AEROSPACE

SAFETY • MAGAZINE FOR AIRCREWS JULY 1980

THERE I WAS

By COLONEL LELAND K. LUKENS • Director of Aerospace Safety

■ "There I was, out of airspeed, ideas, and altitude! So I . . ."

How many times have you heard a great story start with, "There I was"? All those stories, whether told around the ops counter after a flight or around the bar after a couple of beers, were entertaining. But many were much more than just entertaining – some of the great truths of aviation have been learned by the fledglings and relearned by the older guys from the stories that followed that opening line.

The Directorate of Aerospace Safety would like to cash in on the beneficial aspects of the close calls, near misses, errors of judgment or whatever might generate a "There I was" type story. We feel pretty secure in our ability to control materiel related accident potentials; and with inputs from the people who maintain and fly our aircraft, we hope to gain additional insight into the human element accident potential as well.

The Royal Air Force (RAF) has had some excellent results from their Confidential Direct Occurrence Reporting System (CONDOR) which encourages self-reporting of those incidents where human error nearly resulted in a mishap. RAF, like USAF, accident statistics show that human failure or error is the major contributing factor in accident causation. And they, like we, also believe that many basic accident ingredients have been encountered previously in close calls or "There I was's." These experiences have remained private in the past; or if they ever were told, they were kept to a small circle at the ops counter or the bar.

We asked all the MAJCOMs' safety folks to review the RAF program, staff it through their commands, and to provide suggestions on improvements to the program and how best to implement a similar program in the USAF. The suggestions were reviewed and our proposed USAF program was revised accordingly.

This new USAF program is simple and there are very few rules to remember. Basically, we want anonymous accounts of personal errors or mistakes that we can publicize to warn others not to make the same mistakes. The end hoped-for result, of course, is a reduction of our operator factor losses. The form to fill out is the ultimate in simplicity – a nearly blank page on which we have begun the first sentence with "There I was" – the rest is up to the writer. The reverse side of that page is preaddressed to the Director of Aerospace Safety so after the story is told, just fold, staple, and mail. Don't sign or identify yourself or unit – we want total anonymity. I will personally read each account. If considered appropriate, the lesson learned from the account and preventive measures, if any, will be publicized. In effect, save an airplane, save a life, tell your war story to the Air Force through the "There I was" program.

In return for the trouble writers take in relating their stories, they can expect an inner sense that they may be contributing toward saving lives and airplanes and that they have our appreciation for their honest account of human error.

The program is not one to encourage reporting of other peoples' shortcomings – it is not a grievance system, and there will be no retribution or confidentiality breaches; the program is totally anonymous. It is not a program to be used in lieu of the USAF Hazard Reporting Program and the HATR Program – identified hazards should be reported through standard channels. The inputs will receive my immediate personal attention, and any items that may be useful to the operators and maintainers of our aircraft will be disseminated as rapidly as possible.

Sample forms will be sent to safety offices in the August issue of the *USAF Safety Journal* for reproduction and dissemination locally. ■

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Page 2

Page 16

Page 19

SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

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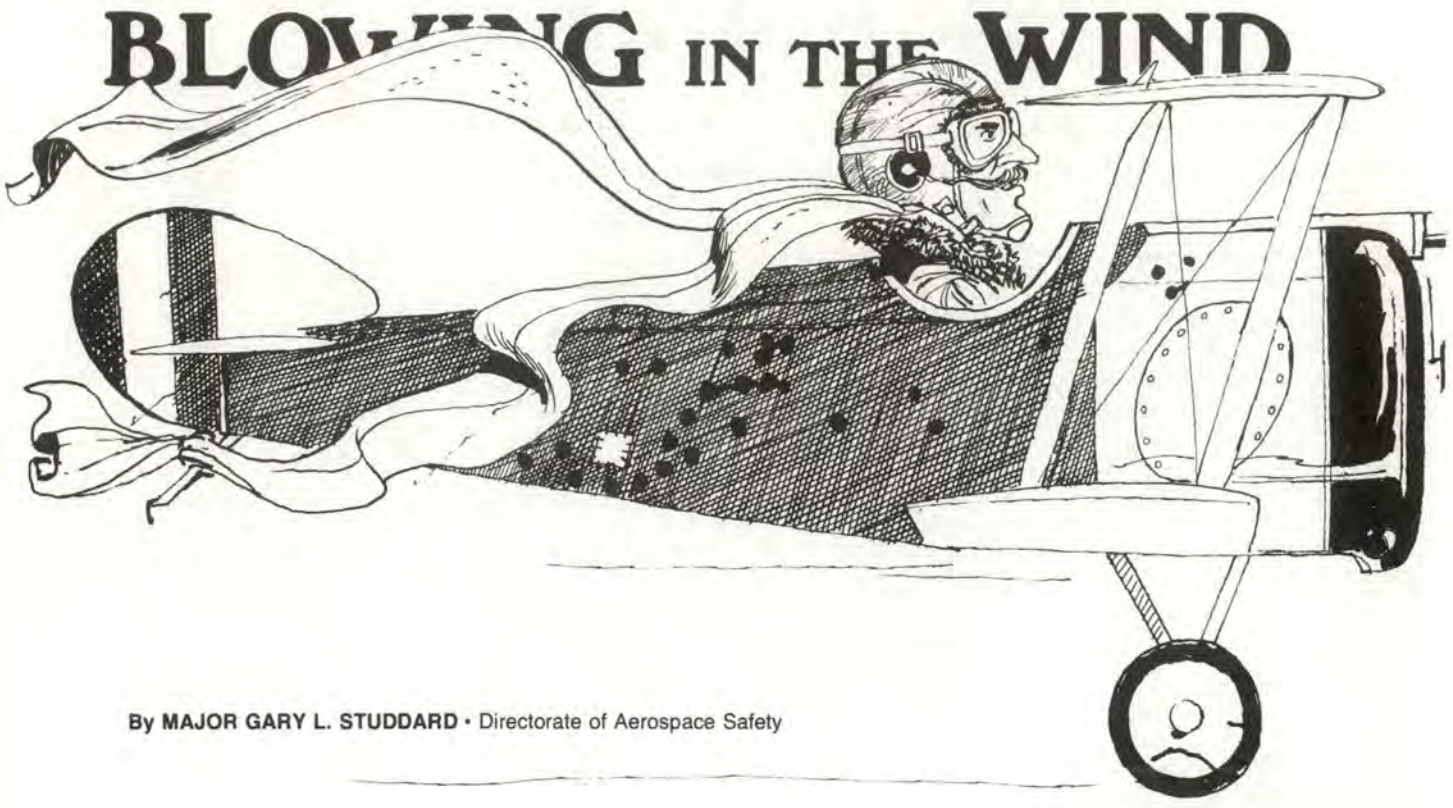
BLOWING IN THE WIND



By MAJOR GARY L. STUDDARD • Directorate of Aerospace Safety

■ The days of jumping in the cockpit of your aeromachine and leaping off with the scarf around your neck haphazardly blowing in the wind have long since passed. Today, nonetheless, some F-4 aviators find themselves exactly in this position of emulating our aviation forefathers. Losing a canopy at the speeds our modern day fighters fly can be a very "hair raising" experience (no pun intended).

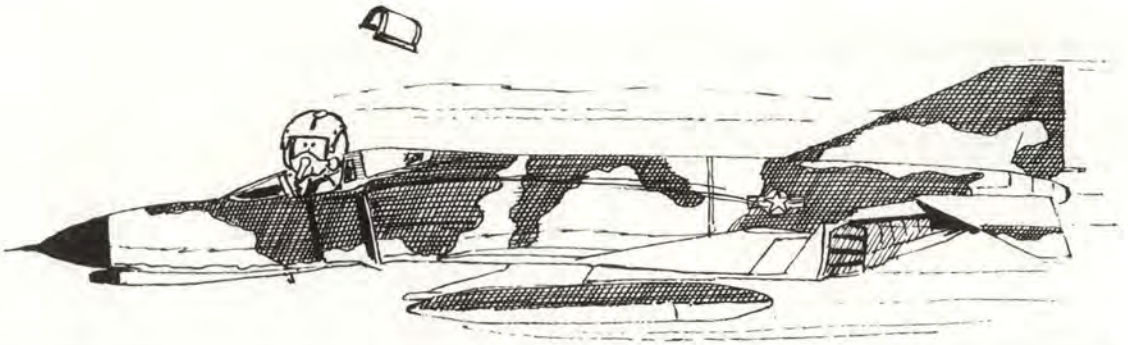
Six canopy losses so far this year caused my curiosity to get the better of me. I called upon our trusty computer here at AFISC which revealed some interesting data on the history of F-4 canopy losses. For a 12-year period (1968-79), there have been 161 USAF F-4 flight mishaps relating to inadvertent canopy losses. Yearly totals have varied from a high of 23 canopies lost both in 1968 and 1969 to a yearly low of only three losses in 1978. This makes the average loss to be 13 canopies per year. Most interesting to me was that a breakdown of those 161 losses over 12 years showed 68 percent (109) involved the front canopy. In trying to formulate a couple of paragraphs talking about all the reasons for the canopy losses, I decided the following chart would be better, and you can draw some conclusions for yourself.

F-4 Canopy Losses/Flight Mishaps 1968-79

	Front	Rear
Operator Factor	31	13
Shear Pin Failure	20	6
FOD (non-aircrew)	5	0
Undetermined	30	17
Miscellaneous (lock boxes, actuators, valves, rigging, birdstrike, etc.	23	16
	109	52

A little explanation on the chart may be useful to clarify any questions. The canopy actuator-rod shear pin exists, of course, to reduce any binding during intentional canopy jettison. Unfortunately, if the shear pin fails, merely of its own accord, there is a likelihood the air pressure on top of the actuator piston will cause the piston to abruptly bottom in the cylinder. This may jar the locking linkage to the unlocked position. Even with a broken shear pin (which you will probably recognize with a "bump" type noise behind you followed by an unlocked light indication), quick actions on your part can lessen the chance of a canopy loss. Reduction in airspeed, keeping Gs to a minimum, and limited maneuvering are the obvious recommendations. Certainly, try attempting to move the canopy lever to the closed position as this may, by chance, re-lock your lid.

It's definitely not my inention to scream "wolf." Our shear pin inspections have received



considerable emphasis in the last few years, and due to this effort, our last canopy loss because of a confirmed shear pin failure was in April 1976. The potential for a future failure, nevertheless, still exists.

In the area of operator factor, the causes for canopy losses run the whole gamut. Some of the more common include: The pilot mistaking the canopy lever for the flap switch, a camera/checklist/flashlight striking the seat-mounted initiator, the proverbial pencil in the sleeve/canopy-opening-lever interference, unintentionally pulling the canopy jettison handle, closing the canopy on the seat pin bag, and failure to observe an unlock light for various, diversified reasons.

In a canopy loss mishap, it is rare for an aircrew not to state, "of course the unlocked light was out when I closed it." At least they *perceived* it was. In defense of us aviators, the time the canopy is usually closed is right before taking the runway. This admittedly is a busy time with the before takeoff checks, formation line-up, acknowledgement of departure instructions, channel changes, etc. Undoubtedly, some aircrews may be calling their "canopy down and locked, lights out, stripes aligned" due to habit more than actually accomplishing a thorough check.

For the front seater, don't forget the backseat canopy unlocked light only tells the status of the rear canopy, so don't rely on him warning you of a front canopy unlocked condition. In the area of our fingers or pencils being in the wrong places, the canopy lever guards now installed on our Phantoms have given some relief to the inadvertent activation – but no safety system is absolute. And by all means, don't take an aircraft with the guard missing!

"Why," you ask, "are so many losses undetermined?" All I can say is the canopy is usually pretty well "beat up" after it is recovered. This, along with the knowledge that each canopy is custom rigged to each aircraft, makes reconstruction of the event very difficult. Some expert guesses are often made as to the cause, but a lot of our mishaps do wind up in the "unknown" file.

So, where do we go from here? The "undetermined" are difficult to correct; hopefully, we will have continued success in our solutions to our early-on shear pin problems; guards on bulkhead-mounted initiators have reduced our foreign object activation; and just because of the amount of exposure, a few miscellaneous losses are bound to occur. So finally, "the ball" comes right back into the court of the operator. Vigilance along with eliminating any complacency when preflighting, closing, and opening the canopy is about the extent of an aircrew's "bag of tricks." Included within this bag has to be the tried and true (but often forgotten) procedures:

- On preflight, thoroughly check condition of the canopy pressure seals and rain seals. Look for foreign objects; check the position of the center mirror on the forward canopy.
- Take a good look at the canopy actuator shear pin.
- Taxi at speeds below 60 knots (don't forget the surface winds) to prevent damage to the canopy operating mechanisms – stagger taxi if possible.
- Before closing the canopy, set the air conditioner knob in the 2 o'clock position along with selecting foot heat on the defog-footheat lever. Keep the rpm at idle.
- Time the locking cycle – 9 seconds from activation to completion.
- Listen for any unusual noise – does the canopy close hard?
- Check alignment marks.
- If all is not right, notify egress personnel. By all means, write up any abnormalities.

To reiterate, canopy losses are a subject of continuing concern, and the canopy system definitely demands the respect of the users. Losing a canopy has the potential for a more serious occurrence, and in three incidents involving canopy loss, crewmembers were also ejected from the aircraft. Remember, aircrews may or may not be the ones responsible for the initial malfunction which prevents a canopy from locking, but the "last look" is theirs. Many losses can certainly be prevented by increased attentiveness. Just remember, letting your scarf flutter in the breeze is probably not all it's made out to be anyway! ■

PART-TIME PILOT·· FULL-TIME PROFESSIONAL

While the following is primarily addressed to Reserve pilots, it has a broad application to the active force as well. Many of us, at some point in our career, find ourselves manipulating pencil and eraser more than stick and rudder and looking wistfully at the young as they go to fly. Staff positions, attached pilots, and even the "irregulars" who are general aviation fliers, pay heed. Here's a little bit of truth, compliments of the Fourth Marine Aircraft Wing Safety Sentinel. *Our thanks to US Army* Flightfax *for calling it to our attention.*

■ All forms of aviation require a professional approach, but perhaps none require this demanding state of mind approach more than we do in Reserve aviation. As Reserve pilots we have been removed from an atmosphere in which we flew every day or at least thought about it a good deal of the time. We don't have the luxury of spending our slack time each day thunbing through operator's manuals or discussing in detail emergency procedures of aircraft systems with other pilots. Most of us may not even think about flying during the normal routine of our civilian jobs. At the same time, we as part-time pilots must fly the same aircraft, to the same set of standards, performing the same missions as our active duty counterparts. To do this safely can only be accomplished by taking a full-time professional approach to our part-time endeavor.

We must set aside the time between flight periods to fully review the procedures and limitations of our aircraft. Perhaps more importantly we must be courageous enough to evaluate our own limitations with respect to the mission at hand, the prevailing weather, and other factors. Sometimes, someone else with a higher state of readiness can proceed with the mission or it may be rescheduled when conditions are more favorable. Each pilot must recognize an area in their personal readiness state which requires some greater attention. The place to discover this is on the ground.

The professional approach is not something that can be turned on when you put on your flight suit. It must start long before that; like setting aside the time to review operator's manuals during the week making sure your flight equipment and personal survival gear are in good shape, and making a conscientious and concerted effort to start thinking about flying as soon as you know that you've been scheduled.

We may only be able to fly part-time. But we will only survive if we think professionally full-time. ■

SPORT SCUBA DIVING
By USAF Aircrew Members

By LT COL BRUCE E. BASSETT, BSC
Research Physiologist
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Brooks AFB, TX

■ Sport SCUBA diving is a popular form of recreation engaged in by an ever expanding number of enthusiasts, including USAF aircrew members. The summer months represent the period of peak numbers of divers enjoying this form of recreation and thus represents a time to review safe diving practices. Of specific concern to aircrew members is the interrelationship between diving and flying.

Review of Safe Diving Practices

Among the cardinal rules for safe diving, the first two are: DON'T DIVE UNLESS YOU ARE CERTIFIED and NEVER DIVE ALONE. Diving is supposed to be fun and for it to be fun it must be safe (it is never fun to be a casualty!). For it to be safe you must be fully trained. If you are a certified diver who took a basic course more than four or five years ago you might consider taking an upgrading course of instruction (open water diver, intermediate, advanced) to find out what is new in the way of equipment, procedures and recommendations.

Buddy Diving involves more than simply being in the same body of water with another individual. For safety, buddy diving means knowing one another's equipment and performing a pre-dive "buddy check," knowing how to communicate underwater, planning your dive/diving your plan and being able to rescue your buddy if the need arises. Distance between buddy divers must never exceed the distance either one can swim without inhaling at the end of a normal exhalation. Underwater visibility, terrain, obstacles, current, surge and the like dictate even closer association between the buddies.

Be Fit To Dive If you are out of condition from a long inactive winter season don't strap on your SCUBA equipment and head out through the surf or dive in strong currents. Get in shape, preferably by swimming, before your first SCUBA excursion of the season. Being fit to dive also means on any given day *don't dive* if you are fatigued, tired, hung-over (aircrews? NEVER!) or sick. Making the decision NOT TO DIVE because of how you feel physically, emotionally or because of environmental factors is a tough but absolutely essential part of safe diving.

Check Your Equipment Inactivity is as hard on your equipment as it is on your body. Check your equipment and/or have your local dive shop check out your regulator(s), gauges, buoyancy compensator (if you don't know what this is you need upgrade training). You wouldn't fly an aircraft that had been in storage for six months until it had been cleared by maintenance. Treat your diving equipment with the same respect.

Always Surface With Air In Your Tank You always land with a reserve margin of fuel – so – always end your dive with a reserve margin of air remaining in your SCUBA tank(s). Three hundred to 600 psi is a range of remaining pressure on reaching the surface that is recommended. The exact amount of the reserve margin depends on the specific circumstances of a given dive. Diving in kelp forests or making exits through surf would dictate ending your dive at the high end of this pressure range. The percentage of diving accidents that start with a diver "running out of air" is amazing and tells those of us involved in diving safety that the incidence of diving accidents would be markedly reduced if *all* divers would surface with a margin of air on *all* dives. Of course, it is obvious that good air management requires an operable and reliable submersible pressure gauge. ☞

SPORT SCUBA DIVING

continued

Descending Feet-First This will help to ensure that you will be able to equalize pressure in your ears and sinuses. Head-first causes an engorgement of the mucous membranes of the oral-nasal passages which may reduce your ability to equalize easily. Don't continue to descend if you are having difficulty with your ears because eardrum rupture underwater can lead to severe vertigo, nausea and vomiting. These in turn may produce panic, aspiration and drowning or uncontrolled ascent and a lung overpressure accident.

Only "No-Decompression" Dives Sport diving should always remain within the U.S. Navy no-decompression limits for single or repetitive dives. If you are rusty in using the tables, practice with them *before* your first SCUBA outing. Furthermore, recent laboratory findings indicate that even the U.S. Navy "no-D" limits may not be conservative enough for the average recreational diver. Because sport diving is for fun and a case of bends is not, the following revised limits and recommendations are presented for sport divers:

A. **Revised "No-Decompression" Limits**

"No-Decompression" Limits (minutes)

Depth (Feet)	U.S. Navy	Sport Diver
20	none	none
30	none	360
40	200	120
50	100	70
60	60	50
70	50	40
80	40	30
90	30	25
100	25	20
110	20	15
120	15	10
130	10	5

B. **Recommendations**

1. Always spend a minimum of three to five minutes at depths between 10 and 20 feet at the end of each dive as a "safety stop."
2. Use total time of the dive (surface to surface) at the greatest depth attained to select the repetitive group letter for the dive.
3. Do not ascend faster than 60 ft./min. Generally slower is safer, especially as you near the surface. Obviously, to keep track of depth and time you must dive with a depth gauge and watch, and they must be calibrated and operating properly. There are NO validated decompression meters on the market that will guarantee you no problems so don't waste your cash on any.

What To Do When Everything Goes Wrong!

Your dive planning is not complete unless it includes emergency procedures. For the routine problems a diver's first-aid kit, such as the Pelican Kit, should be in every serious diver's bag. Emergency phone numbers for medical treatment and the nearest recompression chamber should be readily available as well as plans for emergency transportation. Regarding location of the nearest recompression chambers and emergency consultation in the case of diving casualties, a 24-hour/day service is provided by the Hyperbaric Medicine Division, USAF School of Aerospace Medicine, Brooks AFB, Texas, at AUTOVON 240-3278 or commercial (512) 536-3278.

Air embolism victims (presumed if a diver surfaces with the sudden onset of unconsciousness or any signs or symptoms involving the nervous system such as visual disturbance, paralysis, convulsions, etc.), should be placed in a 15-30 degree head-low position, on their left side if this is possible, and transported breathing 100% oxygen by mask to the nearest recompression facility. Time is critical, but such

victims if transported by air must NOT be exposed to reduced pressure at altitude. They must be, if air transported, pressurized to sea level or flown at as low an altitude as safety allows (i.e., if by helicopter).

Divers with decompression sickness (bends – and if you don't remember the symptoms it's time for refresher training!) should also be transported at or near sea level on 100% oxygen by mask to the nearest recompression facility. The head-low position is not believed to be beneficial in the case of bends. Remember that symptoms of bends generally do not have an immediate onset and may, in fact, not occur for up to 24 hours after exposure.

Recent findings at USAF School of Aerospace Medicine support regulation requiring 24 hours between compressed air diving and flying.

Flying After Diving

And now the real wringer for USAF aircrew members – AF Regulations specify that you must not fly for *24 hours* after any dive (breathing compressed air). This is a conservative rule but one which is backed up by more and more evidence.

Sport divers often hear of other "rules" for flying-after diving, such as it being safe to fly after a surface interval of two, three or four hours or as long as the repetitive group letter is no higher than a D. Even at face value these rules are not always directly applicable to USAF aircrews because they specify a maximum (cabin) altitude of 8,000 feet. Recent studies at the USAF School of Aerospace Medicine investigating flying-after-diving revealed serious intravascular bubbling and cases of bends in exposures which were more conservative than any of these other "rules." Because of these and other findings, and because the onset of bends can be delayed by as much as 24 hours, the hard and fast rule for USAF aircrews who SCUBA dive must remain *24 hours from bottle (SCUBA that is) to throttle.*

Summary

Since repetition is an important part of learning, here we go:

1. Don't dive unless you are certified
2. Never dive alone
   - know buddy's equipment
   - do a pre-dive buddy check
   - know underwater communications
   - plan your dive/dive your plan
   - be able/prepared to rescue your buddy (and vice versa)
   - be able to get to your buddy immediately to help or get help
3. Be fit to dive
   - be able to decide NOT TO DIVE
4. Check your equipment
5. Always surface with 300-600 psi minimum
6. Descend feet first
7. Only no-decompression dives
   - observe revised no-decompression limits
   - use "safety" stops
   - don't ascend too rapidly
   - use depth gauge/watch – NO meters
8. Have an emergency plan
   - know first aid
   - head-low and O_2 for air embolism
   - O^2 for bends
   - nearest chamber
9. Flying-after-diving – 24 hours from SCUBA BOTTLE TO THROTTLE ■

MURPHY ON THE RAMP

By MAJOR ROGER JACKS • Directorate of Aerospace Safety

■ My story begins a couple of weeks ago. I had been working hard to check out as an aircraft commander in the B-52. I had passed my checkride, not exactly with flying colors, but, nevertheless, with a good solid performance. One day while doing some work in the squadron, one of the admin guys walked in the room and said, "Sir, the Commander said he'd like to see you when you get a minute." I said, "O.K.," and started toward his office.

"Sit down, Sid," he said, as I appeared in the doorway. "I'm assigning you to R-13 effective Monday. You'll be the AC and Johnston will be your copilot. He has a lot of experience and is a good man. In fact, a few more hours and I will probably put him into the upgrade program. Smith, your radar nav, has been upgraded a little over a year and is doing a great job. The rest of the crew are all new guys on the block. I'm counting you you to get them off on the right foot.

Sid, the way the schedule works out, you'll get one flight with them next week and then you'll all be going on alert."

Boy! What great news! My own crew. I'm going to make this the best crew to hit this place . . . and on and on went my thoughts as I floated out of the Squadron Commander's office.

Well, that first flight went just great. The airplane performed flawlessly, and even though S-01 didn't have to worry about us taking their jobs, we did okay. I slid right into the green and got the gas off the tank on the first contact. I even did it without scaring the hell out of my crew. A definite plus for crew espirit de corps. The radar got the simulated bombs on the target, and the nav, EWO and gunner successfully did their thing. Crew R-13 was on the road to success!

Last Thursday morning we showed up for alert. I was looking forward to alert since a week of forced togetherness would give me a chance to get to know my crew. I hadn't taken the time to sit down with the whole crew and discuss crew coordination. Oh, sure, the copilot and I had talked about critical phases of flight, and I know the radar and nav had discussed bomb run procedures. We had been careful to thoroughly brief our one and only mission, but we hadn't had a chance to really discuss crew coordination during various crises. I put a discussion of crew coordination on my list of things to do while on alert.

The first day of alert had been tiring. It was a lot of the usual running around, crew change over, EWO briefings, testing, and crew study. I had also started this alert stint on a sour note, like most of my previous tours, by consuming three gigantic meals loaded with stomach bulging calories.

I had just climbed into the rack when the alert horn went off. With my flight suit, boots, and jacket partially on, I headed for the truck. The navigator was already in the driver seat warming up the engine. Within a minute my crew was crunched into the truck, and we were on our way to the aircraft. I thought to myself, Well, not a bad start. At least we haven't lost anyone yet. Now if we find the right . . . Wow! The navigator must be a close cousin to Evil Knevil. I just hope we get there alive. A couple of minutes later we broadslided to a stop in front of a B-52. Yep, right number– must be ours.

Everyone launched into action. The guard was getting the ropes cleared out of the way, the copilot and I were scrambling upstairs to get the engines cranked, and the rest of the crew was removing engine covers, pitot tube covers and getting the ground power unit running. The "Co" and I were just finishing engine starts and the "Radar," "EWO," and "gator" were trying to copy the radio transmissions to see if the alert was real or practice when all hell broke loose.

"Pilot," this is ground, "there is fire coming out of number 3."
"Fire, who said Fire," repeats an unknown voice. "Ground," this is the pilot . . . "Fire, let's get the hell out of here," interrupts someone. "Would you guys shut up," yells the EWO, "I'm trying to copy the message."

I tried to tell ground that the engine was shut down and I didn't want foam sprayed into the engine unless it was necessary, but the

interphone was saturated with voices – some using the call position. "Hey, nav, did you copy the message?" "Radar, how about you?" I think it's a practice exercise, EWO." "Is the engine still on fire?" "I think we'd better get out!" "To hell with this, pilot, I'm getting out." "Here come the fire trucks." "We're ready to spray the engine, sir. No flames, but let's don't take chances."

Meanwhile, I still haven't gotten through to ground. I kept yelling not to spray the engine if there weren't indications of a fire, apparently with little success. Suddenly, as if a white surrender flag was raised, the whole thing was over. "pilot, this is ground, "we gave that engine a good shot of foam, fire is definitely out." "Pilot," this is radar, "simulated exercise has just been terminated by the command post."

My reaction . . . well, there goes R-13's unblemished record. Not only that, I had about as much control over this B-52 crew as I would piloting a runaway shopping cart. I didn't even know if I still had six crewmembers somwhere on the flight line. If we could get this screwed up on the ground, a serious in-flight emergency should be a better road show than *Smokey and the Bandit*. That little talk on crew coordination I had been thinking about was sorely needed, and as far as I was concerned it was going to take place that night while the evening's activity was still fresh in everyone's mind.

We met and chatted several times in the next few days. We talked over crew duties and how each crew position should integrate with the crew concept. We talked about things like: establishing the right priorities, adopting an effective communication system that passes valuable information in a timely manner, ensuring critical events are monitored by as many crewmembers as possible so that human redundancy is optimized, and having an open line of communication. Seniority barriers and misplaced confidence where junior or nonpilot crewmembers are afraid or reluctant to question other members' actions must be eliminated. We discussed many more areas of effective crew coordination, but what is important is that we tailored them to our crew needs.

How about your crew? If you have reservations about your crew coordination, do something about it. Talk to the old heads in stand eval. Do a little research: *Aerospace Safety, Combat Crew, The MAC Flyer* and *TAC Attack* are great information sources. These magazines have published numerous articles on how to develop better aircrew coordination. Get a list of items together that are pertinent to good crew coordination and that fit your particular crew. Then get your crew together. An informal rap session works well – a little food, a little drink, and some good give and take discussions. The pay-off may be a saved aircraft or even more importantly, a saved life. ■

SURVIVAL: Drownproofing

By MSgt STEVE KRESTIAN • Curriculum Management, Operations Branch
3613th Combat Crew Training Squadron (Water) (ATC) • Homestead AFB, FL

■ At the water Survival School, Homestead AFB, Florida, the scenario for a typical water survival episode confronts the survivor with many real physical and psychological hazards. Fear, immersion, syndrome, equipment entanglement, egress injuries, difficulty in boarding rafts, windchill, dehydration, loneliness, calm, and storm are all covered in the curriculum. But even to the properly equipped and trained, the environment can suddenly become unfriendly. As the survivor struggles to overcome these hazards, one omnipotent danger awaits to claim the unwary – near drowning.

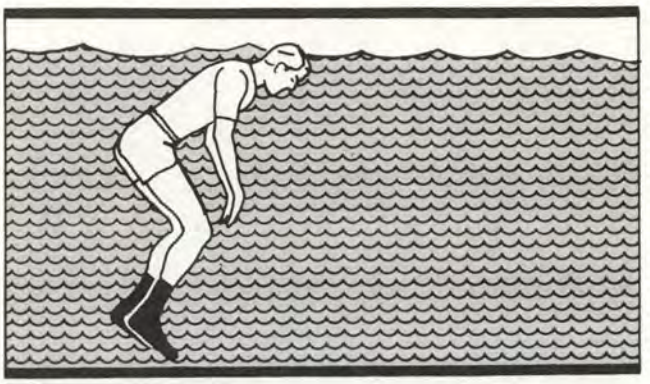
Parachute descent and a no-wind water entry, followed by suspension line involvement, can be dealt with by a calm, well-trained survivor. Trained aircrews and appropriately briefed passengers can escape a successfully ditched airframe and enter their rafts. But in the "real world," equipment malfunctions and ejection of egress injuries greatly broaden the potential of early drowning for the swimmer and nonswimmer alike. That's why a basic knowledge of drownproofing techniques can be a matter of life or death.

More than 20 years ago, the late Fred Lanoue, professor of Physical Education at the Georgia Institute of Technology, conceived and developed drownproof training. Professor Lanoue set forth a step-by-step procedure to teach a simple set of skills that would develop in any trained individual the knowledge and awareness necessary to remain alive in deep water – indefinitely.

The Lanoue technique is based on the general truths of human flotation principles and psychological indoctrination. One major objective of this technique is to eliminate fear of water as a psychological threat. The success rate of his training led the Peace Corps and Marine Corps to adopt the course as a basic skill to be learned by all personnel. In 1973, the US Army Infantry School also adopted the course. Swimming and drownproofing are not the same. Swimming instruction teaches a person how to move in a water environment. Because of the effort required to attain mobility, the duration of such activity is severely limited, and the energy drain is such that the effort to attain mobility is likely to reduce the swimmer's ability to survive. Drownproofing, on the other hand, concentrates on teaching the individual to stay afloat (survive) in deep water for extended periods of time with a minimum of movement and mobility.

Drownproofing employs natural body buoyancy to keep the head and most of the body at rest near the surface of the water. Early rest methods taught the individual to rest with the head out of the water. This is not drownproofing. The key to drownproofing is teaching the individual that resting with the head

POSITION 1



under the water is neither uncomfortable or unnatural.

People who say they fear water really fear the fact that they cannot reach or stand on the bottom. In such circumstances where the surface of the water is below their chin or neck, they panic as soon as they realize the water is over their head or if they catch a wave in the face. In order to overcome this fear, drownproofing advocates mental discipline.

Several aspects of physics form the basis of drownproofing. The first is that 99 percent of all men will remain at the surface in fresh water without moving if the lungs are full of air. About 99.99 percent of all women will do the same. Momentum and inertia, plus shifting floating angles, make this statistic seem wrong. Proper instruction proves it correct.

An average head weighs close to 15 pounds, so as a human floats vertically (most people float nearer the vertical than the horizontal) about five pounds of tissue is above the water line (approximately eight pounds for women). These figures are general. Fat and total air volume, muscle, and clothes themselves are all factors affecting flotation. Thus, if an immersed person wants to keep his nose and mouth out of water all the time and see where he is going, he must hold up at least five pounds with muscular energy. This energy drain increases if he is wearing clothing and during every exhalation. These amounts may sound too small to be important, but over a period of time they impose a steady drain of energy and are a major cause of drowning.

Drownproofing's answer to this particular problem is simple– why hold any weight out of water except when it is absolutely necessary? It teaches dropping down into the water for a rest between breaths. In this way, you use the natural buoyancy that exists when the lungs are full. Simple! But when you try it, it may not seem so simple until confidence is gained through practice.

With personal flotation gear and drownproofing techniques, your chances of a watery grave are reduced.

STEP 1 – RESTING Once you enter the water, rest vertically with arms and legs dangling. The head should be horizontal with just the back of the head above water (Position 1). If a learner becomes confused with up and down movements underwater, he should place his hands on his knees with the arms straight. This will help him achieve a more upright position in the water. If you happen to get water in your mouth, spit it out– don't swallow it.

STEP 2 – GETTING READY TO BREATHE After your natural buoyancy brings you near the surface, the forearms are leisurely raised to the top of the forehead with palms facing half down and half out. The forearms should be together, not the hands. One knee is raised almost to the chest and the foot extended forward with the toes pointed. At the same time, the other foot is raised behind, then extended out with toes pointed so that for an instant you are doing a front-to-back split, just like a dancer (Position 2).

If your head ducks under the water, you either raised your arms and legs too fast, blew out a little air, or lifted your head. With a gentle movement, begin to raise your head to the vertical and start exhaling through the nose. Keep your eyes shut. The exhale must neither be

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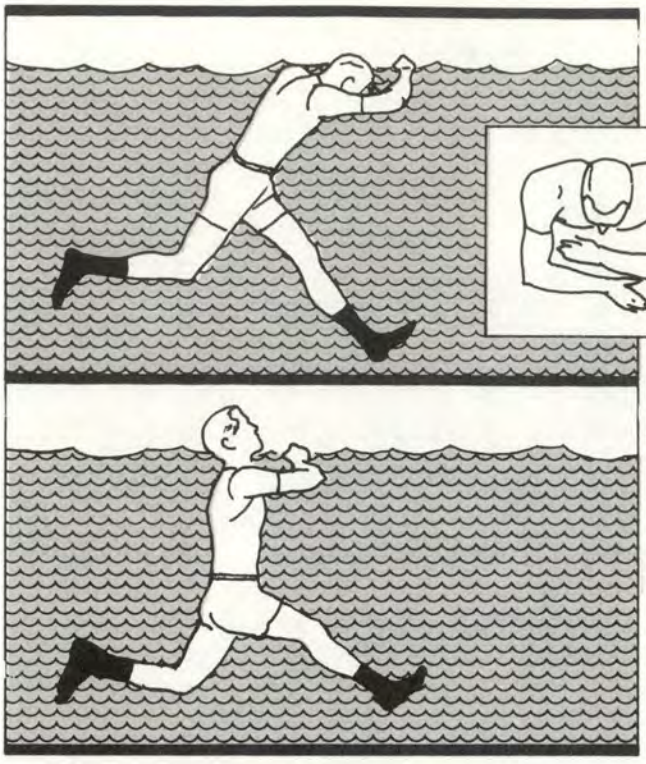


Drownproofing

continued

made entirely under water nor entirely out of water. Air should be expelled throughout the entire raising of the head.

STEP 3 – THE INHALE As soon as the head reaches the vertical and the exhale finished, start your palms sweeping outward with the little finger just scratching the surface of the water. The sole of the front foot and the top of the rear foot now press down gently on the water; the mouth opens and the inhale through the mouth begins (Position 3). If the shoulder or the bottom of the chin comes out of the water, the arm stroke or kicks were too hard or fast. As soon as one has finished the inhale, he usually starts sinking. If this sinking is not arrested and reversed, it is quite possible to sink quickly to a point where the chest is compressed so much that the swimmer does not float back to the surface. To counteract this, Step 2 is repeated but with a gentle stroke using both legs and arms. Resting again is a repeat of Step 1.

With the knowledge you have gained from this article and by practicing these three easy steps, you will be able to assist yourself (and not be a burden to others) when, or if, an emergency occurs. It is also advisable to use some type of personal flotation gear on a pleasure craft or when you egress from a disabled aircraft. With personal flotation gear and drownproofing techniques, your chances of a watery grave are reduced. ■

HE LEARNT

By PATRICIA MACK
Editorial Assistant

■ I heard the door close and called out my usual greeting, "How did your day go?"

"Look at the front of the car. That'll tell you how my day went. Soon as I change my clothes, I'll tell you all about it."

The car was a mess. As I was estimating the repair cost, he came out and explained.

"I was on my way downtown this morning, and as I approached the intersection of 4th and Central a car turned directly in front of me. I hit the brakes, but there was no way I could avoid hitting that car.

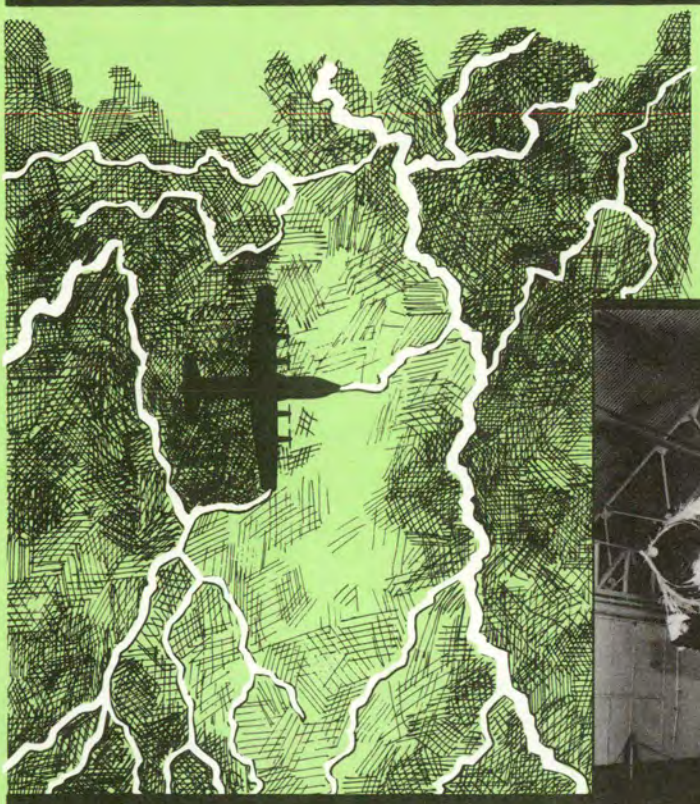
"Was anyone hurt?"

"There were two women and a little boy in it. One woman had a little cut on her face and the driver wasn't hurt, but the little boy was pretty shaken up. The woman told the police officers that she just didn't see me and turned in front of me."

"How about you?" I asked, "you don't appear to be injured. Did you have your seat belt fastened?"

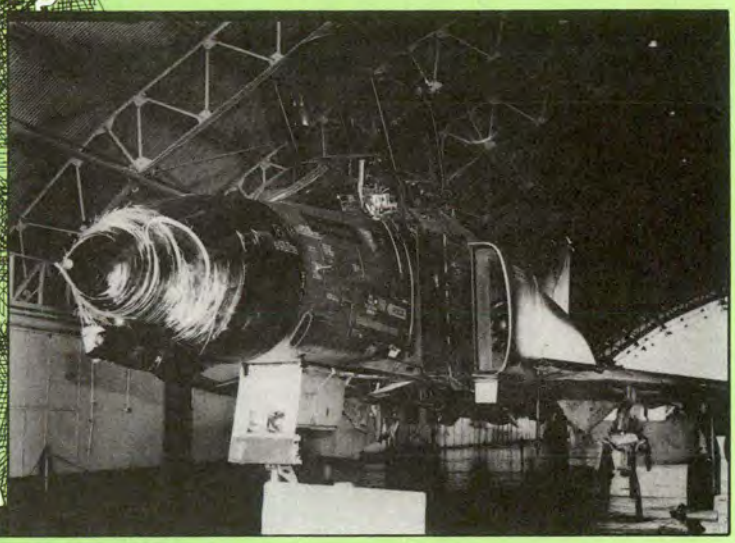
"Questions, questions," he said. "I was kinda shaken up, but not hurt. And, *yes*, I did have my seat belt fastened."

Let's back up about five years. This same man was driving along when he suddenly, unexpectedly sneezed. He reached down to get a tissue, went over a curb and hit a concrete light standard just that quickly. As a result of that accident he had several lower teeth knocked out, his chin cut all the way through, and numerous bruises and sore spots. Was his seat belt fastened? No, it wasn't. ■



Lightning 'R' US

By MAJOR TONY HELBLING
USAF Ret.



During a formation departure of F-4s, the lead aircraft received a lightning strike on the radome. The charge exited the left wingtip, crossed to the wingman's nose wheel door and exited from the tip of the right stabilator. Lead suffered considerable damage, the wing aircraft very little.

Pilots of an F-16 and an F-4 in formation reported a similar experience with little damage.

An F-15 at FL 280 was struck. The pilot received a shock in his left hand, and the right engine flamed out. Stray voltage affecting the electronic engine control/unified fuel control is suspected as the cause of the flameout.

Has your bird ever been struck by lightning? How did the strike propagate? What was the resultant damage . . . and what, if anything, can you do about it?

The majority of lightning strikes is fairly benign in nature. They range from static electricity buildups to strikes/discharges on aircraft appendages. Of the latter group, damage can range from burned paint on a wingtip to the catastrophic loss of an aircraft and crew.

Based on historical data, the FAA has established areas of strike attachment on aircraft that are within 18 inches of the wingtips. Also included are external fuel tanks, engine nacelles and areas within 18 inches of the aft protuberences of the aircraft.

A typical lightning strike actually attaches itself to an aircraft as the aircraft enters the area of electrical charge. The arc reattaches itself at various other parts depending on aircraft speed and properties of the skin surface. Herein lies a possibility of melt-through which becomes a function of skin thickness, heat generated, along with insulating properties of the skin's surface and material composition.

With regard to aluminum skinned aircraft, new design standards require skin in the areas previously discussed to be .080 inches in thickness in order to withstand a possible melt-through.

A melt-through in a critical area would involve other aircraft systems such as fuel cells, flight control circuitry, or hydraulic/electrical systems.

This brings us back to – "What can we, as aircrews, do about a lightning strike?"

- Naturally, avoid areas of thunderstorm and lightning activity.
- If and when we are hit, assume some system in the aircraft may have been damaged and proceed accordingly.
- New weapons systems are designed with lightning protection inherent, while our more mature systems are more vulnerable to system damage.
- Know YOUR aircraft's limitation.

For more specific information on lightning strike phenomenon, refer to National Aeronautics and Space Administration (NASA) reference publication 1008, *Lightning Protection of Aircraft*.

Our thanks for information supplied by HQ AFSC/ AFFDL.

X-COUNTRY NOTES

By MAJOR DAVID V. FROEHLICH
Directorate of Aerospace Safety

■ Before I get into the results of the latest evaluations, I'd like to talk about good guys and bad guys. I still get letters and phone calls asking "What sets the best transient services base apart from the rest?" Let me try and pass on some perceptions based on two year's evaluations including visits to over 60 USAF CONUS installations.

TRANSIENT SERVICE PLAYERS

BASE OPS – Almost universally, the largest problem in Base Ops/airfield management is manning. The 271 career field is a mess! Not only are most places short of people, they are also short of experienced people and/or retainability. Without a tech school, the airfield manager has a continuous uphill battle OJTing the inflow of new folks while trying to keep some semblance of "ops normal." Until the turmoil subsides, some empathy from aircrews, commanders and others can sure help the situation. Aircrews – realize that most Base Ops are having personnel problems and save a few extra minutes, look up the info yourself, write a little clearer, etc., etc. All those things (and others) save time and confusion behind the dispatch counters. Commanders (at all levels) – realize there are problems in a lot of Base Ops areas and if you can lighten the load (nav kits, local flying schedules, FliP distribution, etc.) you might offer some help. One commander had gone back to something like the old AO (Airdrome Officer) idea. A young aircrew member pulls an additional duty two days per week for a month in Base Ops. With the right attitudes – everybody wins. The crewmember adds a current knowledge of airplanes to the behind-the-counter environment. This helps the young and inexperienced dispatchers relate their work to the actual flying a little better. The crewmember also gains by picking up a much more thorough understanding of how the whole airfield runs besides just his airplane. Things like lighting, air traffic control, flight plan processing, RCR checks and all the other stuff that most of us took for granted for years. Like I said – it can be tough to set up, but with good attitudes by all, it can be very beneficial.

Other than personnel, the key to a top-notch airfield lies in the working relationships between the airfield folks and the other agencies on base that support the Base Ops and runway environment. Agencies such as POL, civil engineering and the motor pool can make or break Base Ops. In many cases, a "Rex Riley committee" or "transient services working group" has made great strides in getting all of the players talking in a "no threat" environment.

BILLETING – The key to separating excellent and ho-hum billets lies in *supervision*. The really top installations in the transient quarters category seem to have supervisors that are out and visible. They are watching and working the counters to prevent problems; they have a room inspection plan to check for maintenance and equipment problems; they have a sort of quality control program to spot check on room cleaning, etc. The best service is provided where billeting folks know and understand aircrew problems with regard to meals, transport and especially crew rest. Again, the committee approach seems to help.

FOOD AVAILABILITY – The real live flight line snack bars have begun to re-appear. This is strictly where the commander realizes that not only is this a health and safety requirement for aircrews, but an awfully nice addition for all the folks who live and work around the flight line. If you are stuck with machines, at least make sure the room doesn't turn into a "no-man's land" which nobody cleans. Even if it has to be added as a small paragraph to a commercial cleaning contract, it needs to be kept neat and clean (and not by the Base Ops 271's). Inflight kitchens would have to be given a rising 7 on a scale of 1 to 10. Most are really improving and putting out fast, good lunches and meals. The key is attitude! One thing that inflight supervisors should check is info (phone numbers, menus and locations) posted in Base Ops? That could save you a lot of "no-notice" lunch orders.

REX RILEY TOP FIVE (MAY 1978 - MAY 1980)*				
Base Ops	Billeting	Transport	Food Service	TA
Eglin	Peterson	Peterson	Offut (inflight)	Buckley
Offutt	Eglin	Hill	Tinker (snack bar)	Tyndall
Buckley	Tyndall	MacDill	Eglin (inflight)	Laughlin
Patrick	Offutt	Andrews	Peterson (snack bar)	Randolph
Westover	Scott	McChord	Cannon (snack bar)	Maxwell

*Based on personal evaluation visits and aircrew critiques received.

TRANSPORT – I'm not ringing the prima-donna bell, but aircrews often have some unique and very time-sensitive transport requirements compared to the day-to-day traveler. Transport folks need to talk to someone about crew duty day, crew rest, show times and the like. The best places are the ones with vehicles and drivers dedicated to Base Ops. Again, the key is a good relationship between airfield management and transportation. P.S. Shoot for 100% government vehicle seat belt use!

TRANSIENT ALERT – Last, but certainly not the least important! TA also has manning problems in many locations, and they also suffer from some experience level imbalance. Folks (aircrews, commanders, maintenance supervisors, etc.) need to realize that transient maintenance personnel are not your run-of-the-mill mechanic. A sharp TA individual is part POL expert, electrician, jet mech, hydraulics specialist and crew chief – and on anywhere from 25 to 50 different aircraft ranging from a shiny new F-16 to the 1952 model T-bird (or older). Add to that the duties of taxi driver, marshaller, scheduler and full-time diplomat – now you have TA! Because of this myriad of tasks, the quality of people that do well in TA is quite high. The common thread among excellent TA outfits is attitude or desire. The places that really take pride in good service usually give good service. They work hard at having T.O.'s and being knowledgeable about lots of different machines. For them to have to put "Preflight not accomplished due to lack of qualified personnel" in your forms would be a personal insult – not a crutch. They also have super rapport with the motor pool, POL and Ops.

OVERALL – The name of the game, no matter who you are, is you've got to care and pull together to provide safe, efficient service.

NEW TO LIST

HOLLOMAN AFB – This is a hard place to get in and out of with all the "R" areas, mountains and traffic. Once you get there, however, the service and facilities are super. Call ahead for an RON and watch the traffic in their multi-runway operation.

ANDERSEN AFB – Not exactly your average weekend cross-country stopping place, but we've been told that these folks work hard to take care of those who stop thru. Glad to have you, and keep up the great service.

RAF BENTWATERS – We received an excellent report on Bentwaters and are pleased to add them to the list. Rated top-notch were ATC services, transport and billeting. Keep up the good work.

RAF UPPER HEYFORD – Another excellent report. Outstanding areas included ATC services, Base Ops, messing facilities and TA. Special note was made of super service oriented attitudes of personnel in all areas. That's the key!

That's a wrap for this trip. We're still winning, but it's only through a cooperative effort. Keep the info coming – write Rex Riley, AFISC/SEDAK, Norton AFB, CA 92409. ■

THE

REX RILEY

Transient Services Award

LORING AFB	Limestone, ME
McCLELLAN AFB	Sacramento, CA
MAXWELL AFB	Montgomery, AL
SCOTT AFB	Belleville, IL
McCHORD AFB	Tacoma, WA
MYRTLE BEACH AFB	Myrtle Beach, SC
MATHER AFB	Sacramento, CA
LAJES FIELD	Azores
SHEPPARD AFB	Wichita Falls, TX
MARCH AFB	Riverside, CA
GRISSOM AFB	Peru, IN
CANNON AFB	Clovis, NM
LUKE AFB	Phoenix, AZ
RANDOLPH AFB	San Antonio, TX
ROBINS AFB	Warner Robins, GA
HILL AFB	Ogden, UT
YOKOTA AB	Japan
SEYMOUR JOHNSON AFB	Goldsboro, NC
KADENA AB	Okinawa
ELMENDORF AFB	Anchorage, AK
PETERSON AFB	Colorado Springs, CO
RAMSTEIN AB	Germany
SHAW AFB	Sumter, SC
LITTLE ROCK AFB	Jacksonville, AR
TORREJON AB	Spain
TYNDALL AFB	Panama City, FL
OFFUTT AFB	Omaha, NE
NORTON AFB	San Bernardino, CA
BARKSDALE AFB	Shreveport, LA
KIRTLAND AFB	Albuquerque, NM
BUCKLEY ANG BASE	Aurora, CO
RAF MILDENHALL	UK
WRIGHT-PATTERSON AFB	Fairborn, OH
CARSWELL AFB	Ft. Worth, TX
HOMESTEAD AFB	Homestead, FL
POPE AFB	Fayetteville, NC
TINKER AFB	Oklahoma City, OK
DOVER AFB	Dover, DE
GRIFFISS AFB	Rome, NY
KI SAWYER AFB	Gwinn, MI
REESE AFB	Lubbock, TX
VANCE AFB	Enid, OK
LAUGHLIN AFB	Del Rio, TX
FAIRCHILD AFB	Spokane, WA
MINOT AFB	Minot, ND
VANDENBERG AFB	Lompoc, CA
ANDREWS AFB	Camp Springs, MD
PLATTSBURGH AB	Plattsburgh, NY
MACDILL AFB	Tampa, FL
COLUMBUS AFB	Columbus, MS
PATRICK AFB	Cocoa Beach, FL
ALTUS AFB	Altus, OK
WURTSMITH AFB	Oscoda, MI
WILLIAMS AFB	Chandler, AZ
WESTOVER AFB	Chicopee Falls, MA
McGUIRE AFB	Wrightstown, NJ
EGLIN AFB	Valpariso, FL
DOBBINS AFB	Marietta, GA
RAF BENTWATERS	UK
RAF UPPER HEYFORD	UK
ANDERSEN AFB	Guam
HOLLOMAN AFB	Alamogordo, NM

Which Way Is DOWN?

By CDR V.M. VOGE, MC
Naval Safety Center

■ Somatogravic illusions are those in which we perceive that our aircraft is in an attitude which actually is the resultant of various force vectors that may be in a direction and/or of a magnitude different from the normal gravitational force. Sound confusing? We'll try to clear it up for you. This illusion has already killed too many aviators, and there is no guarantee that its effect will not strike another unsuspecting crew in the near future. No need to get an anxiety attack! This one is *not* dangerous, *if* you are aware of its insidious nature, and take corrective actions. Interested? You should be!

We normally consider gravity as a "stable" point of reference – something we can usually depend on. We're quite used to it, and we accept it for what we think it is. We regard it as a vertical force (at least, most of us do). As you may or may not remember from your basic physics classes, gravity is actually a force of acceleration perpendicular to the earth's surface. This is essentially the same physical principle we experience when we have a linear or a translational acceleration (remember drag-racing at stoplights?). Usually, the linear acceleration curves are shortlived – e.g., you have to stop at the next stoplight, there are bumps in the road, or even your childhood swing only goes so far. When this is the case, our "infallible" brain can separate these added acceleration forces for what they are, and there is no problem.

The problems come when we have prolonged acceleration curves, or profiles – as when we take off in our trusty aircraft – *especially* so on catapult shots, at night, or in severe IMC (no visual reference). These profiles are usually obtained through no increase in thrust or a decrease in drag. Our *Mode X-1-A acceleration input separating mechanism* in our brain gets short-circuited, and the various acceleration inputs are combined. The result is our *new* vertical point of reference (our *force of gravity*). This is another reason why *seat of the pants* flying is so dangerous to the unwary.

Even our basic maneuvers texts way back in preflight gave us a hint of this illusion when they talked about load forces on the aircraft and load factors in coordinated and uncoordinated turns. In a prolonged coordinated turn, we feel as if we're not even turning. Because the gravitational force equals the centrifugal force, we have a net force change of zero. In a prolonged uncoordinated turn, the centrifugal force usually exceeds the gravitational force, and we slide to the outside of the turn (or the inside, depending whether we're in a slip or a skid, a banked or a flat turn). Got the drift? (No pun intended.) If the turn is prolonged, our brain takes the resultant force vector of the gravitational force and the centrifugal force and gives us a *new* vertical (see Fig. 1).

The changes in perceived vertical are not nearly as dangerous in the roll mode as in the pitch mode, especially in low-level flying.

In normal straight-and-level flying, without accelerative or decelerative forces, the force of gravity is the predominate force and we have no problem. Our trusty "glutimus maximus" (pant's seat,

for the uninitiated) faithfully tells us where mother earth is located. During a prolonged acceleration, by increasing our power setting or by reducing drag, a force is pushing us back into our seats, and we feel as if we are pitching up. The resultant force is aft and down (our new vertical), as in Fig. 2. The opposite occurs if we decelerate, by reducing power or increasing drag. (Have you ever double-checked your altimeter or VSI, after putting out the spoilers, to make sure you weren't losing altitude, or pulled the stick back to maintain altitude only to find yourself climbing?)

For those of you who like a definite mathematical equation to tell you just how affected you will be and when – forget it! Just how affected each of us becomes varies with each of us as individuals, how we feel on that particular day, and to make matters worse, it may take up to a minute for the illusion to be fully established. Figures 1 and 2 are just gross estimations. A catapult launch, which usually gives us about a 5G (50 meter/second^2) peak for 2-3 seconds, can also give us an erroneous sensation of a noseup attitude for more than a minute! This was the primary cause of our loss of many naval aircraft several years ago after catapult launches on dark nights. The planes would essentially fly into the water shortly after a completely normal launch. Since the cause of these "unexplained" mishaps was ascertained, general instructions for climbout after such a launch were modified. We have lost very few planes since. However, we are still losing aircraft simply because the pilot in control doesn't look at and believe his instruments! But, these illusions affect not only our high performance jocks. As little as 0.2G, if sustained for several minutes, can make even you helo and patrol types feel as if you're climbing, or at least in level flight, when in reality you could be losing altitude rapidly. This could be bad news for you on a low-level mission, or a dark night, or in severe IMC conditions.

Sound bad? It can be worse! If you experience the somatogravic illusion on takeoff or when you're worried about overshooting an approach (again, especially so at night or under poor visibility conditions), you may feel as if you're climbing or in a pitch-up attitude. Response? Push the stick forward, of course! No time to check altitude – too low! Get the picture?

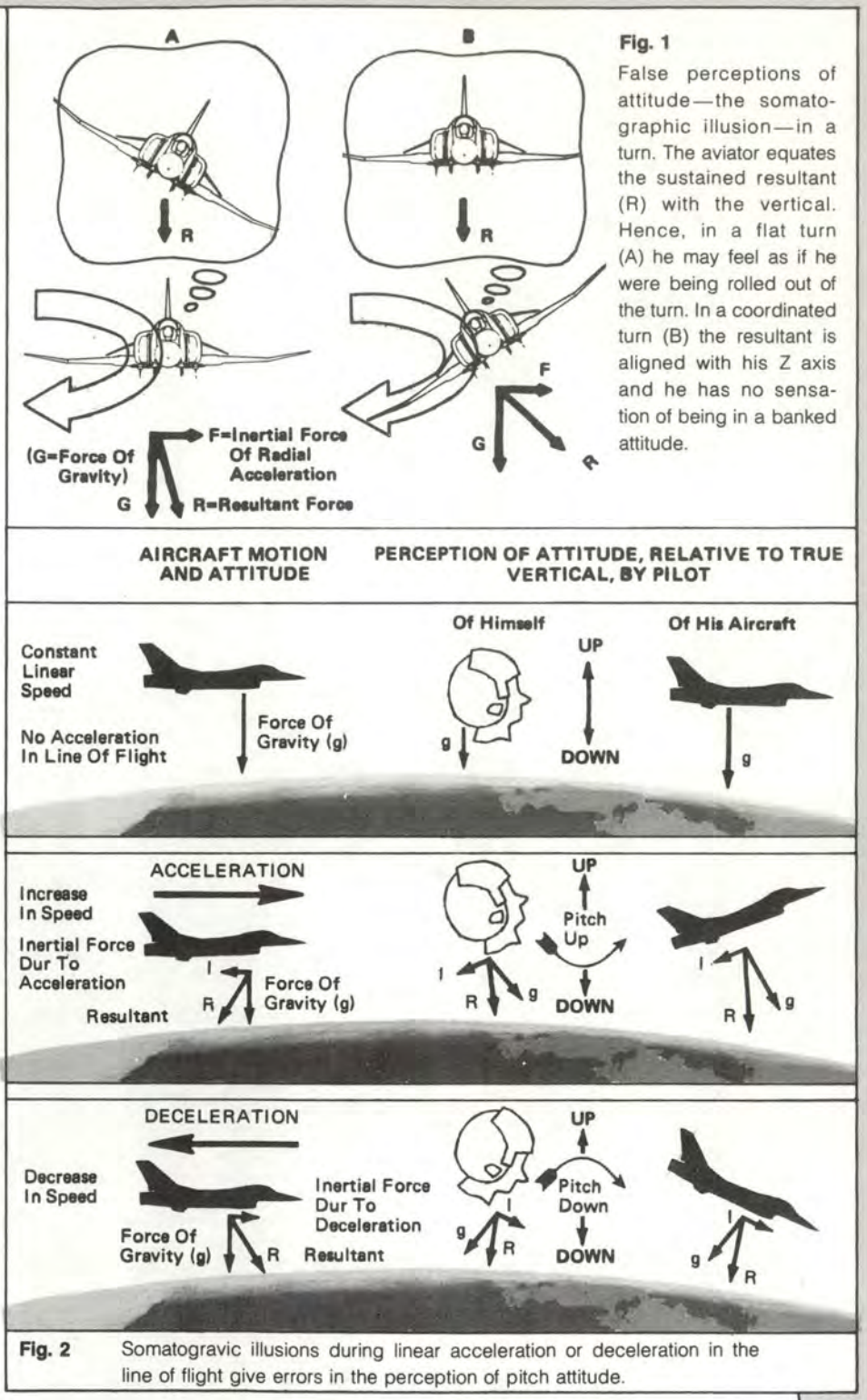
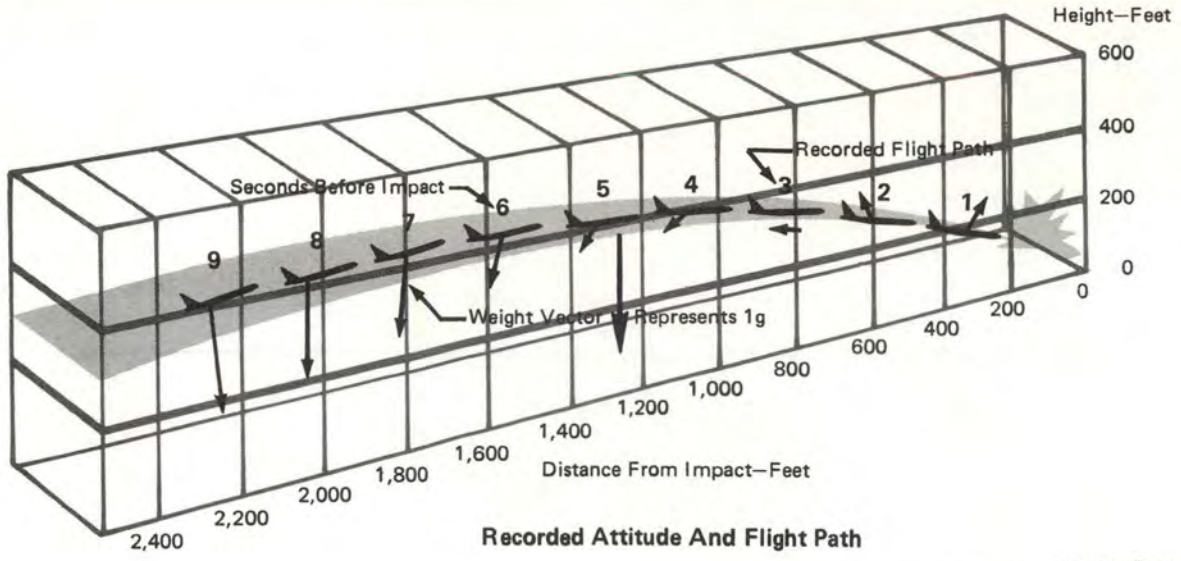
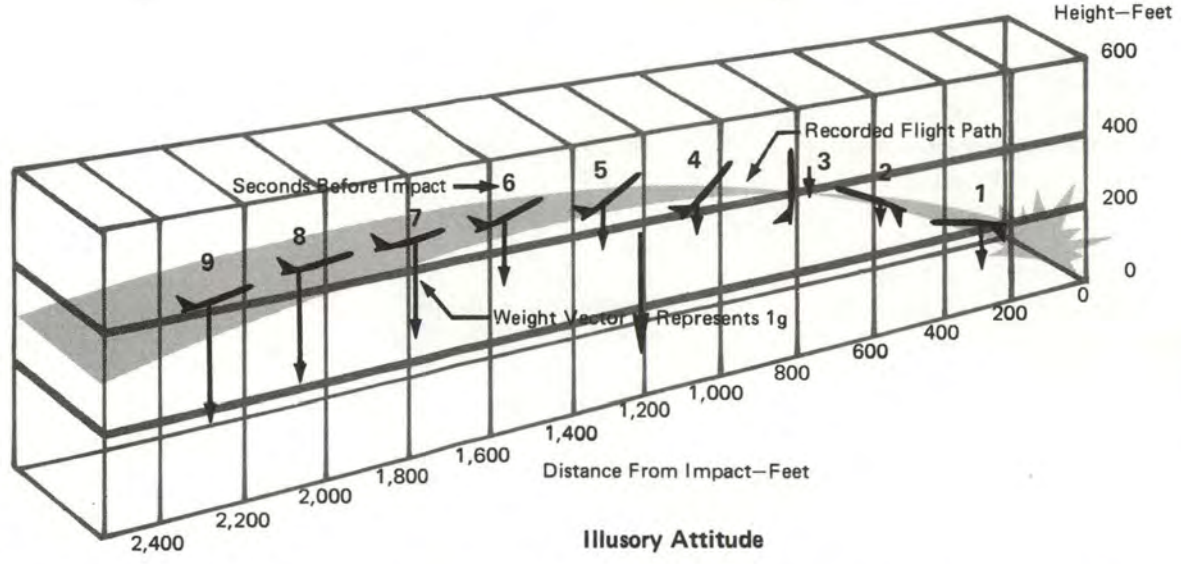


Fig. 1 False perceptions of attitude—the somatographic illusion—in a turn. The aviator equates the sustained resultant (R) with the vertical. Hence, in a flat turn (A) he may feel as if he were being rolled out of the turn. In a coordinated turn (B) the resultant is aligned with his Z axis and he has no sensation of being in a banked attitude.

Fig. 2 Somatogravic illusions during linear acceleration or deceleration in the line of flight give errors in the perception of pitch attitude.



Recorded Attitude And Flight Path



Illusory Attitude

Fig. 3

Recorded flight path and calculated force (weight) vector of an aircraft which crashed after initiating an overshoot. The initial change in the direction of the force vector was caused by acceleration in the line of flight. Later, the curved flight path introduced a radial acceleration and was responsible for large changes in the direction and magnitude of the force vector. Over the relatively short time scale in which changes in the force environment occurred, it is unlikely that the illusion perception of attitude was as erroneous as indicated in the lower half of the figure, but illusions of the form shown have been reported during comparable bunt maneuvers.

Things are usually worse if we decide to decelerate or accelerate during a banked turn. We now have two added accelerative forces, instead of the already-dangerous one. The resultant force vector gives the *seat of the pants* pilot a perceived vertical that is even farther from the truth. We make what we feel to be a corrective response, but the noseup attitude seems to become more severe, rather than becoming less. We're tempted to push the stick a little further forward. This increases the tightness of the bunt maneuver, with further rotation of the force vector. We may even be exposed to negative G. Confused on the outcome? Well, those pilots who have been lucky and high enough to be able to recover from their illusion have reported that they felt as if the aircraft had pitched up and flipped over on its back (see Fig. 3)! Recovery was finally made with the plane actually in a near-*vertical* dive, several thousand feet lower than when everything started!

As usual, we will tell you how to prevent making yourself a statistic in our computer once you suffer this illusion. Scan your instruments repeatedly. Do not rely on what you *feel* to be your orientation or attitude. Double-check your instruments and *believe* the instruments! There's *always* time enough to save your skin, if you only choose to do so. – Courtesy May 1980 *Approach*. ■

THE OTHER PILOTS IN THE AIR FORCE

MAJOR MICHAEL T. FAGAN • Directorate of Aerospace Safety

■ The official Nomex-covered Air Force pilot gets a lot of attention in the magazines and from the safety office, but there are several thousand of you other pilots associated with the blue suit, and this article is addressed to *you*. About four thousand of you are members of Air Force aero clubs (not counting dependents, retired, and other eligibles.)

No doubt there are at least that many more general aviation pilots hiding out there of which we have no specific knowledge. The safety folks learn about a few of you each year from reports of fatal accidents. If you do not belong to an aero club and are not involved in an accident, you will probably remain uncounted. Unfortunately, this also means that it is hard to communicate with you. This article may seem aimed primarily at the aero club flier, but it is actually intended for all you general aviators in, or associated with, the Air Force.

The Air Force wants you to be interested in flying. Aviation is what we are all about. Whether you are a clerk, maintenance person, cook, or dependent, your involvement in aviation and knowledge of flying make us a more tightly knit community and a better, more efficient outfit. It's logical that you should be interested in flying. If you weren't, you would probably have joined one of the other services. What better way to develop (or improve) interest in aviation than by actually being a pilot? It's expected that a lot of you want to fly, and that's what the aero clubs are there for.

They are not only there for your edification and enjoyment, but also for your safety. They work. The aero club safety record is about twice as good as that of similar general aviation. Last year 10 blue suiters were killed in light aircraft accidents. No one was killed in an aero club aircraft. Already in 1980 there have been four Air Force fatalities in non-aero club flying accidents, and none (so far) in the clubs. This should get your attention . . . safety is one of the first things a pilot looks at when he selects a plane or plans a trip.

Consider it. Other things being equal, wouldn't you choose the aircraft with the better safety record? Even though you fully expect not to crash, don't you wear your seat belt? When you say that that one thousand foot sod strip is tricky to get in and out of, don't you really mean that it is more risky? Sure . . . you can handle it, but there is a greater chance of a problem cropping up. The bottom line is that all pilots know they are operating in an environment which presents increased risks. There are very few "fender-benders" in airplanes. Most aircraft mishaps present a high probability of injury or death. Pilots recognize this and compensate for it with caution and discretion in their choice of equipment and flying environment as well as in their conduct while airborne.

So, if you are an aviator but not a member of your local aero club, give a thought to joining. You will find it convenient, relatively inexpensive, and significantly safer than the general aviation community at large. Part of the reason for the better record is carefully maintained equipment. Another factor is that many aero club birds are equipped in a manner which would be well beyond the means of most of us, in addition to facilities help, i.e., runways (*big* runways!) weather service, lights, etc.

Supervision is a major factor. The very regulations that might seem to be a reason not to join the club are really a positive factor. Like your seatbelt – they may restrict you a little, but they will keep you alive in the pinch. This is not only

THE OTHER PILOTS

continued

demonstrated by comparison of the aero club record with that of general aviation, but by analysis of the accidents which have happened within the clubs themselves.

That brings us to the bad news. USAF aero clubs have experienced seven accidents this year, compared with five by this date in 1979. Of those seven, three involved clear violation of club regulations. Two were wire strikes and one involved photo-recce on a one-horned moose.

It should go without saying that certain acts, such as hitting wires or flying up a narrow canyon, are unwise and dangerous. Experience, however, has shown that even the obvious needs to be stated. In fact, a great deal of the body of flying regulations is the direct result of mishaps caused by failure of common sense. "Everybody knows" not to do something, but after several folks do it anyway, with predictable results, the option to be unsafe is restricted by regulation. This does two things: it capitalizes the results of experience and it gives supervisors the opportunity to impose a penalty for recklessness which is less severe than the results of an accident.

Flying regulations will not prevent all accidents. Material failure will still be with us, as will lack of experience, to name just two of the prevalent causes of accidents. And there will always be those who will not follow the regulations, or recognize that they are the distilled essence of painfully learned lessons. But, had basic regulations been followed, the aero club accident rates for 1980 would have been better than last year for a period in which general aviation accidents are running 55 percent ahead of the same period of 1979. Adherence to the regs would have prevented these unexcusable and expensive mishaps, as it has undoubtedly prevented others not suffered because the vast majority of aero club fliers know and comply with the regulations they have agreed to follow when they signed up.

Besides the three accidents caused by unauthorized low level flight, aero clubs have had three engine failures resulting in accidents, and a landing mishap which is still under investigation. In one case of engine failure, the pilot may have erred in judgment, as he had ample warning that the engine was acting up, but elected to continue a sightseeing flight in the mountains.

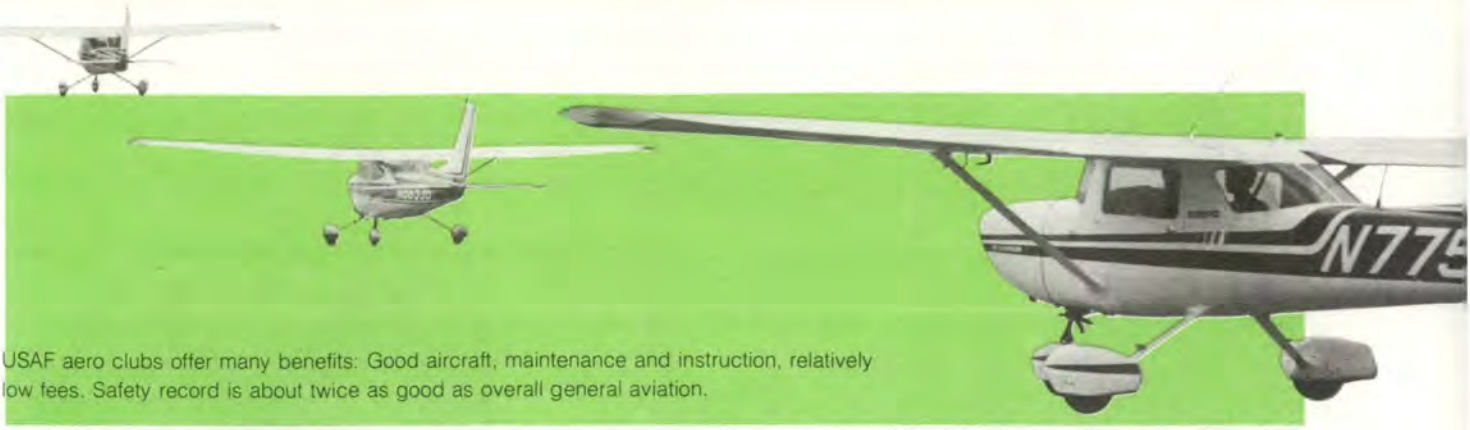
All of the four general aviation fatalities to Air Force personnel display lack of judgment. In January, one of our number was ferrying a Cessna at night. He ran into hazardous weather and elected to press on towards his destination rather than turn back. The aircraft crashed, and the pilot was killed.

In April, on the other coast, an airman had filed day VFR to a resort area in the mountains. Enroute, he was advised that weather was worse than originally forecast, but he, too, elected to continue, despite a pirep that another pilot "sure wouldn't recommend VFR . . ." to the destination. Two miles south of his intended landing point, the aircraft crashed into a mountain and was not located until the following day. The pilot and one passenger (non-AF) sustained fatal injuries.

In the third mishap, two blue suiters were killed. The mishap pilot had driven, at night, to a local airport to show three friends the remains of a single engine aircraft he had crashed without being injured the week before. For some reason, he decided to demonstrate his prowess as an aviator in a light twin parked at the field. He had neither the owner's permission nor any known experience in twin engine aircraft! Two of the fellows, apparently considering the airman's recent track record, deferred, but a third went along for the ride. After a short flight, the aircraft crashed nearly vertically, and both occupants were killed.

No amount of regulation short of direct intervention before the fact, could have prevented this last

An airman crashed this airplane, then one week later stole a twin engine airplane and crashed shortly after takeoff. He and a passenger were killed.



USAF aero clubs offer many benefits: Good aircraft, maintenance and instruction, relatively low fees. Safety record is about twice as good as overall general aviation.

example. Who could have predicted that the mishap pilot would do what he did? As to the weather fatalities, they fall into an unfortunately familiar pattern, as do the low level mishaps. The common thread in all these accidents is failure by the pilot to exercise basic common sense. Granted, most violations of good judgment are neither discovered nor punished with an accident. Most of the time we get by with it, but each of these mishaps could have been prevented by the exercise of reasonable caution. Sometimes that caution is legislated by regulations. Sometimes it's a characteristic you are assumed to possess when you are awarded a pilot's license and which goes beyond the letter of regulations.

Being timid and being a pilot are almost mutually exclusive propositions, but where is the line drawn between lack of caution and lack of timidity? No pilot wants to be called either timid or cautious. So, we have come up with words which are acceptable to our egos and which demonstrate a proper respect for both our airframes and our lives. They are "professionalism" and "air discipline."

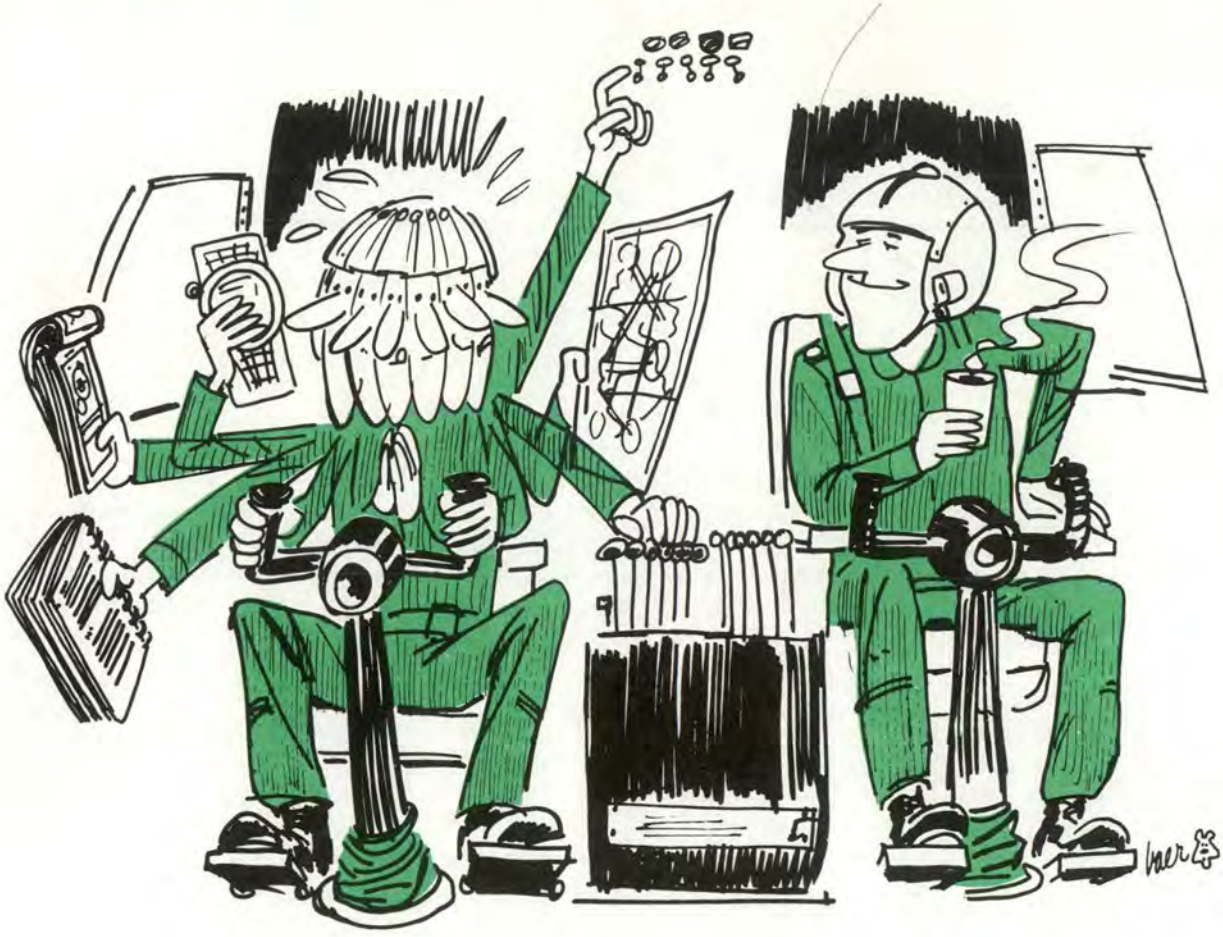
Professionalism begins with the recognition that your pilot's license carries with it not only the freedom to perform acts not given to mere mortals, but the responsibility to be good at those acts. That means knowledge and judgment. As a pilot, you are responsible for knowing your airplane's limitations and your own, and you are responsible for ensuring that neither are exceeded. Demanding more than you or your aircraft are designed for will shortly result in an accident. Having accidents is not the mark of a good pilot. While a crash may be a spectacular ending to a flight, the impression it leaves on your friends is not what you had in mind when you took off. Good pilots are decisive individuals. Two of the hardest professional decisions to make are the decision to turn back and the decision to refuse to show someone just how good a pilot you are.

Air discipline begins with thorough knowledge of the regulations and full acceptance that those regulations were written for your benefit and safety. There is no "Mr. Grinch" at FAA or your aero club whose pleasure it is to keep you from having fun in your airplane. The regulations were written to ensure. insofar as it is possible, the safe, expeditious progress of air traffic. Failure to know the rules is no less dangerous than failure to follow known directives. The result is the same: risk to life and equipment, and inconvenience to those following the rules.

This is the bottom line. If you are a general aviation pilot, you are one of many thousand associated with the Air Force. Your participation in flying activities makes you a better, more knowledgeable member of the team. The Air Force is vitally interested in your safety. If you are not a member of an aero club, please consider it. There are several good reasons for being a member, not the least of which is a proven safer flying environment. Whether a member or not, as a pilot you have a responsibility to be the best possible aviator. This means not only having highly skilled hands and feet, but developing professional attitudes and practicing air discipline.

Remember . . . none of the pilots who had accidents expected to have them when they left home. You may not be able to avoid an engine failure and subsequent inelegant touchdown in an unprepared area, but you can avoid hitting telephone lines. Or finding yourself up a canyon without space to do a 180. Or icing up on what started out as a VFR flightplan. Why not fly smart? ■

The Care And Feeding Of Copilots



■ This article is (or was, anyway) primarily about multi-pilot aircraft. But, before you flip the page and press on looking for something about G's and stuff, read on awhile – some of this may just apply to some of your dealings with navs, booms, loadmasters or even wingmen. What I'm interested in, is talking to the individual who finds himself (or herself) in command of an aircraft. A multi-person aircraft requires a special kind of coordination and communication. That communication includes both verbal and non-verbal between the two pilots, and that is the crux of this article. Having flown in different environments (B-52, F-4, T-33, T-39), I'd like to pass on some thoughts about the treatment of an often berated minority group – copilots.

As an aircraft commander, you are automatically part instructor. You may not have the "I" in front of your title, but the copilot is your student, and what kind of pilot or aircraft commander develops is up to you. The first and most important point is the age-old leadership by example trick. It's going to be pretty difficult for you, as an AC (or IP), to hammer or critique a reg or procedure bust if the "co" has been watching you set the same bad example on previous flights. So the first corollary in the proper care and feeding of copilots is to have your own act together. A professional, knowledgeable aircraft commander sets the tone and standards for the entire crew, especially the copilot. Don't confuse that with dictatorial, tyrannical or obnoxious; I've met those three folks also.

Part of the knowledge you must have stored in the active section of your mental computer is a thorough understanding of the duties and responsibilities of your copilot. I won't say you can't, but I will say that it is an uphill battle for you to properly train and supervise a copilot if you haven't been there. Either way, you need to know what's to be done by the right seater in order to guarantee maximum efficiency and safety together up front. So, the second corollary is – know his (or her) job!

By MAJOR DAVID V. FROEHLICH • Directorate of Aerospace Safety

Next, I think one of the most important tasks (and often the hardest to remember) for an aircraft commander is to let the copilot do the job. Example – I think that for a B-52 copilot to be really good is one of the most challenging and difficult right seat jobs in the USAF. The occupant is part flight mech, loadmaster, fuel specialist, flight engineer, radio operator and low level navigator. And in his spare time, he has to be proficient at flying the machine, too! You give him all that to do and the average conscientious "co" will attack the problem and do pretty well. However, you, as the AC, need to have patience and a certain amount of trust that the tasks will be accomplished properly and at the right time.

Don't jump in on frequency changes, checklists or systems malfunctions. Things may not go as fast as they would for you, but he's learning. Besides, some dark and snowy night, when you've got your hands full of sick machine, you are going to grit your teeth and trust the copilot to do it alone anyway, so you'd better let him practice. This is all tempered, of course, with judgment because, as I mentioned before, you have to be part IP and decide "just how far do I let him go?" I guess what I'm saying is that nothing destroys the initiative and confidence of a copilot faster than to have the left seater continually "helping out" by jumping in or reminding of tasks. It's like fudging on headings on a VFR PAR – you're not helping anybody.

A last pearl of sage wisdom would be to let the "co" fly the machine – no, belay that – *make* him fly the machine! Here's where part IP again enters into the scenario. If you want to think of it as life insurance, go ahead, 'cause it is, You may be the AC that "it can never happen to me" and has the 40 pound vulture land in his lap through the windshield in the traffic pattern. That's when it will be kind of nice to confidently sit back and let the "co" crack the 200 and ½ and bring you (and the rest of your mob) home.

To be able to do that, you had better start giving up as much actual stick time as the law allows until you see the desired level of proficiency emerge. Then, make sure there is more than adequate practice. Your experience will overcome rustiness in many cases, but often a copilot doesn't have that experience reserve to draw from.

An aircraft commander is automatically part instructor pilot.

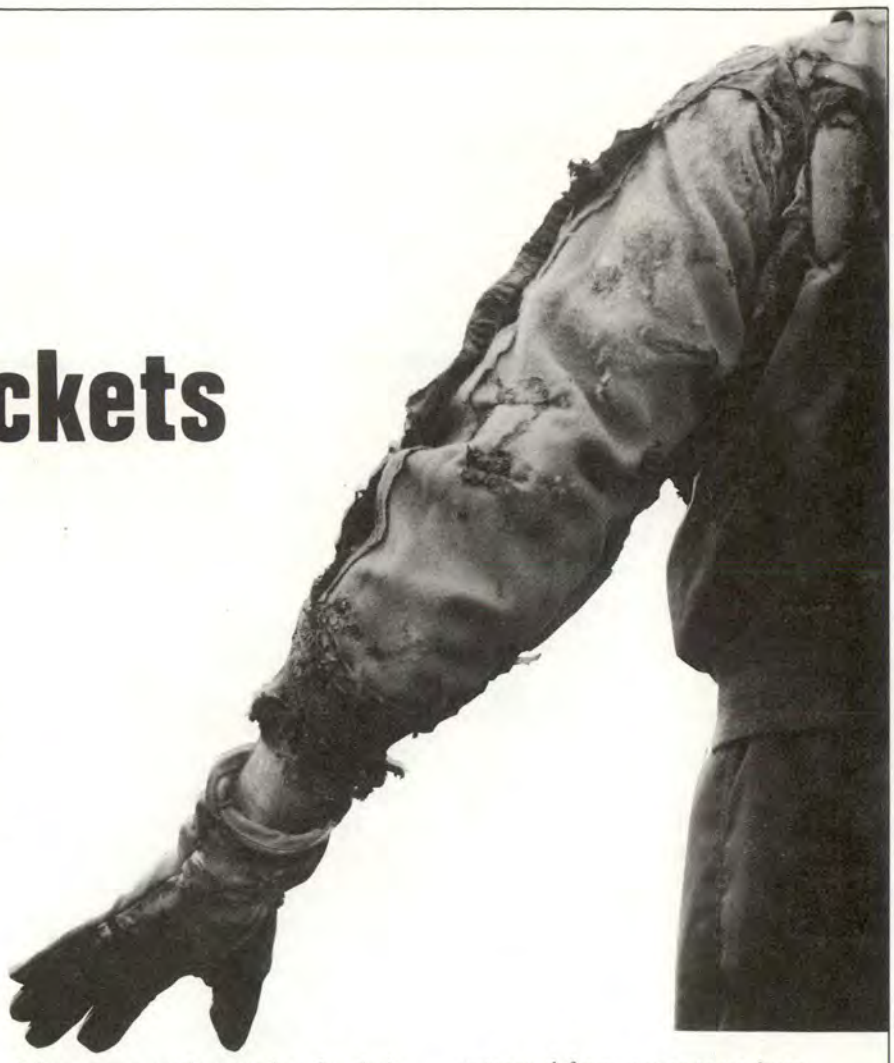
When the copilot is flying the machine, insist upon preciseness and professionalism. Again, this should be done in a way that doesn't detract from the training value. Anyone who's ever had a "screamer" with him knows what I mean.

The crews that I have flown with or been on showed me one major point which I feel is worth repeating. A crew aircraft is just that! Every single body on board has a place and function in the mission of the machine. The two critical elements of crew flying are communication and coordination. These include knowledge of and respect for everybody else's job plus an atmosphere of cooperation. Crew flying should be a no-threat environment in that the nav or copilot should not feel threatened when reminding the AC of an altitude and checklist item, and the AC needs to let everyone know he appreciates being reminded.

The copilot can be either an asset or a liability in the tough situation involving mission accomplishment, despite weather, systems malfunctions or other adverse conditions! How he will perform then depends on how he is trained and supervised now. We have lost some good machines and killed some crews because of confusion in multi-place cockpits. Coordinated crews cut the odds of being a statistic! ■

NOMEX VS NYLON Flying Jackets

By MAJOR WILLIAM HARRISON
Life Support System Manager
Kelly AFB, TX



■ How many times have you heard other aircrew members refer to flying as hours and hours of boredom interrupted by fleeting moments of stark terror? I don't believe there is a crewmember anywhere who can't recall a few of these extremely tense moments. One of those heart-pounding sessions, which occurred a short time ago, should make everyone who flies evaluate how much his own skin is worth. Let's take a look at some of the highlights of this mishap and see just what occurred.

The scene: A fighter base in the southern part of the United States. The machine is a two-seat fighter aircraft with both crewmembers strapped to their seats, preparing to hurl themselves into the blue in search of fame, fortune and to fill a few of the required squares. The front seat pilot depressed the ignition button on the throttle and the starter began its whine. Shortly after reaching 75 percent engine rpm, the crew heard a muffled explosion. Hearing that, the pilot attempted to retard the throttle but it would not go into the cutoff position. Upon seeing flames on the left side of the cockpit, he abandoned further attempts to shut down the engine. As flames shot up both sides of the open cockpit, both front and rear seat pilots decided that things were getting too hot for their liking and thus prepared to depart the scene . . . rapidly.

The front seat pilot then released the lap belt and shoulder harness, stood up in the cockpit, stepped onto the right canopy rail, and jumped to the ground. The rear seat pilot, not wanting to be left holding the bag, or in this case the burning airplane, closely followed suit. Both rolled on the ground thinking their clothes to be on fire, and then were escorted to the ambulance by the crew chiefs. The fire was extremely intense and the aircraft was destroyed.

The front seat pilot was wearing a nylon flying jacket of which the outer portion of the left sleeve was burned completely away from the shoulder to the cuff and he received third degree burns of both wrists. The rear seat pilot was wearing a nomex flying jacket and thus was protected from upper torso burn injuries.

In placing the two jackets side-by-side, it is obvious that all aircrews should heed the aircraft Mishap Investigation Board's recommendation that, "all aircrews be outfitted with nomex flight jackets as soon as possible."

Now comes the hard part – getting the jocks to turn in their trusty veteran nylon jackets for the new-kid-on-the-block "nomex." I can hear it now, "I can't part with my nylon jacket, it saw me through some tough spots in pilot training and over 100 missions in Southeast Asia, and still has a lot of life left in it. Give the nomex to the new guys, I'm keeping my tried and true model!"

Many of us have scores of "war stories" that we can recall just by looking at our old trusty jackets; a scuff mark on the shoulder or a JP-4

stain on the sleeve. These battle scars are visible proof of where we have been and what we have done, and it is understandable that there is some reluctance to part with this old friend. But let's not let past memories prevent us from taking advantage of the latest in protective clothing.

In recent years, we have seen the introduction of nomex flight suits, gloves, insulated underwear, G-suits, life preserver packs, and seat cushion covers. The nomex jackets, both winter and summer, are the latest in aircrew fire protection. Check out your flying wardrobe and, if you're still wearing a nylon jacket, how about getting your order in for the nomex and retiring the nylon? ■

REUNION

World War II, 315th Troop Carrier Group Association, 3rd Unit reunion October 23, 24, and 25, 1980, St. Charles Hotel, New Orleans, Louisiana 70140. For additional information contact: Ed Papp, 315th T.C. Gp., Ross Llewellyn, Incorporated, 222 S. Riverside Plaza, Chicago, Illinois 60606.

Pilot wearing nylon jacket received serious burns. Other pilot, wearing nomex jacket, was uninjured.

Crew Confusion

Helicopter Mishap With a Moral

■ When the rpm warning light and audio activated as the UH-1H was making a ground controlled approach to the airfield, the pilot lowered the collective and began a left turn towards a forced landing area. The aircraft approached the ground in a nose-high attitude with about 20 knots of forward airspeed. After a hard touchdown, collective was increased. The Huey became airborne again and pitched forward. The main rotor blades hit the ground with enough force to cause the transmission to be displaced.

The mission was to fly to a post about 55 minutes away, pick up passengers, and return to home base. While the pilot planned the flight, the copilot preflighted the aircraft. A fuel sample was not taken, and the aircraft was overdue an engine runup and daily inspection.

Although required by current directives, there was no premission coordination between the crewmembers concerning duties in the event of an emergency.

The first leg of the mission was flown as planned and, except for a slight fluctuation in egt, aircraft performance was satisfactory. The copilot, allegedly to reduce fuel consumption, decreased engine rpm to about 6400-6500.

The Huey was refueled at the passenger pickup point. The return flight was delayed more than 2 hours awaiting arrival of the passengers. Departure was made without a passenger briefing.

A VFR flight plan was filed. Weather at destination was 800 feet overcast with 10 miles visibility. Fourteen miles east of destination, a ground controlled approach was requested. The aircraft was 10 miles out in level flight at 4,000 feet when the pilot took the controls and began instrument flight. The ground controlled approach was initiated, and the aircraft entered a layer of clouds at 1,800 feet. At this point, a prelanding check was made, and the landing light was extended but not turned on.

As the aircraft cleared the bottom of the cloud layer, the rpm warning system activated. N_2 rpm and rotor rpm dropped to 6000 and 300 (needles joined). The pilot lowered the collective without rolling the throttle off and began a left turn toward a forced landing area. The pilot then made a Mayday call and decided to try to increase engine rpm using the increase/decrease switch. Simultaneously, the copilot moved the fuel control governor switch to the emergency position. The resulting engine overspeed was in excess of 7000 rpm, and the rotor overspeed was in excess of 400 rpm.

The aircraft responded with an immediate nose-up attitude and right yaw. The pilot increased collective pitch and retarded the throttle to decrease engine and rotor rpm. Without waiting for acknowledgement from the pilot, the copilot returned the governor switch to the automatic position. Engine and rotor rpm decreased and was stabilized at 6000 rpm and 300 rpm with the collective full down and throttle full on.

About 300 to 400 feet above the ground, airspeed was 40 knots and decreasing. The pilot lowered the nose of the aircraft and the airspeed stabilized at 40 knots. About 20 to 30 feet above the ground, the pilot decelerated but did not apply power until ground contact was made. The aircraft approached the ground in a nose-high attitude with about 20 knots of forward airspeed. Touchdown was hard. Collective was increased, and the aircraft became airborne again, then pitched forward. The main rotor blades hit the ground three times, and the transmission was displaced. The aircraft came to rest in an upright position.

The 28-year-old pilot had almost 800 rotary wing flight hours. More than 700 of these were in UH-1Hs. The 22-year-old copilot had almost 300 rotary wing flight hours, with more than 200 in UH-1Hs.

The performance of both aviators

was satisfactory during their postaccident flight evaluations. However, both aviators displayed weaknesses in the knowledge of . . . emergency procedures, use of the . . . checklist, and the performance of autorotations. Neither aviator knew the correct procedure for manual operation of the throttle with the governor switch. . . .

The pilot permitted the copilot to beep N_2 down to considerably less than 6600, allegedly to conserve fuel. The aircraft had been refueled before start of the return leg of the mission and estimated time en route was one hour. The need for fuel/range management was irrelevant to safe accomplishment of the mission. A further beep-down of N_2 may have inadvertently occurred later in the flight, causing the rpm warning system to activate. There was no evidence to confirm a materiel malfunction.

An approach with lower power was made because the pilot and copilot incorrectly assessed a low engine/rotor rpm indication as a low-side governor failure and failed to respond to the suspected emergency correctly. Following the onset of the emergency, the pilot began to remedy the condition by beeping up N_2. The copilot placed the governor switch in the emergency position while the throttle was in the full-on position without telling the pilot. When the pilot tried to compensate for the resulting engine/rotor overspeed by adding collective and rolling off the throttle, the copilot returned the governor switch to the automatic position, causing further confusion.

The cumulative effect of these actions may have overloaded the pilot to such a degree that he was unable to complete the approach and landing without damaging the aircraft. The pilot initiated the deceleration phase of the approach at too low an altitude (about 25 feet agl) to fully realize an appreciable reduction in forward speed and sink rate before touchdown was imminent. As a result, he was late in applying control inputs necessary to arrest the rate of descent and achieve a near-level attitude on landing.

Although the copilot cannot be faulted for misinterpreting a probable beeped down N_2 condition as a low-side governor failure, he should not have cycled the governor switch into and out of the emergency position without the pilot's knowledge. The pilot did not brief the copilot before the flight regarding duties and responsibilities in the event of an emergency. Also, when the pilot began to remedy what he thought was a beeped down N_2 condition, he did not coordinate his actions with the copilot.

- No fuel samples were taken during the mission.
- The pilot did not brief crewmembers concerning duties in case of an emergency.
- Passenger briefings were not given.
- The aircraft was started and shut down without use of the checklist.

The commander had an excellent training program in writing; however, it was not being enforced. Training in the use of appropriate publications, weather, emergency procedures, and other flight-related subjects was not provided on a regular basis.

Stress and its relationship to crewmember performance, as well as the types of errors that lead to creation of a high stress situation, should be discussed at unit safety meetings.

Commanders must ensure assigned personnel are ready to perform jobs assigned. Less experienced aviators must be continually monitored, evaluated, and trained as necessary to ensure they are capable of coping with in-flight emergencies. Aviator judgment should be evaluated as an area of special interest during standardization evaluations and unit training flights.

Commanders should emphasize to their aviators the importance of crewmember briefings prior to flight, proper crew coordination, and aviator professionalism in general. – Adapted from *Flightfax*. ■

FIRST LIEUTENANT

Ben G. Brockman

FIRST LIEUTENANT

Berneil L. Reed

401st Tactical Fighter Wing

■ On 10 September 1979, Lieutenants Brockman, AC, and Reed, WSO, departed Torrejon AB, Spain, in an F-4D as part of a Squadron deployment to Incirlik CDI, Turkey. Immediately after gear and flaps were retracted, and prior to terminating afterburner operation, both engine fire lights and both overheat lights illuminated. The city of Torrejon de Ardoz and numerous high-rise apartments are located only one mile from the departure end of the runway. Lieutenant Brockman and Lieutenant Reed realized that if they jettisoned the external stores, the fully loaded fuel tanks would impact into Torrejon de Ardoz's most heavily populated area. They thus began a shallow climbing turn away from the apartment complexes and terminated afterburners. At this time, both fire lights and the right overheat light went out. Lieutenant Brockman then retarded the left throttle to idle since the left overheat light remained on. The fire warning circuits tested good at this point and the EGT on both engines was normal. By this time, they were over the less heavily populated area between Torrejon AB and Madrid-Barajas International Airport (located some five miles west of Torrejon de Ardoz) and were establishing themselves on a right downwind for a VFR straight-in. As they informed the tower and supervisor of flying of their problem, Lieutenant Brockman deselected the external tanks, went to stop transfer, and began dumping fuel in anticipation of a heavyweight landing. In the space of only a few minutes from the onset of the emergency, the crew had completed all checklist items and were on an extended VFR straight-in approach. Lieutenant Brockman terminated the emergency with an excellent heavyweight landing and shut down the aircraft at the end of the runway. Investigation revealed that the centerline tank had partially broken loose from its fittings. Additionally, extensive fire damage was evident throughout the aft portion of the aircraft. The outstanding airmanship, professional abilities and calm thinking demonstrated by Lieutenants Brockman and Reed during this emergency marked the difference between tragedy in the heavily populated suburbs of Madrid and the actual safe recovery back at Torrejon. WELL DONE! ■

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UNITED STATES AIR FORCE

Well Done Award

Presented for

outstanding airmanship

and professional

performance during

a hazardous situation

and for a

significant contribution

to the

United States Air Force

Accident Prevention

Program.

CAPTAIN

Brent Leveille

22d Bombardment Wing
March Air Force Base, California

■ On 28 August 1979 Captain Leveille was flying the low level portion of a B-52D training sortie at night below an overcast when the aircraft developed multiple AC power failures. Dash 1 procedures to restore power were implemented immediately, and the pilot initiated a climbing right turn to abort the low level route. During the climbout, the aircraft experienced total AC power failure limiting the pilot's instrumentation to "needle, ball, and airspeed." While the aircraft was in the overcast, the airspeed indicator failed to zero. Still in the weather, the aircraft entered a 3,000 - 4,000 fpm rate of descent before the wings could be leveled using needle and ball indications. A gradual climb was re-established. Soon afterwards, AC power was restored allowing the pitot heat and airspeed indicators to function normally. The aircraft was recovered without further incident. The professional performance of Captain Leveille and crew under the most demanding conditions was responsible for saving a valuable aircraft. WELL DONE! ■

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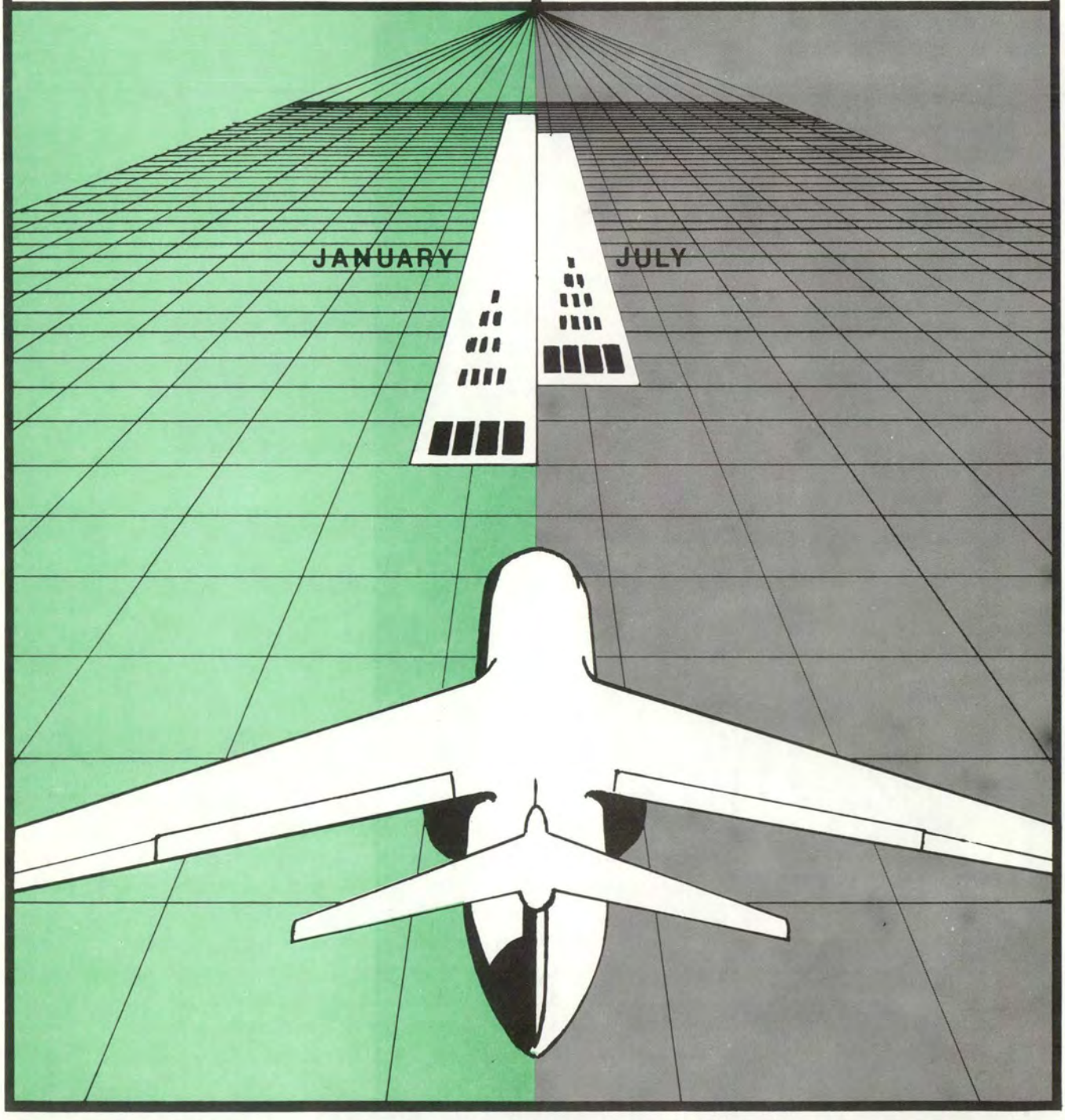

CHECK DENSITY ALTITUDE