caring.

A Problem Solved

PEGGY E. HODGE
Assistant Editor

■ The following incident could happen anywhere—anytime—in any aircraft!!

A Close Call

A C-141 aircraft and a base operations vehicle equipped with an emergency rotating beacon were **cleared to use the same runway at the same time**. The vehicle was stopped on the centerline approximately 2,500 feet from the approach end threshold. The C-141 was in the flare approximately 10 feet above the runway.

The loadmaster was the only crewmember to see the emergency rotating beacon as the C-141 wing passed by the ops vehicle. The driver of the vehicle saw the C-141 out of the rearview mirror and made a sharp, left turn avoiding a possible mishap.

A go-around was initiated, and the C-141 missed the vehicle by less than 150 feet. The aircraft landed uneventfully from a closed pattern following the go-around.

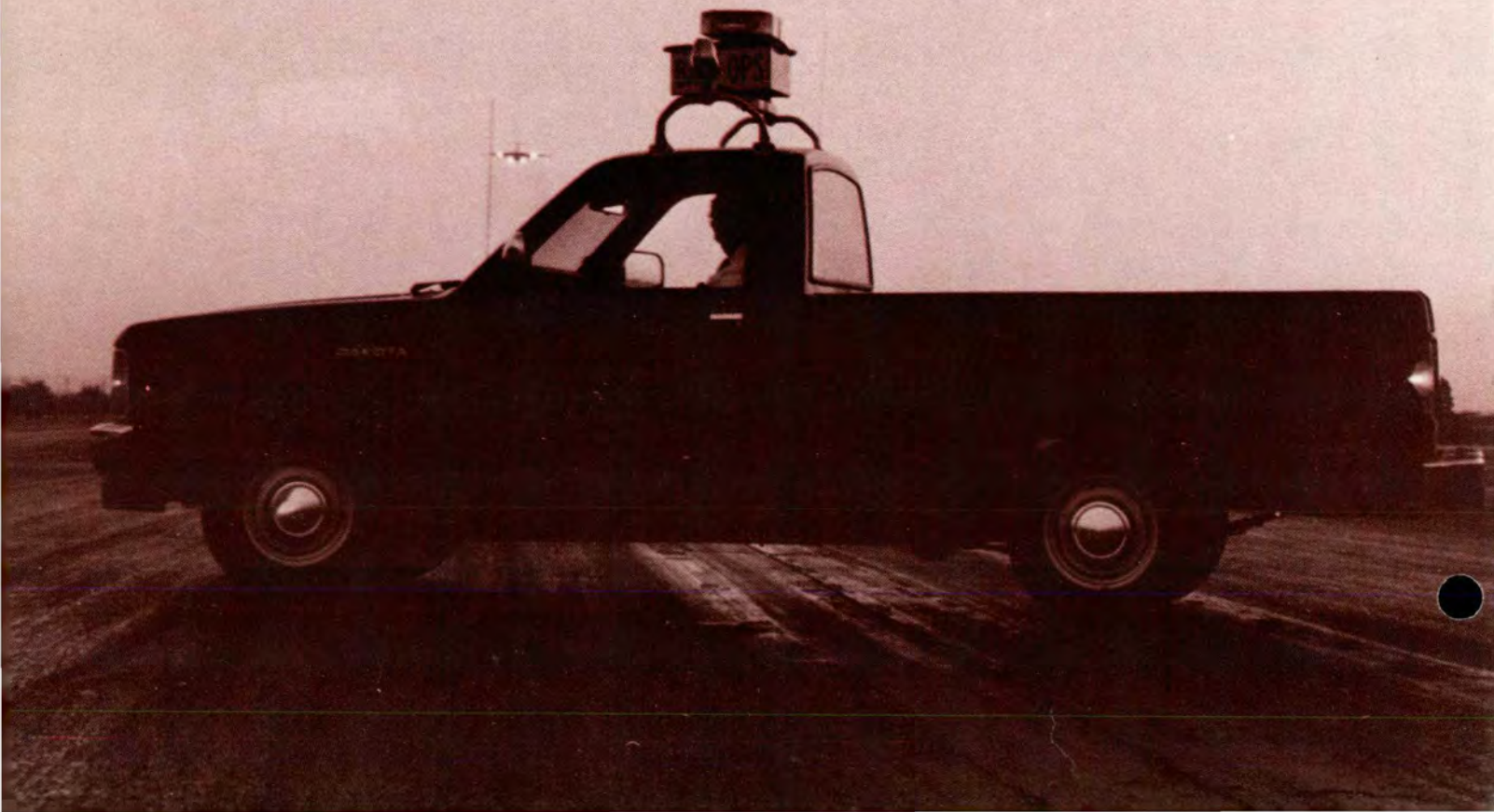
A Dangerous Problem

The rotating lights used on emergency vehicles that operate on the active runway and other airfield movement areas are *not* always visible to crewmembers approaching on the glidepath to a landing runway. This potentially dangerous problem is common to both military and civilian airports and is an obvious hazard.

The incident described above was recreated using a security police vehicle and a fire truck. Both vehicles were equipped with emergency lights. This test indicated the emergency rotating lights used on the vehicles (a focused narrow beam aimed horizontally with the surface) could *not* be seen by any of the six crewmembers on the test C-141. These are USAF standard safety lights also used on base ops vehicles.

This same test was conducted two more times under the same conditions, and the results were identical. All tests indicated crewmembers were unable to see the rotating beacons in time to take evasive action if the aircraft had been making a normal landing.

"What we needed was a major breakthrough in ground operation



The Strobe Alert Landing System (SALS) provides a valuable solution to a problem common to both military and civilian airfield operations.

technology," says Mr. Robert Broadwell, Assistant Chief of Airfield Management at Norton AFB, California. "And, an inexpensive safety warning light system which could be the answer to a common worldwide problem. By sharing this lifesaving solution with other airport personnel, both in the U.S. and other countries, we could minimize the jeopardy to lives and property."

A Problem Solved

The Air Traffic Management people at Norton AFB, California, have a possible solution. Mr. Broadwell researched the possibilities with 10 different emergency light manufacturers and found a possible solution with the Whelen Engineering Company. Whelen delivered the first Strobe Alert Landing System (SALS) for testing and evaluation.

SALS features four directional strobes in a compact, low profile housing with inner optics, which redirect light upward for maximum visibility from the air. The lenses are made of a high impact, shatter-resistant material. The unit provides 6,000 to 10,000 ECP (effective candlepower) warning flash pattern needed for daylight visibility. A photostatic cell automatically reduces the ECP from 1,000 to 600 for nighttime operations.

SALS mounts easily with a single bolt and two wire hookups, making it easy and quick to install or service. The SALS has been tested in fog, rain, smog, bright sunshine (early morning, midday, and evening) by C-141, C-12, C-21, and T-38 aircraft. In over 150 tests, the light was clearly visible at distances of over 5 miles in light overcast and over 2 miles in bright sunshine.

Information concerning this system can be obtained from Mr. Robert Broadwell, 63 CSG/OT, Norton AFB CA 92409-7001. ■

One great feature is that SALS produces a flashing that is *random*, so there is no confusion between this flashing and approach lights or other lights on the airfield. SALS mounts easily with a single bolt and two wire hookups, making it easy and quick to install or service.

TROUBLE AT ALTITUDE

PEGGY E. HODGE
Assistant Editor

The subtle but potentially devastating is an ever present danger no matter

"At 20,000 feet, while still climbing in large circles, my goggles became frosted, making it very difficult for me to watch my instruments. When I reached 25,000 feet, I noticed the sun growing very dim. I could hardly hear my motor run, and I felt very hungry. The trend of my thoughts was that it must be getting late . . . I went on talking to myself, and this was a good sign to begin taking oxygen, so I did. I was then over 25,000 feet, and as soon as I started to inhale the oxygen, the sun grew bright again, my motor began to exhaust so loud that it seemed something must be wrong with it. I was no longer hungry and the day seemed to be a most beautiful one . . .

"The lack of oxygen was affecting me. I was beginning to get cross, and I could not understand why—I was only 29,000 feet after climbing for so long a time. I remember that the horizon seemed to be very much out of place, but I felt that I was flying correctly and that I was right and the horizon was wrong...

"About this time, the motor quit. I was out of gasoline, so I descended in a large spiral. When I had descended to about 20,000 feet, I began to feel better . . . "

This pilot was lucky! He had not recognized his hypoxic symptoms, but as he descended, obtained sufficient oxygen to regain his level of awareness, and the potential tragedy of ground impact was avoided.

Similarly, from a more recent account, a mishap pilot's hypoxic symptoms also went unrecognized, but he never regained consciousness. His speed and attitude, typical of today's jets, worsened his fate.

"Mark was no. 2, and I was lead in a two-ship practice air defense alert scramble. Mark had been cleared to the east point, and I to the west.

"I radioed Mark I was ready to start the intercept. As it turned out, he had not proceeded to the east but had also proceeded to the west point.

"I told GCI I would proceed to the east point and directed Mark to stay where he was, and we completed the first intercept.

"We then separated to set up for a second intercept, but had to rejoin because we had lost our clearance. At this point, I saw Mark 2,000 feet below me.

"When I asked him if he was visual, he said no. I told him he was nearly underneath me. Mark then called visual, but his position forced him to look directly into the sun so I told him to "take it up."

"I followed up with several calls which went unanswered. Looking back, I saw him in a nose-low dive —then a near vertical dive. I made several calls asking him to recover. When the aircraft continued to dive, I directed him to eject.

"No response—no attempt to eject, and Mark was a fatality."

Effects of Hypoxia

how rarely it occurs. Once during your career can be too much.

Altitude hypoxia is *nothing new!* Since the early days of aviation, hypoxia has impaired flying safety. As shown above, the key to survival is our ability to **recognize** the trouble and take corrective action.

To do this, we have to know all we can about hypoxia and, especially, our own hypoxic symptoms. Although our physiological refresher courses remind us of this potentially serious problem, we must be ever alert to its dangers. As a reminder, we offer some important facts about hypoxia, some ways to help you better recognize the problem, and some suggestions on what to do when you're hypoxic.

About Hypoxia

Hypoxia is a state of oxygen deficiency in the body which can cause an impairment of our ability to

continued

function properly. A reduction in oxygen, inadequate oxygen transport, or the inability of our tissues to use oxygen are the conditions that can cause hypoxia.

Because the retina of the eye and the central nervous system have a great requirement for oxygen, they are the first areas affected by any oxygen deficiency. Hypoxia, therefore, will decrease visual and cerebral performance.

Intellectual impairment is an early sign of hypoxia, making it unlikely you will recognize the early onset of hypoxia. Your thinking may be slow, and your calculations will most likely be unreliable. Fixation, or the tendency to repeat courses of action, is common, and memory is bad, particularly for events in the immediate past. Judgment is poor and reaction time is delayed. These symptoms will most likely greatly reduce your ability to make a rapid and accurate assessment of your situation.

Hypoxia is particularly dangerous because its signs and symptoms do not usually cause discomfort or pain. And to further complicate our situation, as crewmembers, we can become so engrossed in our flight duties that our hypoxic symptoms may very well go *unrecognized*, and as you know, this can be fatal.

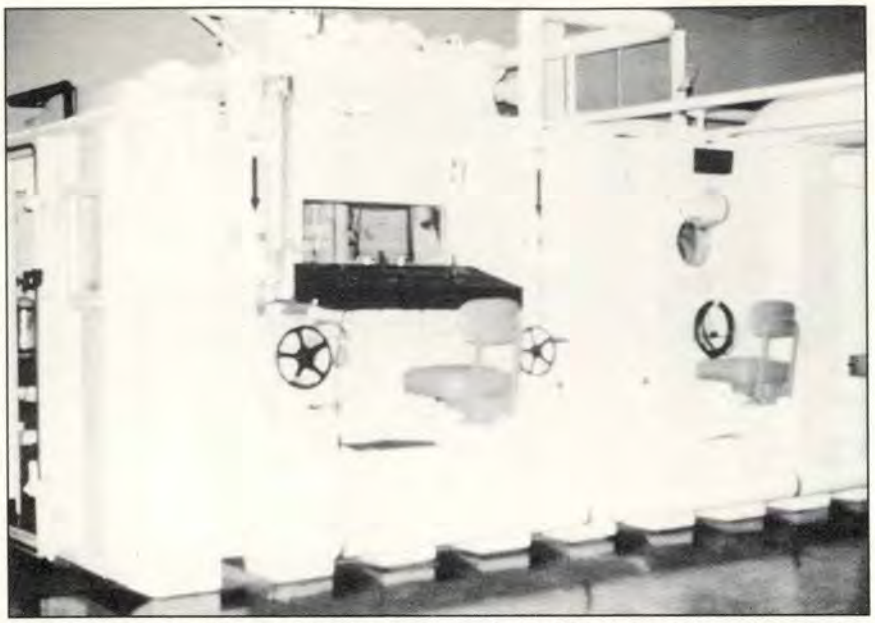
In addition, you should know there are individual and daily variances to tolerance. Factors affecting our tolerance level include flight altitude, duration of exposure, physical fitness, physical activity, environmental temperatures, and medication and drugs.

Realize your time of useful consciousness (TUC) decreases after there is an interruption of your oxygen supply. TUC is the period of time from the interruption of oxygen to the time when useful function is lost. You may no longer be capable of taking proper corrective and protective action. It is *not* the time to total unconsciousness. The figure reflects various altitudes with the corresponding average TUC. These times have been established from observations over a period of years.

A rapid decompression can reduce the TUC by up to 50 percent. This results from the forced exhalation of the lungs during decompression and the extremely rapid rate of ascent.

Because of the insidious characteristics of hypoxia and potentially fatal results, it is important you recognize and have a plan of action.

Blurred vision is just one of the subjective symptoms of hypoxia we may experience. Because the retina of the eye and the central nervous system have a great requirement for oxygen, they are the *first* affected by any oxygen deficiency. Watch out for this symptom!



It is critical you know well your hypoxic symptoms. Recognizing them may one day save your life! So, when you go in for that refresher ride, make sure your experience your symptoms!

Altitude and Time to Loss of Control

Altitude (Flight Level)	Time of Useful Consciousness
180	20-30 minutes
220	10 minutes
250	3-5 minutes
280	2.5-3 minutes
300	1-2 minutes
350	0.5-1 minute
400	15-20 seconds
430	9-12 seconds
500 (+)	9-12 seconds

SIGNS AND SYMPTOMS OF HYPOXIA

Subjective	
Air hunger	Blurred vision
Apprehension	Tingling sensation
Headache	Numbness
Tunnel vision	Euphoria
Dizziness	Belligerence
Fatigue	Nausea
Hot & cold flashes	
Objective	
Hyperventilation	Poor judgment
Cyanosis	Muscle incoordination
Mental confusion	Unconsciousness

Recognition Is The Key

How many of our Class C mishaps related to hypoxia would have been Class As had a crewmember not recognized their hypoxic symptoms? Recognition is the key to preventing a minor incident from becoming a serious mishap.

To recognize your hypoxic symptoms, you must *know well* what they are. Altitude chamber training is important and is most significant in helping you accomplish this! Chamber flights permit you to experience and identify your symptoms of hypoxia under safe and controlled conditions. Your symptoms will vary with such factors as age, physical condition, temperature, and degree of apprehension.

See "Signs and Symptoms of Hypoxia" for some of the objective and subjective symptoms of hypoxia. These are symptoms we should all be aware of and watch out for.

Learn your hypoxic symptoms and react to them. Try to *fully experience* your symptoms while in the chamber. It's important not to put your mask back on too soon. And remember, your symptoms may have changed. So when you go in for that "refresher ride," make sure you practice.

Lt Col James E. Freeman, an aerospace physiologist at the Air Force Inspection and Safety Center, is a strong believer in recurrent training. "Having investigated a mishap caused by hypoxia, I am well aware of the tragic consequences which can result. Each year, 30-40 hypoxic incidents occur in USAF aircraft. Some of these cases are very close calls but, fortunately, the aircrew recognized their hypoxic symptoms.

The frequency at which aviators should reexperience their hypoxic symptoms in the altitude chamber is currently under debate. If this frequency is extended beyond 3 years, it will be even more critical for aircrews to make the most of their refresher physiological training."

Trouble at Altitude

Trouble at altitude in the form of hypoxia is a concern to both aircrew and flight surgeons. In spite of our increased knowledge, training, and improved life support equipment, it continues to plague flight safety. If we do lose aircraft pressure, and if we do lose oxygen, human intervention in the form of recognition will keep us from striking out.

Know your hypoxic symptoms—know them well! ■

When You're Hypoxic

■ As pointed out earlier, your hypoxic symptoms greatly reduce your ability to make a rapid and accurate assessment of your situation. Therefore, a plan of action must be made in advance for any such problems. When you're hypoxic:

■ Put on your oxygen mask and go to 100 percent if you are not already on oxygen.

■ Check your equipment. (Even though you've done the PRICE check a thousand times and never found a problem, keep doing it!)

■ Check your breathing rate.

■ Descend, if possible.

Remember, hypoxia can slip up on you. Make regular oxygen checks and be alert for symptoms.

COL ROBERT F. WENDROCK, JR.
Directorate of Aerospace Safety

I FLY JETS- What Makes Me Tick?

■ For several years, many in the flying community, both civilian and military, have focused attention on what is commonly called human factors. Today, that focus covers the entire flying community from the airline industry to our sister services to across the USAF flying operation. In my opinion, this is clearly the right way to go.

We have done a very creditable job reducing logistical mishaps by identifying parts that break and fixing them before they become a statistic. But unfortunately, we have not done so well addressing operational mishaps. Human beings still tend to break occasionally, and as of yet, we have not found a good way to fix them.

When we look back at some of the mishaps we classify as operational, we tend to refer to them as "dumb" mishaps. "How can anyone do something so 'dumb'?" But I submit, for the pilots doing it at the time, it wasn't "dumb" to them or else they wouldn't have done it.

Which one of us in our flying career hasn't had a real close call from something we did or didn't do, but due to skill or luck, we survived? Why? What causes a fully trained aircrew member to fly a completely functional aircraft into a position that causes a mishap?

Maybe fully trained is an inaccurate description. What are human factors anyway? What is all of this touchy, feely stuff about? I hope to take a few minutes of your time to give you my ideas on this subject which is complicated, but at the same time simple.

When we talk about flight crewmembers, we have as many different personalities as there are faces and names of individual fliers. However, we all share the common thread of understanding and sharing of similar flying experiences. It is this common thread that links us and can help us learn from our brothers and sisters of flight.

The Way We Think and Operate

Human factors, as I see it, are those factors which affect the way we think and operate. In short, it's those things inside of us that make us act and react to inside and outside stimuli. It's what makes us, as aircrew members, tick!

The AFISC Director of Aerospace Safety recently held a human factors conference, attended by a select group of operators and professional flying safety officers, in an attempt

to address this issue. We discussed the numerous efforts going on across the flying communities to address human factor concerns. CATM (Cockpit and Task Management), TTT (Tactical Task Training), CRM (Crew Resource Management), ACT (Aircrew Coordination Training), and LAT (Low Altitude Training), and the Human Factors Traiing Program for Flight Commanders may be familiar terms to you. These are current efforts just in the USAF to address human factors issues. This doesn't include the Army, Navy, and airline industry!

It's enough to make one's head spin. But it's all for a good cause. All are designed to help train our aircrews to more effectively fly and employ their weapon systems, and as a natural result of this effort, to stop losing aircraft in human factor mishaps. I believe these are all good efforts. As Air Training Command develops its human factors program to indoctrinate our young aircrews right at the beginning of undergraduate flying training and the TAF develops a coordinated fighter human factors training program, we are well on our way to attacking this insidious problem called human factors.

A Bigger Picture

However, the vast amount of discussion at the recent conference and most of the above training programs deal with the aircrew once they are in the cockpit. Granted, in the cockpit is where it all comes together. It's where we get channelized attention. It's where we get spatial disorientation. It's where we lose situational awareness. It's where our crew coordination breaks down. And it's where we ultimately fly a good jet into the ground or out of control. But, I submit the human factors picture as it affects our flying operation, and as it must be incorporated into our training program, is much broader than "in the cockpit."

Human factors affect everything we do. From the day you decide you want to fly airplanes, I believe you exhibit a personality separating you from the vast majority of the population. The more you understand what makes you tick, the

I FLY JETS—What Makes Me Tick? continued

more you will understand and be prepared for the way you will handle and respond to certain stimuli and pressures during your flying career.

The programs I mentioned above are all attempting to deal with your response in the aircraft. They are continuously being developed and modified. Many of you will become very familiar with them as you go through these programs and read about them in periodicals such as this.

EVERYDAY HUMAN FACTORS

What I want to do is to walk you through some human factors examples which each of us who fly must deal with well before we are ever in the cockpit. Many of you, even most of you, are aware of these influences in your life but maybe haven't thought of them in the human factors light. Since I am a fighter pilot, I'll use other fighter pilots as examples although these factors affect most, if not all, of us in whatever aircraft we fly.

- When an experienced fighter pilot comes into a new squadron, he is programmed to show his new mates and supervisors how good he is. You want him to be good, but as it relates to human factors, we are set up for an engagement or pressing above and beyond the desired learning objectives if we don't watch it closely.
- When an old head goes back to RTU for a quick upgrade, the hair on the back of the RTU squadron commander's neck should go up. The old head never loses his desire to show the young kids he has all the flying skills he ever possessed. It doesn't matter what his rank is. His desire is there. The young IPs have the same desire to show the old head he never was as good as they are. We have fairly recent mishaps to show us how quickly this situation can degenerate into a "who's better" engagement rather than an IP and student relationship. The squadron leadership must deal with these human factors before they happen.
- The wing commander is flying with your unit today. One of the first questions the ops officer should ask is "What is he doing tonight?" If his exec tells you he is the keynote speaker at some special function, you can bet he is programmed to press to get back, no matter what he tells you. He's probably going to fly anyhow, so both you and he must be sensitive to this urge.
- If you know B Flight is having a party tonight and you don't have the option to stand them down, you can bet they are programmed to press to get back. If you know the flight commander's wife told him he

missed the last two of these and if he misses this one, he need not come home, what do you think he is programmed to do? We're okay as long as everyone knows going out the door the urge for get-home-itis is there.

- Ops officer, if you are having a wing or squadron bomb competition, you can bet your guys are going to almost "bust their rear" to win. That's the way we are programmed. You must convince everyone that even if they are the only flight that aborts for weather, it's

Leadership must deal with many human factor elements before allowing a pilot to enter the cockpit. As leaders, we want to help our young aircrews understand and deal with the influences and pressures they will face every time they fly.

Human factors should be a concern to all of us. It isn't only our fighter aircrew—but all our people—who face this area of concern.

okay. Maybe the others should have. It's a real leadership challenge, but as long as we know, up front, the tendency to press is there, we are probably okay.

■ If you are scheduled for a static display at an airshow where foreign fighters traditionally put on a display before they leave, you will be tempted to do likewise, no matter what you know is right and were briefed. This will be especially true if you get a little prompting from the tower personnel. Count on it and deal with it.

Nobody *WANTS* to Hit the Ground

Why would we rather hit the ground than go through dry on the bombing range for a 25-cent bet? Of course, none of us **want** to hit the ground. But something in us causes us to be so fiercely competitive we literally will kill ourselves to be considered by our leaders, and more importantly, our peers, to be the very best in our weapons system. And what makes this so tough is that's what we want in all our aircrews.

What we have to do is teach our people to know, to recognize, and to control those urges to press beyond what we know is prudent or required for the situation. We need to make sure we, in leadership positions, communicate that aborts, dry passes, terminates, knock-it-offs, etc., are okay. (Of course, if this is being abused by an individual, it indicates other problems the squadron leadership must address.)

You notice I said "communicate," not "say." What you say and what you communicate may be entirely different. There is not a squadron commander I know who does not publicly support the policy that if you don't feel like flying, take yourself off the schedule. Why, it's policy! But if your people do and get chastised for it (no matter how subtly) by the ops officer, flight commander, or scheduling officer (or worse, their peers), they probably won't do it again. And if the squadron commander flies when he shouldn't (for whatever reason), you have just communicated something entirely different than what you said.

Our Air Force's mission is critical, and it demands we be trained as smartly and professionally as possible. An Aircrew's good training and common sense can win out over any human factors problem.

Understanding the Influences

Well, it's time I wrap this up. I think you get the thrust of what I'm trying to say. You can come up with a hundred other examples of situations which could lead us to do "dumb" things because of what makes us tick. The more we, as fliers and supervisors, are able to understand these influences and why we as aircrews act and react as we do, the better we are going to be able to meet the challenges when they occur.

Certainly, every day the vast majority of our aircrews fly smartly and professionally. The pressures are still there. The human factors influences are still present, but on **that** day they didn't override the aircrew's good training and common sense. But, I suspect if we are honest with ourselves, all of us at some time in our flying career (if we have been flying for any length of time) will admit to succumbing to some pressures that maybe we didn't even know existed and afterwards admitted how dumb that was and how lucky we were to have survived.

Am I speaking from personal experience? You bet! I've been skillful and I've been lucky—and I've survived. I'm not suggesting we try to change the way we fly. What I am suggesting is we improve the way we train.

What I believe we are trying to do today with our human factors emphasis is to help our young aircrews understand and deal with the influences and pressures they, without doubt, will, and do, face **every** time they fly. And we want to do this **before** they have to learn from experience! In fact, it appears to me we are attempting to institutionalize Friday night watch shooting. I think this is the right way and smart way to go. Don't you? ■

Write A Dumb Caption Contest Thing

Well, wouldn't you know we hadn't heard the last from Byron Q. Lackluster, President and Chief High Muckety-Muck of the United Organization of Dumb Caption Writers of America (UODCWA). As you recall, he was so upset with you folks for beating the best efforts of his people here on the *Flying Safety* staff that he wrote up the contest caption to beat for the July contest. Well, that hasn't even been judged yet (at this writing), and he's already running scared.

So now ole Byron-baby formed up the UODCWA's most distinguished blue ribbon committee and had them come up with this month's contest caption. He now arrogantly claims he'll stake his career reputation on the supremacy of their efforts over your abilities. Imagine that! Well, we say horse feathers, blither blather, posh, posh, and twiddle de dee! We'll match your wits against a stinking blue ribbon committee any day.

So have at it, and you may be the one to wipe that silly smirk off Lackluster's limp lips and win our greedily coveted and world renowned CHEAP LITTLE PRIZE at the same time. Think what that will do for you. Never mind—just do it anyway! Hurry!

Write your captions on a slip of paper and tape it on a photocopy of this page. DO NOT SEND US THE MAGAZINE PAGE. Use "balloon" captions for each person in the photo or use a caption under the entire page. Entries will be judged by a panel of experts on humor in January 1991. All decisions are open to bribes in excess of $100,000. In fact, make it big enough and we'll go back and make you the winner of previous contests. Hey, we're flexible, gang, and we've still got to feed all these dumb caption writers.

Send your entries to **"Dumb Caption Contest Thing"** • *Flying Safety* magazine • HQ AFISC/SEPP • Norton AFB CA 92409-7001

The Long Steel Pin

CMSGT ROBERT T. HOLRITZ
Technical Editor

■ His name is not important, although many who read this article will recognize the person it is about. He was an excellent Deputy Commander for Maintenance (DCM). Unlike his predecessor, who ruled the maintenance complex like Castle Grayskull, the colonel enjoyed an excellent rapport with both officers and enlisted folks whose job it was to keep the aging fleet of fighters combat ready. Also, unlike many DCMs, he was a command pilot and maintained his proficiency by regularly flying training missions in one of the wing's fighters. He even looked like a fighter pilot—tall, slim, and he walked with a kind of cocky swagger.

It was to his credit, even after a year as the DCM, he managed to maintain his calm and confident demeanor in spite of the fact that, like most maintenance outfits, we had our bad days. Even when the flying schedule came apart like a $2 watch, and the stats were lower than a snake's belly, he maintained his composure. For this reason, I was surprised when the maintenance officers and senior NCOs were called to his office for an "immediate" meeting.

The colonel's office was typical. Just inside the door stood a glass case full of books and memorabilia. The walls were cluttered with plaques. The colonel sat at a large, mahogany desk, on top of which lay stacks of paper and reports and a curious steel rod, 8 to 10 inches long.

After we all had assembled, the office door was closed, and the DCM came straight to the subject of the meeting. "We've just had an aircraft return with an IFE for a binding control stick," he said. He placed a piece of hardware on the desk just in front of the metal rod. Then in a voice that quivered with more than a hint of anger, he said, "QA found this jammed under the stick boot."

His point was quite clear. This small piece of widget almost caused the loss of an aircraft and possibly the lives of its crew. "I don't want this to happen again."

As he rose from behind the desk, it was evident the meeting was over. Everyone was surprised at the DCM's attitude. Why, after a year in the maintenance business, with IFEs almost a daily occurrence, did

continued

The Long Steel Pin continued

the boss get so upset over this particular incident?

At rollcall the next morning, all maintenance folks were briefed on the meeting and on the sternness and resolve of the colonel's words. Things seemed to return to normal, but the next day, another pilot reported a binding control stick caused by a piece of stray hardware. Except for a short moment of controlled rage at the morning meeting, nothing came of it. Once again, the maintainers were reminded of the colonel's strict policy on preventing FO.

The next morning, the word came down from the squadron commander a third aircraft returned from flight with a binding control stick, and the DCM would hold a mandatory meeting for all maintenance people in one of the hangars that afternoon.

Anyone with any sense avoided the DCM's office that day. It would do little good to try to convince the colonel three incidents in as many days were just bad luck and not the beginning of a potentially disastrous trend.

The flying schedule was cut short, and the maintenance people assembled in the hangar at 1530. The colonel arrived exactly on time and climbed on top of a flatbed trailer parked along the back wall of the hangar. I noticed he was holding what at first appeared to be a pointer. But after a closer look, I realized it was the long, steel rod the colonel kept on his desk.

I don't recall the exact words of his address, and to my knowledge they were not recorded, although they probably should have been. In a firm, but not threatening tone, he expressed his concern over the recent flight control incidents. "There is nothing more frightening for a pilot than to have his flight controls jam," he reminded the audience. All three of the recent mishaps were caused by maintenance-generated FO. He went on to describe the incidents which occurred during the past 3 days. Then he paused for a second, took a step back, and began a recount of his personal experience with jammed flight controls—which nearly cost him his life 15 years prior.

He was the pilot of an F-4C during a two-ship training mission, flying over England at about 16,000 feet. As he began to bring the aircraft into an inverted flight maneuver, the controls jammed, causing the aircraft to enter an upright, wings-level dive. The aircraft accelerated to about 400 knots and entered a cloud layer at 5,000 feet. In spite of his efforts to free the jammed controls, the aircraft continued to dive.

The jet broke through the cloud layer at about 3,000 feet, and at the pilot's direction, the WSO ejected. With the aircraft now approaching 2,000 feet, he knew he had to get out. He also knew that at more than 550 knots, his chances for a successful ejection were almost none. With one hand on the stick to stabilize the aircraft, he said a quick and humbling prayer, then pulled the ejection handle with the other hand.

He ejected at less than 1,800 feet. At nearly 600 knots, the force of the windstream was incredible, ripping the gloves from his hands and tearing off his helmet. His 6-foot, 4-inch, 200-pound frame was flailed about like a marionette. The chute opened at just under 1,000 feet, and after clipping the top of some trees, his twisted body landed only a few feet from a pond.

As he lay there, both arms and legs broken, he knew only by the grace of God was he alive. The aircraft crashed in a wheat field not far from where its pilot landed. There was no fire. The Phantom hit in an almost perpendicular attitude, penetrating 45 feet of earth and leaving a crater nearly 40 feet deep and 30 feet wide. The drag chute and a small wing panel were the only hints an aircraft was buried beneath the crater.

Although he survived, he was seriously injured. His chances for recovery were good, but the doctors agreed he would never fly again. He spent the next few years in and out of the hospital with a steel pin inserted in one of his legs to allow the bone to heal.

But the young pilot did not accept the doctors' prognosis. Instead, through his determination and faith, he recovered and made it back into the cockpit. The curious steel rod he kept on his desk, and now held in his hand, was the pin that once joined the broken bone in his leg.

As he walked out of the hangar, I realized for the first time, his walk was not that of a cocky fighter pilot, but a reminder of the day FO almost cost him his life. ■

MAINTENANCE MATTERS

Thinking Green

■ During a touch and go, the pilot of a T-37 was directed to go around when the controller saw a vehicle cross onto the runway about 200 feet from the departure end. As might be expected, the driver was apprehended. When asked to explain why he crossed the runway, he said he waited at the hold line until he saw a green light, then proceeded to cross the runway. But, the only possible source of green light was the tower's light gun, and at no time was it used to signal the driver. The only possible explanation for the transgression was since the driver expected to see a green light, he unconsciously saw the clearance light.

In the haste to get the job done, many of us make presumptions, both conscious and unconscious, which sometimes cause problems. In this case, the driver's failure to ensure proper clearance almost ended in disaster.

Before crossing an active runway, be sure you have tower clearance by:

- Knowing the procedures. If you are not sure of the procedures, don't attempt to cross.
- If in radio contact with the tower, repeat both clearance in structions **and your call sign** before proceeding on to the runway.

Above all, if lights are used, be sure you have the **green** light before proceeding. Thinking doesn't make it green.

Eagle Leak

The F-15 was no. 3 of a four-ship flying in tactical formation. As the Eagles climbed to 14,000 feet, the no. 4 pilot noticed fuel leaking from no. 3's right side. The pilot checked the fuel flow gauges and engine instruments. All indications appeared normal, but the fuel quantity was down to 11,500 pounds. He reduced the right engine to idle, turned to the airfield, and declared an emergency.

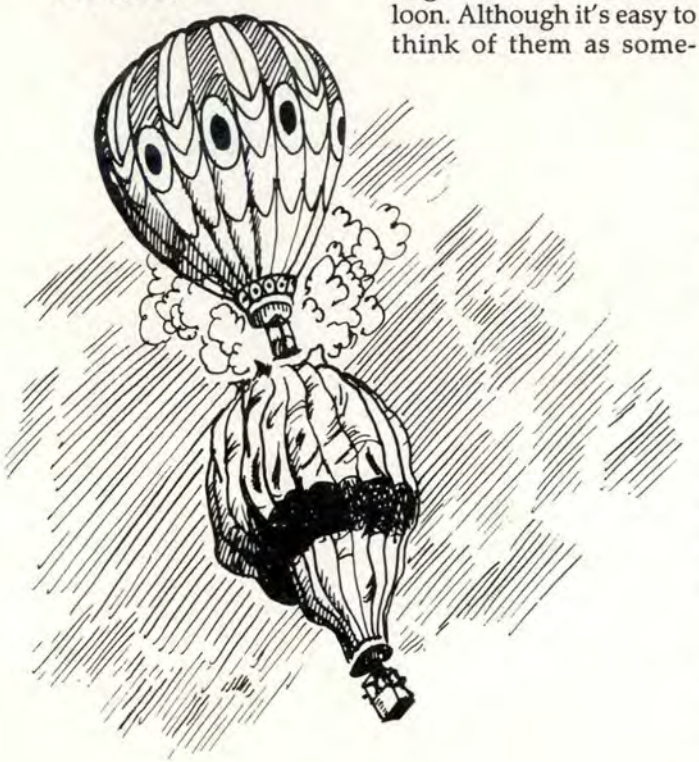
In accordance with checklist procedures, the pilot shut down the right engine. Four minutes later, the wingman confirmed fuel was still leaking. The fuel quantity was now less than 10,000 pounds. As per the checklist, the pilot restarted the engine.

Lined up for a straight-in approach, the pilot noted the fuel quantity was now reading 9,000 pounds. Fuel continued to pour from the aircraft through landing roll. Just 7,500 pounds of fuel remained at shutdown. The leak continued until maintenance applied ground power and turned the right master switch off

A maintenance team found the leak came from a loose coupling nut in the augmentor fuel outlet line of the no. 2 engine. They also noted three pins and safety wire required to secure the coupling were not in stalled. A review of the aircraft forms revealed maintenance personnel replaced the fuel/oil cooler which required them to remove the pins and safety wire. Not only did the technicians fail to install the pins and safety wire in accordance with the TO, but the required maintenance inspection was not properly performed. The duration of the entire flight was only 15 minutes. In that time, approximately 4,000 pounds of JP-4 leaked from the aircraft! In this case, failure to follow technical data and careless supervisory inspection procedures almost caused the loss of an aircraft and could possibly have cost the pilot his life. ■

OPS TOPICS

Hot Air Balloons in Formation?



■ One of the many ways to get airborne is in a balloon. Although it's easy to think of them as something else, balloons are still aircraft and flying safety principles still apply.

Two balloons were scheduled to fly "formation" for the paying customers on an early morning flight. The first one rose quickly to 2,000 feet AGL, and the second one was soon on its way up.

Witnesses in other balloons saw the first balloon begin sinking, without the usual addition of burner, while the pilot pointed out landmarks to the passengers. They also saw the second balloon rising very quickly, almost directly under the first balloon.

Soon, it was obvious the pilot of the lower balloon could not see the balloon above. The witnesses described the sequence of events clearly. The basket of the higher balloon broke open the velcro panel vent and fouled the other safety lines of the climbing balloon. This allowed the panel of the lower balloon's envelope to open fully as the two separated.

The pilot and all five passengers died in the resulting crash of the lower balloon. Air safety investigators noted many factors similar to fixed-wing midair collisions: The pilots failed to maintain an adequate lookout; the pilots were not in radio contact; and the "formation" was not adequately briefed by either pilot.

Some lessons are clear enough they don't need to be tested every time you take to the air.

Gliders for Recreational Flying...

OK, so it's not as easy as it looks. One of the many goals for glider pilots is a silver badge for gaining 1,000 meters of altitude, traveling 50 kilometers, and staying aloft for more than 5 hours. This is often easier for the sailplane to do than it is for the pilot.

After about 3 hours of circling in thermals, the pilot of one sailplane became nauseous. By changing the direction of turn and moving along the course, the pilot felt better until the fourth hour. Nature was not to be denied and the airsick bag was finally filled.

Feeling somewhat better, the pilot pressed on. Reaching the 5-hour point and the final destination, the pilot looked at the altimeter and decided to overfly the field before entering the pattern. But the picture didn't look right. Although the altimeter showed 1,500 feet above the ground, it looked more like 500 feet.

Unable to make even the base leg for the runway, the pilot tried to turn onto an adjacent strip but cartwheeled when the wingtip touched the ground. A closer look at the altimeter after the dust settled showed it was set 1,000 feet too high.

Heat stress, followed by dehydration and compounded by poor inflight planning, nearly killed an otherwise competent pilot. Soaring is a sport, which, by definition, means it's not worth getting killed for. ■

☆ U.S. GOVERNMENT PRINTING OFFICE 1990-779-017/20022

Once Again, Thanks For Your Support!

AND THE WINNER
FOR THE JUNE 1990
DUMB CAPTION CONTEST
IS . . .

Col Stu Bradley
12 FTW/MA
Randolph AFB, Texas

Oh, this is a four-judge month. This time we lost three judges from the giggle fits and another to the silly spasms before we came up with the winner to the June Dumb Caption Contest Thing. It's a dirty job but somebody's got to go nuts around here. But, at least, we know that we're not alone. We have all you nuts to keep us company. And the chief nut and winner of the inimitable and world-famous CHEAP LITTLE PRIZE is the inimitable and now world-famous Col Stu Bradley who came up with the outstanding caption printed above. Not too shabby. You've done good.

But you had a lot of close competitions from the Honorable Mention crowd which we've printed below. If any of you would also like to become inimitable and world famous, you can try your hand at being our prize winner, too, by entering this month's contest.

Remember, if at first you don't succeed, get a gun. Er . . . forget that . . . just send in your entry now before sanity returns. Besides, we've got to take the UODCWA down a notch or two.

Honorable Mentions

1. Lieutenant—that's the worst egress I've ever seen!
TSgt Dave Anderson, HQ ATC/SG, Randolph AFB, Texas

2. I ain't cleanin' that up!
TSgt Dave Anderson, HQ ATC/SG, Randolph AFB, Texas

3. Hey, Cruise! You can't be airsick! You're not off the ground yet!
Jeri Rood, AFISC/SEPP, Norton AFB, California

4. Gees! They'll stick those "MAINEiacs" stickers *ANYWHERE!!*
MSgt Michael P. Gleason, Maine Air National Guard, 101 Mission Support Squadron/RS, Bangor ANG Base, Maine

5. He may not know which end is up, but at least his heart is in the right place!
Capt Gerry Sohan, 463 TAW/SEF, Dyess AFB, Texas

6. No, that's not what I meant when I said fly with your head, not the seat of your pants!
TSgt Ed Trevino, HQ ATC/SG, Randolph AFB, Texas

7. Party hardy, he said. Haw! . . . Now just look at him!!
Capt Ken Bowen, 347 ATG/DOVC, Little Rock AFB, Arkansas

8. Watch that last step!! (Cockpit thinking) This just isn't my day.
Lt Col Bill Bounds, HQ USAF/XOOSE, The Pentagon, Washington D.C.

9. Hey Bud, I don't think that's what the Chief meant when he said, "It's okay to fly this rhino upside down!!"
Dan DeFinis, OO-ALC/SES, Hill AFB, Utah

10. Okay, mmm . . . The red wire goes to the brake lights, the blue to the, oh look! A quarter.
SRA Israel J. Menchaca, 93 MMS/MAWML, Castle AFB, California

11. It sure looks a lot easier when the other guys get in their cockpits.
Honorable Byron Q. Lackluster · President and International Director of the United Organization of Dumb Caption Writers of America (UODCWA)

To the men and women of Operation Desert Shield:

Our Gratitude and Support WE SALUTE YOU!