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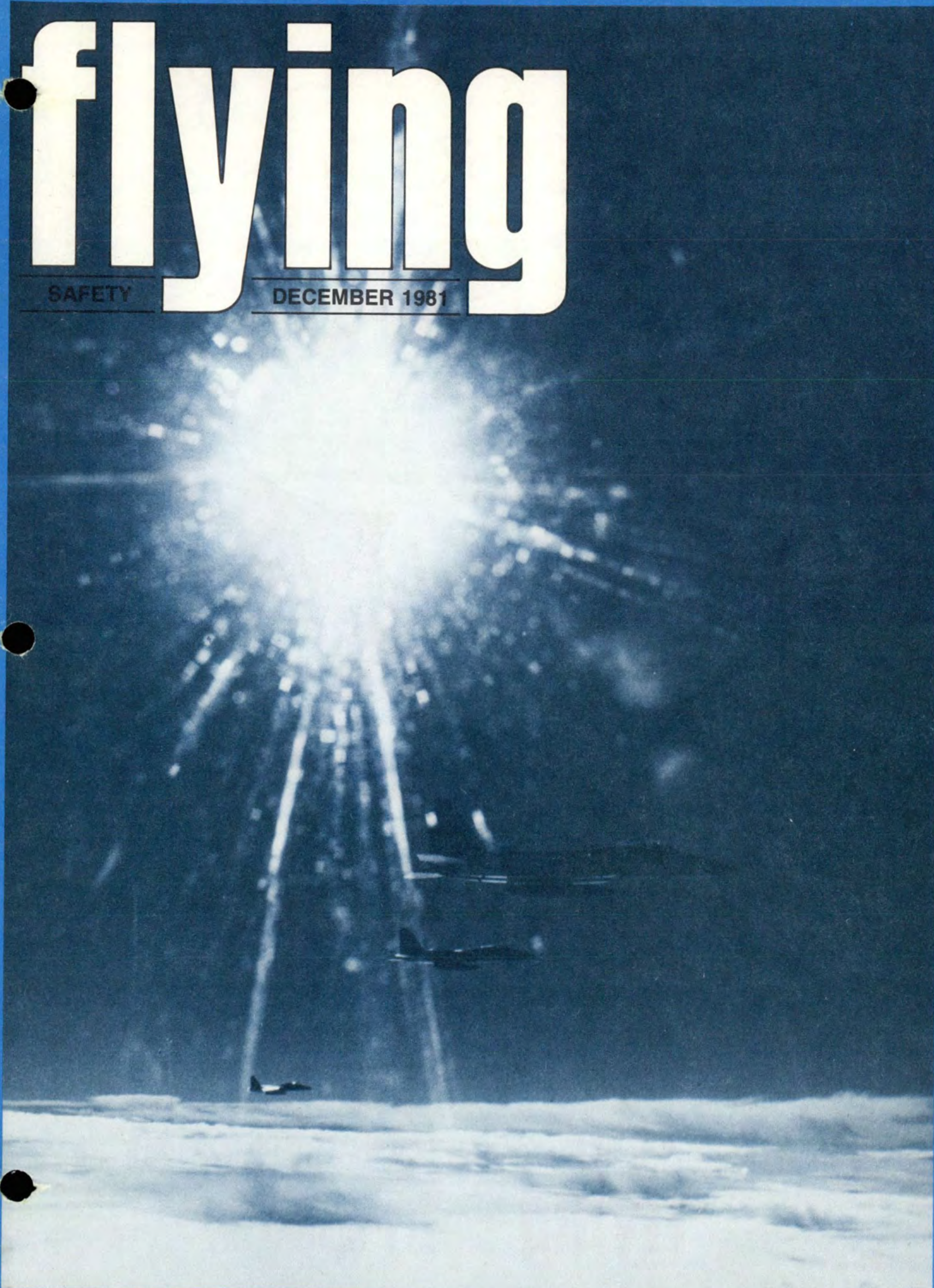
SAFETY

DECEMBER 1981



Here's wishing you the SAFEST of SEASON'S GREETINGS.... ever!!

From all of us here at AFISC and the staff of the...

flying SAFETY MAGAZINE

UNITED STATES AIR FORCE

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SAFETY MAGAZINE

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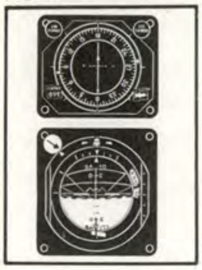

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DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

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Planning And Flying

MAJOR MICHAEL E. THORN
71st Flying Training Wing
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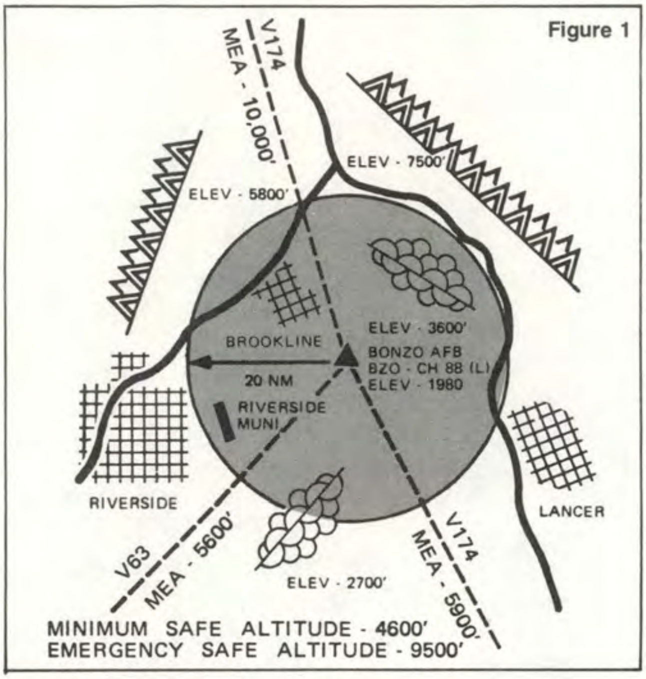


Figure 1

■ With the advent of winter weather and associated lower ceilings, it is appropriate to consider once again the vagaries of fate as they pertain to terminal arrival procedures. This article, however, is not concerned with IFR procedures and/or instrument flying, but one of the main staples of aviation — VFR arrivals.

As stated in AFR 60-16, Chapter Eight, "All Air Force flights are conducted under IFR to the maximum extent possible. . . ." This overall policy, though, does not prohibit a substantial amount of VFR flight if necessary for mission accomplishment. Several instances of exception to this basic policy immediately come to mind: parachute drops, tactical maneuvers/bombing, VR low level routes, lost communications during

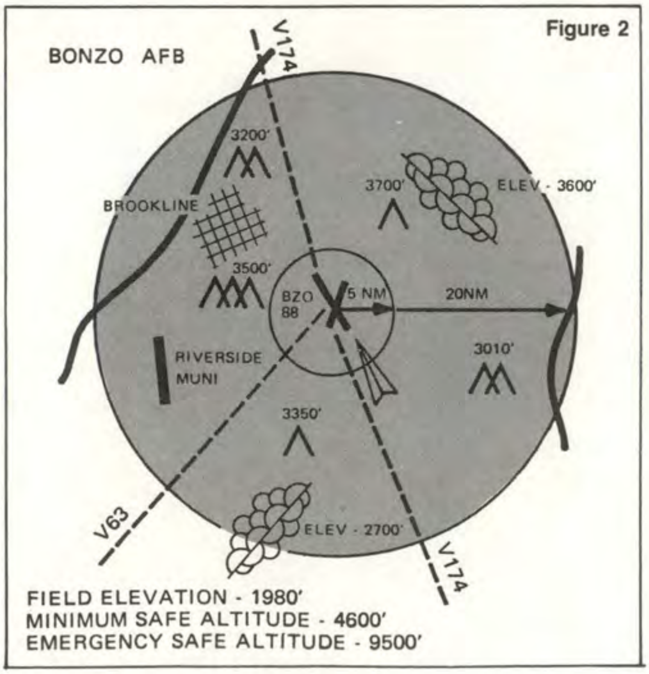


Figure 2

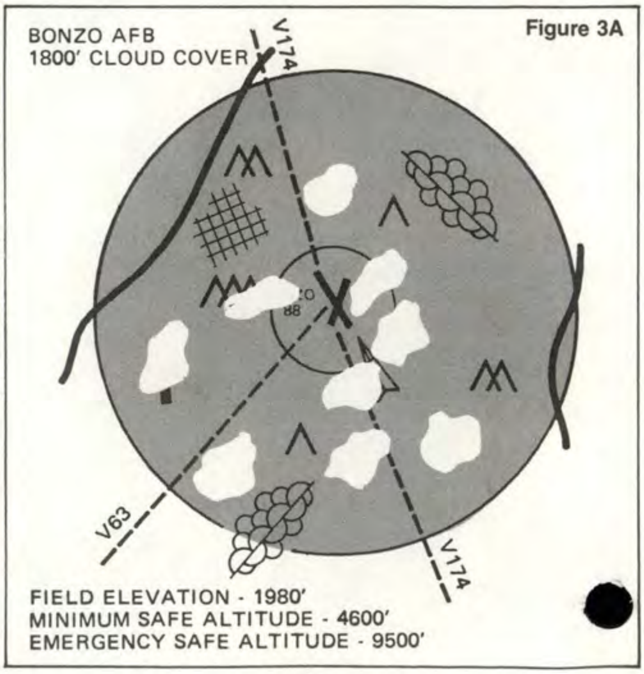


Figure 3A

The VFR Arrival

an instrument approach, normal traffic patterns, and VFR arrivals. Unlike IFR, VFR is a rather unstructured environment, governed primarily by several basic weather restrictions, generalized hemispherical altitudes, and the basic principle of "see and avoid." Simply put, VFR is essentially a free-lance operation, and is ultimately based upon pilot judgment.

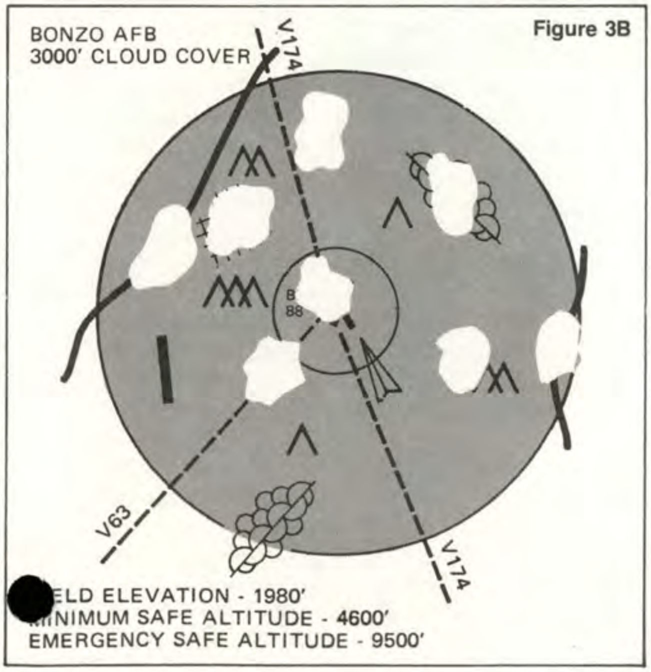
VFR arrivals can occur as a result of a variety of causes: A planned maneuver, certain aircraft emergencies, failure of ground radar, failure of navigation equipment, lost communications, as a back-up to an instrument approach. Whatever the reason, the criteria for flying a VFR arrival remains the same — a general familiarity with the aerodrome and the surrounding area and weather of at least 1,500 feet and three miles visibility. Assuming proper preflight planning to become familiar with the approaches and environment surrounding the base of intended landing, the only real variable remaining is that of weather.

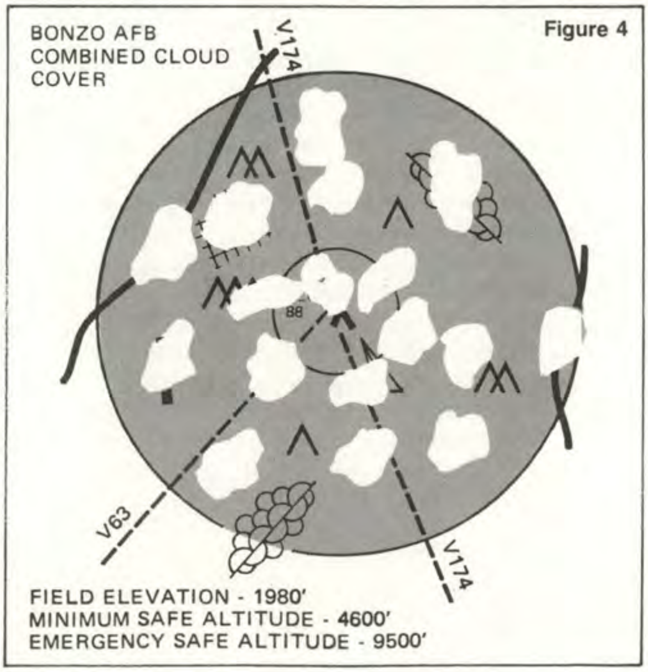
To illustrate, consider the following scenario. You have filed an IFR flight plan along low altitude airways to Bonzo AFB where you plan on receiving radar vectors to the ILS final for Runway 34. The weather forecast is:

18⌀ 30 ⌀ 80 ⌀
/ 330/15G20 / 29.98
/ 5-7 miles visibility.

You are flying south along V174 at 10,000 feet, staying just above the forecast deck at 8,000 feet. As part of your Before Descent Check, you review/update the terminal weather. It is as briefed, and you note that the field is VFR with a ceiling of 8,000 feet and five miles visibility with a light haze. You also review your PTC arrival map and FLIP arrival book, paying particular attention to obstructions and other hazards to flight for your planned ILS approach to Runway 34. (See Figures 1 and 2 for sketches of Bonzo AFB and the immediate area.) It appears that the area is not overly crowded and offers a reasonable number of landmarks in terms of rivers, towns, and the hills to the NE and SSW of the field. Finally, you note that the base has Stage I radar service. In view of the weather and the surrounding area, you feel confident that you will be able to find the field without any difficulty.

continued





Planning And Flying The VFR Arrival continued

After following an ATC-directed descent to 7,000 feet, you find yourself in the clear and identify the river to the west. You also notice that your TACAN has broken lock (bearing and range), but are not overly concerned as both you and the field are VFR, and you can positively identify your current position. Given this ideal situation, you decide to accomplish a VFR arrival. Accordingly, you cancel your IFR flight plan at approximately 20 miles from the field and contact Bonzo Tower. Not being very busy at the moment, Tower clears you for the requested VFR arrival, instructing a right turn onto a five mile initial. Noting that you have 30 minutes of fuel remaining, you acknowledge, turn slightly to the east, and descend to 5,500 feet (the VFR altitude closest to the minimum safe altitude for the area). All is well, and the thought of a cold beer momentarily flashes through your mind.

After a fair amount of skill and cunning on your part, plus a substantial dollop of luck, you find the field and land without having to declare "min fuel." And so ends another successful navigation sortie in general and this scenario in particular.

However, the ending to this scenario could easily have had a different outcome. To understand why, it is first necessary to review the technical "rules" of VFR flight. Referring to AFR 60-16 again, VFR aircraft are expected to maintain the following cloud clearances below 10,000 feet: 500 feet below, 1,000 feet above, and 2,000 feet horizontally (plus having a visibility of at least three miles at all times). In addition, Chapter Five of AFR 60-16 states that no aircraft will be flown within 1,000 feet of the highest obstacle within a horizontal radius of 2,000 feet in congested areas, or 500 feet from the surface in noncongested areas.

Do these rules present a problem on a VFR day such as that presented in the above scenario? Looking at the cloud cover at 1,800 and 3,000 feet shown in Figures 3A and 3B, respectively, the answer appears to be a definite "no." However, when looking at the *total* cloud cover shown in Figure 4, the answer is not quite as clear-cut. When the additional factors of limited visibility, obscured landmarks, possible loss of communications and/or navigation equipment, other VFR aircraft (Riverside Muni is not far away), and obstacles (terrain and towers) are entered into the equation, there may indeed be a problem. It just may be that finding the field will be a bit more difficult than originally envisioned. Further, at the low altitudes required to fly the intended approach, you will have a maximum of 10 minutes of flying time to find Bonzo AFB prior to becoming minimum fuel — or worse. Without belaboring the obvious, you now have a problem — and it is growing rapidly.

Is this amended scenario an unlikely occurrence? Not really. Any number of factors may conspire to put you in such a situation. The sinister aspect of this scenario is that it may occur on an *unplanned* basis (e.g., lost communications during an instrument approach). If so, you may find yourself with very few options by which to recover.

It is not the purpose of this article to discourage VFR flight in general and VFR arrivals in particular, but to illustrate some of the common, but not necessarily obvious, hazards associated with them. In this regard, several recommendations are offered for consideration:

- Even if an alternate is not required, know where your nearest divert base is located and compute the time, distance, and fuel required to reach it.
- Prior to attempting a VFR arrival, be sure to review the *current* weather. Be wary of overlapping cloud decks that constitute an *effective* ceiling. Of course, a detailed review of the immediate area (approximately a 20 NM radius) in terms of landmarks, obstacles, restricted areas, minimum safe altitude, etc., is mandatory.
- When briefing a VFR back-up to an instrument penetration and/or approach, be sure it is both legally (i.e., in accordance with AFR 60-16) and physically possible to do so.
- Regardless of how you come to the point of flying a VFR arrival, request radar monitoring. It is far better to accept a traffic advisory, altitude alert, or radar vector to initial than it is to become a statistic and/or run out of fuel.
- Watch your fuel closely while maneuvering at low altitudes.

Take it from those who have been there before you — VFR arrivals can be expeditious and fun, but they often require just as much planning and skill as cracking that 100 foot ceiling. Be prepared. ■

The "Best Dressed" Award

CAPTAIN PHILIP J. MESSURI
416th Bombardment Wing
Griffiss AFB, NY

■ *"Stand by to start engines."*
"Fire guard posted and clear."
"Start engines."

"Pilot – Ground, there's a big fuel leak and fire under engines three and four. Shut down and get out!"

Fire in an aircraft is one thing which makes even the most steely-eyed successor to Steve Canyon afraid. No one likes to think of the possibility of having to make an emergency ground egress through a wall of fire.

But it can happen. Hot pit refueling malfunctions, fuel leaks, hose failures — they all happen, and if conditions are right, we have a fire.

Well, if it does happen, are you ready? Will you have your equipment available, and will you use it?

It's winter now, and we are more likely to wear jackets and gloves while starting engines. But how about summer? Do you start engines with a headset on (if you're in a many motor) or with sleeves rolled up and gloves rolled down (in any aircraft? Even in the winter many bases are still pretty pleasant. The temptation is there.

But this is not considered "best dressed" for an emergency egress. If you were suddenly faced with the necessity of getting out fast, could you do it with a minimum of problems?

The best way to be sure you could is to be prepared. Start engines wearing your helmet with one or both visors down, sleeves rolled down and snug around the cuffs of your gloves. Your flight suit should be zipped up in front with the collar up protecting the back of your neck. It may be "too hot" to do this, you think, but even Davis-Monthan in July is not as hot as a jet fuel fire.

By the way, scarves are great and really add to the esprit of a squadron. But if it is nylon or some other similar cloth it can be deadly in a fire. You may be well-protected otherwise, but that scarf could melt and turn into a molten ring of agony around your neck. So, by all means, if your squadron has a scarf, wear it with pride *until you strap into your aircraft.*

In addition to dressing properly, you have another step in getting prepared. When was the last time you practiced or even thought about emergency egress? Every airplane is different. Could you unstrap and crawl to the emergency exit in the dark with heavy smoke inside the aircraft? Or, can you quickly and accurately unstrap and egress from your fighter/attack/trainer aircraft without getting hung up or injured?

There are things you can do to aid in your escape. First, disconnect your CRU-60/P. Put the open hose inside a zippered pocket, and fasten your mask. This will give your throat and lungs good protection from heat and smoke inhalation.

If you are in a large aircraft and don't have a mask available, take off your jacket or take a blanket from the passenger compartment. Covering your head and neck will give you a few seconds of protection through the fire.

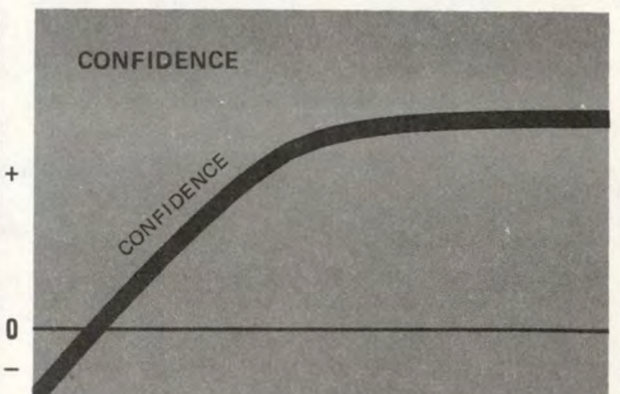
If you are in a fighter type, the next time you are in the cockpit go through a mental drill. Check out the easiest and fastest way to get out. If possible, talk to your life support officer. He can give you some excellent suggestions. If you have a cockpit trainer try an emergency egress every once in awhile. A little practice may prevent you from being embarrassed like the jock a few years ago. After a hot landing, blown tires, and a runway departure, he coolly leaped over the side of the cockpit only to be brought up short hanging upside down by his G suit harness and survival kit. The fire department cut him free.

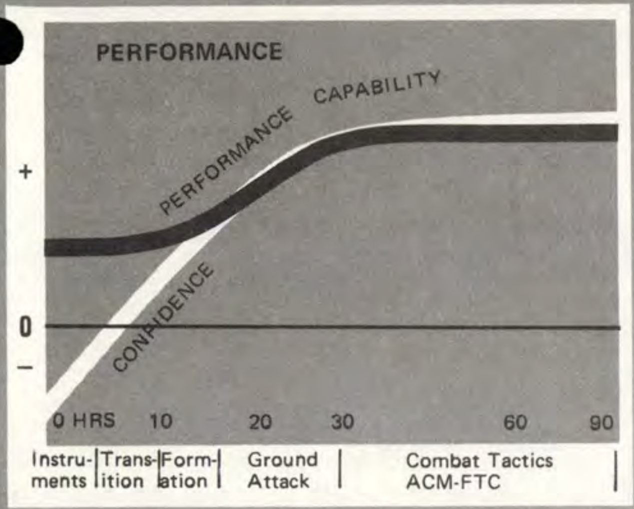
Maybe you have thought about all this. But how about the crew chief who flies once in awhile, or your passengers, or even the other members of your crew? If you are ready, it is still worth a couple of minutes before each flight to ensure the other crewmembers are prepared. There is no reason not to be. ■

The Capability–Judgment GAP

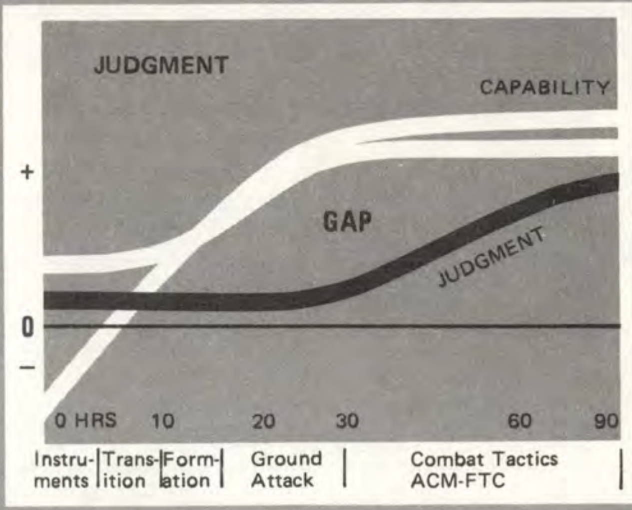
In November 1968 and August 1972, we ran the following article by then Lt Col Victor J. Ferrari, Jr., and it enjoyed great popularity. At that time, USAF was pumping pilots through the pipeline to SEA and the RTU business was big time. Although this article was inspired by that activity, the lessons to be learned can apply to all flying outfits. Recent mishap experience indicates we still have some aviators with a high guts-to-brains ratio and that the "gap" is alive and well.

The graph at right depicts the buildup of student confidence throughout the training program. Student interviews indicate that they enter the program with a "healthy" apprehension as depicted by the portion of the curve below the base line. Confidence builds rapidly, with most students stating they "get ahead of the aircraft" by the second or third transition ride. Confidence continues to rise to the high confidence level of the typical fighter pilot. IP interviews verify this rise in confidence.





The black line depicts student stick and rudder performance. The student enters the program with moderate capability in this skill. Instructor pilots testify that this ability rapidly rises and closely parallels the confidence level. This is to be expected because confidence and performance reinforce each other. For the purpose of this discussion, we equate confidence and performance to capability.



This curve represents the development of judgment, or is comparable to the student's capability to correctly estimate the effect of all human and environmental factors on his "real life" capability. This starts to rise toward the middle of the ground attack phase, after he has had enough experience to convince himself he can and will make mistakes. As mentioned previously, this capability-judgment gap is validated by automobile and general aviation accident experience. This curve flattens out below the "capability" curve and may never merge with it.

■ Those pursuits which require the development of manual skills generally indicate a need for the development of good judgment — or else great skill without good judgment might result in trouble for the individual. This is particularly true in flying and is a factor that must be taken into account in any training program for the development of piloting skill.

What we have just said, and what is about to be presented, is not new. In fact, we assume that nearly all pilots who read this recognize the concept as something learned in a practical way in youth and documented in some textbook at a later day. What *is* new is the chart upon which we have plotted curves representing certain factors indigenous to the kind of training program described. The chart presents graphically an abstraction that, while known, is not always recognized nor acted upon — a desert-like area of the chart we call the *capability-judgment gap*.

The chart came about as the result of a study of an F-105 Replacement Training Unit. The aim of the study was to identify all factors which have accident potential.

The method used was an analysis of the psychological and physiological stresses of the training program and student capability and limitations. Techniques included interviews with students who had recently graduated from undergraduate pilot training (UPT), squadron commanders, and IPs, medical evaluation of the training program (inflight and ground) and a review of accident experience. We should point out certain factors:

- The majority of students involved in accidents was evaluated as above average in the course.
- Some students were direct from undergraduate pilot training, while others were experienced pilots but new to tactical fighters (only one had any significant tactical fighter experience).
- The accident experience covered in this study was too limited to be applied with statistical significance to the concepts discussed here.
- The Capability-Judgment gap is validated by correlation of accident rates and age groups, in general aviation and automobile accident experience.
- The curves on the charts represent judgment factors and are not intended to imply mathematical values or relationships. Their shapes are based on student and IP interviews, review of training folders, and general aviation and automobile accident experience. The curves should be expected to vary in shape and magnitude with specific training programs and personnel. However, *the concepts are valid for any flight training program*.

As the charts show, there exists a gap between a pilot's capability and his judgment development. This gap occurs early in a training program and would be predictably greater in the more aggressive student.

One thing we were especially interested in was the

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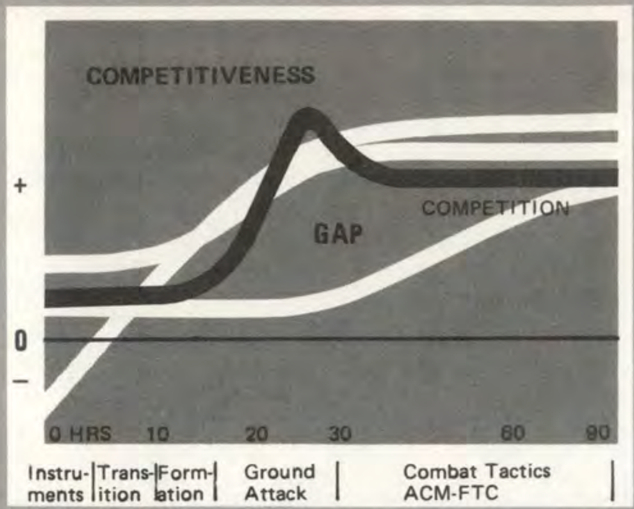
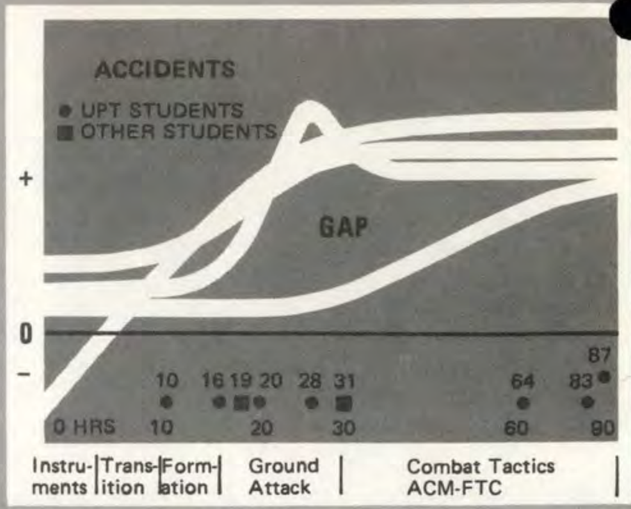


The element of competition is shown here. The graph depicts the competition curve rising rapidly while the judgment curve is still flat. The peak of the curve suggests that this factor may exceed the "capability" curve. This becomes more likely when a very capable and aggressive student is matched with an inexperienced IP. Actually competition may exceed capability at several points in the program, for example the air combat maneuvering phase.



On this chart are plotted nine accidents involving pilot factor. As previously mentioned, these accidents are too few to have statistical significance. Black dots represent students fresh from UPT; gray dots are experienced pilot students. The most significant thing about this chart is that two of the accidents involving recent UPT graduates and four of those involving experienced student pilots occurred between the 10th and 31st course hour — in the wide portion of the capability-judgment gap.

The Capability-Judgment Gap continued

role competition plays in this type of training program. The UPT students who are assigned to F-105s are selected for their competitive background, and well so, for the tactical fighter mission demands an aggressive, competitive personality. Student and IP interviews, both formal and informal, reveal that this competition is not very apparent during the orientation/transition phase of the program. However, as soon as the students "get their feet on the ground" it rises rapidly. Formation and ground attack naturally stimulate the competitive spirit of the students with a positive correlation with the students' aggressiveness.

Rarely does this competitive spirit result in an accident. More often it results in a "close call," which only the student knows about and never talks about. This experience has great learning value because it produces "judgment." Note the time correlation of the two curves, with the judgment curve starting to rise just after this peak.

Even if an accident rarely results, the accident potential during this phase is great. It must be recognized and controlled in order to optimize the learning process without compromising safety!

So where does all this lead? It leads to the conclusion that the instructor pilot must fill the capability-judgment gap. This means that instructors must exercise mature judgment in their supervision of students. Inexperienced or immature instructors may misinterpret the observable self-confidence and performance of students as an indication of good judgment and, consequently, set up a potential accident. Therefore, instructor pilot upgrade programs must emphasize a sound student-IP relationship with special attention to the capability-judgment gap. Finally, supervisors must closely monitor inexperienced IPs in order to develop in them an awareness of the need for a close student-IP relationship and the vital role the IP plays in the development of student pilots.

While this article was based on a study of a pilot training situation, the principles discussed apply to many training situations.

For example, the "student" could be the new arrival from RTU and the "IP" could be the flight commander who is supervising upgrade training to mission ready status. But the "gap" needn't be confined strictly to a "student" type environment. It should be evident that anytime overconfidence exists, the "gap" exists. Until the young aviator accumulates sufficient experience and judgment, he lacks the capability to adj[illegible] mission difficulty to competence level. He needs stro[illegible] squadron leadership to help him fill the "gap." —*Lt Col Edmond N. Durocher, Directorate of Aerosapce Safety.* ■

An uneventful flight....

■ . . . until initial takeoff. This was one pilot's description of an interesting voyage through the airspace.

On his initial climb to altitude, the pilot of a military transport noted that his rate of climb appeared low when compared with his airspeed. ATC must have concurred, since the controller began asking whether the flight could expedite its rate of climb. The pilot began to comply but stopped when he noted that the air speed was dropping below climb schedule. He reflexively looked at his attitude gyro and the outside horizon, both of which showed a very flat climb angle. Air speed continued to drop, so he told his copilot that he had an instrument problem and glanced at the copilot's instruments. Those gauges appeared correct, so control was shifted to the copilot, and the pilot requested a return to the airfield. The problem turned out to be a loose connection on the static air tubing that permitted air to leak into the instruments once the aircraft pressurization began at an altitude of 1,500 feet. A repair was made, and the flight was resume, albeit behind schedule.

Several hours and one stop later, the pilots began their descent from altitude and prepared for their approach to the destination airport. All progress in the cockpit ceased when ATC advised the crew that the control tower at the destination airport was on fire and that the field was closed. The natural ATC question followed, "What are your intentions?"

The answer involved several variables only the crew could balance out. Chief among the variables was fuel. Several additional stops had been projected for the flight, and fuel was needed at the next destination. The aircraft was on the verge of burning into its fuel reserves, so the crew could not delay indefinitely. On checking the books for fuel availability at the other airport serving the destination, the crew discovered that there was none to be had. How does one get his passengers home and finish the day's flying?

This crew decided to backtrack and buy fuel at an airport behind them. The passengers would have to show some patience and grace under stress.

A flurry of activity began in the cockpit. Charts were reopened, airfield selected, approach charts changed, ATC contacted, the passengers briefed, etc. ATC cooperated by providing the crew a precipitous descent combined with a 270° course change. Since the autopilot was inoperative, the pilot flew the aircraft, while the copilot attempted to sort out the multitude of charts that had accumulated in the cockpit. New navigation aids were tuned on the radios, and a quick approach brief was conducted.

The approach chart showed a 7,650 foot runway available, more than adequate for the aircraft to land, and an appropriate flap setting and air speed were selected. So far, so good.

Not so. The airport appeared through the thick haze, and the crew configured the aircraft for landing. At an altitude of approximately 200 feet, both pilots realized that more flap and less air speed would have been preferable — the runway had a significantly displaced threshold. The situation was a surprise, but workable, and the crew landed.

The 7,650 foot runway actually had 6,000 feet of usable pavement because of obstructions. The approach chart did not indicate this, but the airport facility directory did. The crew had reviewed the directory but had been concerned only with fuel. They had overlooked the runway restrictions in the process of resolving their diversion problem.

Fuel was obtained, and the series of flights was completed many hours later. The passengers viewed the diversion with good grace, and all ended well. The control tower fire was extinguished, so even that part of the story ended well.

On reviewing the events of the day, the pilots made some useful observations:

- Always plan for a diversion, even when the weather is good.
- Take time to fully review the airfield information. — Courtesy FSF *Accident Prevention Bulletin*, July 1981. ■

COLD

CAPTAIN GEORGE J. KERRIGAN Directorate for Investigation, Analysis and Research, U.S. Army Safety Center

■ Winter presents a multitude of hazards for both aviation personnel and aircraft operation — especially in Alaska and in other areas of the world where frigid temperatures prevail.

And while conditions associated with cold weather operations are probably more severe in Alaska, similar conditions exist in varying degrees in other parts of the world.

Pre-snow Training

Among the numerous cold weather problems that plague helicopter pilots, rotor-induced whiteout during operations close to the ground is the most common. When encountering loose, powdery snow during flight, helicopter pilots often find themselves in the middle of a ball of swirling, visually cueless atmosphere. This is an ideal condition for inducing serious disorientation which often leads to the wrong flight control input or pilot freeze-up on the controls. Minimizing whiteout from rotor-wash requires special techniques. Fortunately, these techniques can and should be practiced before the first snowfall. The thrust of this training is to provide pilots the experience they need to handle blowing snow without actually experiencing whiteout.

The following techniques should be followed during both pre-snow training and snow operations.

■ Takeoff should vary somewhere between a maximum performance takeoff when the flight path is clear of obstacles all the way to a near vertical takeoff when obstacles are present. For example, takeoff could involve a near vertical lift until clear of the snow cloud, a transition to a maximum performance takeoff until clear of the obstacles, and then a transition to normal climbout to en route altitude.

■ Landing over loose, powdery snow is probably the most demanding phase of snow operations. The approach is almost a normal one with a slightly concave effect close to the ground and an appearance that the aircraft will land short of the actual touchdown point. This technique, coupled with a slightly higher airspeed on final, allows the pilot to stay ahead of the snow cloud until just before touchdown.

■ Taxiing can be safely done one of two ways. When in close proximity to other aircraft or buildings, the pilot's only choice is

WEATHER ALERT

to keep the skids on the ground and proceed slowly in the desired direction, stopping as necessary to allow the visibility to clear. When room permits, aircraft should be flown to a hover and taxied at a faster rate than normal (about 10 to 15 knots). This method will keep the snow cloud behind the aircraft and provide good visibility.

All pilots, including IPs, lose a certain amount of winter flying proficiency after several months of summer operations. Therefore, at the onset of the first snowfall, blowing snow refresher training should be conducted IP with IP or IP with the most experienced pilot.

Icing

Icing poses a serious hazard to both rotary and fixed wing aircraft. Icing in Alaska presents both bad and good news. The bad news is that icing can be very severe. The good news is that except for about three to four weeks at the beginning and end of winter it is usually too cold and dry for icing. Compared with Alaska, icing is a continuous threat in other areas of the world because of less severe temperatures and higher humidities. But regardless of the area of operation, icing conditions must be evaluated during weather briefings. Take, for instance, one Huey pilot who encountered unforecast icing less than one-half mile from the end of the runway. Within 30 seconds, while the pilot was turning back to the airfield, ice had obscured windshield visibility except for two six-inch squares in the lower left and right corners. Only instant realization of the severity of this problem saved the crew from facing more serious danger than they had already experienced during the one-minute flight.

Preflight and Postflight Requirements

Winter operations demand additional preflight and postflight requirements.

- Extended warmup time is required for drive train and electrical equipment.
- Flight controls should be thoroughly checked for ice buildup and complete freedom of movement before runup.
- Sufficient time should be allowed before hub system checks are attempted to avoid damaging brittle seals.

Many more requirements and suggestions can be found in the applicable aircraft operators manuals.

Static Electricity

The danger posed by static electricity is much greater during cold, dry seasons than during warm, humid ones. Static electricity can be generated by the movement of the aircraft through the air or by brushing snow and ice from aircraft surfaces. It is especially dangerous during refueling operations since friction generated by fuel flowing through the hose and past the filler neck can produce an electrical charge sufficient to cause a fire or explosion. Consequently, during servicing, it is extremely important to properly ground the aircraft as well as bond it to the refueling vehicle. As an additional precaution, the nozzle should be fully inserted into the filler neck at all times. Also, before refueling aircraft, individuals should discharge any static charges built up in their bodies. They can do this by touching a properly grounded conductor.

Survival Training and Gear

Hopefully, aircrews will never find themselves in a cold weather survival situation. But no matter how sophisticated our weather reporting abilities, no matter how good our crews, no matter how well equipped and well built our aircraft, nature can get to us now and then. Thus, we must think about the unthinkable — survival.

If you have never been stationed in Alaska, it may be hard to imagine temperatures that range from 30 to 60 degrees below zero for weeks on end, winds that average 35 knots for 10 to 12 days, or a storm that piles snow into eight-foot drifts in a single night. Since Alaska presents an arctic-type cold climate, all crewmembers are required to attend the four-day Air Force Cold Weather Survival School during their first year in Alaska. But for those of you in other areas of the world where this type of schooling may not be available, your best bet is to acquaint yourself with survival hazards contained in applicable cold weather aircrew publications. After all, the alternative to being a fatality in a survival situation is to be properly clothed, to know exactly what to do, and to have the necessary gear to handle the emergency.

Units operating in cold weather areas are responsible for conducting a thorough and well organized training program. This training must be geared to instill confidence, to develop skills in all areas of cold weather operations, and to ensure safety. The buck begins with the unit commander and travels down through the chain of command.

The key to successful winter operations is advanced planning and preparation — before Ole Man Winter sets in. — Adapted from August 1981, U.S. Army *Aviation Digest*. ■

Hazards Of LOW LEVEL Flying--

COLONEL GRANT B. McNAUGHTON, MC
Directorate of Aerospace Safety

In Part I, November issue, the author discussed some of the elements that can result in a pilot going too low in the low level flying environment. In this article he examines factors that cause attention problems that may result in a mishap.

■ Survival in the low level arena depends upon several human factors, not the least of which is good vision. Yet, as we attempted to illustrate last month, even "good vision" is not completely reliable and frequently lets the pilot fly lower than he realizes. Once the pilot is lower than he thinks himself to be, a brief period of attention misappropriated from his flight path will often allow the mishap. In flying low level, the pilot's first job is to avoid hitting the ground, or things attached to the ground. And if that were not demanding enough, he must also navigate, keep track of element mates, look out for threats, monitor instruments, change frequencies, set up his ordnance panels, etc.

The amount of time the pilot permits away from monitoring his flight path depends upon how high he thinks he is relative to terrain and obstructions, what he thinks his flight path is doing relative to the surface, or what he thinks the surface is doing relative to his flight path. Let's face it: The ground is very close to 100 percent kill, and no one intentionally flies into it. If the pilot thinks himself low, he'll be on the edge of his seat, clearing 12. But if he thinks himself high, he may drop his guard and become a victim of an anomaly of attention.

You've all heard of these attention problems. Aviation psychologists/pilots have defined several of them as follows:

- **Channelized attention** Focusing of conscious attention on a limited number of environmental cues to the exclusion of others of a higher or more immediate priority. An example is target fixation in which the pilot concentrates so intently on keeping his sights into the target that he flies into it.
- **Distraction** Interruption of conscious attention to a task by the introduction of a non-task related environmental cue or mental process. The distraction may be external to the cockpit and may cause a startle reaction in which aircraft control is lost. It's happened with an A-10 vs bird, F-4 vs microwave tower, and F-4 vs F-4 on sloppy rejoin; or the distraction may be something inside the cockpit such as a dropped object, or something inside the pilot's head.
- **Task Saturation** Demands exceed the attention capacity of the pilot, either because of increased demands or relative incapacity. System design of marginal adequacy to handle the mission or mission requirements stretching design limits may task saturate even a well-trained, competent, and experienced pilot.
- **Inattention** Not paying attention; seen in the "mission complete syndrome" and in fatigue states.

Mission complete syndrome is a period of reduced vigilance in a comfortable environment occurring after the demanding portion of the mission has been successfully completed. The false assumption develops that the tough part is over and the remainder is a piece of cake. Similarly, if a pilot perceives the upcoming portion of the mission as undemanding, his investment of attention may be inadequate. The mission complete syndrome can actually occur at any point during the mission.

part II

Fatigue comes in several forms:

Acute Inadequate rest, commonly from day-night sleep disruptions, time-zone changes, or self-induced stress (hangover).

Mission Physical fatigue probably accounts for more attention anomalies than suspected, especially in view of busy alert schedules, surge exercises, multiple daily missions, long missions, hectic briefings and debriefings, little nourishment, peer and supervisory pressures, plus the heat, dehydration, noise and vibration of the mission. Pulling Gs is highly fatiguing, as is formation flying, expecially while low level. The responsibility of leading is fatiguing as is station-keeping on an inexperienced Lead.

Chronic/emotional fatigue from coping with long term personal, family, financial, professional, social or other problems.

Accident files are replete with instances in which an anomaly of perception permitted an anomaly of attention, resulting in the mishap. Some recent examples:

1. **A-7D** The mishap pilot was Lead of a two-ship low level bombing mission to a desert range. During ingress at 460 KIAS, and "about 100 AGL," Lead was attacked by an F-4 from the right hindquarter. In accordance with his ROE, Lead rolled 45-60 degrees and turned into the F-4, then glanced back to check the F-4's response. He then looked ahead, felt he was low ("below my comfort level"), rolled out and pulled. Simultaneously, his wingman called, "Bring it up! I think you hit something." Lead's right wingtip had indeed struck an ironwood tree, which in that area reach a height of only 8-10 feet. Lead was a relatively high time pilot who had completed the low level awareness training syllabus during which his "comfort level" had dropped to "below 100 feet." Lead later admitted that he may have "become a little too comfortable down there — even complacent."

Thinking back, he feels he could have been as low as 60 feet during that turn since there was little in the way of perspective cues by which to gauge height. His cue to being too low was a blurred sensation of motion in his peripheral vision. In a 60 degree bank, the 19-foot A-7 wing drops over 16 feet, and with 8,000 pounds of stores, the aircraft was heavier than usual and may have mushed a bit.

Conclusions regarding human factors:

a. Height misestimation. Pilot inadvertently dropped well below 100 feet AGL due to paucity of outside visual cues, comfort level and complacency.

b. Attention. He misappropriated his attention momentarily on the aggressor instead of monitoring his flight path. During the turn, his wing dropped an additional 13-16 feet and the aircraft may have mushed down even farther, causing the wingtip to contact vegetation.

2. **A-10A** This mishap pilot was lead of a two-ship low altitude tactical navigation (LATN) element proceeding to the range at 300-500 AGL in a right tactical spread. Upon reaching a turn point, Lead, using communications out procedures, flashed a wing signaling for a left turn. He then flashed the opposite wing signaling his wingman to roll out. Lead, who was closer to 300 AGL, then rolled into a steep left bank and turned toward the low lying sun. He apparently failed to perceive a progressively increasing descent until collision with the ground was unavoidable. His last second reef on the pole pancaked the aircraft, leaving a perfect imprint of an A-10 on the edge of a ploughed field. There was no apparent attempt to eject. The Safety Investigation Board concluded:

a. Perception difficulty. The pilot failed to perceive a subtle drop of the aircraft's nose during the turning maneuver. He may have been dazzled by the low-lying sun as he looked toward his destination and the resulting after-image could have temporarily impaired his ability to gauge height as well as aircraft attitude.

b. Attention. The pilot's attention

continued

Hazards Of Low LEVEL Flying -- part II

continued

was diverted (misappropriated) to his wingman excessively, instead of monitoring his own flight path.

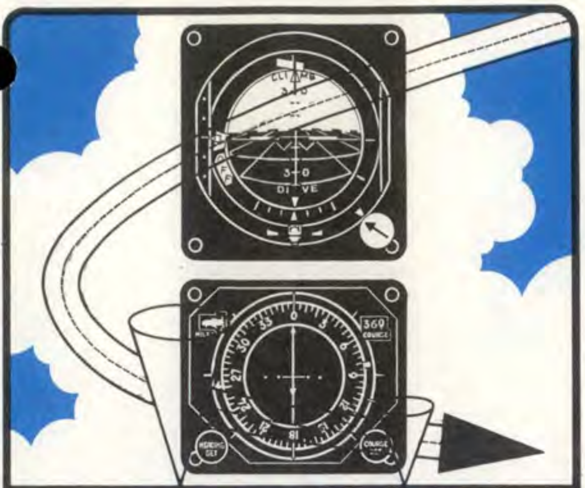
3. A transport aircraft was flying the final mission of a 16-day exercise from a deployment base near the home drome. Crews had flown 12 of the 16 days, averaging five flying hours per day. A minimum of 14 hours' crew rest was scheduled between the termination of one mission and the takeoff of the next. Takeoff times were adjusted to comply. Several administrative flights had also been made to the home base, the last one occurring the day before, landing about 1217 local. Takeoff time for the final mission was therefore readjusted to 0430 to permit the 14 hours crew rest. This administrative flight, however, interrupted the normal sleep-day/fly-night cycle to which the crew had adapted. Consequently, upon their return, several key crewmembers joined others in the BOQ lounge-bar and generally socialized the rest of the day into the early evening. One, for example, was seen almost continuously in the BOQ lounge-bar from 1230 to 2230L, drinking until at least 1930. Most of the crew slept less than six hours. The pilot and flight engineer had only about 3.5 hours and the copilot about 5.5. This amount of sleep was all they had had in the last 24-30 hours.

The mission profile included a night low-level navigation route to a tactical landing site, followed by a tactical departure to another low-level route, terminating in a night non-tactical recovery. The crew took off and flew the tactical portion of the mission well, which required excellent flying and crew coordination. Though this might seem to contradict the entire fatigue notion, it really doesn't. Man has the ability to tone up his mental and physical processes, in spite of fatigue, generating an aroused and more efficient state, the degree and duration of which are limited by the amount of fatigue. The tactical or demanding portion of the mission actually involved only about 40 minutes. The aircraft commander considered the flight home at 500 AGL to be a "piece of cake."

Coming down from the excitement of a demanding task, this "high," quite likely led to post-mission let down or "mission complete syndrome." Also, this was the last mission of a demanding exercise. The crew had performed well and had earned their three or four days off, before leaving on another two-three week exercise. Plans for brief joint family trips had been made and perhaps these occupied the thoughts and conversation on the flight deck as they flew home. Whatever the cause, there had to have been some form of distraction or inattention for the entire crew to ignore their altimeters for the 60 seconds or so required to descend from 500 feet to impact. The water over which the aircraft was flying was glassy smooth. The night was black and the low altitude warning lights were thought to be taped. The aircraft gradually descended into the water at cruising speed, broke up, and sank within minutes. The sole survivor happened to be asleep at the time of impact and was rescued by local fishermen.

Anomalies of perception and anomalies of attention; at low level they're real killers. How do you avoid their pitfalls? Be alert to the tricks your eyes play — missing obstructions and misjudging height. Be aware that in the absence of a perspective cue of known dimension, it may be impossible to gauge your altitude and that it is easier to get lower than you think. Of course, anytime you perceive yourself high and think your trajectory parallels or diverges from the surface, realize that you are a set-up for an anomaly of attention. Don't allow channelized attention, distraction, or task-saturation to upset your priorities of flying the aircraft and avoiding the ground. Recall how fatigue and the mission complete syndrome contribute to inattention. Unless you absolutely know for sure how much clearance you have, incorporate an automatic spasm of the right biceps (or whatever it takes) to get your vector skyward before hazarding the luxury of inattention to your flight path. Don't let yourself become another victim of an anomaly of attention. ■

Part III of this series will appear in the February issue.



ON COURSE

NEW FEATURE Instrument flying is the common denominator among pilots whether they are single seat, single engine fighter jocks or multi-many motor bomber crews. "On Course" revives a tradition which goes back to 1965. As this article explains, "On Course" will be a forum on instrument operations and procedures for you, the pilot. With your support, it will be as effective as its predecessors, "IPIS" and "IFC Approach."

■ "On Course . . . The locus of those points in a horizontal plane where the perceived cross pointer deviation amperage is zero." The preceding definition is provided for the use of those pilots who continue to request a precise description of the term "On Course." Attempting to provide a universally acceptable answer to "What is on course?", ranks right up there with determining how many nautical miles there are. It can be done but not everybody will agree with it.

Since the closure of the USAF Instrument Flight Center and the discontinuation of "The IFC Approach" articles, there has been no central forum for the discussion and interpretation of instrument flying procedures and techniques. Although it would be impossible to duplicate the efforts of the former IFC staff in producing those monthly articles, as OPRs for AFM 51-37, we feel that from time-to-time selected instrument related topics deserve discussion.

No set format has been developed for these articles as we intend to allow the subject to dictate our approach. Ideally, topic selections should be made by you, the aircrews faced with day-to-day exposure to instrument operations. We solicit your questions, comments, recommendations, and perceptions concerning procedures and techniques. Lacking your inputs, we are left with little else to discuss but "fun things to do at your clearance limit fix." If you have an area of concern, a question on a particular procedure in FLIP, or a recommended technique, you can be assured you are not alone. In flying operations, particularly the instrument area, there are no questions too mundane to ask; only pilots with too much pride to ask them! We certainly don't know all the answers but have maintained the necessary contacts to research almost all areas of instrument flying.

To keep you informed of recent happenings in the instrument field, please note that Change 2 to AFM 51-37 is being written at this time. It will include an all new Chapter 7 entitled "Spatial Disorientation." This new treatment of the subject is an attempt to approach the S.D. problem more from the pilot's point of view and less like a subject for a flight surgeons' convention. The low altitude approach section of Chapter 6 has undergone some extensive revision with the hope that it will read more easily.

We hope to have Change 2 in the field by the first of the year. In addition, we have begun revision of AFP 60-19, Volume 3, Pilots Annual Instrument Examination. We are attempting to "clean up" some of the old, but still pertinent questions as well as writing new questions covering some of the recently changed material. You can expect the new exam to hit the field sometime in early 1982.

We hope you enjoy future articles. Let us hear from you and . . . keep it "On Course."

The authors of this article, Majors Bill Gibbons and Jim Curran, were assigned to the Instrument Pilot Instructor School (IPIS) Division of the Instrument Flight Center (IFC) prior to its closure in 1978. They are currently the OPRs for AFM 51-37, Instrument Flying. They welcome questions and comments concerning instrument flying in general and AFM 51-37 in particular. They may be reached at AUTOVON 487-5834 HQ ATC/DOTO, Randolph AFB, TX 78150. ■

FLIGHT SAFETY CROSSFEED

Formation Flying

MAJOR JOHN E. RICHARDSON
Directorate of Aerospace Safety

■ Formation flying is a common Air Force procedure and a continuing source of mishaps — 25 in the past five years as a direct result of formation flying. This does not include air refueling, ACT, or BFM, just plain old formation. The problems involve all phases of the flight from takeoff to landing. So, for the second installment of Crossfeed, let's talk about formation.

Takeoff

Formation takeoffs require planning and especially good leadership. Here's what can happen otherwise. An F-101 was nr 2 in a twoship cross-country mission. The flight planned and briefed a formation takeoff after a refueling stop. Number 2 was able to stay in position for the first part of the takeoff roll but soon fell behind lead. Lead took off safely but nr 2 lifted off in an extreme nose-high attitude. The aircraft stalled and crashed just off the end of the runway.

There were several factors which contributed to this mishap: The aircraft were not configured the same; the field from which the formation was to take off had a high density altitude; the aircrews involved had minimum proficiency in close formation takeoffs. It was the first such F-101 take off for the crew in nr 2. The preflight planning for the takeoff was not adequate. The aircrews did not use the checklist performance data properly and incorrectly computed their takeoff data. The lead IP did not ensure that the computations were correct.

In the briefing, Lead did not discuss abort procedures, or dissimilar power requirements due to different aircraft configurations. Before starting the takeoff roll he failed to check nr 2 in on departure frequency and during the roll reduced power to minimum AB — below what was briefed. Then just at liftoff Lead went to full AB without notifying or considering nr 2. In an effort to stay with Lead, nr 2 pulled the aircraft off the ground early before he had flying speed. As a result, the aircraft stalled at about 30 feet in the air then departed controlled flight and crashed.

Rejoins

A rejoin is not an especially difficult maneuver considering some of the other things aircrews must do. Maybe that's why they cause so much trouble. Pilots tend to relax because "the rejoin is a piece of cake." But here are some of the things that can happen.

An A-7 was nr 2 in a flight of four. On a dry pass, the pilot descended below minimum altitude either due to a visual illusion or misinterpretation of the altimeter. During the rejoin, Lead saw the aircraft was low and still descending. He called for nr 2 to pull up but, for undetermined reasons, the aircraft continued to descend and struck the water.

Although the cause is undetermined, two possible reasons for the continued descent were suggested in the investigation. First, the pilot could have channelized his attention on Lead and inadvertently allowed the aircraft to descend. His already excessively low altitude would make this second error critical. It is also possible that a malfunction of the HUD flight path marker misled the pilot into believing he was in a climb.

A C-130 was part of a four-ship night tactical formation. There was a large number of training events scheduled, so the recovery profiles were somewhat compressed. On the second overhead recovery, the crew of nr 2 saw the mishap aircraft, nr 3, overtaking them on the left extremely low and in a left bank. The aircraft struck a ridge some 1,200 feet below the briefed rejoin altitude.

The compressed recovery forced Lead to start a turn before all members of the formation had completed the rejoin. This early turn caused the nr 3 aircraft to overshoot. The crew of nr 3 became preoccupied with avoiding the other members of the formation and forgot to monitor their altitude. Unknowingly, they descended to an unsafe altitude and struck a ridge.

Two F-106s were on a training sortie. Lead's weapons bay doors hung open so he asked nr 2 to join up and check his configuration. Number 2 complied, but made the rejoin with an excessive rate of closure. He then attempted to overshoot by rolling over the top of Lead. At the peak of the roll the nr 2 pilot was distracted by a master caution light. When he looked back outside, saw Lead and tried to continue the rejoin, the aircraft departed controlled flight.

This mishap resulted from the pilot misjudging the overtake then trying to salvage the rejoin by doing an unapproved roll over the top of Lead. That maneuver placed the aircraft at the edge of the flight envelope. Then, after he was distracted by the caution light, the pilot lost awareness of the aircraft performance parameters. When he again applied controls to continue the rejoin, the additional loading placed the aircraft outside the flight envelope, and the aircraft stalled and departed.

Departing the target area from a T-38 low level mission, the pilot in nr 2 was slow to respond to Lead's climb and turn. When Lead rolled out on recovery heading and altitude, nr 2 collided with Lead.

Because nr 2 was slow to respond, the aircraft fell behind and ended in a position well below and 1,000 - 2,000 feet behind Lead. The pilot of nr 2 selected and maintained military power in an attempt to regain proper spacing. He also maintained a position directly astern of Lead making it very difficult to perceive the increasing rate of overtake. The IP in the nr 2 aircraft allowed the pilot to continue into close proximity to Lead with 50 - 70 knots of closure. At this time, Lead had been in a climbing right turn with increasing bank up to 90 degrees. As Lead began to roll out, nr 2 saw this as increasing horizontal separation. While directly below Lead, the pilot of nr 2 abruptly reversed from 60 degrees left bank (toward Lead) without releasing back pressure. This caused nr 2 to climb on a collision course with Lead. The IP in nr 2 took control but was unable to alter the flight path in time to avoid a collision.

Lost Wingman

After rejoins the lost wingman maneuver is the most hazardous in formation flying (based on number of mishaps). The problems seem to be failure to transition successfully to instruments and failure to gain separation from the other members of the flight.

A flight of four F-15s joined up below the overcast and started a climb through the weather on a SID. After the flight reported level at 7,000 feet in IMC, Departure Control requested that all wingmen cease squawk. Shortly thereafter, nr 4 and then nr 3 went lost wingman. Lead acknowledged, reported to Departure, and requested climb to on top. Once on top, nr 3 rejoined. Number 4 never responded to a frequency search and was found to have crashed.

The investigators found that the

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FLIGHT SAFETY CROSSFEED

continued

aircraft had impacted in a steep dive. The pilot had made no transmissions nor had he attempted to eject. The dive probably was the result of an unusual attitude from which the pilot could not recover. Possible explanations for this include disorientation from a sudden head movement required to change the IFF or a sudden, aggressive maneuver to avoid a dangerous situation after element Lead (nr 3) went lost wingman. There could also have been a malfunction of the flight instruments which induced the unusual attitude or inhibited recovery.

A flight of four F-4s had descended to 7,000 feet for low level entry when Lead determined that the weather was unsuitable and received ATC clearance to climb to 10,000 feet. During a left climbing turn, nr 4 became separated and leveled off at 9,000 feet.

The other three members of the flight leveled at 10 and then received clearance to 14,000 feet. During this second climb, nr 4 collided with nr 3.

When he lost sight of the formation, the pilot of nr 4 correctly leveled off and established altitude separation. However, nr 4 failed to maintain this separation and inadvertently climbed into the altitude of nr 3 and then collided with 3. One other point, this mishap was in part set up by Lead taking the flight down to the low level entry knowing that the weather was unsuitable. Thus, the flight was forced into a descent and climb in IMC.

A flight of two F-15s were recovering from an uneventful night intercept mission. The flight was in fingertip for a weather penetration. The flight penetrated 2,000 feet of thick cloud, breaking out at 18,000 feet. Shortly after reaching VMC, Lead directed nr 2 to route formation. He saw nr 2 moving out to route and looked inside his cockpit to level at 16,000' as required. When he looked out to check nr 2, he saw the aircraft about 500 feet below. At this time, nr 2 called lost wingman. Lead called his altitude of 16,000' and directed 2 to maintain altitude separation. The pilot of 2 did not reply to this call and began drifting to the right under Lead still descending, now about 1,000' below. Lead turned right to get lateral separation so he could see 2. In the turn he saw a flash reflected on the overcast, rolled left, and saw the impact fire. The time from the lost wingman call to impact was about 15 seconds.

It was very dark under the overcast when Lead directed 2 to go route. The reason nr 2 went lost wingman is not known. He could have been out of proper route position, or been disoriented due to a visual illusion, or distracted by some other event — a flashing light in the cockpit perhaps. In any case, the pilot of nr 2 did not fully accomplish the lost wingman procedure. Instead, he attempted to retain or regain his position relative to Lead. In this attempt he allowed the aircraft to get into an extreme nose low attitude from which he could not recover.

Leadership

Much of the success of a formation depends on Lead. When a leader forgets that responsibility the consequences can be tragic. Here are some examples:

A mixed flight, two A-7s and two F-106s, were scheduled for a strike mission. The flight was ingressing in a box pattern, the A-7s in the lead and the F-106s 1 - 3 miles in trail. During a tactical turn, nr 2 (A-7) and nr 3 (F-106) collided.

During the briefing, the flight Lead did not brief abort contingencies or formation procedures. Approaching the range, the flight did not have clearance and the flight Lead called for an in-place 180 left turn.

Because of the inadequate briefing, the nr 3 pilot did not perform the in-place turn properly. This led to a breakdown of flight integrity. The flight Lead failed to reestablish flight integrity before calling for another in-place turn. In the turn, nrs 2 and 3 failed to clear adequately and collided.

Perhaps the worst problem of leadership occurs when a flight deliberately violates principles of good judgment. A flight of two A-7s were returning home from Red Flag. While in route formation, nr 2 was taking motion pictures with a hand-held camera. Number 2 moved to a line abreast position and gave what he considered to be a change of lead signal. He received what he thought was an acknowledgement so he engaged the altitude hold mode of the autopilot and began taking movies of Lead. Lead thought nr 2's signal was for more power, advanced the power slightly, and retained the lead. Shortly thereafter, the nr 2 aircraft began to converge with Lead, passed over Lead and sheared off part of Lead's vertical stabilizer and rudder.

Two OV-10s joined up after takeoff and proceeded to a local maneuvering area. Once there, they engaged in a series of maneuvers at very low altitude which resulted in one aircraft stalling and crashing.

The pilots of both aircraft were aware of the minimum altitudes and the maneuver restrictions on their aircraft, but they chose to deliberately ignore them. In performing the unauthorized ACM, the aircraft violated the minimum altitudes, and when the aircraft stalled it was too low for a safe recovery.

Formation Landing

The final act in a formation flight, a well-executed wing landing, is a beautiful sight and a satisfying accomplishment, but it does require some skill and attention to detail. Here are a couple that didn't quite work out.

The IP in the rear cockpit of an F-4 was demonstrating a wing landing. As the flight came over the overrun the mishap aircraft drifted right and touched down with the right gear more than 11 feet off the runway. The aircraft continued relatively straight until the right gear struck the BAK-12 housing, collapsing the gear.

The IP obviously failed to maintain proper formation position, but the pilot in the front cockpit had been briefed to assist with runway alignment. This he failed to do.

In another case, an F-100 was making a wing landing. The initial touchdown was firm, and the aircraft bounced about five feet in the air. On the second touchdown, the nose gear failed. The pilot selected AB and after a slide of about 750 feet the aircraft became airborne again in a very nose-high attitude. The aircraft touched down again aft section first, and then the nose slammed down onto the runway. At this point, the pilot pulled the throttle to idle, deployed the chute, dropped the hook, and waited till the aircraft slid to a stop before egressing.

After the aircraft bounced the first time, the pilot did not establish the proper pitch attitude. The second time the aircraft touched down, it was nose gear first, overstressing the gear and causing it to fail. The rest of the damage was caused by the pilot's unsuccessful attempt to go-around.

Formation flying is fun. It is one of the most beautiful and satisfying forms of flying. One has only to watch a good formation flight to see this. But like all things requiring skill, formation flying requires practice and attention. We use formation for practical reasons in flying. But it becomes impractical when poor execution causes mishaps. ■

Medication And Alcohol

■ "Tis the season to be jolly, . . . Fa La La La La. . . ." Indeed, the Christmas-New Year holiday season is truly a time to be jolly. The gathering of family and friends, the friendly greetings for total strangers, the giving of gifts to friends and loved ones, and the whole idea of peace and joy on earth make this particular holiday season unique. Mankind would probably receive highly desirable benefits if the spirit of this season could be with us throughout the year instead of the brief three to four week period in December and early January.

Unfortunately, this holiday season also carries with it many dangerous and deadly events. Tragic fires from unsafe tree lights and overloaded electrical circuits still occur. Greatly overshadowing the fires, however, is the carnage of death and injury from PMV accidents. Inevitably, this increased rate of PMV accidents can be linked to the almost geometric increase in the consumption of alcohol. The usual TGIF get-togethers now are expanded to office parties, division parties, squadron parties, commanders' parties, neighborhood parties, casual impromptu "drop-over-for-a-drink" parties, New Year's Eve parties, etc., etc. In addition, we receive and give as presents the myriad of sizes, shapes, and quantities of special holiday liquor packages which are advertised in almost every news media, using every kind of appeal. It is truly the glorious season for the social drinker.

Despite this overwhelming exposure to alcohol during the holiday season, there is a voice to the contrary. In the past few years the American public, both military and civilian, has been the object of a massive educational effort concerning the dangers of alcohol abuse. The DOD, DOT, DOL, NIH, APHA, AMA, and, of course, AA as well as several other alphabetic acronyms of various social, psychiatric, and industrial organizations have brought to the surface an iceberg that has survived apathy, ignorance, avoidance and permissiveness. Such a revelation is long overdue and perhaps will lead to a needed revolution in dealing with this disease, the greatest drug problem in the world. With this influx of facts and figures as well as the various programs of public education, it would appear that the fears of alcohol abuse would be allayed. This is definitely not true, and the present holiday season may not differ greatly from previous years in alcohol-related accidents. The basic reason for this, I believe, is the indisputable fact that an individual's drinking habits are his own and will not change by a direct order, suggestion, or other dictation. Unless the individual can be shown very objectively that his alcohol abuse is a detriment to himself or others, all pleas for change will be futile.

What then can be achieved by another dissertation on alcohol abuse during the upcoming holiday season? There is one area that can be discussed rather objectively and which may be useful as an educational tool for all of us. This early winter season is also that time of year for the annual flu syndrome to strike. As a direct consequence of the "flu," there will be a marked increase in the use of antipyretics, antihistamines, nasal sprays, nebulizers, antitussives, and antiinflammatories. Many of these liquids, pills, capsules and aerosols are over-the-counter drugs resulting in the proliferation of these medications in the home drug store, i.e., the medicine cabinet. Aside from the collection of these medicines with varying efficacies and dates of expiration, there is one ominous fact that is true for almost everyone: Synergism with alcohol (wherein the action is greater than the sum of the two parts separately).

Most physicians should and do caution their patients about possible side effects to the medications they prescribe during office visits. At least, these patients have been warned and can exercise caution in their drinking. The patient who uses over-the-counter drugs or his spouse's, or his friend's may not be so fortunate. Hopefully, this article will reach this latter person and make him or her equally as cautious as the person who uses a prescribed medication. It takes little imagination to create this situation: John or Mary Doe has a bad case of "flu" with nasal congestion, headache, fatigue, muscle and joint aches, cough, sore throat, and low-grade fever; he or she takes one

or several of the drug store preparations previously described, following directions; the blood level of the drugs may be fairly high by mid-afternoon just before the office party; having missed lunch because they wanted to clear the desk before the party, they join in the fun on an empty stomach and consume three, four, or more glasses of "egg nog" or "Christmas punch."

The groundwork has been laid for an accident looking for a place to happen! All that is necessary is for John or Mary to drive home from the party during the rush hour on slick, icy or snowy streets.

How can the patient who buys over-the-counter drugs receive the same warning about synergism that the doctor gives his patients? The answer: READ THE LABEL!! Under Federal regulations, manufacturers must provide the buyer with a list of ingredients as well as appropriate warnings. Although most of the ingredients' names may seem to be the epitome of tongue-twisters designed to impress, confuse, and baffle the consumer, there is a finite number of chemicals which are used by most manufacturers, despite the claims made in the news media and the various shapes and colors used. The following list contains the more common ones and their action:

GENERIC NAME	ACTION
Chlorpheniramine	Antihistamine
Pyrilamine	Antihistamine
Bromphenitamine	Antihistamine
Pheniramine	Antihistamine
Methapyrilene	Antihistamine
Doxylamine	Antihistamine
Tripelennamine	Antihistamine
Phenyltoloxamine	Antihistamine
Methscopolamine	Bronchodilator
Methoxyphenamine	Bronchodilator
Dextromethorphan	Antitussive
Terpin hydrate	Antitussive

Although this is only a partial list, it should provide a useful guideline to a lay person who purchases over-the-counter drugs. It is also wise to assume that these compounds will act syngergistically with alcohol. Thus, depending on one's weight, nutritional state, and general health, that one glass of "egg nog" or "Christmas punch" may seem like three or four and place the body in an altered physiologic state much quicker than anticipated. Regardless of the degree of the effect, it is a well-established pharmacologic fact that there is synergism with alcohol.

The usefulness of any recommendation pertaining to alcohol abuse can only be achieved if it is practices by each of us. It is not the intent of this article to dictate temperance, but to urge discretion and good sense in drinking habits if one is also taking medication to treat minor illnesses. The advertisement that asks if we know when to say *when* must then have greater significance. During this, the most joyous holiday season of the year, we should be enjoying ourselves with our families, friends, and associates instead of keeping a vigil in an intensive care unit of a hospital. The Christmas-New Year holiday must and should always be the season to be jolly. — Reprinted from *Aerospace Safety*. ■

Excuse Me While I

MAJOR MICHAEL T. FAGAN
Directorate of Aerospace Safety

■ Step right up! Welcome to the Carnival of Errors!

Ah, you there . . . would you like a glimpse of the future? Come right in! Who can resist a peek at things yet to come? Price? Oh, don't worry about that. Just step right in.

Watch your step as you come in the door, please. Yes, right through that green and white striped door. Like the color scheme? I bought this concession from a retired Air Force Safety officer. The green and white frame used to be a bulletin board.

Actually, that's part of the problem. The guy got into the crystal ball business trying to predict the next accident his unit would have. I don't know where he got the thing, but it works. Problem is, the only future it shows is future accidents. Yes . . . that's why I seem a little nervous. Drove the other guy whacko. He started grabbing pilots, supervisors, and whoever wore wings, by the Nomex and shouting "It's all the same! It's all the same!" but nobody would listen. Finally, they put him in a nice, safe home, and I got the place for a song.

Sit down right over there. Fly airplanes, do you? That's good. I got the ball to show civilian flying as well as the military stuff, but it still sticks to airplanes. No . . . I can't guarantee that the visions will be about you, but they will be true.

Let's see . . . go ahead and use that bent Continental valve cover for an ashtray; I'll take the cover off and get to work. (Old sectionals make great crystal ball covers, have you noticed?)

Ah! I begin to see it now. It's cloudy . . . cloudy, (looks like about 300 broken, 1,000 overcast, with light rain and fog.) Now I see clearly!

I see a young man . . . a professional man. He is successful and he is a pilot. He has a beautiful wife and nice neighbors. He has a new airplane!

I see him leaning over his logbook. It shows that he has nearly 700 hours of flying time.

What's this? All but 37 are in a fixed-gear single engine type, but his new machine (polished, it is!) has two! Ah . . . he has a shiny new instrument rating, a shiny new plane, and a 37-hour package of experience in his new source of pride.

Here come the neighbors, carrying skis! The four are headed for the mountains for a weekend of frolic in the snow.

Excuse me, would you pass that cup by your elbow? I need a sip. Herb tea, anyone? It's so "gypsy" and besides, it's decaffinated. Helps steady my nerves.

Back to the gazing . . . ah, yes. Here is the young, successful man in his lodge room in the mountains. He is studying his log book. No! It's his appointment book. He must see clients (or are they patients?) on Monday. It's Sunday morning, and as cloudy as your mother-in-law's reasoning. Off they go to the airstrip, rosy cheeks aglow! The phone call to the weather person said they'd be all right if they cleared the pass. CAVU south of Alamosa. VFR all the way, after the first leg, and that looks makable.

Wheels in the well, and away they go, right under the ragged ceiling! No sweat. Well, maybe a little. They drop down a notch to stay VMC. No biggie.

It's getting cloudy . . . cloudy.

CONSULT MY CRYSTAL BALL

No, not a ball malfunction, . . . the weather south of Vail. Can't see over the pass anymore. Just mountains rising into the clouds. It's a little hard to see even that in the light snow.

The pilot is asking flight service for help getting an IFR clearance! Ah, now he has them. Sorry about that, flight service, but I can't seem to lay my hands on the freq for Alamosa VOR, but . . . thanks, flight service, I have a good needle now. No . . . no identifier, but I am climbing and expect it shortly. Say again? You're breaking up. I'll pick you up again after I climb a little.

Oops! Let's see. Mixture rich, carb heat . . . cuts down on the power a little, but keeps the props turning.

Not much rate of climb showing, so he pulls the airspeed back a bit. The snow on the windscreen is sticking in the corners now, and some appears to be sticking on the leading edges of the wings.

It's getting cloudy . . . cloudy. The crystal ball this time. I guess they'll find the aircraft in the spring.

What? You don't own your own plane? Let me knock on this thing and see if I can scare up a vision for folks who can't afford their own plane. This crystal ball is just like an old TV I once had . . . works better if you jiggle it a little.

Sit down, sit down. Here it comes now. Ah, a rental plane, with no frills. Here comes the family of four, heading back from a Thanksgiving visit to Grandma. Weather includes a line of thunderstorms but Pop thinks he can weave through them. The VHF is a little scratchy with all that lightning, and he considers hanging a hard left to Atlanta to wait it out, but that would mean another night away from home, which costs money, both for the hotel and for the rented plane. Oh, oh, he says that if he steers for the light spots, and stays below the ceiling, he can make it. Junior just got airsick in the back . . . it's a little turbulent. Now Pop is in as much a funk as the weather . . . a mess to clean up after landing.

Whoops! It's really getting rough, even here outside the showers. Everything is spinning, spinning, spinning.

Don't get up. Please stay a while longer. What kind of pilot are you? A helicopter pilot? Oh. Let me see . . . I think I can get this thing to come up with a vision about coming home from a deployment and going lower and lower to stay VMC. Something about a powerline across a river, I think. . . .

Heard it before, you say? It's all the same story, you're right. Owe me? You don't owe me a thing. You didn't really listen, anyway, so forget it. It's all the same . . . all the same. Have to go now? Well, goodbye, I guess. Thanks for stopping by.

Several times this year, during the winter months, an affluent professional man with his family and/or friends will be returning from a weekend trip, proceed into weather, ice up and crash. Likewise, there will be one or more instances of light aircraft pilots proceeding into weather conditions beyond the capabilities of their aircraft or themselves. These will result in control loss and fatalities. At least one helicopter will strike either the ground, trees, or wires while trying to "duck under" a lowering ceiling to remain VMC. In each case, the mishap will be the result of an error in judgment by the pilot. The machines are excellent. Training programs are thorough and stress safety. Weather forecasting is comprehensive and reliable. These are the easy safety problems to solve, and they are well in hand.

Why, then, will these accidents occur? Because of the social system in which we operate as pilots. We have all been told, time and again, that certain types of decisions will predictably result in accidents. Despite warnings, threats, and good advice, otherwise sound thinking men and women continue to give judgment a back seat to social pressure to get home, to think themselves capable of deeds which have proven fatal to many others, or to impress others. Dead pilots don't impress anybody. The boss may be upset if you're late, but that is preferable to being hospitalized. An unplanned RON costs, but not as much as a funeral. The choice is not between missing appointment and making it; you are already late when the weather sets in. Oh, you might make it this time, but somebody else, who was as confident as you, will not.

No crystal ball, no magic, no foolin'.

No doubt about it. ■

OPS topics

Just a Slight Stuffy Nose

■ The T-37 pilot had been suffering from what he described as a slight nasal stuffiness for a few days. But he did not go to the flight surgeon. On the day of the mishap, he was scheduled for a night navigation mission. Everything went fine until the descent for landing. As the aircraft passed 17,000', the IP developed a severe sinus block. He was unable to clear his sinuses or reduce the pain which became so severe that he was unable to see clearly.

Fortunately, the student was able to take the aircraft and, after a slow descent, make a successful landing. A sinus block is not funny or merely a minor inconvenience. The pain can be so intense that it is incapacitating. It is very possible that just such a block led to a crash several years ago.

Investigators were at a loss to explain why a perfectly sound aircraft should suddenly descend below minimum altitude on a TACAN approach, crashing into the trees about 5 miles from the runway.

Medical examination of the pilot revealed a sinus block so severe that the pilot's sinus cavity was actually collapsed. It was the opinion of the examining doctors that the pain of the collapsed sinus would have been so severe that the pilot was probably unconscious, thus he never recovered from the descent or else was slumped over the stick. A head cold when flying can be deadly.

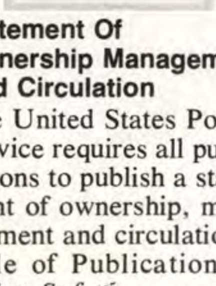
Gear Jammed

An A-10 pilot realized he had a problem when the light in the handle and the gear warning horn both stayed on after gear retraction.

Another A-10 joined and advised that the ground refueling door was open and binding against the left main gear tire. The pilot lowered the gear and made an uneventful landing.

There are two latches on the refueling door. The outboard latch was sprung out of position. Therefore, it only partially engaged the lock tab. Neither the pilot or the crew chief noticed this.

During takeoff roll the latch vibrated open. The door then twisted slightly pulling the inboard latch loose and allowing the door to open. How well do you check latches on preflight?



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Ops Check OK?

The FCF pilot made an unplanned addition to his check flight profile. The pilot placed his parachute in the bed of an Air Force pickup and rode in the truck from the briefing to the aircraft. The parachute had been placed in the truck with the actuator knob laying on the bed. When the pilot pulled the parachute from the truck bed the actuator caught on the tail gate. The ops check of the parachute deployment was successful.

Thunderbirds Seek Former Members

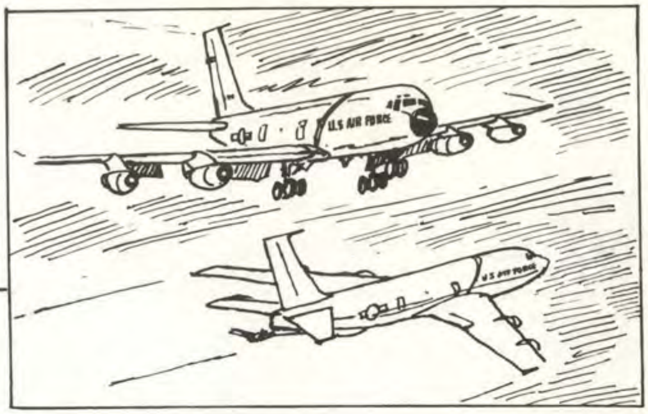
The U.S. Air Force Thunderbird Alumni Association is looking for former members of the aerial demonstration team. The association is made up of former members, officer and enlisted. Former members should contact P.K. Fisher, Box 4004, North Las Vegas, Nevada 89030.

Major Over G

Two F-4s were flying a BFM sortie. The fourth engagement was set up with two as defender. At the ready call the WSO called for a guns break and the pilot began an immediate 6 G right slice back, forcing Lead to reposition. Noting Lead's position, nr 2 began a short extension to gain airspeed. This maneuver placed the aircraft at about 8,000' and supersonic.

Then, to create an angular problem for Lead, nr 2 began a 6 G pitch-up with throttles idle and speed brakes out. The WSO made a "Watch the G" call as the aircraft decelerated through Mach 1, but before the AC could react, simultaneous slat extension and mach tuck caused an instantaneous increase in G loading to 9.5 G.

The AC was new to the phenomenon of mach tuck. This was only his second experience, the first being a demonstration ride the day before the mishap.



A Lot Of Little Things

Four KC-135s returned from a long refueling mission. Lead penetrated and landed without problem despite a low ceiling (250 feet). The nrs two and three went missed approach because of patchy fog (visibility as low as ¼-mile).

Because the radar was out, the aircraft were making TACAN/ILS penetrations and approaches. Numbers two and three, after their missed approaches, were cleared to a holding fix some 20 miles southwest of the base. The fix was off a TACAN other than the base TACAN. Number four was cleared for a TACAN approach after the two other aircraft reported in holding. Numbers two and three were in holding at 4,000 and 5,000, seven NM from the ILS approach course.

Fuel was critical, and the two aircraft in holding began pressing for clearance to their alternates, but they did not report minimum fuel to RAPCON. As nr four passed 5,000 feet on the TACAN approach, it passed 200 feet above another KC-135.

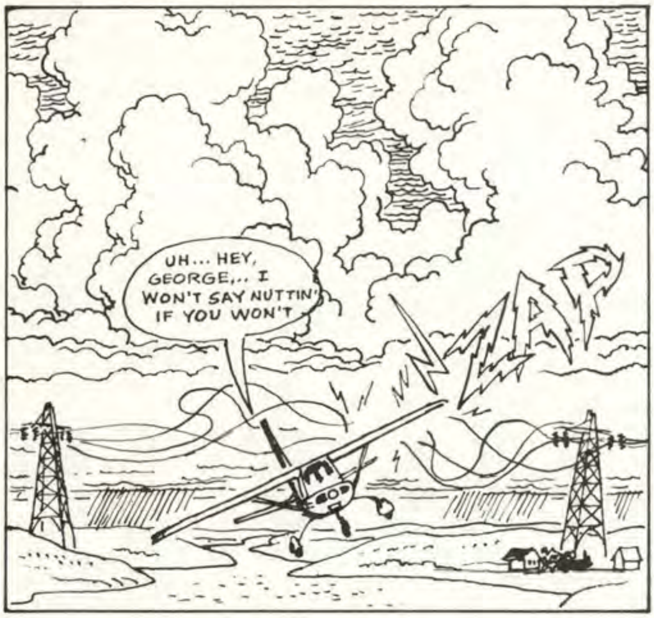
Several things contributed to this almost mishap. The mission was a late night takeoff, early morning landing upsetting the crew's circadian rhythms. The aircrews all knew that return fuel would be low. The weather was poor and there was the pressure of low fuel and the effect of a long, tiring mission. This resulted in an error by one of the two crews in holding.

They either strayed from the holding pattern onto the approach course or mistuned the TACAN and were holding on the final approach course, not the holding course. (The two radials were similar.)

The one thing which really set this one up was a failure to communicate. The crews knew the mission as scheduled was a problem (it had been flown before) but no one told any supervisors about this. The crews all knew that fuel was critical, but no one told the command post or RAPCON. The answer is: If nobody knows you have a problem, then nobody can help.

continued

OPS topics continued



Low Level Surprise

An Aero Club member and his passenger took off from their home base on a VFR Local flight. They proceeded to another air base some 20 miles away for some pattern work. Although the weather was deteriorating, the pilot continued and made two approaches.

Then the aircraft departed the pattern and proceeded to a picturesque river valley not far from the base. Approaching the river, they encountered rain showers and poor visibility (less than VFR minimums). The pilot decided to fly along the river back to home base.

After about 15 miles, the aircraft again flew into VFR conditions. Here the pilot climbed and did some steep turns then descended back into the river valley and continued down the river at a very low altitude.

Ten miles down the river while in VMC the aircraft struck some high tension lines approximately 200 feet above the river. Fortunately, the pilot was able to recover the aircraft and make it back to base. It took about four hours to restore electric power and clear the river for traffic again. As a final note, the pilot did not tell tower of his difficulties prior to landing.

Radiation Hazard

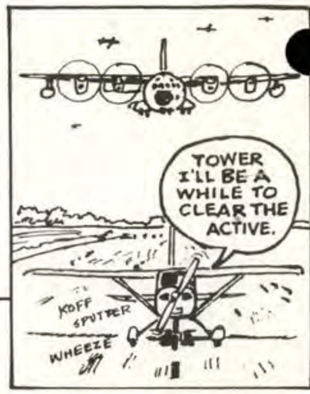
Not long ago, a fighter aircraft approached to within 50 feet of an E-3A while the AWACS radar was operating. The fighter pilot evidently was unaware of or had forgotten the hazard area surrounding AWACS when the radar is operating.

The radar produces high energy radio frequency (RF) radiation. Such radiation can be hazardous because it has the capability to injure people, ignite fuel vapors, interfere with avionics equipment, or trigger electro-explosive devices.

Although aircraft have operated close to AWACS without harm, the potential is very real. Consequently, the Air Force has established the following minimum separation distances from an AWACS aircraft when the radar is operating.

Vertical	650 feet
Horizontal	1,300 feet

These distances will assure complete safety.



A Little Extra For Safety

An Aero Club student learned a lot about fuel management when the engine in his C-150 quit from fuel starvation in the landing flare. He had flown an out - back during which he had taken on 10 gals, good for two hours, with 1.5 hrs to go. However, he overlooked some things that a more experienced pilot should have planned for: (1) The wind changed from a cross to a 20 kt headwind, (2) the temperature was higher than forecast, (3) instead of a touch-and-go at an intermediate airport, traffic caused a full stop landing and taxiback, and (4) he had to hold on downwind for traffic at home base.

We are not saying that everyone must be Full-tank Frank, but on a X-country a 30 min margin for a fairly long flight is cutting it just a bit too thin. Too many things can extend your flying time, so put a little extra in the tank bank.

Only A Small Problem

The two T-38 pilots were on an out-and-back. At the out base the pilot in the rear cockpit made an instrument approach and touch-and-go without difficulty. Then the pilot in front flew an approach to a full stop. As the aircraft flared and touched down, the nose pitched up rapidly before it was stopped by both pilots' inputs to the stick.

The pilots discussed the pitch up and decided that it was due to inadvertent trim actuation by the front seater. The crew did a flight control check and inspected the control surfaces but could discover no problem, so they decided to return home without asking for maintenance support. Nor did they call the SOF for advice. During the full stop at home base the aircraft once again pitched up rapidly. Again the crew were able to control the pitch-up and make a successful landing.

This time they wrote it up. The maintenance investigators found that the bearings in the horizontal tail assembly mixer quadrant were corroded and binding causing the pitch-up.

The aircrew admitted that they were aware of the procedures outlined for maintenance problems when away from home. They also were concerned about having to remain at the landing base until the aircraft could be cleared for flight. "Get homeitis" influenced their decision to take an aircraft with a suspected flight control malfunction.

Short Circuited Changeover

The KC-135 alert crew were making a crew changeover. The pilot and crew chief got an MD-3 power cart and prepared to apply external power to the aircraft. The crew chief started the cart while the pilot plugged the cable head into the aircraft external power receptacle. Then the crew chief placed the power cart on line. The pilot looked at the cable, decided that it was not plugged in all the way, and attempted to push it farther into the receptacle.

The crew chief saw that the pilot was having difficulty and, without shutting down the power cart, went to help the pilot. Holding the power receptacle door open with one hand, the crew chief began to help the pilot to push or seat the plug properly. While both men were pushing on the plug a short occurred, and there was severe arcing with sparks and flames. Although neither the pilot nor the crew chief received an electrical shock, both were burned, the pilot seriously.

The cable head had not been properly assembled in that potting compound had not been injected into the cable head. Therefore, there were bare wires inside which, during the pushing and twisting to seat the cable head, touched each other and short circuited.

If the power to the cable had been shut down before the crew tried to seat the cable, the short would not have occurred. The deficiency in the cable was not visible to the crew.

Gray Airplanes Are Hard To See

The UH-1 was inbound to an east coast base. The aircraft was not in radar contact because it was too low. About 18 miles out, the aircrew saw a light plane on a collision course about 250' away and took evasive action. The other aircraft apparently never saw the helicopter and continued on unconcerned

Both aircraft were legally operating VFR below clouds. The gray paint on the UH-1 makes it hard to see in certain light conditions.

continued

OPS topics
continued

"River Rats" Extend Scholarship Eligibility

Eligibility for scholarships offered by the Red River Valley Fighter Pilots Association has been broadened to include the children of all aircrew members killed or missing in action in Southeast Asia and those who died in the attempt to rescue the hostages in Iran.

"River Rats" scholarships generally range from $500 to $1,500 per student. Established in 1970, the annual scholarships are awarded on the basis of need and scholastic ability of students in accredited colleges and universities.

The River Rats is an organization of aircrew members who flew over the Red River Valley of North Vietnam during the Vietnam War. Its efforts include recognition for missing comrades, scholarship support for their children and educational programs about American aviation.

Information on River Rats scholarships is available by writing Lt Col John Piowaty, Box 531, Holloman AFB, NM 88330.

Aircraft Deicing

A couple of incidents involving commercial carriers have some points of interest for Air Force flyers. Both aircraft departed late in the afternoon and during climbout experienced increasing problems moving the elevators. Wet snow had frozen between stabilizer elevators and tabs.

The aircraft were not deiced because, apparently, the snow falling during the ground operations was not sticking to the wings. No one thought to check the tail surfaces also.

The reason the snow did not stick to the wings was that the refueling operation had added sufficient relatively warm fuel to the tanks to heat the wings above the temperature at which snow would stick. ■

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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.

AIRMAN

James T. Gardner

305th Air Refueling Wing
Grissom Air Force Base, Indiana

■ On 25 March 1981, while a KC-135 was parked in the alert area at Grissom AFB, Job Control notified the Small Gas Section that the auxiliary power unit (APU) on the aircraft would not start. A priority one work order was issued, and Airman Gardner and one other jet engine mechanic were dispatched to the aircraft. They troubleshot the malfunction and determined the unit had a low battery and bad igniter plug. After replacing the defective parts, they made an attempt to start the APU. As the APU came up to speed, flames burst through the top of the APU reaching the ceiling of the aircraft. Airman Gardner reacted immediately to the emergency situation. His co-worker was instructed to evacuate the aircraft and notify the fire department while he stayed to fight the fire. He immediately pulled all the APU circuit breakers. Using a fire bottle, he extinguished the blaze and disconnected the battery. By the time the fire department arrived on the scene, Airman Gardner had the emergency well in hand. Airman Gardner's quick thinking, outstanding technical knowledge and bravery prevented the possible loss of the aircraft and damage to nearby aircraft in the alert area. WELL DONE! ■


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