flying

SAFETY

MARCH 1984

Fighter Pilot Survival Kit

Automatic Opening Lap Belts

How It Went In 1983

Human Factors Happenings

THERE I WAS

■ After completing their KC-135A checkride at Castle AFB, my student crew was scheduled for their solo flight before departing for their assigned units. Since it was a two-copilot crew and I was their instructor, it became my duty to fill the aircraft commander's seat on the solo flight. Everything went as planned up to the air refueling rendezvous. Then things started to happen.

Air refueling base altitude was FL 240. As we started a turn to our receiver's inbound track, the cabin pressure slowly started to rise to 18,000 feet. As soon as we noticed the increase, I said over the interphone, "Crew, we're losing cabin pressure; let's go on 100 percent oxygen."

By this time, I had rolled out in front of the receiver just as we got our quick-don masks on. We were below FL 250 with plenty of oxygen, so I planned on completing the air refueling unpressurized. The extra copilot was in the jump seat so I glanced at him to make sure he had his helmet and mask hooked up correctly. He was OK, but I noticed that the new navigator still didn't have his helmet on and was concentrating on the scope.

I said, "Nav, you had better get on 100 percent oxygen," and he replied, while pointing at his regulator, "I am on 100 percent oxygen." I proceeded to explain that it wasn't going to do any good if his helmet and mask weren't on properly. When I quizzed the boom operator the long delay before he responded told me he had made the same error. That is, checked 100 percent on his regulator but no helmet.

It occurred to me that pilots have numerous simulators to practice in for just such a situation, but what about navigator and boom students? Also, was my terminology perfectly clear? It was to me and my copilots, but the whole experience provided food for thought. ■

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SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

Fighter Pilot Survival Kit

COLONEL PAUL F. ROST
Directorate of Aerospace Safety

Survival in flight requires a balance between two seemingly contradictory values — the feelings of freedom that flight provides and the self-discipline necessary to handle that freedom.

■ People have always been fascinated with the beauty of flight. Certainly one of the joys for fighter pilots that earthbound people miss is the feeling of freedom and power we experience as we "slip the surely bonds of earth." To me, piloting a high performance fighter provides the ultimate challenge — to become one with your machine through total control of your physical and mental skills. No other profession or sport taxes both the mind and body as much — or requires such precise control of our hands and legs while under physical and mental stress.

Granted, there are a few pilots out there whose physical abilities are more suited to working with pipe wrenches and the like, but they are the exception. Given all the above, it has always fascinated me that survival in this game requires a balance between two seemingly contradictory values — the feelings of freedom that flight provides and the self-discipline necessary to handle that freedom.

While 1983 was a banner year for the Air Force in reducing flight mishaps, the gain has been primarily made on the logistics side of the house. The Ops cause factors have remained the same. In this article I'd like to share some things with you on things you can do to avoid becoming one of those Ops statistics. Sort of a personal survival kit for the fighter pilot. My belief is that the keys to survival lie in the following areas that should be of concern to all of us:

- Self-discipline and ego
- Risk taking
- Crosscheck
- Habit patterns
- Task saturation
- Night flying
- Stress
- Fatigue

All the supervision in the world will not prevent you from killing yourself in a single-seat fighter. It's up to you to take care of yourself.

Let's talk about each of these areas and see if you agree.

Self-Discipline and Ego

My basic premise is that these two make up the foundation of any good pilot and fighter pilot in particular. And to really understand how we are affected by them requires that we put ourselves through a form of self-analysis. That shouldn't be too hard to do since that is exactly what we should do in every debriefing. Why do we need self-discipline? Because all the supervision in the world will not prevent you from killing yourself in a single-seat fighter. All supervisors can do is reduce that risk by limiting your exposure. It is up to you to take care of yourself — i.e., know thyself — and develop the self-discipline to control yourself (egos). Just as a football team must wield controlled agression to win, we must do the same.

Let's talk about ego — something fighter pilots are famous for having in abundance. If you didn't think you were a heck of a pilot, you wouldn't be a fighter pilot. Some fighter pilots disguise it, others flaunt it — but we all have that inner level of consciousness that says "I'm the best." Not second, third or fourth, but first.

That is the only place we want to be. If you don't believe that, then you need to change jobs because the basic premise of our business is that the team that comes in second place dies and/or loses the war. I know of no other honorable profession that has such a stringent pass/fail criteria. Therefore, it is no wonder strong egos are involved — and certainly are desirable.

This strong ego, combined with the power and freedom of flight is both our biggest asset and liability. It is our strongest asset when we control it to give us drive, tenacity, and self-reliance. It gives us the self-confidence to succeed in battle even when outnumbered and outgunned. Uncontrolled by our self-discipline, it becomes our strongest liability and leads us to overreach our needs or abilities.

I submit that there are no "old head" undisciplined pilots. Granted, in the past some may have even willingly violated the regs, but if they have survived for any extended period of time, they have plenty of self-discipline in their flying.

We all take risks — life itself is a risk — and sooner or later, the grim reaper will get us. The game is in delaying the inevitable. The bottom line is that the smart pilot understands how his ego drives him and uses his self-discipline to control it and turn it to his advantage.

Risk Taking

As you fly, you often reach decision points that involve risk taking. If you will take just a split second to interrogate yourself — what is the risk? — is it worth it? — if it is, then press on — if not, don't. In some cases this may mean a balance between feeding your ego and complying with the rules. My experience has been that most people have a pretty good "feel" for what the odds really are. Usually when we get in trouble, it is because we didn't consider the risk at all.

Most of our risk analysis is done on the ground in emergency procedure study. Section III of the flight manual is really a listing of steps to take the lowest risk path for a given malfunction. I am a strong believer that you should never "react" automatically to warning lights. If you know your aircraft well, it only takes a split second to confirm in your mind the proper actions to take. To me, a fire warning light shortly after I'm committed to a takeoff is not the time to throttle back in a single-engine fighter — as long as the engine is still producing thrust. I want ejection altitude first, then I'll worry about the light.

One thing about risk taking that has always amazed me is how some pilots are so ready to put all their eggs in one basket. Always have a backup option. Don't box yourself in. Too often I read of pilots who hit the barrier at unnecessarily high speeds without much apparent concern for the consequences should the hook skip over the cable. Barriers are backups, not primary means of stopping.

Before landing, think beyond the barrier. At what speed will you bailout if you go off the runway, when will you shut down the engine, would you prefer to leave the runway straight through the overrun or is it safer going off the left or right side? All of these decisions involve risk assessment that you should be thinking through, first on the ground, and then for each emergency as you face it.

Crosscheck

A fundamental of flying that I see violated more and more is that, for precise flying, when the hands move on the controls, you should be looking out the front of the aircraft or at the ADI. This means that

continued

Do you preflight yourself as well as you preflight the aircraft? Are you really ready to fly or are you betting the odds that nothing will go wrong? You must always be ready to handle the worst case situation, not just the routine.

low altitude turns are done by looking straight ahead over the nose where you have both pitch and bank references — not over your shoulder. I don't want to get hammered by a MIG anymore than anyone else; but if I make turns looking behind me, it won't be Ivan that gets me. The crosscheck should be — clear six and the area of the turn — fly through the turn, crosschecking over the nose — and return to clearing.

In air-to-air, I know we always preach, "lose sight, lose fight." But, the truth is we also need to keep track of our flight parameters. The adage is great when you've got a long range tally and know you have a lot of smash. However, when you've cleverly got the bandit trapped at six and you want to reverse, you'd better know your energy state — and that means crosscheck. If you can't afford a check of your airspeed and altitude, and still come back out and find the bogey; you either have the world's slowest crosscheck or need glasses. (Your eyes only have to see the gauges for a split second to read them — interpreting what they mean should be done with your eyes outside, not staring at the gauges.)

All I'm saying is that even our "magic" airplanes today still demand that flying the aircraft is a vital part of fighting with the aircraft.

Every time you're tempted to exclude the airspeed/altimeter, etc., from the crosscheck because they're not necessary — bells and whistles should go off in your mind warning you not to do it. Mishaps have occurred where the pilot failed to crosscheck his altimeter for an extended period of time — 45 to 60 seconds. Why did the pilot forget to crosscheck this instrument? I don't think he did. I think the answer is, he deliberately excluded that instrument from his crosscheck because he felt confident that he knew where he was.

During my first tour in SEA, we lost two pilots during night formation rejoins. Both were wingmen trying to rejoin immediately after takeoff in clear VMC. Both had aggressive cutoff angles established and only had to maintain that position as they closed with lead. Instead, both descended into the ground. Why?

I think it was because they were rejoining using only visual references, and forgot that at night they had no perception of how close (or rather how far) they were from lead. The altimeter was the only way to know they were heading back into the ground, but they had deliberately excluded it from their instrument crosscheck since they were flying a VMC rejoin. The lesson learned is to beware of dropping items from your basic crosscheck because you *know* where you are.

Flying on autopilot provides the same trap. The only thing an autopilot does is to let you physically remove your hand from the stick. The crosscheck must continue or someday, somewhere, you'll pay the hard way.

FIGHTER PILOT SURVIVAL KIT

continued

Habit Patterns

Do you have specialized or generic habit patterns? To the maximum extent possible, basic habit patterns you develop should be transferrable from weapon system to weapon system. The basic instrument crosscheck should include the same instruments — perhaps in different locations — as you transition to other aircraft.

The most important thing about task saturation is to preempt it. That's why flight planning is so important. It's much easier to keep up rather than catch up, so have a plan.

In particular, when you transition to a new aircraft, review your habit patterns and see where the old ones may conflict with the new. Ejection seat handle location is one of the most critical. Like it or not, the habit patterns you learned best (usually your first operational aircraft) will come out at the most unexpected times. They could mean trouble.

A simple example I personally experienced was in the back seat of a T-38. I was not current in the aircraft and the IP offered me a chance to do a back seat pattern. As I started the final turn, I was amazed to see a horrendous nose slice — until I realized I had put in full rudder, just as I had used two years prior in the F-100. Without realizing it, my mind had equated the T-38 performance with my F-100 experience of years ago and I reverted to the old habit pattern.

It should be obvious that where we put the gear down should be a "standard" location throughout our flying careers.

What do you do when you get that uneasy feeling that you've broken your habit pattern? My solution is to go back at least two steps prior to what I think I've previously finished and start over from there. Often, I've found the interrupted step, which I thought I had completed, was what I had missed. By going back two steps, I make sure I've gotten everything.

Task Saturation

This is a very common factor in Ops mishaps and all of us seem to become task saturated at some time. How can we control it?

Hopefully, we all know that *complete* mission planning is mandatory in a single-seat fighter. If you step to the aircraft without knowing exactly what you are going to do, then you are asking for trouble. What appears like good inflight mission planning by "old heads" is actually application of options already preplanned on the ground.

There is another aid we have inflight to help prevent task saturation. Timing patterns. One of the things that should have been drilled into us in pilot training is that a disciplined crosscheck — visual or instrument — allows us to be consistent in making corrections. This means that if you use the same parameters for making control corrections, you eventually develop a sense of timing of when it is time to crosscheck that parameter again, i.e., altitude corrections should take 30 seconds, regardless of the size of the correction.

Avoiding task saturation requires that you be a jack of all trades, master of none. What I mean is you must be able to detect errors in altitude, airspeed, and heading while trying to concentrate on tactical events — and make corrections without devoting 100 percent attention to any single item (channelized attention).

The most important thing about task saturation is to preempt it. That's why flight planning is so important. It's much easier to keep up rather than catch up, so have a plan. When you detect task saturation coming on (falling behind in your crosscheck or unsure of what is coming next) it's time to call for a "Knock It Off." At low altitude, climb to cope. Get on a basic crosscheck — visual or instrument and catch your breath. Check your fuel.

If you're handling an emergency, go for survival issues first. Once they're handled, you can talk to the rest of the world. If the emergency occurred in the training area, chances are you won't become task saturated until the approach phase. Tell them you want a single fre-

continued

Task saturation — everybody's been there but the real fighter pilots prepare for it. A pilot must be able to recognize errors in altitude, airspeed, and heading while focusing on tactical events. Then he must be able to correct those errors without devoting full attention to any one of them.

As a supervisor, make sure the unspoken message you are sending to the troops is the one you really intend. Your actions, not your words about safety, are what count.

quency approach.

If possible, prior to sticking your head in the clouds, burn down the fuel if that is necessary. Remember, "land as soon as possible" really means "as soon as prudently possible," not 500 kts until on short final. A 360-degree turn to give you time to get your act together may be just what you need to keep ahead of the game.

Night Flying

It seems a higher number of accidents occur at night than is proportional to our night flying hours. When I hear people talking about turning down their interior lights to save their night vision, I get the impression they are flying at night using outside references. There are only two references I use at night.

One is my leader if I'm in route formation or closer; at all other times I use the gauges. Interior lighting should be high enough that you can immediately and accurately read the instruments. With better lighting, you won't need your head in the cockpit as much (allowing you to clear better in VMC) and your night vision will not be impaired. Put the lights on the bright side rather than the dim side. If they're dim, and you get vertigo, you'll add that much more to your problems as you are forced to stare at the instruments to read them. You'll be task saturated for sure then; inadequate lighting will only make it worse.

Is there a tactical need for "night vision" in our current single-seat aircraft? I don't think so. No matter how bright my interior lights, I've never had trouble finding a bogey within 10 miles. In the F-16 with its strobe light, 20NM tallyhos are common during intercepts. If it's a real bandit, I doubt he'll have any nav lights on and all the night vision in the world won't find him. In the air-to-mud business, even if you're not working under flares, your night vision will last only until the first MK-82 goes off. You'll want your lights up pretty high after that.

Stress

Do you recognize when you're in a stressful situation? What is your personal reaction to it. I've found mine is to start humming to myself. When I see this reaction, I stop and analyze what is causing it. Sometimes we enter a high stress situation without recognizing it — and that can be dangerous. If we recognize it, we can take action to handle it better.

Stress means adrenalin, and that speeds everything up. Yet, the guys with the "right stuff" that we admire so much sound very cool and deliberate under stress. How? I think this is a learned response. With adrenalin pumping through you, you tend to do everything faster. But, there are physical limits as to how fast your hands can move and do it accurately. Moving too fast leads to mistakes — and more stress.

Instead, try to be very deliberate. When you reach for a switch, do it slowly enough to get it right the first time. Chances are it will only seem slow; you'll actually be moving faster than normal. The success in doing it right the first time will give you more confidence and help reduce the stress. However, you can't do these things until you recognize you're under stress — so learn your personal stress symptoms.

Fatigue

I believe fatigue is the most significant second level cause of Ops factor mishaps. We'd all like to be nice and fresh for each flight, but it's a fact of life that it just isn't so. How you handle fatigue in yourself, and in the people who work for you, will determine your success in the fighter business.

First, your own fatigue. Part of being a fighter pilot is knowing you can hack it. None of us want to back down. This is where our self-discipline should come in. Before flying, you preflight both the aircraft and yourself. Are you really ready or are you betting on the odds that nothing will go wrong? My

How you deal with fatigue in yourself, and in the people who work for you, will determine your success in the fighter business.

Under stress in the cockpit? Slow down! There is a limit to how fast you can move and still be accurate. Doing it fast and wrong just means you have to take the time to do it again.

experience is that fighter pilots take themselves off the schedule only when they have genuine concern about being able to handle the routine. Our real concern should be whether we feel capable of handling the worst case situation. You owe it to your fellow pilots to take yourself out when you can't give 100 percent.

In every squadron I've ever been in, supervisors would tell us not to fly if we weren't ready, and that no retribution would be taken. This was true. However, when you saw the same supervisor flying when you knew he shouldn't be, you quickly got the unspoken message that those who couldn't hack it were "weak."

As a supervisor, make sure the unspoken message you are sending is the one you really intend. Also, remember that many highly motivated fighter pilots will press themselves farther than you want. A "pre-emptive strike," removing someone from the schedule who is obviously tired, (even yourself) can show the troops that you really do not want them flying when overly fatigued. Give additional consideration to crew rest for night flying. Normal crew rest times may not adequately compensate for the change in the work/sleep patterns.

We've discussed some attributes and concerns which influence our long term survival in the fighter business. While you may not agree with everything I've said, I hope you'll take the time to clearly define in your own mind how these factors should be handled. Because how you do handle them will determine both your success and longevity as a professional fighter pilot. The choice is yours — fly safe. ■

That's NOT the way it's supposed to happen

Even though this article does not specifically address flying safety, it does point out a few of the hazards which can face any crew at a strange field, where the support isn't quite up to par, or where transient maintenance might not be familiar with the aircraft. When we go to a strange field we always review the approaches, SIDs, field, etc., but we frequently give lip service to the nuts and bolts support we'll need to blast off.

1LT MARK DORIO
391st Tactical Fighter Wing
Mt Home AFB, ID

■ Ground clears you to taxi, Clearance Delivery reads you your clearance, and Tower clears you for take off . . . all the time, right? At least those things are supposed to be givens in the modern Air Force, right?

And in between, a sharp crew chief sends you off with a snappy salute, the end-of-runway crew does its thing, and the lucky dude in mobile gives you the once over through his binoculars before you take the active. I mean, afterall, that is the way it's supposed to happen.

Well, Bucko, it doesn't always happen that way, as a recent "no-notice flexibility check" demonstrated to my pilot and me. And when it doesn't happen that way, you'd better grit your teeth and think everything through twice, because if you don't, order will fly out the window — followed a moment later by safety.

We were at Lake Charles, Louisiana, doing a four-day hardship tour for a national static show. The local folks were nice enough to put us up downtown at a hotel approximately 15 minutes ride from the site of the static, Lockheed-Chenault field.

Never heard of Lockheed-Chenault? Neither had we. And it's not in the IFR or VFR supplements. As it turns out, Lockheed-Chenault is an old SAC base which was closed about 20 years ago, according to the locals. It was opened (along with its previously defunct tower) strictly for the two-day static display and the Monday blast off following the show.

Beyond the basics, there was nothing. No TACAN, no ILS, no military or civilian services. Nothing. In fact, the only tenants on the base were some small civilian businesses and a minimum security prison which occupied the old SAC alert facility.

Well, if you've been around the F-111 long enough you know there are two things it does exceedingly well. The first is to fly low level, all weather interdiction missions at high speed. The second is to break down at strange fields.

Our bird, ol' 7088, performed the latter very well indeed. On Monday morning, when everyone else (including the Thunderbirds) was blasting off for points from one end of the states to the other, and the local sponsors began literally folding up their tents and hauling away the portable johns, 7088 went

into her act. First, she started leaking fuel from both wings. Then she gave us a CADS light and an inoperable AOA probe.

Still a chance we could go, though. I mean, after all, 7088 (Arnold II?) was still practically TDY Code 1. But then, as if to punctuate her desire to stay on the ground, 7088 sheared a CSD shaft and dropped a couple of quarts of oil on the ramp.

Time to shut down and call the Mt Home Command Post. Easier said than done.

If you look at an ONC chart of the Lake Charles area you can find Lockheed-Chenault. It's right next to the word *abandoned*. And they're not kidding. It is.

The only telephone at the field was of the mobile variety and sat in the front seat of a gray pickup truck. Luckily, its owner was an understanding chap and he let us borrow it to fill in the Command Post.

Meanwhile, the mass exodus continued so that by noon, the pilot, myself, Arnold II and the local CB club were the sole occupants of the field.

No problem we think. We'll just go back to the hotel, check in, and leave Arnold out on the ramp — by herself, in the dark — with no security.

Just when we started having visions of sleeping on the ramp underneath Arnie's fuel-soaked wings, one of Louisiana's finest came to our rescue. No problem, the sheriff told us. "The boys over at the prison would be glad to watch her for y'all."

So that's where Arnie II sat for three days, until Blue AMU's troops could knock the last ounce of reluctance out of her. And on that fine day, we participated in probably the most singularly unceremonious launch of a $19 million jet fighter in history.

First — and you have to strain your imagination to picture this — *everyone* was gone. Yes, *everyone.*

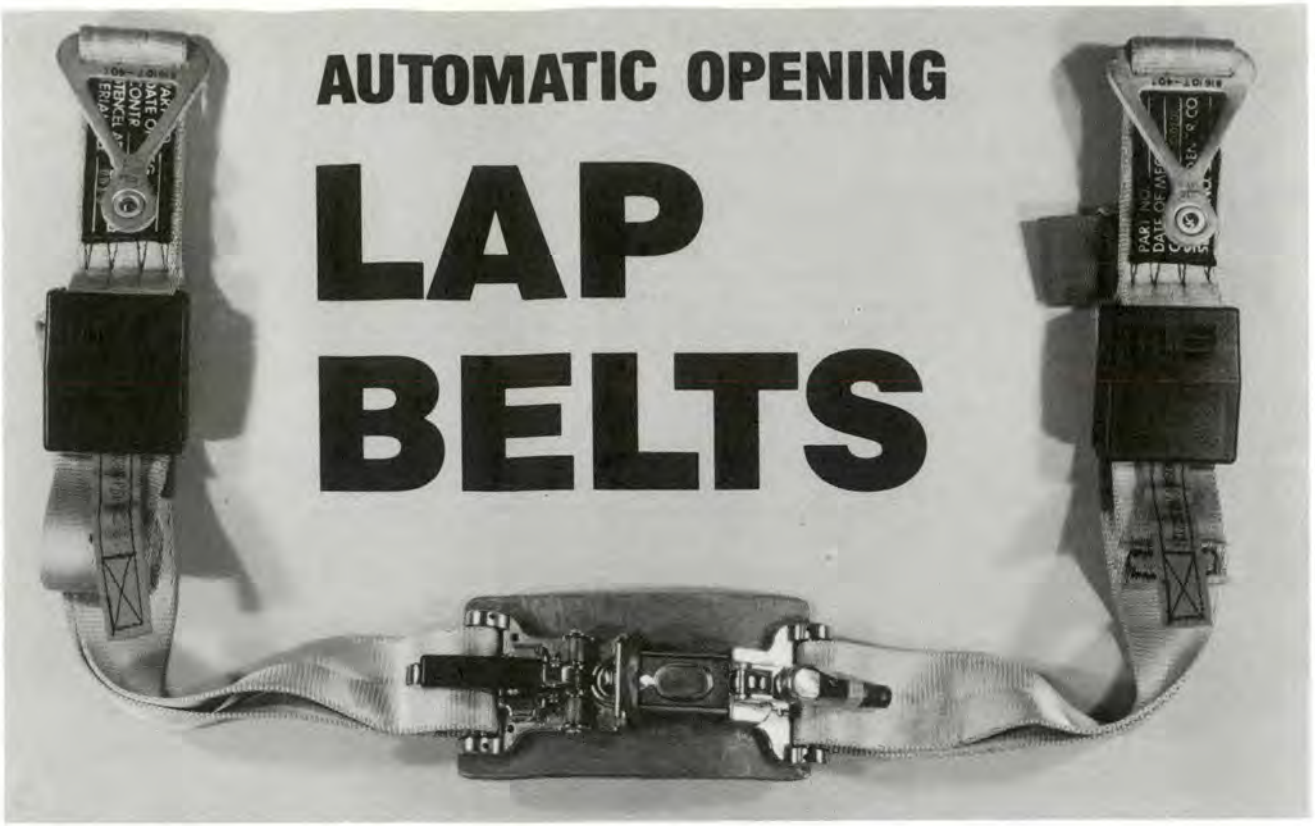
Second,the local driving school had set up orange cones all over our runway, and they were using it for a road rally. No problem. We'll just chase them and the herd of cows gathering at the edge of the asphalt to another playground.

So now, we're ready for launch. And with the sheriffs waving so long from the porch, and the prisoners waving goodbye from their windows, we taxied to the runway, with our crew chiefs escorting us in their rent-a-car.

Remember, no Tower, no TACAN, no Ground. Nothing.

After the crew chiefs drove up and down the runway to check for kids, cows, and FOD, and with my pilot watching the cows, and me eye-balling a Cessna 150 doing touch-and-gos less than 300 yards away, we launched. Shortly thereafter, we air-filed with the local flight service station and had an uneventful trip home.

A strange but slap-stick adventure. And one for which I will always remember 7088 and our "no-notice flexibility check" with fondness. ■



AUTOMATIC OPENING LAP BELTS

RUDOLPH C. DELGADO
Directorate of Aerospace Safety

■ By now most of you who fly F-5, QF-100, F-106, OA-37, T-33, T-37, and T-38 aircraft have seen, or have heard of, a new lap belt called the HBU-12/A. Because of some apparent problems that have been reported concerning this new belt, several of you have asked us why it was developed. Why not stay with one of its predecessors like the MA-5/MA-6 or the HBU-2B/HBU-4B? To answer that question we'll have to give you a bit of history.

The first ejection seats were not equipped with automatic opening lap belts. It soon became apparent that such a capability was needed, particularly for low level ejections. We went through a series of automatic lap belts such as the E-1, MA-1, MA-2, MA-3, and MA-4, from the early '50s to 1955. Still looking for improvements, the MA-5 and MA-6 lap belts were developed and introduced into service in 1955. (These two belts are identical except that the webbing is 51 inches long in the MA-5 and 45 inches in the MA-6.) This belt was widely used since most of the older aircraft ejection seats were made to accommodate this type of belt.

Soon after the introduction, MA-5/MA-6 problems started being reported, the main ones being: (1) inadvertent opening during ejection with subsequent loss of the automatic parachute arming capability, (2) aircrew failure to connect the automatic parachute arming lanyard (gold key) ending with the same results as cited above, and (3) failure of the automatic opening feature. Several attempts were made to correct the MA-5/MA-6 belt's problems, but no overall satisfactory solution could be found. During its era, this belt was blamed for 36 failures during ejection with 13 of these resulting in fatalities.

In 1971, the HBU-2B and HBU-4B belt was introduced. (These are identical except that the HBU-2B requires a gold key to latch it and the HBU-4B does not, so it can be used with force-deployed parachutes which do not use a gold key). This belt also developed problems soon after its introduction. The worst of these was that it could be friction overloaded to the point where it would not open manually until tension on it was relieved. It could also open inadvertently during ejection and release the gold key. ATC considered the HBU-2B/HBU-4B belt's problems serious enough that they chose to stick with the MA-5/MA-6 in their T-37 and T-38 aircraft. During its time the HBU-2B/HBU-4B

MA-5/MA-6 And HBU-2B/HBU-4B Experience In USAF
As of 31 Dec 83

				Lap Belt Problems During Ejection		Lap Belt Problems Resulting in Fatalities	
Belt	Ejections	Survived	Fatal	No.	Rate	No.	Rate
MA-5/MA-6	1954	1653	301	36	.0184	13	.0067
HBU-2B/ HBU-4B	271	207	64	7	.0258	2	.0074

The new lap belt, designed to solve the problems of inadvertent opening and failure to open during ejection, is still experiencing a few glitches. While these problems are still being worked out, it's up to the wearer to minimize any possible risk by meticulously adhering to the recommendations for use.

belt had seven ejection failures, two of which were fatal. The total ejection experience, as of 31 December 1983, with the MA-5/MA-6 and HBU-2B/4B lap belts is shown below. The HBU-12/A belt has not been involved in an ejection through 1983.

The HBU-12/A belt was designed and operationally tested to ensure that the inadvertent opening and the failure to open during ejection problems were eliminated. However, recent material deficiency reports have described incidents of inadvertent opening, failure to open manually, parts coming out of the belt and emergency ground egress hang-ups. San Antonio ALC has been working these problems and will soon be putting out official word to the field.

The problem of inadvertent opening presently appears to be easily corrected by aircrew training, removal of the webbing retainers, and repositioning of components on the survival vest. First, ensure you correctly understand the locking and unlocking of the belt. The surest way to ensure the belt is locked is to press down on the handle after the belt is connected; then pull up on the handle *without* depressing the black top of the handle. The belt should not open if it is locked.

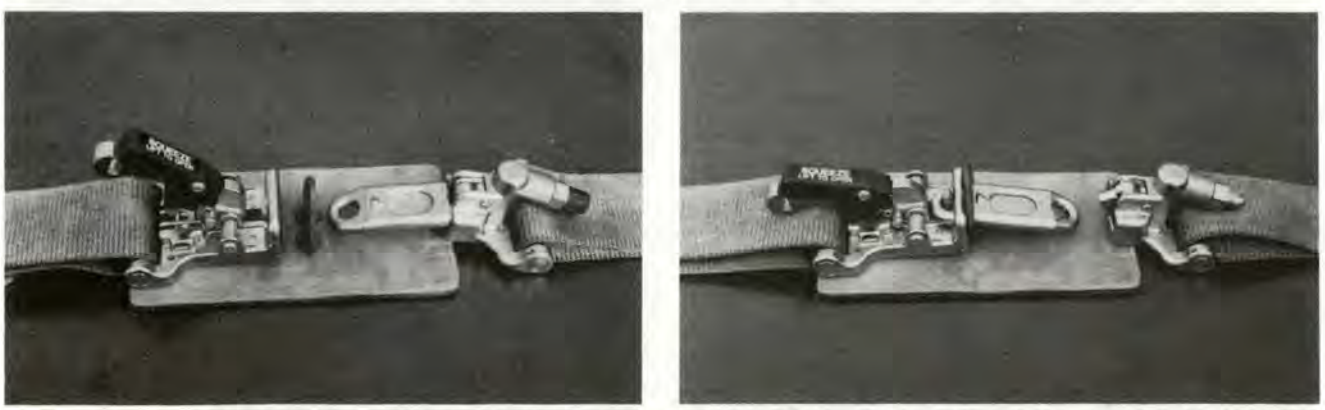
Secondly, don't store the excess webbing under the handle. Put it under your thighs as the latest guidance states. Thirdly, to ensure the black upper portion of the handle is not inadvertently depressed, relocate the bulky heavy pockets of the survival vest to another non-interference area. The survival kit T.O. allows for repositioning of vest pockets.

The failure to manually open problem has occurred once in a T-33 aircraft. Investigation by San Antonio ALC has revealed that the black portion of the handle was subjected to a very high force which slightly crimped the handle and prevented the black portion from depressing and allowing the belt to open. Most likely the handle was cramped by some movement of the seat in the cockpit as the belt had operated satisfactorily on previous sorties. Interim solution: check the action of the belt handle prior to strap-in. The shiny bottom part of the handle and the black upper part should squeeze together easily. If they don't, don't strap in.

The problem of parts falling out of the belt are related to the lock pin springs coming out of their holder. This has been identified as a manufacturing problem and San Antonio ALC will be issuing an operational supplement in the near future to correct this problem at field level. This problem should not affect proper belt action.

The last problem of emergency ground egress hang-up with the anti-G garment can be precluded with a properly fitted anti-G suit. San Antonio ALC is also looking at extending the leather protector on the back of the buckle to eliminate any hang-up potential.

The bottom line is that the HBU-12/A belt was developed as a replacement for two types of older lap belts that have caused ejection fatalities. It is a new piece of equipment that will take some time to get used to. You will have to be extra conscious about proper use of this belt including temporary precaution checks until all the bugs have been worked out of it. ■



The HBU-12/A automatic belt buckle hardware and gold key is shown separated as before hookup (left) and after automatic disconnection (right). The surest way to be certain the belt is locked is to press down on the handle after the belt is connected, then pull up on the handle *without depressing the black top of the handle.*

HOW IT WENT IN 1983

MAJOR JOHN E. RICHARDSON
Editor

■ For the second year in a row the Air Force achieved a record success in aircraft mishap prevention. The 1983 aircraft Class A mishap rate was the lowest ever. This record is an accomplishment of which everyone in operations can be justifiably proud.

But even with this fine record, there were aircraft mishaps in 1983. Fifty-nine Class A mishaps destroyed 58 aircraft. We still have work to do.

Let's look at those 59 mishaps and try to identify some areas on which we can concentrate in 1984. The following is a breakdown of 1983 mishaps divided by type of mishap. This classification does not imply cause but rather is a result of statistical analyses done by the AFISC Reports and Analysis Division.

1983 Aircraft Mishaps By Type Mishap

	Control Loss	Collision With The Ground Non-Range	Collision With The Ground Range
Fighter/Attack/ Trainer	11	8	3
Tanker/Transport/ Bomber	1	1	—
	Midair	**Landing Pilot**	**Flameout (Pilot)**
Fighter/Attack/ Trainer	6	1	1
Tanker/Transport/ Bomber	—	2	—
	Flight Controls	**Landing Gear**	**Fuel System**
Fighter/Attack/ Trainer	3	1	2
Tanker/Transport/ Bomber	—	—	—
	Engine	**Electrical**	**Undetermined/Other**
Fighter/Attack/ Trainer	10	1	8
Tanker/Transport/ Bomber	—	—	—

But such a count is only a start toward our goal. We need to go farther in analyzing each of the types. Looking at our chart, we see that a few of the categories account for a major part of the mishaps. It would seem logical that this is where we should look for clues to better prevention efforts.

Control Loss

We lost more aircraft due to pilots' loss of control than any other type of mishap.

- Four pilots lost it during BFM or ACM. The usual problem is the press to win. We try to get that extra ounce of G and degree of turn to get the shot. That's when the inexorable laws of physics get us. Departing the aircraft is at best an embarrassing and, all too often, a permanent way to lose the fight.

ACT accounted for the most loss of control mishaps but it was closely followed by the other categories.

- Two aircrews crashed while maneuvering in formation to enter low level routes.
- Two more aircrews crashed when they stalled in the traffic pattern.
- Three loss of control mishaps do not fit any of the above types but all exceeded the limits of the aircraft and the capabilities of the crew when attempting a maneuver that just would not work.
- In one other case, the pilot attempted an unauthorized maneuver at low altitude and paid the price.

Collision With The Ground (Non Range)

Collision with the ground or, as it is known in civilian mishaps "controlled flight into terrain," is a well known type of mishap. Here a crew, for any number of reasons, hits the ground in a perfectly good airplane. In 1983, eight mishaps were in this category.

- The most common situation was during low level navigation. Four of the five mishaps involved flight in IMC or at night.
- Two collisions with the ground off range (as well as one on range) may have involved loss of consciousness.

Collision With The Ground (Range)

In addition to the one mishap mentioned above, two other aircrew committed the fatal mistake of turning without first clearing their flight path. The aircraft then flew into the ground. This also happened to one fighter off range.

Midairs

Six times in 1983 aircraft were involved in midair collisions. Four of these midairs involved aircraft in ACM or on an intercept. The other two were between members of the same flight.

Landings

Three times pilots slipped up during landing, and the result was a mishap. In one case, the pilot got into a high sink rate and crashed. In the other two, one crew landed short while the other forgot to put the gear down.

Flameout

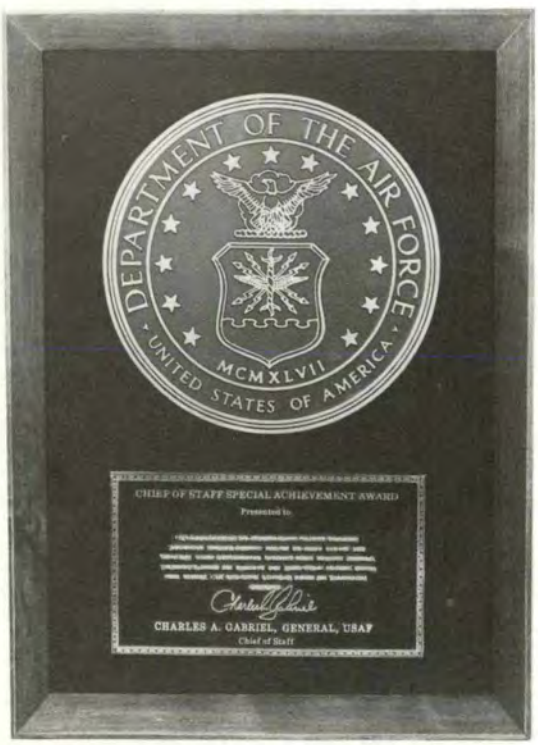
One pilot mismanaged his fuel, flamed out on final approach, and was forced to eject.

That covers those mishaps over which the aircrew had some control — more than half the total. But there were 25 others, 18 of which involved some material or logistics problem. This is a big improvement over the 41 logistics related mishaps for 1982. People have been working the logistics problem very hard, and it has paid off.

Ops related mishaps are still plaguing us. Every one of the mishaps in 1983 is a familiar one. The same old problems keep showing up. We were very successful in our 1983 mishap prevention but if we are to equal that success again, to say nothing of beating it, we must get a handle on the Ops mishap problem.

The chart and this review shows where we need the emphasis. Loss of control, midairs, and collision with the ground are our priorities for 1984. We also need to be alert for things like gear-up landings and fuel mismanagement. The Ops problem is up to us to solve. We've done a lot but we can do even better this year. ■

SAFETY AWARDS



THE CHIEF OF STAFF
SPECIAL ACHIEVEMENT AWARD

MILITARY AIRLIFT COMMAND

During 1983, the Military Airlift Command had the lowest number of Class A aircraft mishaps and aircraft destroyed in its history. Only three Class A mishaps were experienced compared to nine in 1982, and only one aircraft was destroyed. Nearly three-fourths of a million hours were flown performing a variety of missions including tactical and special operations, rescue, aeromedical evacuation, Presidential support, weather reconnaissance, and global weather data collections with a controlled departure reliability rate of 95 percent. The command also participated in numerous exercises, including the Grenada rescue operation and exercises in Central America. These achievements attest to safe operational and maintenance effectiveness, strong leadership, and a high degree of professionalism among aircrews, support agencies, and all other members of the command.

AIR FORCE RESERVE

For the third consecutive year, the Air Force Reserve experienced only one Class A aircraft mishap during 1983, and did not experience a single Class B aircraft mishap compared to one in 1982. This sustained record of safe mission accomplishment was achieved while flying 132,400 hours in a variety of weapon systems. More than 45,000 hours were flown in fighter/attacker aircraft. The command performed a demanding and varied mission and participated in numerous exercises, special missions, and deployments. These achievements reflect strong leadership, professionalism of aircrews, and dedication to excellence by all members of the command.

AIR FORCE LOGISTICS COMMAND

Only 18 logistics-caused aircraft mishaps were experienced in 1983, the fewest number in Air Force history and nearly 60 percent fewer than the previous year. This significant reduction is one of the primary reasons that the Air Force achieved its record-low aircraft mishap rate in 1983. This achievement reflects favorably on all flying commands but most favorably on the Air Force Logistics Command as functional manager for logistics and attests to strong leadership, supervisory involvement, and the highest dedication by all members of the command.

AIR TRAINING COMMAND

The Air Training Command equaled the fewest number of ground mishap fatalities in its history during 1983, and the 17 fatalities experienced were nearly 50 percent lower than the previous year. This achievement was attained with a command population of nearly 100,000 personnel, most of whom were young airmen. Military and civilian injuries were also lower than the previous year, and government motor vehicle mishaps were nearly 30 percent lower than 1982. In addition, the command's unique motorcycle safety training program contributed to significant reductions in motorcycle mishap injuries and fatalities. These achievements attest to strong command and supervisory involvement at all levels of command.

IFC APPROACH

■ Rumor confirmed! For those who didn't see the January issue of *Flying Safety,* the USAF Instrument Flight Center is back in business. Although not completely staffed yet, the initial cadre has been able to spring free from the tasks of ordering furniture and arranging offices, to attack a few of the publications which have been in need of attention.

Our first priority was the AFP 60-19 series. Volume I, the Pilots Annual Instrument Refresher Course Instructor's Guide, has been completely reviewed and revised; we are currently working on the graphics for that pamphlet and are looking toward mid '84 to publish. Volume II, the Programmed Text is also nearly ready and should be published during that same mid '84 time frame. Now the news you've all been waiting for!

We promised it in '82; we were sure we'd make it in '83; but Volume III and IV, the all new and different Pilots Written Instrument Examination Question Bank and Answer Key is at the printer. It has been dated 15 Mar 84 and we've been promised that date should be good. You've all been patient on this one — we at the Center believe this new concept will prove worth the wait.

Once all volumes of AFP 60-19 are revised, the Flight Directives Division of the Instrument Flight Center plans to attack AFM 51-37. We foresee a complete revision and the possibility of some radical changes. Your inputs will be extremely valuable in this endeavor — so keep those cards and letters coming. If you've got a "red hot" idea and no time to write, a phone call will do!

In December of 1983 the Instrument Flight Center took delivery of an old friend — T-39 Number 61-0649. The aircraft was originally assigned to the Instrument Pilot Instructor School (IPIS) and then to the Research and Development Branch of the former Instrument Flight Center. Following the Instrument Flight Center's closure in 1978, the aircraft, which had been extensively modified for various instrument flying projects, went on loan to the FAA and then NASA before it once again was returned to the Air Force. By chance, while HQ USAF action was underway to reopen the Center, a disposition decision was being made concerning 649.

The cost to retrofit this unique aircraft to a standard CT-39 configuration exceeded its value, since CT-39s are being phased out of the active Air Force inventory. The reactivation of the Center provided the opportunity for retention of 649 as an operational test and evaluation tool, the role which it was originally to fill. In the future, the Center will be exploring cockpit displays for the Microwave Landing System and the Navstar Global Positioning System. This T-39 is also an ideal platform for evaluation of procedures and techniques unique to multiplace/multi-engine airplanes.

Our next article will begin a series of discussions concerning instrument flying procedures and techniques. For openers, we will bring you up to date on a change to Air Force procedures for flying course reversal maneuvers (procedure turns). If you have questions concerning the IFC and/or instrument flying, drop us a line at the USAF IFC, Randolph AFB TX 78150 or give us a call at AUTOVON 487-5071. ■

SECRETARY OF THE AIR FORCE
SAFETY AWARD

Major command that flies more than 2% of the total USAF flying time.

PACIFIC AIR FORCES

PACAF experienced only one Class A aircraft mishap, the lowest number of Class A mishaps and lowest mishap rate in the long and brilliant history of the command. Also, for the first time, the command did not experience a single aircraft mishap fatality. This remarkable achievement compiled while flying realistic combat training missions in a demanding flight environment indicates dedication to high standards of excellence. Accomplishments in other safety disciplines were also impressive. No ground on-duty mishap fatalities were experienced, and in weapons safety, there were no Class A or Class B explosives or air launched missile mishaps.

Major command with a small, or no, flying mission.

AIR FORCE SYSTEMS COMMAND

For only the second time in its history, AFSC did not experience a single Class A or Class B aircraft mishap. This record is particularly impressive when considering that flying operations were conducted in a test mission environment featuring one-of-a-kind aircraft, unique aircraft configurations, and missions designed to test the limits of a system's capability. In weapons safety, there were no Class A or Class B explosives or space mishaps, and the nuclear surety program had outstanding accomplishments. Reductions in civilian fatalities and injuries further enhance the command safety posture.

THE MAJOR GENERAL
BENJAMIN D. FOULOIS
MEMORIAL AWARD

TACTICAL AIR COMMAND

TAC achieved the fewest number of Class A aircraft mishaps and a Class A mishap rate of 3.7, the lowest in the past 9 years, and sustained a downward rate trend for the fifth consecutive year. For only the third time in the history of the command the rate has been below 4.0 mishaps for each 100,000 flying hours. Class B mishaps were also reduced to five compared to eight the previous year. This is an impressive achievement in view of numerous exercises, deployments, mission complexity, and continuous operational tasking in high performance aircraft. More than 709,000 hours, 400,000 sorties, and 497,000 landings were flown in a variety of 19 weapons systems, most of which were fighter/attack aircraft. The command's outstanding flight safety record testifies to strong command support and leadership and the highest degree of professionalism among pilots, aircrews, and all other members of the command.

THINKING ABOUT AIRCRAFT CONTROL

GENE HOLLINGSWORTH
Aeronautical Systems Division
Wright-Patterson AFB, OH

■ "Controlling an airplane with thought commands is a long way off and may never come about," according to Colonel Robert D. O'Donnell, a researcher at Wright-Patterson AFB, Ohio. "Wright-Patterson is not conducting any research into thought control of a system," he emphasized, in response to recent reports that the Air Force now is researching that area.

However, Colonel O'Donnell, who is chief of the Workload and Ergonomics Branch of Aerospace Medical Research Laboratory's Human Engineering Division, is conducting research on the human brain and the electrophysiological signals it emits.

The purpose of his research is to design work centers, or cockpits and crew stations for future aircraft. He does this by measuring the electrical output from the brain to determine how hard a person is working at a given task, when they're overloaded, when they're too fatigued to go on, and when they are at their best or peak performance.

And he's working way out front, ten or more years, on the leading edge of aerospace technology ensuring the fighters, bombers and spacecraft of the future — although ultra-sophisticated — are not too sophisticated for humans to operate.

The general areas of research dealing with the use of physiological signals to modify the performance of a system is called biocybernetics. Colonel O'Donnell distinguishes between two types of biocybernetic research: one is referred to as closed loop, and the other, open loop.

Closed loop is where the person's physiological signal such as an electrocardiogram (EKG) or electroencephalogram (EEG) is fed directly to a machine and affects what the machine does. This is what most people refer to as thought control, and no research of that type is being carried out at Wright-Patterson. Although Colonel O'Donnell is watching scientific literature in this area for possible future applications, he's skeptical about it.

Colonel O'Donnell explained his skepticism in using biocybernetics to control an aircraft by pointing out that a person can physically throw a switch or push a button almost as quickly as he can think about it. "You might save a few ten-thousandths of a second, but that's hardly worth the tremendous investment of money and personnel resources it would take to perfect such a system," he emphasized.

He doesn't completely discount other uses of closed loop biocybernetics, however, and noted that it has great possibilities in the medical community. It could be useful in helping paraplegics walk again and, for amputees, artificial limbs might

continued

Open loop biocybernetics may be the clue we need to determine how to match a person to a mission or aircraft. We may even be able to monitor a pilot in flight and tell what the pilot's capability really is at that moment.

THINKING ABOUT AIRCRAFT CONTROL continued

be made to function like real ones.

Open loop biocybernetics deals with using the person's physiological responses to determine the best way to design or configure a system such as a cockpit. This second area, open loop, is Colonel O'Donnell's area for research. He gave two examples of what can be done in this area.

The physiological signal can be used to determine a person's capabilities, how they respond, what they best respond to, and whether they process a certain kind of information differently than another kind. Once that determination is made, a system can be changed to fit the person.

For instance, some people may not process information as fast as others, so designers may provide a slower system, computer, or information flow to match the person's processing speed. Colonel O'Donnell said that if we can learn a person's abilities through biocybernetics research, then perhaps we can match people better to missions, jobs, systems and work centers. Even better, he said, we can design work stations with flexibility for change so as to accommodate individual workers.

Checking a pilot before a flight might be a good use for biocybernetics. Decisions can be made on whether the system should be configured differently for that day, the type mission he would do best, and even if he should fly at all that day.

"People have good days and bad days," Colonel O'Donnell noted. "And no two pilots fly exactly alike. One may be a better map reader than another, but the second person may be able to react a split second faster. By knowing this we can compensate by configuring the cockpit for the individual — put the switch in the best position for each pilot and maybe provide more detailed maps for some.

"That's off line," he explained. "It's human engineering done before the actual mission to help the operator work optimally with his machine."

Another example of open loop biocybernetics is monitoring the pilot in the plane. Simply by monitoring the person's state during a flight, we may be able to decide if he or she should fly another mission, whether the person is overloaded on that mission or fatigued to the point of needing rest before going out again.

No matter how well a system is designed, people do tire — we all have highs and lows — and to be able to schedule people for certain missions or tasks during their peak performance periods is important for at least two reasons: "One, we want to successfully complete the mission, and two, we want the safest possible environment for our people to ensure that they'll survive," Colonel O'Donnell said.

To achieve these open-loop biocybernetic goals, Colonel O'Donnell's group is using ultra-sophisticated, sensing and analysis equipment. In addition to miniaturized electrical brain wave detectors, research is being done with a sensor which permits measurement of the magnetic field which is generated by the brain's activity, and surrounds a person's head. This permits measurements to be taken without touching the person.

The instrument used to measure the electromagnetic field generated by electricity in a person's brain is called a SQUID. That's an acronym for Semiconducting Quantum Interference Device. In the form used at Wright-Patterson, it consists of two coils which are supercooled to four degrees Kelvin (colder than 400 degrees below zero Fahrenheit).

When an electric flow is introduced into a coil at that temperature, it flows almost forever due to lack of resistance. The magnetic field to which the coils are exposed generates the only resistance to its flow; therefore changes in the coil's electrical flow tell what magnetic field is around it.

"There's nothing bizarre about this," Colonel O'Donnell pointed out. "It's a straight physical relationship between the electricity in the brain and the magnetic field it generates. We simply measure that field with a detector in a supercooled environment. By using this method, we can get to signals that are generated by the smaller pieces of brain tissue, making this potentially more precise than the EEG."

He said that while the Air Force has high hopes that these techniques will be extremely useful in the areas of cockpit design and operator monitoring, they still are highly experimental. "The possible applications of open-loop biocybernetics are exciting enough. That makes it easy to be patient while we wait and see if closed-loop applications will be of value to the Air Force." ■

HUMAN FACTORS HAPPENINGS

COLONEL GRANT B. McNAUGHTON, MC
Directorate of Aerospace Safety

"It is well appreciated that nearly all of us have a breaking point. What may not be so well appreciated is that most of us also have a saturation point."

■ The really tricky part for jocks and supervisors alike is how to get the most out of the people and the machines without exceeding their limits! The operating limits for the birds are published. The manual for the birdmen is still missing several important chapters.

Our experience tells us that personal limits are elusive things. They are not the same for all of us, nor are they constant in every situation or from day to day.

How do we cope with our humanity in the dynamic, demanding world of air machines? Good question. Unfortunately, Blue leader and Blue 4 can't put the world on hold waiting for the −1 for old featherless biped to make it through distribution. The good news is that despite all we don't know, the jocks do a magnificent job of sorting it all out. More has been written about this subject than is understood.

Then the unexpected happens. One of the troops least likely to bend metal has the wheels come off. We are shocked — often frustrated to the point of anger trying to understand it.

It just shouldn't have happened. When we look closely at the sequence of the mishap we can generally determine that point, or brief segment of time, at which the breaking point was reached. This is extremely valuable information and adds to our knowledge and understanding. It represents another precious data point paid for at an intolerable price. If we look farther back in time we may find those decisions or events which brought our troop to the saturation point. When did the motivation to succeed despite terrible odds become the dominant force? When did characteristically excellent judgment begin to fade or lapse. When did ____? These are the most difficult to identify because they sometimes took place long before the gear was raised or long before the inevitable become obvious.

Study the two examples which follow. Remember that these were solid, capable troops with demonstrated records of achievement proven in sortie after sortie. They were first-class folks — the antithesis of the classic case study. Put yourself in their positions and find that moment when they wrote the check that either they or the aircraft could not cash.

What's the answer? There is no one answer. Currently our best defense is to develop a feel for our own limits. When you start to feel things are piling up too fast and your saturation point is rapidly approaching — it's time for an instantaneous personal audit. Check your personal bank balance and avoid writing the one you can't cash.

Everything considered, it's infinitely better to sneak up on your personal limits than go thundering past them. Think of it like jogging around the edge of the Grand Canyon. When you're getting near the edge — slow down your pace and take smaller steps.

Exercise Mission Pressure — The Saturation Point

It was the third mission of a multi-national exercise, and the American contingent wasn't feeling too well. The first day's mission was capped by a mass debrief which the good guys felt was biased in favor of the opposing forces. Unfamiliar with the standoff capability of our air-to-surface missiles, the "enemy" SAM sites failed to honor the fact that they had been neutralized. Hence they continued to video-tape kill after the kill of the good guy strike forces. The "enemy" air defenders, including F-15s and F-16s, would aggressively press their attacks, often pursuing beyond the bounds of the Rules of Engagement (ROE), video-taping kill after kill of the less maneuverable F-4s.

All except the good guys seemed to be violating the host nation's airspace rules, not only by flying low, but by commonly flying at speeds which exceeded the carriage limits of their ordnance. Though there was some genuine misunderstanding of the ROE, the guys in the white hats were making an honest attempt to stick to the ROE as they understood them, and seemed to be getting penalized for doing so.

As the debriefing continued, the good guys, their temperatures approaching the boiling point, patiently awaited their moment on the stage for rebuttal and to present their view of the day's activities. But their moment never came. At the conclusion of the defenders' stories, the debriefing abruptly adjourned for supper.

The second day was more of the same, and to make matters worse, the white hats were taking a substantial ration at the bar. An "enemy" pilot asked, "Do you guys really fly like you intend to fight?" and, "Is this what you are really going to do when the shooting starts?" Our guys were getting the beak. Something had to be done. This was no longer an exercise, it was war! This was no longer a matter of individual egos or unit pride. What was at stake was no less than national honor!

continued


RESCUE

HUMAN FACTORS HAPPENINGS

continued

Among those in the good guy contingent was an experienced and mature flight commander who was the epitome of the professional officer: his flight boots were always spit-shined and his flight suit pressed; he was a big brother figure who took good care of his troops, a leader who set a good example for his men and was liked and respected by them. This flight commander was highly regarded for his overall professionalism, flight discipline and safety consciousness. In fact, he had once served as chief of flying safety during a previous assignment. He was not one to willfully violate flying regs or rules of engagement. He was also a normally aggressive and competitive American male who thoroughly enjoyed winning, but not the type who would take it too hard if he lost.

In contrast to many of his teammates, this flight commander was having a rather good time, so far. True, he'd attended the first day's debrief, but didn't appear too upset by it. Then, on the second day's mission, he'd had a marvelous time. Shortly after take off, two "enemy" F-15s had materialized in front of his flight and he and his wingman had "shot" them both down. Then they had successfully attacked their targets, and during RTB, had successfully evaded two attacks by "enemy" fighters: a crossturn vs two F16s and a 30° check turn into two F-15s.

Having flown his sortie in the afternoon, this flight commander missed the second debrief. But he had hardly unstrapped when he was bombarded by his troops who had attended imploring that something be done. Now this was a man who was undoubtedly enjoying a well deserved "high" from a highly satisfying mission. This was also a man who did not want to let down his troops. They felt wronged. He was their leader, and they implored him to do something. At first, he tried to calm them down — after all, it was only an exercise — nothing to really get excited about.

But after supper, more pressure from his own troops plus more pressure from the "enemy" at the bar, something happened. Perhaps it was a sense of obligation to his group or perhaps it was genuine indignation at the perceived unfairness, coupled with a competitor's desire to win, regardless. Whatever it was, this flight commander took off the next morning with a mindset: no way were he or his troops going to look like wimps; no way were they going to be humiliated at the mass debrief by showing up on someone else's gun-camera film.

In contrast to the clear weather conditions of the first two days, the third day was an accident looking for a place to happen: frontal weather, marginal visibility, depressed horizon, crowded airspace. Less than four minutes after take off while still low and heavy, and with deteriorating visibility, the flight commander's flight was tapped by "enemy" F-16s. The flight commander's subsequent evasive maneuvers not only violated the ROE, but nearly resulted in a midair collision with a fifth aircraft (another "enemy") blowing through the fight. It also severely depleted his energy, and left him passing his wingman, nose to nose, closely trailed by the two "enemy" F-16s. Whether he was attempting to attack the intruder or the F-16s, or was just trying to stay out of everyone's way will never be known. What is

known is that, with all the distractions, he neglected his energy state, departed controlled flight and hit the ground before initiating ejection.

It is well appreciated that nearly all of us have a breaking point. What may not be so well appreciated is that most of us also have a saturation point. Regardless of the amount of professionalism and self discipline, there is a point where we just get fed up.

What this flight commander did amounted to more than just a violation of flight discpline and ROE. Conducting dissimilar air combat tactics (DACT) against F-16s at low level, while heavyweight and at an aft center-of-gravity, and in marginal visibility, was also a violation of good judgment and common sense. F-4s just don't turn with F-16s, and this flight commander certainly knew that.

Throughout his flying career, the pilot will be faced with many temptations to violate good discipline, sound judgment, and common sense. He should realize early on that among the most effective of those temptations are assaults upon his personal honor in the form of exercise mission pressure.

The Saturated Supervisor

We often tend to think of task saturation attacking the overcommitted pilot, tending to forget that it can likewise affect the overcommitted supervisor. In this instance, the supervisor was responsible for evaluating a pilot who was upgrading. As such, the supervisor's task included evaluation of the upgrading pilot's ability to plan, brief, and lead a four-ship formation on a comprehensive mission. Since the upgrading pilot was not yet certified as a flight lead, this supervisor held ovérall responsibility for the safe conduct of the entire mission.

It so happened on this particular day that the supervisor was wearing several additional hats: those of Squadron Commander, Ops Officer, Instructor Pilot, and Flight Lead, as well as overall Flight Supervisor and Evaluator. Occupied with the additional responsibilities of those jobs including a last-minute phone call, he arrived slightly late for the briefing. He also had not obtained a pre-brief of the flight and had not filled out his own data card. Nor did he cross-check the evaluee's map, data card, or computations, a practice he normally performed prior to stepping. Had he done so, the mishap might have been averted. However, he also felt responsible for ensuring the other flight members were adequately briefed on certain additional events they planned to accomplish, and he simply ran out of time. The supervisor was stretched to the limit.

The upgrading evaluee (mishap pilot) arrived that morning with several things going against him. First, there were no maps (1:500,000 TPC's) covering the flight route in either his squadron or the squadron next door. He finally retrieved an old map and an old data card from a flight some months earlier but forgot that coordinates of several turn points had been miscopied onto the data card by as much as 24 NM. When the errors had been discovered during that previous flight, all members of that flight had been told to destroy their erroneous cards. For some reason the upgrading pilot had kept his, and now, having no other maps

continued

HUMAN FACTORS HAPPENINGS

continued

available and running late, he copied the inaccurate coordinates onto a line-up card for each member, including the supervisor.

Second, the upgrading pilot should have been tired. Two nights before the mishap, he had missed the last train back to base and had stayed up all night, consuming unknown quantities of alcohol. He had then flown a 1.5-hour mission, taken a 5-hour nap, had some supper, then slept about 8 hours more. Despite the 13 hours total rest, his actions on the morning of the mishap indicate he may not quite have been at 100 percent.

Third, his father called long distance pulling him away from the briefing for about 5 minutes. His father had always taken considerable interest in his career, more since the upgrading pilot's recent divorce. During this phone call, the pilot told his dad he was briefing to fly his upgrade mission. Naturally, he'd want to do well so he could write home that night that he'd passed. The combination of the supervisor's additional responsibilities and the phone call now strained the flight to step on time.

Upon arriving at his aircraft, the upgrading pilot discovered his aircraft lacked a fuel tank configuration to provide sufficient fuel for the route he had planned. He, therefore, directed the flight to bypass the initial turn point and proceed straight to the second.

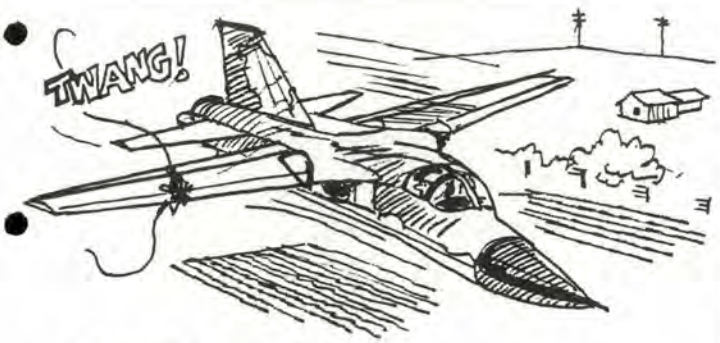
During the flight, it apparently became obvious to the upgrading pilot that his INS coordinates were not agreeing with his map. It may be that he then recalled the misplotted coordinates of the prior flight. If he were discovered committing such a dumb error or if he missed his range time, he would most likely flunk the ride. His urge to rectify the situation and avoid discovery must have been intense. Undoubtedly, he was headsdown, presumably working on his map or his INS until a second or two before he hit a hill.

While the actions (or inactions) of this busy supervisor were not considered causal, had he been able to fully discharge his responsibilities toward the upgrading pilot, the mishap might have been avoided. Saturated supervisors can, unwittingly, compromise flight safety.

The drivers of supervisor saturation also need to be analyzed. Among these factors are the quality, quantity, and availability of other middle-level supervisors. One guy can't do it all himself, although he may literally run himself into the ground trying. Another driver is the quality, experience and pertinent training of the new guys coming into the squadron. Another is the time available to get these new guys mission-ready. Sortie generation is crucial too, and is driven by factors such as maintenance, parts, and weather. Special missions, exercises, TDYs, VIP visits, etc., also affect supervisor saturation, either directly or indirectly by impacting training resources.

The supervisor is indispensible — not only to safety but to operations. Depending on the unit, the mission, the higher level management and a host of other factors, there may develop tremendous demands on his time. The highly conscientious supervisor may allow himself to become acutely/chronically stressed and fatigued: in short, saturated. Stretched to his limits, he may quickly become part of the problem instead of the solution. Some consideration needs to be given to the plight of the saturated supervisor. ■

OPS TOPICS



Power Lines

■ An F-111 was on a practice low level training mission with an AC and an IP on board. The crew descended to 250 feet and flew the route twice without problems.

As they climbed out after the second low level, the crew swept the wings forward and saw damage to the leading edge of the right wing. The crew recovered safely and after landing discovered that they had hit a powerline. The line was not indicated on any maps available to the crew.

Let's be sure we do our semiannual low level route surveys right, and that we get the right CHUM info out.

Power Lines Again!

The pilot of an A-7 was flying in a low level wedge formation. After cresting a small ridge, he saw a small canyon about 200 feet deep and ¼ mile wide at his 12 o'clock — exactly on course. The pilot flew at rim level altitude down the canyon and about two miles later terminated the low level uneventfully.

After landing, the post flight inspection discovered three horizontal cuts in the tail about two feet from the top.

The local power company confirmed that an aircraft had hit a three-line transmission system which crossed the small canyon right at rim level.

Somebody Did It Right!

Every day we are bombarded by safety messages that tell of mistakes. But they are not the whole story. In fact, with the aircraft mishap rates dropping as they are, the real story is in what people are doing to prevent mishaps.

We believe that these are the stories which should be told, so *Flying Safety* is asking for your account of how units and people are performing the mission safely and effectively. We want to tell about successes, not failures.

Send your stories to:
Editor, *Flying Safety* magazine
AFISC/SEDF
Norton AFB, CA 92409
AUTOVON: 876-2633

Self-Medication Is Dangerous

On Saturday before a Monday flight, a boom operator developed a cold. Hoping it would clear up before Monday, he did not go to the flight surgeon. Sunday, he was still congested, so before going to bed he took some AFRIN. Monday he was still congested, but being very motivated to complete this flight he reasoned that he would be all right if the copilot set the cabin altitude rate of change to a minimum.

The mission went fine until descent when the boom operator started having difficulty. The copilot had forgotten to reduce the cabin altitude rate of change. The boom operator developed a right ear block which was very difficult to clear and cost him seven days DNIF after landing.

continued

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Oxygen Malfunctions and the Emergency Oxygen Bottles

Malfunctioning LOX units and regulators are alive and well. Remember the Green Apple and associated emergency oxygen bottle? If the aircraft oxygen system isn't giving you what you selected, even in the Emergency or 100 percent position, *use* the emergency bottle. It is one of the most easily replaced ejection system components and is there to be used in an emergency.

If you have oxygen system problems, use the Green Apple and get down fast. — Lt Col Al Schneider, Directorate of Aerospace Safety.

Canopy Loss

Prior to take off the crew of an F-4 closed the canopies to pass behind another aircraft. They then reopened them while holding for clearance. The crew closed the canopies prior to taking the active. Immediately after take off the aircrews noticed a higher than normal cockpit noise level. After about three minutes of flight, the aircrew felt the cockpit pressure building above normal and then the rear canopy departed the aircraft.

Investigation could not discover any serious malfunction in the canopy system. It appears that the canopy was installed prior to takeoff and the crew did not notice either the canopy unlocked lights or the alignment stripes. The lights and stripes are difficult to distinguish, especially in bright sunlight. So on a sunny day, make an extra check. Better yet, make it a habit to watch the lights go out and the stripes align properly after you close the canopy, and before you do anything else.

Visual Illusions

Is it a bird? A plane? Or a train? Yes! A train. A flashing white strobe light is mounted and flashing on the lead locomotive of all AMTRAC, Santa Fe, and Union Pacific trains when they are running the rails. Other locomotives of eastern and southern railroads might also use strobe lights. Surface lights at night are sometimes fatally misleading. Check with the railroads operating in your local operating areas, a flashing white strobe does not necessarily indicate an aircraft. — Lt Col Al Schneider, Directorate of Aerospace Safety.

Nomex Flight Clothing

Once again, the use of Nomex flight clothing has proved its effectiveness. In a recent mishap, the pilot was subjected to the effects of a fireball being sucked into the cockpit after rear canopy jettison. Although he was exposed

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to the fire for less than a second, it was intense enough to completely char his helmet shell and burn (char) both arms of his Nomex flight jacket off to above the elbows. The good news is he only received minor burns to the unprotected area of his neck. He had his Nomex gloves on, flight suit sleeves down, and visor down.

When we wear our flight equipment as advertized, it protects. Let's stress it *again:* all Nomex, sleeves rolled down, gloves on all the time. No matter if it's a fighter, trainer, or heavy, macho people with sleeves rolled up and gloves off have no place in an aircraft. Nomex protects — use it. — Lt Col Al Schneider, Directorate of Aerospace Safety.

Hot Foot

A T-38 crew had refueled at a cross country base. When one of the pilots grabbed his G suit out of the front cockpit, he heard a mild explosion and then saw the right bottom pocket of the G suit on fire. The fire was quickly extinguished, and the crew investigated the source of the fire.

The pilot was carrying his personal survival kit in that pocket. The matches in the kit rubbed together and ignited. The matches had been improperly packed. Good thing it didn't happen at the top of a loop on a solo mission.

Carrying a personal survival kit is a good idea but you ought to check with your personal equipment specialists to be sure that you haven't set yourself up for a similar surprise.

FOD Watch

As two F-16s taxied out for takeoff, the flight lead saw several small rocks on the taxiway at an intersection with a vehicle road. He alerted both his wingman and the ground control of the FOD problem. After the mission, maintenance found damage to several first stage compressor blades on the No. 2 aircraft.

This area is heavily traveled by ground traffic as they cross and recross the taxiway each day. The base has made it a requirement to stop and check tires for stones before crossing taxiways, a high interest item for all flight line vehicle operators.

What about your base? Is there a similar area which could be a FOD problem? A quick check by the safety officer or chief of airfield management would be a good idea. Of course, if you see a spot that looks like trouble while you are taxiing, report it then. After the mission, follow up with a call to the flight safety office. The engine you save could be your own.

The PRICE of No Check

On climbout, passing 10,000 feet, the pilot of an A-10 checked his oxygen system. There was no flow and the supply pressure gauge indicated zero, so the pilot aborted the mission.

After landing, mainten-

continued

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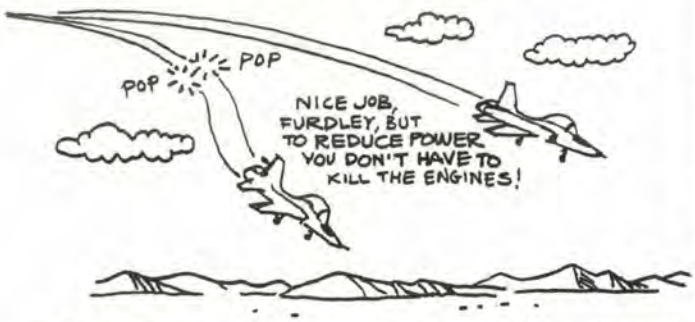
ance troubleshooters found the LOX pressure and vent lines to the regulator disconnected. Once the lines were secured, the system worked as advertised.

It is probable that the lines were disconnected prior to flight. This cannot be absolutely established because *the pilot did not perform an oxygen system check before take off.*



Surprise!

The pilots of two T-38s were making a formation approach to an aux field. At about one mile on final at 500 AGL the trainee on the wing moved forward and too close to the lead aircraft. The IP took control of the aircraft, simultaneously retarded the throttles and pushed over to maintain separation. Almost immediately, both crew members realized that the throttles were in cutoff and both engines were unwinding.

The IP immediately initiated airstarts, and both engines began to accelerate. Recovery and go around occurred at 100 feet AGL.

An Uncomfortable Stop

While on a cross country in a Cessna 182, an Air Force member and his family diverted to a nearby airport for a "comfort stop." The approach and landing were normal. The pilot turned his attention to raising the flaps. At this point, the aircraft entered a slight left skid.

The pilot, recognizing the skid, applied right rudder. This caused the left rudder pedal to move aft which resulted in the pilot inadvertently applying left brake, aggravating the skid.

The aircraft left the runway and continued across the terrain for about 190 feet before hitting a drainage ditch, finally coming to rest over 300 feet from the runway. The pilot and passengers deplaned without injury. ■

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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 Accident Prevention Program.

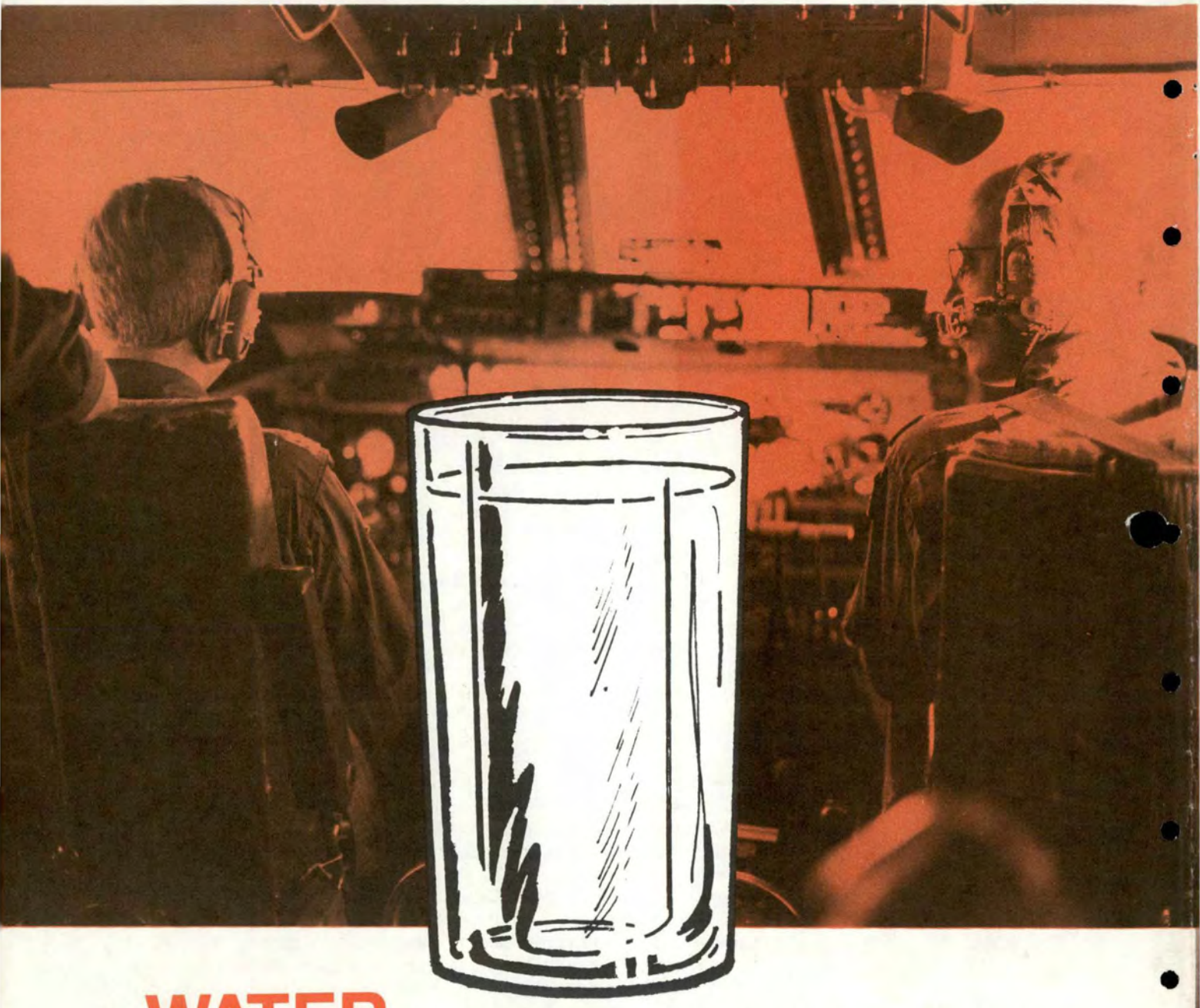
FLIGHT LIEUTENANT
Ian C. Mattimoe

MAJOR
James J. Dougherty

388th Tactical Fighter Wing
Hill Air Force Base, Utah

■ On 15 April 1983, Flight Lieutenant Mattimoe, RAF Exchange Officer, and Major Dougherty were leading a two-ship F-16 surface attack tactics mission. During target area egress at 500 feet AGL and 540 KTAS, Flt Lt Mattimoe performed a level, 3 to 5 G right turn. During the hard turn, the right leading edge flap (LEF) failed. The F-16 suddenly rolled farther right to 120 degrees of bank and started descending. Flt Lt Mattimoe arrested the uncommanded input and regained control of the aircraft via an unloaded roll back to wings level flight and initiated a climb out of the low altitude environment. During the climb, Flt Lt Mattimoe and Major Dougherty discovered that the inboard two-thirds of the right leading edge flap had completely torn loose from the aircraft. The remaining outer third of the LEF had failed 90 degrees upward, perpendicular to the windstream. Flt Lt Mattimoe locked both leading edge flaps to eliminate operational commands from the flight control computer. Major Dougherty discovered that the missing portion had struck the vertical stabilizer, destroying the top 8 inches and puncturing a 3-inch hole in the rudder. Major Dougherty assisted with checklist response as Flt Lt Mattimoe held significant left pressure on the side stick controller to maintain wings level flight. The required left pressure, as well as aircraft buffeting, was reduced by jettisoning the external wing tanks and manually applying full left flaperon trim. The aircrew diverted the F-16 into a nearby emergency field. Flt Lt Mattimoe performed a controllability check in landing configuration and determined that he would be able to fly a flat straight-in final approach at 8 to 10 degrees angle of attack and 220 KCAS. Aircraft attitude required to maintain final was slightly right wing low with a noticeable left drift. Just prior to touchdown at 205 KCAS, Flt Lt Mattimoe applied rudder to align the aircraft with the runway. After touchdown, he lowered the nose and controlled the aircraft with wheel brakes. He stopped safely just short of the departure end barrier. The quick reactions, excellent systems knowledge, and the flying skills of this aircrew probably saved the aircraft. WELL DONE! ■

$R_x = H_2O$



WATER The dehydrating effects of altitude, low humidity, alcohol and coffee are all trying to turn you into a beef jerky. The results: headache, fatigue, among others. Shoot for eight full glasses of water a day. It WON'T rust your pipes. And by the way — if you wait till you're thirsty, you're already about a quart low, so develop the habit.