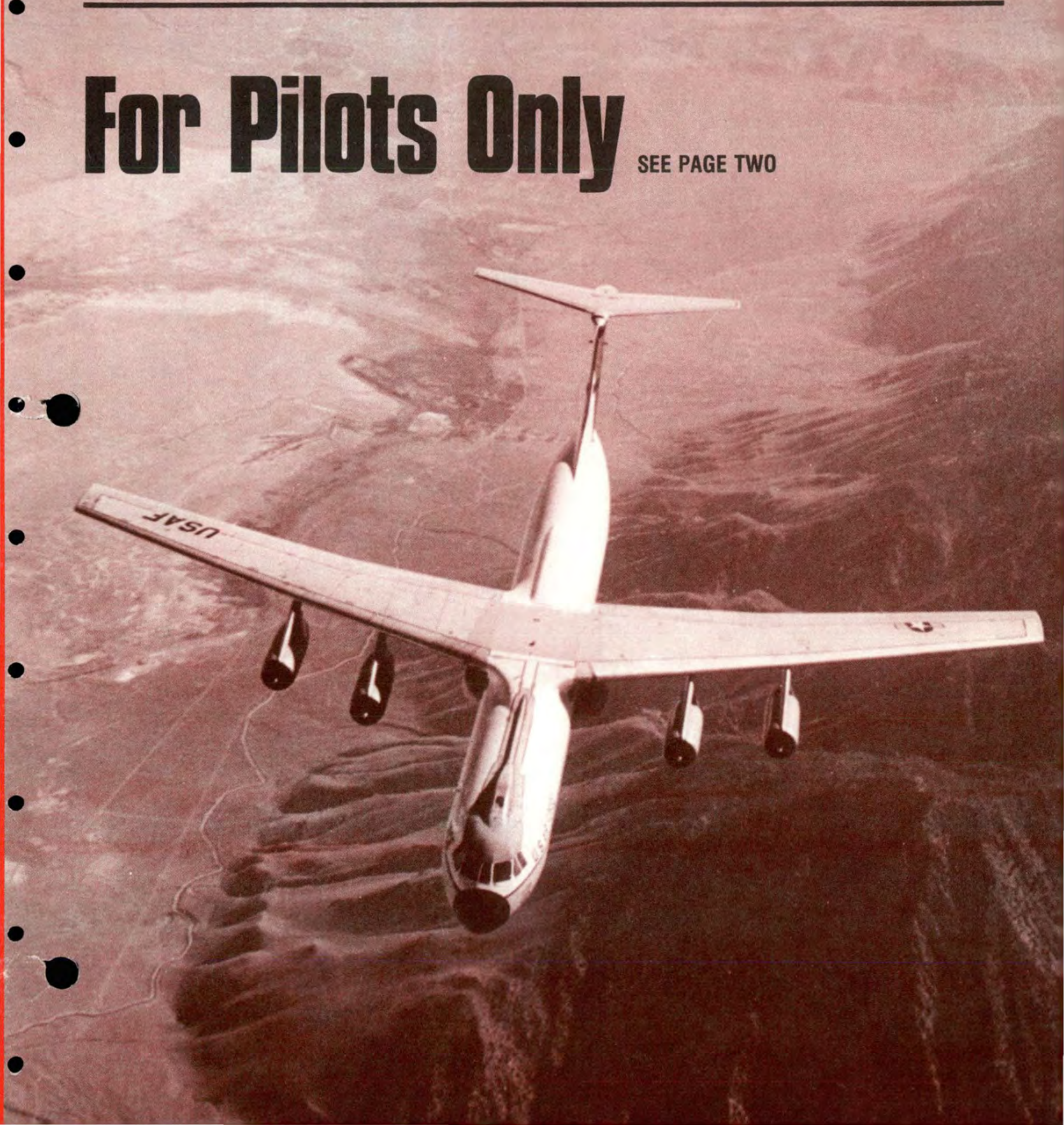
AEROSPACE

SAFETY • MAGAZINE FOR AIRCREWS

JANUARY 1980

For Pilots Only

SEE PAGE TWO



Low Altitude Operations

Below is a letter from Brig Gen Thomas S. Swalm to members of the 57th TTW at Nellis AFB, NV. We pass it on because we think he has said some important things about a very sensitive subject. Our thanks to General Swalm for permission to use it here.

■ "1. I am convinced we are not being realistic in our realistic training. It is a real combat training breakthrough to be allowed to routinely, at pilot discretion, operate below 500′ AGL and, in some cases, even down to 100′ AGL. However, we seem to have interpreted this authorization to be a requirement to stay low throughout all missions, even when not required by proximity of air or ground threats. This is unrealistic.

"2. Low altitude operations, demanding the highest level of pilot skill and proficiency, will be required regularly under wartime conditions, but not every mission nor throughout any given mission. Low altitude operations place pilots and aircraft in a regime where there is virtually no safety margin available. The pilot has only a fleeting second or two to react to a misjudgment, miscalculation, or malfunction before he is past the point of recovery. He is regularly at the edge of the safe ejection envelope. There is no reason to operate this close to the margin of safe operation unless required. We have assumed the enemy radar, SAM, and air-to-air threats to be nearly perfect in their ability to detect us and to then bring us down. This is not true. They are not perfect. Their omnipotence is somewhat exaggerated. We have let perceived enemy capabilities force us to routinely operate in a regime where we do as much damage to ourselves as the enemy can, and most of our self-inflicted losses will be unnecessary.

"3. There is a way of significantly reducing our self-inflicted low altitude losses. We should subject ourselves to the dangers and rigors of low altitude operations only as required to safely penetrate high threat areas or to negate ground-based or airborne reactions against us. A key element in knowing when to get low and when you can operate at higher altitudes, where more reaction time is available to respond to mistakes and aircraft problems and have a safe ejection guaranteed, is to thoroughly know enemy detection capabilities, the effective range and capabilities of ground-based anti-air weapons, and the range and capabilities of enemy threat aircraft.

"4. Not every enemy radar operator, AAA/SAM gunner, or pilot is an automatic ACE. Enemy equipment has limitations. They all can be rendered ineffective or defeated by smart pilots who know their capabilities and deficiencies. Operating below 500′ AGL may not be necessary if you are smart. Operating below 500′ AGL on all missions, in all areas, all of the time may be an unnecessary risk you are taking. I request all aircrews review their perception of the requirement to stay low all of the time. Analyze enemy capabilities as we have simulated on our ranges and see where you are taking unnecessary risks." ■

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FRONT COVER—Stretched C-141B prepares to test air-to-air refueling capability.

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SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

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For Pilots Only

ROGER G. CREWSE · Directorate of Aerospace Safety

■ In the past two years we have seen a substantial change in our overall Class A mishap profile. Historically, operational type mishaps ran about 47 percent of our totals, logistics mishaps about 42 percent, and the remainder were undetermined or environmental in nature. Now, and this has been true since the end of 1977, about two-thirds of our mishaps are operational, while less than one-third are logistics. The overall rates in terms of mishaps per 100,000 hours really haven't changed substantially, even though they are up from the mid-70s by 10- to 15 percent.

Also of concern is the fact that the destroyed aircraft rate is high, as is the fatal mishap rate. Now these aren't up just a little bit – they are higher than they have been since the late 60s. The destroyed aircraft and fatal mishap rates are up because the operational mishaps are up, and they are far more serious in nature than they used to be. We have agonized over the rate increases for the last 18 months or so, told everything we know and then some, in an effort to reverse the trends in the operational mishaps.

A brief summary of the facts is in order. When operational mishaps are looked at in detail, it is apparent that it is the fighter/attack aircraft mishaps that are really up. This does not mean that there has been any great decrease in operational mishaps in other types of aircraft at all. As a matter of fact, the rest of the aircraft types have kept clicking along at their usual frequency, as far as operational mishaps are concerned, and should give none of us any warm feelings.

In the fighter/attack mishaps we find two types of losses that are driving all rising trends:

- Collision with the ground or water with, as far as we know, a perfectly good aircraft.
- Pilot-induced control losses.

Both of these mishap categories are deadly. We destroy aircraft almost every time and almost always there is at least one fatality. On the other hand. those mishaps which occur on the range, during landing and takeoff or point-to-point normal navigation, and those involving midair collisions have changed very little in frequency.

The problems generating the increases in both collisions with the ground and control losses are basically mission-related. Low level nav, low level formation, low level maneuvering, ACM, DACT, are the mission elements where they occur and, with the exception of the last two months, for two years the frequency of mishaps during these mission elements has been increasing. While it is certainly too early to tell, the last two months of the year may be signaling a decrease or at least a leveling of the operational mishap frequency. We're hopeful.

Unfortunately, and naturally, operational mishaps get everyone tight-jawed. Rarely is there any type of malfunction involved; however, this is not always true. Our tendency is to get mad at the individual involved, even though he may be dead. Mostly they look like dumb accidents by dumb pilots and that isn't true either. As a matter of fact, it is our opinion that we could court-martial or otherwise unburden ourselves of every pilot wh[o] has had a bash and we wouldn't change the rate at all. The facts of the matter are that most of them die anyhow, and yet the rate has continued on.

To limit our action to the individual event which precipitates the mishap or to the individual himself who had the mishap, is really an ostrich-like maneuver. We know who did it and we know what he did, but why? Once again, we believe that since the system selects these folks, trains them, and commits them, the system itself then must be a part of the problem, if not most of it.

When underlying causes that result in a pilot error or a supervisory error type mishap are examined, we see the leading contender is that the pilot was pressing too hard or *being* pressed too hard. Combined with that oftentimes is an overcommitment. Either the pilot overcommits himself or he is overcommitted by the mission which he is trying to accomplish, based on his training, knowledge, and proficiency.

Low event proficiency is a large player in the oper[ational] mishap. By event proficiency we mean the pro-

Every now and then an article appears that stands out . . . one that strikes home and says what needs to be said clearly and concisely. We believe this article falls into that special category and recommend it as important reading.

ficiency the pilot had for the specific event he was trying to accomplish at the time of the mishap. We have few pilots who don't get enough 30-60-90-day time, and I am sure there are few whose training squares aren't filled. But in 48 percent of the mishaps we have looked at, the pilot or the crew involved had either never done the specific event before, had not done it for at least two months prior to the mishap, or had done it once before, recently, but only for the first time.

In almost half of the collisions-with-the-ground mishaps involving fighter or attack aircraft, event proficiency was a factor. The first time that low, first time in that formation position, first time on that range, first time on that exercise with those specific parameters – all of those have been factors in our collision-with-the-ground mishaps.

Briefings. Here we aren't talking about the fact that the pilot wasn't briefed to put in left rudder when the aircraft drifted right on the runway. We assume he learned that someplace in his career and doesn't need to be briefed on it. But if the mission elements are not covered in the briefing, or if while the aircraft are still in the chocks because of early abort, the mission is changed and there is no briefing, then there is a good possibility of committing some folks for a mission for which they have not been briefed. Secondary missions – instruments, navigation, whatever – oftentimes are briefed just about in that detail and that bites us with one of those dumb accidents.

Skill and technique deficits primarily concern the control loss and landing and takeoff mishaps. They also are factors in mishaps where there is an overcommitment. In winter, for instance, we become extremely optimistic about the weather, particularly runway visibility and ceilings, when we attempt to bring our machines home rather than scatter them at other bases. Destination fixation on the part of the crews, as well as supervisory personnel, lead us into situations where marginal weather becomes sub-marginal and cannot be coped with regardless of skill levels or techniques used by the pilot. Then we have another one of those dumb accidents.

Experience levels. We find in some of our mishaps that experience, both UE and total time, is a definite factor. We see where a pilot may have had a considerable amount of total time but no mission experience that parallels his current assignment. If his UE time is low then, we have the probabilities of a mishap soaring. From what we see in our accident pilot experience, both total and UE time, experience is a significant factor in the control loss and range mishaps, while in the other types of mishaps, excluding the solo UPT pilot in the training command, it is not.

Distraction/inattention. Distraction and inattention, task saturation, loss of situational awareness, or whatever you want to call it, is the single problem that precipitates collision-with-the-ground mishaps. Out of the 40 plus we have had in the last two years, where a perfectly good airplane, as far as we know, was flown into the ground, none of the aircrews involved knew they were going to do that until just before they did, if at all. The mistake? Attention, for whatever reason, was subtracted from flying the aircraft, to the point that the pilot was unaware that he was about to hit the ground.

The reasons for the distractions are not really as dumb as the accident seems to be on the surface. The conditions which distract from flying the aircraft in the low level environment are very predictable. Low level nav over flat or undulating terrain in a spread formation requires considerable attention outside the cockpit. First time for a crew in a formation position that low, combined with first time on the range or in an exercise, can make a collision-with-the-ground mishap distinctly possible. At the best, that combination may result in the fact that you had

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Pop goes the life raft!

PAT HENRY/Chief Experimental Test Pilot
and **FRANK MANIE**/Senior Engineer, Design, McDonnell Aircraft Co.

It doesn't happen often but you had better be ready when . . .

■ During the course of a recent accident investigation, the potential results of an uncommanded in-cockpit life raft inflation were brought into sharp focus. While highly improbable, there is evidence that it does happen, and that it could contribute significantly to a hazardous incident or even accident. Since it would be an immediately alarming event for the pilot, to say the least, this article hopefully will help prepare him mentally for the quick reaction necessary to cope with this unpleasant potentiality.

The scenario we investigated, and are reporting on below, is that of a life raft suddenly trying to inflate with the pilot still strapped comfortably (up to that point) in his seat in the airplane. This huge canvas balloon that's trying to instantly mature underneath an unfortunate crewman can break the survival kit latches as it attempts to escape its confines. When this happens, it is guaranteed to cause personal discomfort of rapidly increasing severity, and more than likely some incapacitation, as you will see below.

The Investigation

The Life Support, Crew Station Engineering, System Safety, and Flight Operations groups here at MCAIR collaborated to investigate this situation, using an ACES II seat and a laboratory test setup. The object of the investigation was two-fold, thus requiring two consecutive tests. The first test was designed to establish the force, in terms of lapbelt load, that would be induced by life raft inflation; the second was to quantify the human tolerance level and reaction to those loads.

Test One—The Dummy

For the first tests we used a 5th percentile Alderson dummy seated in an ACES II ejection seat. All attaching hardware was standard USAF equipment except for the lapbelt, which was instrumented with strain gauges to measure tension. The survival kit was a production "fly-away" ACES II kit, fully packed, including the LRU-16/P life raft and the FLU-2A/P carbon dioxide cylinder. Both a pressure transducer and a direct reading gauge were installed in the inflation assembly to record life raft pressures. Initiation was via a static line attached to the CO_2 bottle.

Upon actuation of the CO_2 bottle, the life raft partially inflated within the survival kit container. Pressure within the life raft reached 45 psi almost instantaneously. The raft cammed the seat pan latch open and rotated the seat pan up approximately 2.0 inches along the rear edge, raising the dummy in the seat accordingly. Lapbelt tension reached 450 pounds within 3.0 seconds and rose to 475 pounds within 50.0 seconds!

While these figures may not seem significant at first, consider that the 45 psi measured in the raft increases with altitude. Thus the lapbelt tension of 475 pounds, equivalent to a downward load of 950 pounds across the mid-section, would also increase with altitude, producing a tension of 540 pounds, or a total load of 1080 pounds at a cockpit altitude of 14,000 feet!

Test Two—Live Subjects

Obviously, only a dummy would "sit still" for something like the highest numbers recorded in the first tests. So our second series of tests were conducted on real live "volunteers," who would add a subjective aspect to the investigation by being able to say "OUCH, this is enough!" at the proper time. We proceeded to these second tests somewhat cautiously, but anxious to see exactly what human reaction to loads of these magnitudes would be.

This test setup was a little more elaborate than our first one because of the safety precautions required. The seat, attaching hardware, and survival kit were from the first test, but in place of the CO_2 bottle, we used a controlled nitrogen source with a subject-held dump valve switch. This was necessary to command the inflation value while maintaining the applicable rate of onset, while allowing the subject to terminate the test in the event the forces became too great.

The test subjects were subjected to gradually increasing lapbelt loads, each time deflating the raft and recharging the nitrogen source to the next higher value. The tests were continued until lapbelt tensions of slightly over 400 pounds (800 pounds total load) were reached. At this point we seemed to be approaching the subject's willing tolerance level, with no doubt that the significance of the problem had been clearly demonstrated.

All subjects, pilots and engineers alike, were unanimous in describing the rapidly mounting pain and alarm as the seat rose and attempted to squeeze one in half with his own lapbelt. Even though sitting there in the relative comfort and security of our Life Support Equipment Lab (at zero mach and floor level) we all experienced an apprehension which built almost instantly – probably because there was no discernible end point to the rapidly increasing pain. This concern and pain immediately commanded almost all of one's attention. It is easy to imagine how much more alarming it would be inflight due to the hostile environment and obvious potential consequences. There's no doubt in our minds that the pilot is going to stop doing almost everything, except flying into the trees, to address this new problem. It is a real attention getter.

None of us subjects were the least bit interested in subjecting ourselves to loads representative of what the dummy felt during the actual inflation test. When one realizes that those loads would be significantly higher again at elevated altitudes, the picture becomes even more sobering.

The Conclusions

After the tests were completed, we analyzed the data and drew the following conclusions:

- While the test did not establish the ultimate lapbelt tension physically tolerable by an aircrewman, it was generally concurred that lapbelt tensions of about 400 pounds are extremely uncomfortable and would require immediate corrective action.
- Within the limits of the tests performed, no involuntary reactions were noted; however, it can be reasonably assumed that the total surprise of the inadvertent raft inflation would draw a good portion of the aircrew's attention immediately, and would center his attention on resolving that specific situation.
- The maximum time that the lapbelt load is tolerable appears to be unpredictable from these tests and possibly variable from subject to subject. It is fair to conclude that a crewman would make every possible effort to relieve the tension as soon as possible rather than live with the condition until landing the aircraft.

The technical and quantitative results of a life raft inflation as measured in our simulations are obvious in the numbers recorded. It is somewhat more difficult to clearly convey the qualitative and emotional results of such a traumatic event.

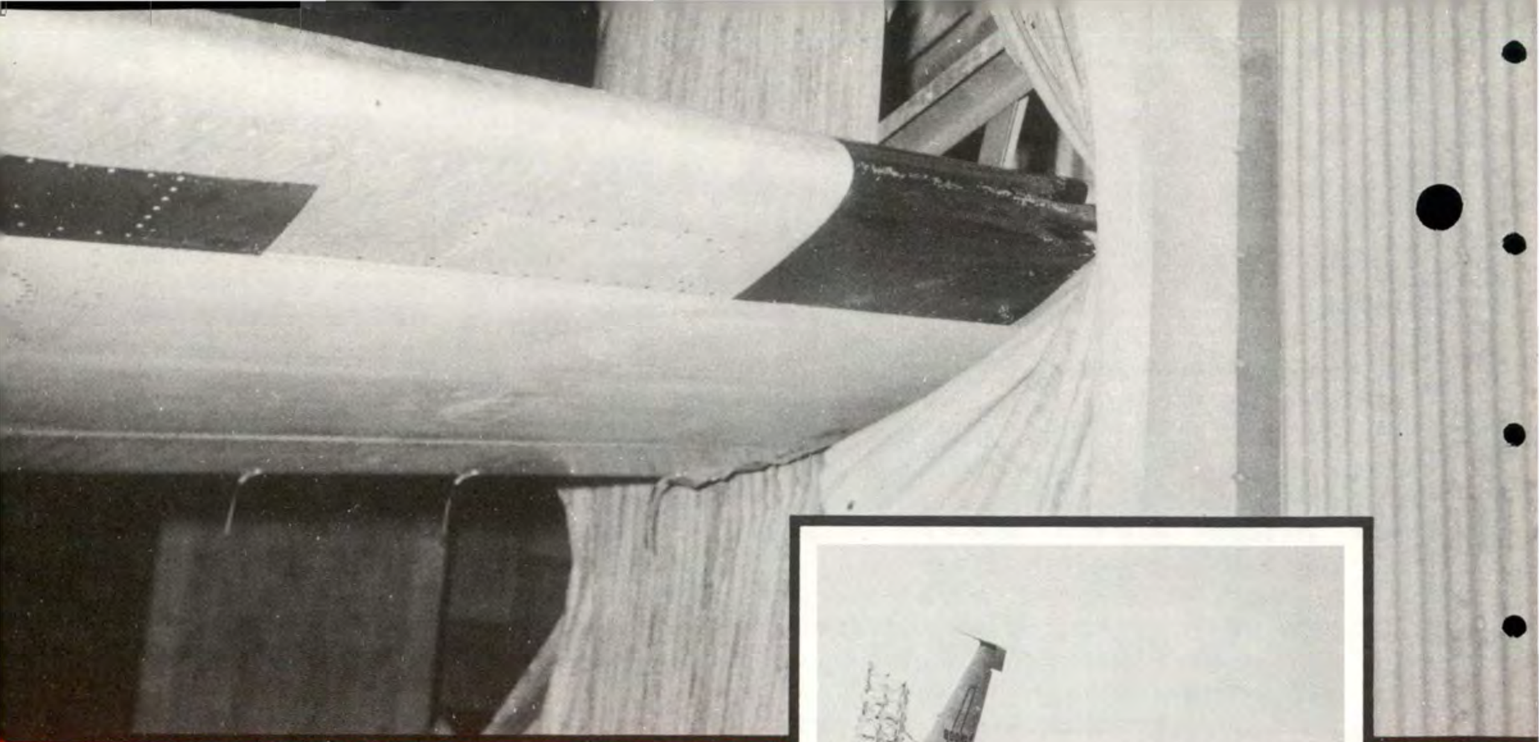
The Recommendations

Based upon the results of our investigation, we offer three recommendations in the event you should suddenly find yourself vying for cockpit space with that huge balloon.

- Don't Release the Lapbelt – This may sound obvious, but during the surprise and alarm of an airborne inflation, you might be tempted to go with your first impulse, namely, to relieve the lapbelt tension by releasing the belt. If you do, your rapidly growing raft is going to try and drive you through the main instrument panel.
- Puncture the Raft if Possible – Due to the attach point design of the survival kit cover, it should raise up as much as an inch across the front, giving a wide target area for knife point deflation.
- Descend as Soon as Possible – If you're unable to relieve the pressure in the raft, descending to as low an altitude as possible will minimize the pressure differential between the raft and ambient air, thereby keeping expansion force to a minimum.

Although rare, inflation of raft in the cockpit is a very serious thing. Quick action with a knife, as illustrated, may be a crew's only hope.

Let us conclude by reminding you that we aren't trying to sound like alarmists – we recognize the probability of any one of you having to cope with an uncommanded life raft inflation is extremely small. Nonetheless, the potential is there and its impact is very serious. In the absence of more realistic simulation, we hope that this report will help you to be prepared for the unexpected. – Courtesy *Product Support Digest*, McDonnell Aircraft Company. ■



PILOTS BEWARE

MAJOR MIKE BLANCHARD
Directorate of Aerospace Safety

■ Did you know there are all kinds of people out there who are trying to help you have a taxi mishap? If you don't believe it, take a look at some of these set ups:

B-52 TAXIED INTO SECURITY POLICE VEHICLE.

Design of B-52 taxi lights limit side illumination.

Vehicle without required lighting was allowed to operate on unlit part of airfield at night.

Vehicle was parked on taxiway too close to centerline.

Flashers were not used on parked security police vehicle.

Pilots had just taxied past area of bright illumination which reduced night vision.

A-10 TAXIED INTO MAINTENANCE TRUCK.

Vehicle was parked too close to painted taxi line.

C-130 RIGHT WING TIP HIT BUILDING.

Marshaller was directing aircraft from the left side – right side hit building.

C-130 WING TIP IMPACT WITH ANOTHER C-130 WING TIP.

Parking plan required excessive maneuvering without wingwalkers always available.

Poor ramp lighting.

KC-135 WING TIP DAMAGED BY SNOW BANK.

Snow removal operations not completed.

Taxiway centerline was displaced 100 feet but tower was not notified.

KC-135 LEFT WING TIP HIT LOADING RAMP.

Aircraft was parked too close to a stationary loading ramp.

Pilot requested a tow out but was convinced by maintenance that they could marshall him out safely.

Marshallers did not ensure wing tip clearance during taxi out.

C-141 LEFT WING TIP HIT BUS.

Bus left unlit and unattended.

Ramp lighting inadequate.

No taxi line on ramp.

Army marshallers not familiar with 141.

F-4 LEFT WING TIP CONTACTED POWER CART.

Power unit incorrectly positioned.

Marshaller did not ensure wing tip clearance prior to marshalling aircraft.

F-4 WING TIP COLLISION WITH ANOTHER F-4.

Parking lines did not provide sufficient clearance.

Aircraft was improperly parked.

F-15 WING TIP COLLISION WITH ANOTHER F-15.

Taxi lines in arming area did not provide proper clearance.

Snow not completely cleared from arming area.

T-33 AIRCRAFT TAXIED INTO LADDER.

Ramp was unlit.

No marshallers available.

Taxi lines covered by snow.

Aircraft ladders left out on ramp.

Ladders were painted dark with no reflective tape.

How can we as pilots avoid these type of pitfalls?

Keep head out of the cockpit when the aircraft is taxiing.

Stay on the taxi line and ensure obstacles do not infringe on your taxi space from the side.

Use very slow taxi speeds in congested conditions.

Call for wingwalkers if in doubt as to wing tip clearance – required when less than 25 feet.

Park it if the obstacle is less than 10 feet.

Don't trust a marshaller implicitly – he can err also.

Use the rest of your crew to help clear.

Review AFT 60-11 periodically.

The key to all of these tips is "USE GOOD JUDGMENT." Remember, in the final analysis AFR 60-11 levies the responsibility for safe taxi clearance on the pilot. So if you cannot positively ensure you have safe taxi clearance – don't taxi. You may save Uncle Sam some money and yourself a red face. ■

Beware Of Low Flying Bread Trucks

MAJOR MICHAEL D. BLANCHARD
Directorate of Aerospace Safety

■ Have you ever been on the flight line and seen a maintenance van, more popularly known as a bread truck, go flying by in front of you? I don't mean speeding, I mean flying by on its side 5 feet in the air. It does happen.

During an operational exercise a bread truck was blown over on its side by a parked KC-135. The driver of the van noticed that engines 1 and 2 were running so he drove around to the other side of the plane assuming that nr 4 engine would no longer be at a high power setting as it is when used to start 1 and 2. When he drove into the jet blast he ended up on his side sliding down the ramp. Luckily, he was wearing his seat belt and was not injured.

Another jet blast incident occurred when a C-5 was making a 180-degree turn at the end of the runway. Even though he was using marshallers and minimum power for the turn he blew away a set of VASI lights. Cause of this one is both operator and supervisors. Both were aware of the potential hazard and neither took appropriate actions to prevent the damage.

The third mishap occurred during a C-141 engine start. Prior to engine start the scanner was completing his final walk around and he noticed several helicopter parts and mattresses between 40-100 feet behind the aircraft. He asked personnel in the area to help him move the gear farther back. An Army captain informed him there was no need to move anything, as nothing could be damaged. The scanner complied with the captain's wishes, advised the pilot of the situation, and recommended that engines 3 and 4 be kept to minimum power settings until well clear of the area. You guessed it, the jet blast blew the mattresses and parts over and damaged an Army helicopter blade.

I hope the moral of this story is clear: Whether you are a crewman, maintenance man, or supervisor you must be aware of the extremely hazardous potentials of jet engine blast. An ounce of prevention by appropriate personnel in each of the three cases cited would have saved "Uncle" 10,508 dollars. ■

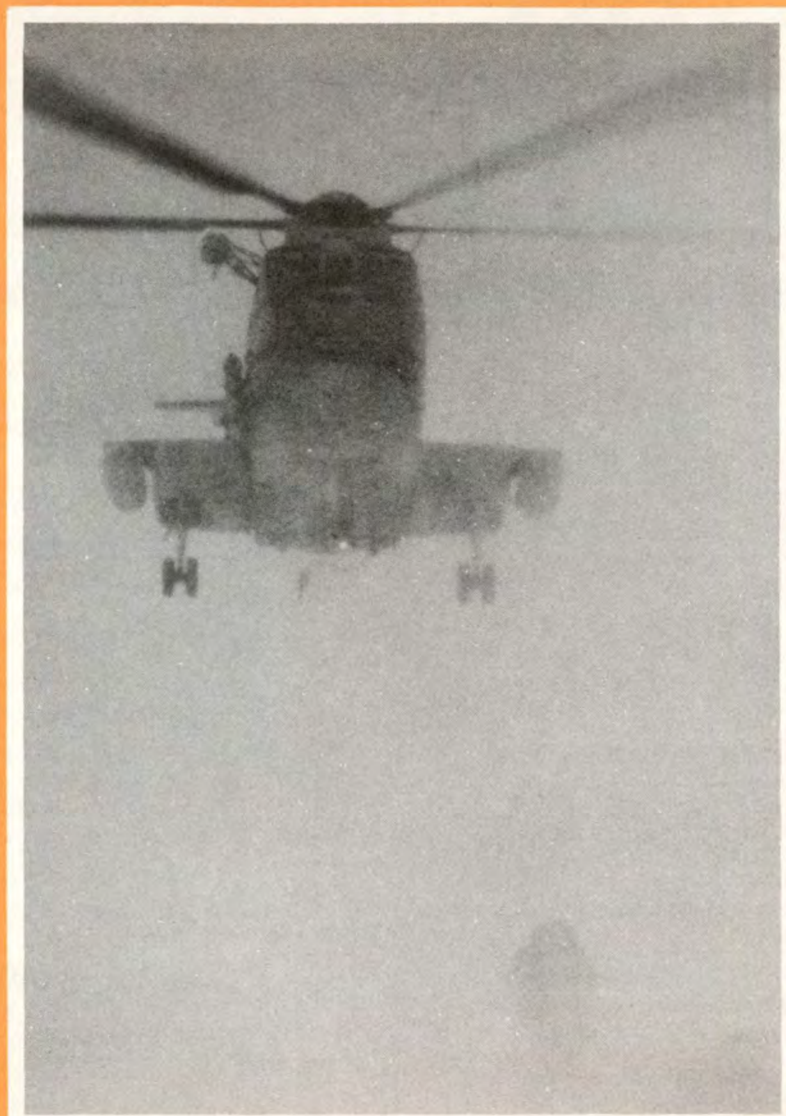
Whiteout: A Rotary-Wing Winter Menace

LT COL ROBERT L. GARDNER
Directorate of Aerospace Safety

■ Winter weather brings many increased risks to flying, but one of the more serious hazards for helicopter operations is rotor-induced whiteout. All aviators have to contend with natural whiteout conditions where snow covered terrain blends into a milky sky; low visibility and blowing snow may contribute to the loss of visual references; but helicopters pilots are faced with generation of their own snow cloud during operations close to the ground.

When flight over loose powdery snow is encountered, a helicopter pilot can find himself in the middle of a ball of swirling, visually cue-less atmosphere. This is an ideal condition for inducing serious disorientation in which you may have the sensation of moving in one direction when, in fact, you are stopped or moving in another direction. The wrong flight control input or pilot freeze-up on the controls are possible results which can lead to disaster or, at the least, a very uncomfortable situation.

Lack of familiarity with a snow environment, not anticipating or being prepared for a sudden whiteout condition, and continuing to press on in a recognized hazardous situation are the most frequent contributors to whiteout mishaps. See how many of these factors are illustrated in the following.



Whiteout Mishaps

While flying at 700 feet AGL in a remote arctic location, an H-43 pilot encountered the first natural whiteout of his career. In an effort to establish visual reference with the snow covered terrain he reduced airspeed and lowered altitude until the undefined, irregular white surface came into perspective. Flight was continued in a slow high hover, maintaining visual ground contact, until suddenly the aircraft started to become engulfed in a rotorwash induced snow cloud.

Fortunately, an arctic-experienced instructor pilot in the left seat got on the controls and maneuvered the helicopter out of the circulating snow before complete outside references were lost. The crew then got on instruments, climbed to a safe altitude, and proceeded to home base. The pilot who got them in the high accident potential condition had only recently arrived at the northern location and had no previous snow environment experience. To this day he vividly recalls the apprehension and tenseness that he felt developing in the matter of a few seconds as the visual cues he was relying on started to disappear.

As an OH-58 pilot taxied for takeoff, he hovered slowly at a three-foot altitude over loose falling snow. The rotorwash created a whiteout condition, and the pilot became disoriented, lost control, and crashed. The pilot had not received any instructions concerning whiteout resulting from hovering too low and too slow in loose and falling snow.

A UH-1 pilot, approaching a landing zone, flew into heavy blowing snow and lost control which resulted in the helicopter rolling on its side as it touched down. The pilot was not familiar with procedures in the operators manual and continued to land after encountering a whiteout condition.

While on a search and rescue mission in mountainous terrain, an H-3 encountered marginal weather with a ground cover of fresh snow. After finding the objective, the helicopter was landed at the site; however, takeoff was delayed for a short time due to poor visibility. The first tákeoff was aborted because of rotorwash-induced whiteout. A little later a second takeoff was accomplished, but after 15 minutes of hovering around, a landing was again made due to limited visibility and lack of ground references. A third hovering takeoff was attempted, the pilot became disoriented, began inadvertent rearward flight and froze on the controls. As the helicopter moved rearward, the main rotor blades struck the hillside causing the blades to strike the cockpit and chop off the tail boom. The aircraft commander was fatally injured, two other crewmembers received minor injuries, and the H-3 was destroyed.

Recognize The Hazards

Knowing the snow condition will give you some idea of what to expect during takeoff and landing in snow environments. The snow may be well packed, crusted or frozen to ice, thereby presenting very little problem. At other times, it will be light, loose, dry and powdery and easily converted to a swirling snow cloud. The following points can help you determine the snow condition.

Know The Snow

Where the temperature is −20°C. or below, fresh snow will be loose. Any time a wind of 10 knots or more exists, you can anticipate blowing snow. Open areas may be blown clean of fresh snow deposits. However, huge snowdrifts will develop when terrain features such as trees and crevasses block the flow of air.

Loose snow that has been exposed to the sun for three days or more will form a crust. The depth of this crust will depend on the time it has been exposed to the sun. Overcast conditions will not cause the snow to crust. The rotorwash of a light helo may not cause a breaking up of the crusted snow, while operation of an H-53 over the same area could cause the crust to break up in pieces.

Footprints of people or animals provide an indication of the snow condition. Deep prints indicate snow is loose and blowing snow will be encountered when landing. If a person is seen standing atop snow without sinking, you can anticipate crusted or frozen snow.

A low, slow pass will give an indication of the snow condition. If the rotorwash creates a snow cloud, you must initiate the proper flight technique for a safe landing.

The following techniques are recommended for helicopter operations in a snow environment:

Taxiing in the Snow

The helicopter produces the greatest amount of rotorwash when hovering. This creates a very hazardous condition for taxiing skid-mounted aircraft. This hazard is not as serious for aircraft with wheels. These aircraft can ground taxi safely to the takeoff point with only minimum pitch, thus reducing the force of the rotorwash.

If you must relocate a skid-mounted aircraft from the parking area to the takeoff point:

Ground taxi the helicopter to a point where it can be flown to a hover and air taxied at a high taxi speed

Whiteout: continued

(approximately 10-to-15 knots). The reason for ground taxiing is to permit positive control of the aircraft when in close proximity to other aircraft and obstructions. At this low altitude, the rotorwash will produce an area within the snow cloud where forward visibility can be maintained with the ground. The type of aircraft being flown will determine the size of the clear area. The air taxi speed should be slightly below effective translational lift airspeed. This technique allows the aircraft to be flown forward of the snow cloud where visibility is not restricted by blowing snow.

Avoid taxiing in the near vicinity of another aircraft that is running up or taxiing. Sufficient time should be allowed for the snow cloud produced by other aircraft to dissipate before taxiing through the area.

Takeoff

The techniques used to take off from snow will vary depending on the type aircraft you are flying; however, the doctrine for this type of takeoff is common to all helicopters. The following takeoff techniques are recommended:

Ensure the skids are free from obstruction and not frozen to the ground.

Where the snow is only a few inches thick, application of pitch to the blades before takeoff may blow most of the snow away from the takeoff point, thus reducing the density of snow that will be lifted on takeoff.

After the above procedures have been accomplished, stabilize the aircraft on the ground until the snow cloud dissipates. When ready for takeoff, position the cyclic for takeoff. If there are no obstacles along the takeoff route, it should be positioned to achieve a maximum performance takeoff attitude. If the takeoff is to be made over an obstacle and adequate power is available a near vertical ascent should be made.

". . . blowing snow will increase and reference to the ground will be temporarily lost. Maintain heading and altitude by reference to the flight instruments."

When ready for takeoff, make a continuous application of torque. The aircraft should have no forward movement until clear of the ground. Sufficient torque should be applied to ensure a positive rate of climb. As the aircraft begins to climb, blowing snow will increase and reference to the ground will be temporarily lost. Maintain heading and flight attitude by reference to the flight instruments. When clear of the snow cloud, adjust flight attitude and torque so as to achieve normal climb airspeed and rate of climb. Throughout the maneuver, the copilot should monitor the engine and transmission instruments.

Before takeoff, you should discuss with the copilot what action will be taken in the event of an engine failure or rpm bleed-off while in the snow cloud. The normal procedure for single-engine aircraft is to maintain takeoff heading and to perform a hovering autorotation. The copilot's responsibility is to assist in identifying the failure and height above the ground during the descent. If flight is conducted in a multiengine aircraft, you must determine before takeoff if single-engine operation is possible based on gross weight. If it is determined the aircraft must be landed, the pilot should beep up the good engine to gain maximum power and position the aircraft in a landing attitude. Power is added during the descent to cushion the aircraft onto the ground.

Landing

When landing a helicopter to snow-covered terrain, you can anticipate being engulfed by a snow cloud unless the proper landing technique is used. This technique requires the aircraft to be flown in front of the snow cloud until it makes contact with the ground. Although the specific technique will vary for each type of helicopter, the basic principle for snow landings is the same for all helicopters. Remember that no two snow landings are the same. You must always anticipate the unexpected and be prepared to cope with any condition that confronts you. Use the following techniques when landing to snow-covered terrain:

Before initiating the approach, you should learn as much about the touchdown area as possible, e.g., condition of the snow, slope of the area, obstacles. If the landing is made to an improved landing site, some forward airspeed on touchdown is desirable. Where there are no unknown obstructions, a running landing is the best procedure to minimize blowing snow. However, when landing to an unfamiliar or remote site, forward speed should be dissipated upon touchdown. The approach should be planned so that only minimum power is required to terminate. If there are no obstacles along the approach path, a shallow approach is recommended. If an approach angle greater than a normal approach is required to get into a confined area, it is preferable to terminate the approach out of ground effect above the touchdown point and hover vertically downward. The rate of descent will depend on the condition of the snow. In very loose snow, a slow descent will blow the snow away, allowing you to maintain visual reference with the ground. This procedure permits greater control when in the snow cloud.

The initial position of an approach to the snow is the same as any other approach. The primary difference is in the last 50 feet. Instead of making the normal deceleration below effective translational lift airspeed, you must maintain this airspeed until just before touchdown. This allows you to keep the helicopter in front of the snow until touchdown, after which the aircraft will become engulfed in the snow cloud. A slight leveling off is required to maintain airspeed. Forward cyclic must be applied to maintain speed. As the aircraft descends to an in-ground-effect altitude, blowing snow will develop to the rear of the aircraft. At this point, begin a deceleration. After the aircraft has begun to decelerate, it should be positioned in a landing attitude. If inadvertent ground contact is made due to poor depth perception it will not be hard enough to damage the aircraft. Once contact is made, reduce torque until the aircraft is firmly on the ground. Never plan to terminate the approach to a hover as disorientation can occur easily in a snow cloud.

The most difficult aspect of the approach is determining your height above the terrain. Trees or other terrain features located in the near vicinity of the landing area provide good ground reference. If none of these objects are available, it may be necessary to drop an object or smoke grenade near the touchdown point.

Once on the ground, the crew chief should conduct a walk-around inspection to ensure the aircraft is positioned securely on the ground before shutdown. If on a slope, precautions must be taken to ensure the aircraft will not slide downslope after shutdown.

"Although the specific technique will vary for each type of helicopter, the basic principle for snow landings is the same. . . ."

Night approaches to the snow are normally made to a reference point on the ground, e.g., tactical landing light or runway light. These devices provide a good reference for judging angle of descent and rate of closure. When executing a night approach to a tactical landing site with lights, always plan your approach to land short of the touchdown point. This technique ensures that you will not overshoot and have to decelerate rapidly in a snow cloud. Additionally, by shooting short, it allows you to maintain airspeed after the level-off, thus keeping the aircraft in front of the snow cloud until touchdown. If the landing light or searchlight is used during the approach, position these lights so the beam is beneath the aircraft so that reflection from the snow cloud will not blind the crew.

En Route

In a nontactical environment, aircraft will normally be flown at an altitude and airspeed where the rotorwash will have no effect upon loose snow. In a tactical environment, however, you must fly at terrain flight altitudes to avoid destruction by threat weapons. Because terrain flight altitudes are so low to the ground, rotorwash creates a signature identifiable for several miles.

To minimize the effect of rotorwash on loose snow, maintain an airspeed of 40 knots or greater. At this airspeed the rotorwash is displaced horizontally.

Terrain features that served as good references for one mission may not be recognizable on the next flight. Snowstorms or winds can change the appearance of a snow-covered area in a matter of hours. An awareness of this phenomenon is essential to ensure accurate navigation.

Summary

Winter flying requires specialized techniques. By knowing the hazards and being prepared to cope with them, safe operation can be conducted. Take a look at your helicopter's flight manual and review the cold weather procedures. See what it says about takeoff and landing in snow conditions. Discuss the procedures with an old head or someone who has been there before. Try and learn from their experiences. Awareness and training are two essential weapons in the battle against whiteout mishaps.

Much of the foregoing was adapted from the US Army *Flightfax*. ■

LANDINGS

MR. ROBERT W. HARRISON, Editor

■ The December 1978 *Aerospace Safety* contained an article titled "No Short Landings?" The last paragraph read as follows: "This is the December issue of *Aerospace Safety*. We sincerely hope that when next December comes up on the calendar that we can report 'no short landings this year'."

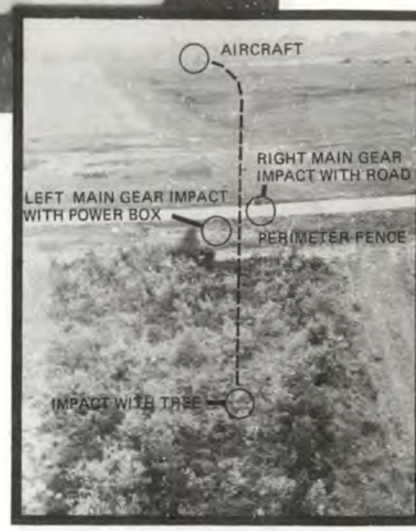
Well, it didn't turn out that way. In fact, 1979 wasn't a very good year. Frustrating is the fact that we keep having the same accidents, year after year. We merely relocate them. For example:

■ An F-5 received major damage when it landed 300 feet short of the overrun. This appears to have been a classic visual illusion case. The approach is over a valley with a floor 450′ below runway elevation. The slope from the valley floor toward the runway can fool a pilot into believing he is high. The scenario then reads like this: An early turn to avoid flying over the valley; having changed his pattern and perceiving that he is high, he reduces power; a high sink rate develops; when he sees this, he adds power but it's too late and a short landing results. Such was essentially what happened in the F-5 mishap. That was not an original; the files contain many such cases.

There are several things that can be done to prevent this type of mishap. First there is smart flying. The pilot must use the aids and not let the lay of the terrain determine his approach pattern. The aids include speed, VASI, glide path indicator, VVI. FSOs can help by recognizing the problem and discussing it in safety meetings. IPs can warn students of the hazard and demonstrate proper procedure.

■ It was a bad day for a C-9 pilot who had just about nothing going for him. On a GCA, the pilot lost visual contact with the runway between DH and touchdown. He attempted a missed approach but struck the overrun 526 feet short of the threshold. The aircraft bounced and landed again 51 feet from the threshold. The aircraft then swerved and hit a couple of runway lights before the crew got things under control.

Now to the fine points. The weather was near minimums. While the aircraft was on final nearing DH, a fog bank moved over the first 2,000 feet of the runway. After passing DH, the pilot apparently became somewhat disoriented after losing his visual references and allowed an excessive descent rate to develop. The base Inter Service Support Agreement didn't ensure removal of snow from the overruns. Consequently, snow and ice had accumulated, and when the aircraft touched down hard the first time, ice ingestion failed the left engine. On the second touchdown the pilot, not realizing the left engine was out, tried to place both engines in reverse. The asymmetrical thrust caused the aircraft to swerve and hit the lights. The aircraft received severe damage but there were no injuries.



F-5, above left, followed this path during short landing caused by illusion produced by terrain.

■ Several things that probably could have been coped with individually combined to cause a Class A mishap. The mishap aircraft was nr 3 in a flight of 3 landing out of an ILS approach.

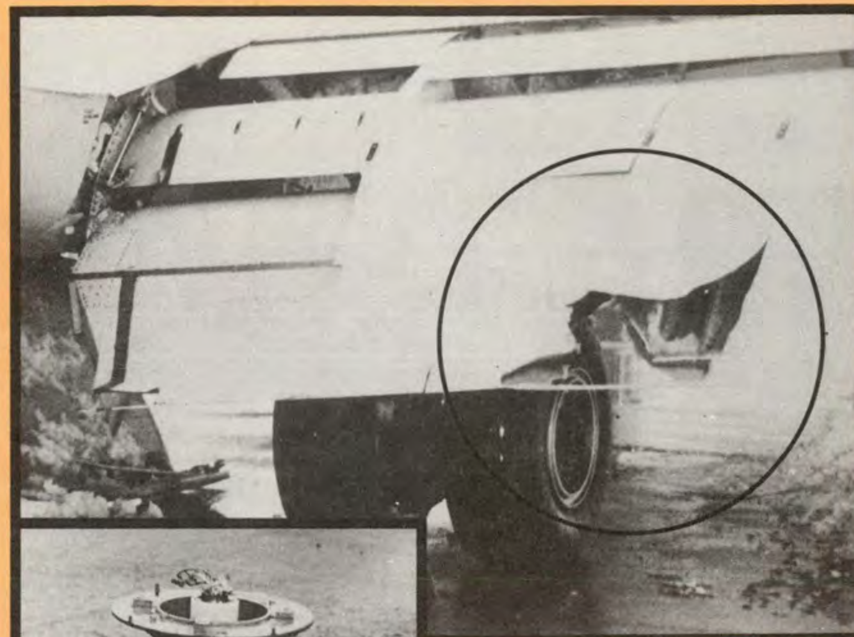
A heavy snowstorm had deposited more snow than the removal equipment could handle. During the

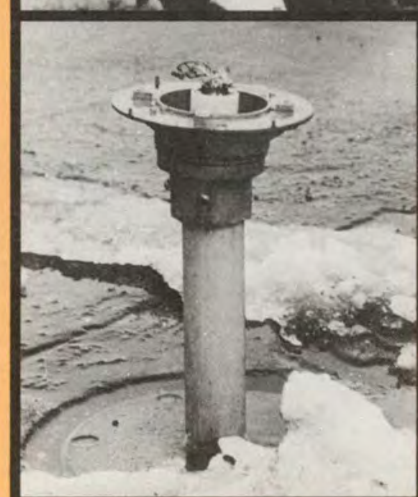
approach, snow was falling and WX went down to 300 and one. Unfortunately, the pilot was not wearing his prescription lenses. He was left of course and failed to correct. He asked for the sequenced flashing lights and approach lights to be turned down, but his transmission was not heard.

Apparently, the pilot was bothered by: (1) the poor visibility, (2) inadequate vision due to lack of his prescription lenses and (3) the lights. However, rather than go around, he attempted to land. The aircraft landed on the left side of the runway, hit a snow bank and was destroyed. Ironically, even with the snow plows not being able to do a complete job, cleared width of the runway was 125 feet, more than adequate.

■ Seldom do accidents result from a single identifiable cause, as we have seen from the above examples. Such was the case with an F-4. The IP in the rear cockpit was attempting a night landing from a GCA. Touchdown was short of the threshold lights and well to the left side. This crew didn't get any help when the aircraft rolled over the BAK-9 barrier ramp which had been recently repaired. The right main broke through the surface and was sheared from the aircraft. The crew lucked out and didn't get hurt. Crew coordination appears to have been less than excellent.

■ Our old enemy wake turbulence apparently combined with inadequate training and weak or wrong guidance to produce a minor mishap. Minor, in this case, meant a $92,500 repair job.





Touchdown in snow and ice covering overrun resulted in ice ingestion fouling an engine. Flap damage occurred in collision with runway lights.

Number 4 in a flight of 4 probably got below the rest of the flight and into their wake. Not having a good grasp of the lift available in the landing configuration at AOA above 10, and hit by the wake turbulence, the pilot failed to stop a high sink rate and let the aircraft hit short and hard. The right main gear and tire failed but the pilot was able to take it around. Then he made an attempt at an approach end arrestment. The right main gear wheel caught the cable which disengaged after 600 feet. The aircraft drifted off the runway and stopped.

This article has been based on 23 Class A and B landing mishaps that occurred during the first nine months of 1979. There were many different causes but in 12 of these mishaps some form of supervision, direct or indirect, was listed as a cause factor. Several of these cited deficiencies in the aircraft Dash One. In some cases the pilot's training was considered inadequate. Other factors included weather, maintenance tech data, and poor pilot technique.

The most distressing thing is that as one reads the reports there is the feeling of having been there before. While the pilot is always the first one on the scene of an aircraft accident, he is not the only one who could have prevented it. His supervisors, maintenance people, engineers, handbook writers – all have a part in ensuring that the pilot, the aircraft and the operating procedures are capable of doing the job safely. ■

X-COUNTRY NOTES

Some thoughts about a group of folks that are critical to a smooth and safe airfield operation.

IDEAS AND NOTES

■ **WHAT'S A 271?** There is a small group of people who grease the wheels of airfield operations. If you don't know the difference between a 271 and a 781, and you are an airplane operator, read on and you may learn. One of the most challenging and variety-packed enlisted career fields is the Base Operations Dispatcher, 271XX. I need to point out that 271's are also used in some command's and locations as Alert CQ's, command post flight followers, etc. Predominantly, however, these are the people you find behind the base ops dispatch counter.

I think there is a need to pass on to crewmembers what goes into the making of a dispatcher. First, there is *no* tech school for these people — that's right, no formal school to teach them their job. So what you have are individuals usually right out of high school, thru basic training, and shipped to their PCS base to pick up their career field through OJT processes.

There are some excellent CDC's for the 271 folks, but essentially they arrive at Podunk AFB not speaking airplanes at all. In no time they learn FLIP, 175's, FAA, radios, weather, protocol, MAC passenger service, etc., etc. Granted, at some locations, they are pretty much only dispatchers, but more often they are part airfield manager, part welcome wagon, part tour guide, part motor pool dispatcher, part radio operator, part flight planner, part meal orderer, part runway inspector, etc., and *all* diplomat. They take noise complaint calls and receive aircrew complaints — usually in stride. I have been to more than 60 bases in the past year and can say that by-and-large this is one of the most professional and motivated group of enlisted folks I have run into.

Aircrews need to have a little empathy before they rant and rave at the counter. The dispatcher will be happy to take down your complaint and attempt to help. Often the problem you have is not within their power to magically fix. Take a deep breath and cool off before you head for the nearest dispatcher with your problem. Remember that you are talking to non-aviators who are doing their best to learn your business and provide professional service and assistance. They come in all shapes, sizes and backgrounds. They work some strange shifts and hours, perform some weird duties and are still called upon for bay orderly, CQ, clean-up details and other non-dispatch-type duties. They have headaches and bad days just like other folks. They are the backbone of a smooth and safe airfield operation — work with them and they'll do their best for you!

DON'T STEAL THE BOOKS — Several base ops counters this past trip had out-of-date FLIP books and charts about a week after the change-over date. About half of the problems were ops personnel posting and the other half were crewmember larceny. First — don't steal the books; if you need one, go to the dispatch counter and ask. Most often they will be glad to give you one. Second — if you do insist upon stealing the books, don't put the out-of-date pubs in the rack. They're harder to notice and somebody may flight plan using your out-of-date charts and lose their assets because of it.

SMALL CERTIFICATES — about 1 February 1980, we will have available for Rex Riley list bases, 8 x 10½ inch Rex Riley certificates which can be imprinted with "Billeting, Inflight Kitchen, etc.," to show that the Rex Riley award covers all agencies. We will be able to send 10-15 copies to bases that request them. Please! We will honor only written or telephonic requests from Chiefs of Airfield Management (to prevent duplicate requests). So, after 1

REX RILEY
Transient Services Award

MAJOR DAVID V. FROEHLICH · Directorate of Aerospace Safety

February, check with your airfield manager to see if he has ordered them from Rex Riley, AFISC/SEDAK, Norton AFB, CA 92409, or AUTOVON 876-2113.

RETAINED AWARDS

LITTLE ROCK AFB—Lots of traffic (little, big, civilian and military) make this place a spot for vigilance. Ramp space is plentiful, but the pattern can be saturated! Good people providing good service.

GRISSOM AFB—Nasty winter winds and weather, but these people are aiming to provide good service. CAUTION: REX spotted lots of gravel and concrete chunks on the ramps and especially on the transient parking area. Could be food (FOD) for a hungry engine and ruin an otherwise super stopover. Watch for it!

MINOT AFB—Ditto on the nasty winter weather, but again the Minot personnel will work hard at making your stay a safe and pleasant one. Watch the transient ramp! It's been normal to find several helicopters and T-Birds parked there besides transients. This makes taxi tolerances tight, and with the winds and ice up there, could lead to a taxi crunch. Some of the best meal and billet facilities we've seen recently. A good quick turn or pleasant RON. Stop by.

REESE AFB—Down Texas way with all that open space you can get falsely lulled into being alone. DON'T! There are loads of white rockets and whistles in the pattern and area. Keep your eyes open, but don't avoid Reese 'cause they'll give you a good stopover. Standard UPT operation though, so plan on maybe only a full stopper.

ELMENDORF AFB—Facilities and TA services were super! A pretty specialized operation with some strange environmental and weather problems, so do your homework well! Attitudes are good and the folks will work to give you a good stop or stay.

No new additions to the list, but we are generally seeing some improvements in facilities and attitudes. The name of the game is caring whether or not service is provided. A lot of hurdles and brick walls can be overcome by folks with a "can-do" attitude. CREWMEMBERS—The same rules apply! Your attitude and how much you try has a direct bearing on how your service is. People will go a lot farther if you are trying, too. Make reservations if you can, call ahead with special requirements and be emphatic of the local problems and limitations. Good service is a two-sided coin! Good turn or bad—fill out a questionnaire, leave it with the base ops folks and send REX a *copy*. Rex Riley, AFISC/SEDAK, Norton AFB, CA 92409. ■

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

Report Of A Pilot Giving Flight Training On A Jet Transport

■ I must tell you about my experience with an airport fire department during my last flat tire incident. We pulled off the runway and called to tower to inform them of our situation. They said they wanted to call the fire trucks because they saw some smoke coming from our wheels. We said, all right, and then we shut the engine off.

By the time I had got out of my seat, the engineer had both doors open. As I looked out the passenger door I could see that all four tires were going flat and there was an average amount of smoke coming from the wheels. I told them not to worry nor get excited and then walked to the forward galley door to look at the right gear. I also noticed some smoke but I considered it normal under the circumstances.

When I walked back to the forward lounge, I noticed the engineer standing in the doorway and jumping up and down. He wasn't moving – just jumping up and down and shouting in his native tongue. Then everybody except the engineer (he just kept jumping up and down) started running up and down the aircraft. I got out of the way just in time to avoid being knocked down. I knew a little of the local language but they were all yelling and talking so fast I couldn't understand. I walked over to the engineer who was the only one left with me in the lounge and put my hands on his shoulders to stop him from jumping and then asked him to speak slowly and tell me what was wrong. The only word I got was "fire" and he pointed to the left wheel. I looked out and saw smoke but no fire.

By this time the entire crew had returned to the front door and in their excitement, almost pushed me out. They had all the fire bottles in the aircraft. About that time I could see the Captain was going to jump out the front door. I yelled "Don't do that or you'll break both legs." I told them to just be calm, that everything was all right. By this time, my statement was about as effective as shoveling water against the tide.

The Captain sat on the floor then twisted around and hung from the bottom of the door and jumped to the ground. (No broken legs!) Then to my amazement, all eight fire bottles were thrown out of the door. I could just see one of them hitting the ground and exploding. I have seen some juggling acts in my life but never one like this because the pilot caught every bottle, even though on the last one he fell down. It was fantastic, but I was beginning to get worried and I yelled down to find out what he was going to do and he said he was going to spray the wheels. I started to plead with him and I know I must have said "Please don't do that," at least twenty times and each time my voice got a little louder.

As he sat on the ground, he lined all the fire bottles neatly in a row. Then he jumped up and I know he never heard my pleading voice. He got one fire bottle and ran back to the left gear and standing about 2 feet away from it, he emptied the first bottle. I told him the thermal shock might make the whole wheel come off and if it does "you'll be killed." Each time he came back to get a fresh bottle, I pleaded and issued the above warning. After using the fourth (and each time he stood a little closer) I was exasperated; I just went over and sat down. That was one time I could have really used a drink. When I looked around, the engineer had pulled the inflatable evacuation slide out of the ceiling. I yelled, "no, no" and ran over to stop him from pulling the toggle, because I knew

there were no replacement slides at the station, and that would have stopped our training. As I looked out of the door, the last bottle was being used and this time, the nozzle of the bottle was right against the wheel.

About 10 minutes after engine shutdown, the fire trucks came rolling up; one of them was pushing the other because they could not get it started. The vintage of the trucks was about 1940, or earlier. There were about twenty firemen dressed in all kinds of attire, but mostly shorts and no shirts. They all jumped off the trucks and began yelling and running over to the main gear. The next thing I observed was just about the funniest sight I have ever seen in my entire life. All twenty of these firemen started jumping up and down and yelling at one another. Nobody moved, they just jumped up and down. I stood in the doorway and laughed. This went on for about 2 minutes.

The trucks were equipped with about twenty individual bottles of foam and a big water tank, which had to be hand-pumped. The pilot during all this had gone to the truck in which the engine worked and started to pull out the foam hose. When the firemen saw him they stopped jumping and proceeded to help him. He got right on top of the gear and released the foam. I closed my eyes and prayed. The fire truck without the operative engine had stopped about 35 feet in front of the aircraft, so about ten of the firemen ran over to it and pushed it under the right wing. Why they did not hit an engine nacelle I will never be able to figure out. They released all the foam from this truck on the right gear. I still continued to pray. I guess the good Lord heard me because nothing happened.

By this time a jeep pulled up towing a large ladder. All of the crew immediately disembarked in such a hurry that one mechanic (we always carry two) fell half way down to the ground. Fortunately, he only had skinned shins. I remained in the aircraft because I was afraid I would get run over if I was on the ground. I finally got up courage and went down, just as another smaller foam truck arrived. They decided to put it on the right gear and I ran about 100 yards in front of the aircraft. As they released the foam, the hose split and there was no way to stop it so it sprayed all over the wing. At about this time, a blow out plug fused in the right gear and I saw twenty firemen run by me going about 40 miles an hour. Then I looked out across the airport towards the operations building and here came a little old man carrying a bucket of water and running at top speed. The water was splashing all around and by the time he arrived at the left gear he had about a quarter of a bucket left. He lifted the bucket and gently poured it on the wheels and then he turned and walked away smiling.

By this time, I thought I could not laugh any more. I had noticed two C-119s circling the airport and I watched one of them on the final part of his approach. Evidently, the tower had closed the airport because as I glanced towards the tower I noticed they had shot off two red flares. It had not rained in this area all summer and everything is tinder dry. When the flares came down they landed in dry grass and started one of the biggest grass fires ever seen in the area. By this time there was no fire fighting equipment at the airport so they took a bulldozer and plowed up the ground around the fire to stop it from spreading.

This reportedly occurred at a European airport in the sixties. – Courtesy British Airways *Air Safety Review.* ■

For Pilots Only

continued from page 3

to luck out, in that there just wasn't anything to run into right at the time you were giving your entire attention to something other than flying the machine. In addition, a warning light at just the wrong time, losing sight of the leader at just the wrong time, encountering an unexpected threat, either ground or air, at just the wrong time, may singularly or all together, subtract from the attention that is required to fly the aircraft in the low level environment long enough to result in a collision with the ground.

Losing situational awareness – a term that has been coined recently – usually results from distraction on the part of the mishap pilot. Burying the nose while looking out the top of the canopy and not realizing the position of the aircraft until it's hopeless, has happened too many times in the last two years, and it looks like a dumb accident. Looking over the shoulder when under attack has also resulted in many pilots placing their aircraft in an impossible recovery situation.

Desire, motivation, ego – whatever – also is a big player in our DACT/ACT mishaps. An experienced pilot with a less capable aircraft, or the obvious novice, has the pride, ego, and the desire to get the more capable aircraft, or pilot, on film if he can. But desire, no matter how well motivated and understandable, will not increase the capabilities of the equipment or the pilot one bit, and we have another dumb accident when those capabilities are exceeded.

All pilots must have a knowledge of basic aerodynamics. Now you don't need a college degree in aero engineering to get this, but if you are to fly an airplane at its limits, you have to know what the limits are. You have to know what the signals are when you are approaching them, and what the first signals are when you exceed them. Pilots who are flying air-to-air combat must also know, in addition to the basic aerodynamics, the specific aero characteristics of their aircraft associated with high angle of attack maneuvering. In the middle of an exciting engagement, below the recovery altitude for your aircraft, is a very poor time to learn some startling facts about the aerodynamics of your airplane.

Discipline breakdowns. We are talking more about the subtle discipline breakdowns where the rules are stretched, limits are pushed, and procedures modified, than we are about the gross and willful. This problem of discipline breakdowns is a tough nut for any of us to crack. The reason is that you get more victories – although they are paper ones – when you stretch the rules and press on than you do when you follow the rules exactly. The fact that among the losses are destroyed aircraft and fatalities doesn't seem to be balanced against that potential paper victory. Also, the problem with the subtle discipline breakdowns is that they may be tacitly approved by the supervisory personnel at the unit, or perhaps even demonstrated by airborne supervisory people, and then if not encouraged, certainly condoned by all.

It looks to us that, in over half of our mishaps, there is a discipline breakdown of some type, whether inadvertent, or subtle and encouraged. We say that because the rules which applied at the time of the mishap, covering the specific event attempted, simply were not followed. Then once again – you guessed it – a dumb accident.

So the causes of our operational mishaps which underlie that call are as follows: pressing and overcommitment, training and knowledge deficiencies, low event proficiency, poor briefings and failure to follow briefings, skill and technique deficiencies, experience deficits, distraction/inattention, and discipline breakdowns.

The types of mishaps in which they result – and it makes little difference what kind of an airplane we are talking about here – are pilot-induced control losses, collisions with the ground or water, midair collisions, and takeoff and landing accidents. They account for approximately 95 percent of all operational mishaps and always have. The underlying causes we have listed cover 95 percent of the problems that generate the operations type mishaps. But there is something else.

It is not enough to know what kind of mishaps operators have, and the underlying causes, the discussion still is purely academic. The guts of the issue is: How do you use the information we know about our mishaps to prevent future mishaps?

And all of us agree, I hope, that the human factors of our mishaps are by far the most difficult to get our arms around. When we have the human factor mishap, the resulting recommendations may change procedures, change misison elements, cause retraining, change proficiency requirements, expand briefings, restrict or limit low experience level pilots from the more difficult missions, and discuss the best methods of improving discipline. Of course, when all else fails, we rebrief all pilots. But all of these actions can be likened to what our traffic folks go through. A curve is placarded for 45 miles an hour; the driver tries it at 85 miles an hour and doesn't make it. The action is to reduce the sign limit to 25 miles an hour. So it goes with some of the actions that we feel obligated to take resulting from our operational mishaps.

For the most part, we have good procedures. They evolved from our combat experience, as well as what we have learned while training over the past 30 years. The mission is stated – we can't change that. It's a requirement and is the reason we even have an Air Force. Our pilots are well educated, trained; they're sophisticated folks much, much better equipped to fly the mission than was my generation. On the negative side, the mission is harder than it has been in the past. We have less dead time per sortie and our margins for error are less than they were. But to balance that, the training is much more realistic than it was in the past, and I am sure that our readiness is also higher in a peacetime environment than it has ever been before. And that, after all, is why we train. But on top of it all, the stakes are much, much greater than they have ever been in the past for any military organization.

We think the situation boils down to this, and is why the article is entitled "For Pilots Only." When you strap yourself to a machine and your wheels go into the air, no book, no tech order, no regulation, no checklist, no supervisor, flies that machine. It's you, babes – you're the one who does it, and the only one. When those wheels go into the air, no pilot can delegate responsibility for flying the machine to another soul on the face of the earth. He can't delegate his altimeter, airspeed, attitude indicator, aircraft attitude, aircraft control, or aircraft position to another soul in the universe. Not a nav, engineer, copilot, flight commander, or command post. They can only help. The whole thing is his. Given his existing experience, skill, knowledge, training, and proficiency, he must then play the game as best he can with what he has.

Now there are lots of people who would like to take some of that responsibility, as long as they don't get any on them when things go wrong. Don't let them have it. Controllers, both military and ATC, will go so far, but when you are in real dire, deep trouble – unless things have changed since I've quit flying – their final transmission is "what are your intentions?" The classic reply, I think, to that transmission (and I don't remember the situation exactly, except it was bad) was when the pilot answered back "I intend to cry a lot."

But there is a control that you have as a pilot. In fact, you have the only control which will neutralize the threat to your clothes and bod, and that is to exercise what successful pilots of all countries' air forces have exercised, and that very simply is self-discipline. Now before you gag, read on just a little bit. You must discipline yourself to maintain situational awareness, to maintain attitude awareness, to know what your altimeter and airspeed say and what they should say, to know what you are up to and what you are capable of doing, when to do it, and make decisions and follow through. Nobody, but nobody, can do it for you.

continued

For Pilots Only

continued from page 19

In a good many of the mishaps of an operational nature we have had this year, we believe the problem was a breakdown or an absence of self-discipline. They go like this: In the past couple of months there was a fighter pilot who died because he lost track of where he was, and ended up with his nose buried at an impossible altitude for either recovery or ejection. What was he doing? He was looking out the top of the canopy in the kill kill kill mode while attacking a flight of two at low altitude who had not seen him. He probably had a smile on his face right up to the time the entire earth showed up in his windscreen.

There was an IP tanker pilot who ended up dead, along with four others in the airplane, because he just wasn't ready for the emergency that developed, and was generated, by a student pilot. He had probably been mesmerized by how well the student pilot was doing, to the point that he dropped his guard – something that no IP can ever do, regardless of aircraft type.

There was a bomber pilot recently who lost control of his aircraft somehow – we're not sure how – in a benign environment at the end of a mission on his way home. Whether his adrenalin level was still up to the point where he simply overcontrolled his aircraft while accomplishing some simple navigation maneuver, or he became distracted momentarily, we don't know. But both he and his nav are dead and the aircraft hit the ground because it had gone out of control.

There was a cargo IP on a touch-and-go who raised the gear instead of the flaps, probably, and right to this day we are sure he hasn't the foggiest notion of why he did that. He certainly didn't mean to. But he was on his seventh or eighth approach and somehow the head bone became disconnected from the arm bone. Pushing the wrong switch, pulling the wrong lever, continues to cause mishaps each year. The automatic actions only partially thought through are a problem of being human.

All of the mishaps we have mentioned, which are typical of many more that you can probably think of, have lacked that element of self-discipline as we have defined it. Pressing too hard too far, subtle discipline breakdowns, distraction, loss of situational awareness, overcommitment, and even deficient airborne supervision – all of those factors are still prevalent in our mishaps and all of them can be neutralized only by forcibly keeping aware of those potentials. The pilot then relies on his airmanship, common sense, knowledge, experience, and *self-discipline*, so that the traps are clearly and cleanly avoided.

Somehow, over the years, it seems to me that it has become unacceptable to enjoy flying. To enjoy it has somehow been equated to complacency, whatever that is. Perhaps you feel guilty when you are enjoying flying a military aircraft on a tough mission. Certainly you don't want anyone to know that really you are having one hell of a good time. But that's the way it should be. Our four stars, right down to our buck pilots who wear wings, flew or fly for only one reason when you get right down to it, and that is because they like to. They had or have pride in their ability to do it and are specifically proud that they have shown it in every war.

Few of our heroes in the flying business died in a dumb accident. Excluding combat losses, those who took pride and had fun doing the mission – those who had confidence that they were able to do the mission, and those who found better ways to do that same mission, are alive, or died of old age. They are the ones, for the most part, we look up to today. You know their names as well as I do. They didn't fly military aircraft because they didn't like to, and neither should you.

So the bottom line of this particular piece is this (I hasten to add, in my opinion): Enjoy flying our aircraft and doing the mission. Be good at it. Look for better ways to do it. Learn your fundamentals and boldly apply your knowledge, common sense, and above all, your basic airmanship in flying our aircraft today. Be proud that you can. As a pilot you have the whole thing. You can't give it to anybody, and if you want to, get out of the business. And finally, develop and maintain that self-discipline which keeps you out of the traps that some mighty fine pilots have fallen into and died. ■

FUEL DENSITY

by GORDON McKINZIE
Manager Fuel & Performance Control, United Airlines

■ Jet engines burn fuel at a voracious rate. It is the responsibility of the flight crew to not only stay on top of fuel consumption relative to flight plan, but to know with confidence the exact status of fuel quantity at all times. How confident are *you* in your understanding of what comprises indicated onboard fuel? The anatomy of that load, from the time it is delivered into the tanks, until it finally exits via a fuel nozzle deep in the engine's core, is not as straightforward as might be generally believed. The measurement of fuel, as a heating product at rest, or in motion, must be accomplished with careful consideration of its characteristic value of *density*. The purpose of this article is to provide some additional insight into the subject of fuel density and the influence of that parameter on quantity indication systems, flow measurement systems, and the combustion process.

Density 101 (Short Course)

A bucketful of aviation kerosene weighs approximately 14 pounds. That same bucket, filled with water, weighs 17 pounds, and when filled with mercury, weighs 227 pounds. If we are using a standard 2.1 gallon bucket, and the temperature at time of weighing is 60°F, we can describe the densities of these three materials:

Kerosene -	14.0 lbs ÷ 2.1 gals =	6.67 lbs/gal	
Water --	17.5 lbs ÷ 2.1 gals =	8.34 lbs/gal	
Mercury -	227.0 lbs ÷ 2.1 gals =	108.1 lbs/gal	

A density "value" is nothing more than a *conversion factor*, which links the weight of a substance to the volume it occupies. It would be convenient if turbine fuel always weighed 6.67 lbs/gallon, but two factors come into play which introduce variability into the value of density: composition and temperature.

Fuel Chemistry

The real measure of a fuel is its heating value, or BTUs per pound, and engine efficiency is directly linked to the capability of the fuel to produce maximum energy output, or thrust, for the smallest amount of fuel consumed. What we are always looking for, as an ideal, is: (1) The most BTUs in every pound we burn, and (2) The most pounds in every gallon we buy. But these two requirements directly contradict each other, as will be explained later.

Both BTU content and density characteristics are permitted some latitude in the specification requirements we impose on our fuel suppliers – the "net heat of combustion" is limited to 18,400 BTUs per pound as a minimum and density can range from 6.452 to 6.944 pounds per gallon.

Today's actual density, although numerically different from that of the past due to slightly changing composition, has continued to remain well within these specified limits.

Why the changing composition? Our in-house experts tell us that since refineries have been forced to process a wider spectrum of foreign crude oil, a rigid compliance to previous density levels has become impractical. As a consequence, all refineries, with the concurrence of users, have had to permit some latitude within certain specification limits. The value of our average system density has been declining for many years, but has recently bottomed out and started to rise as a result of the heavier North Slope crude being refined.

FUEL DENSITY continued

Fuel Temperature

The effect of temperature on fuel density further complicates the process involved in precisely determining fuel loads. In a wide temperature range from −40°F to +100°F, the density of fuel can change by .5 lbs/gallon, which could result in appreciable "incremental" discrepancies in load when large fuel volumes are boarded. For this reason, our fueling distribution charts (for USAF read AFTO 781-H) are tabulated for fuel densities of 6.55 (low density) and 6.8 pounds per gallon (nominal density). When fuel density at the delivery truck is exactly known, fuelers are instructed to use such value directly to convert gallons to pounds, if the density is different from 6.8 or 6.55.

Density Accountability

To reiterate: Tank volume, measured in gallons, remains constant while tank capacity in pounds changes as density variations occur.

Fuel quantity indicators, which display fuel weight, will not gauge a tank filled with low density fuel to read as much as the same tank filled with higher density fuel. To reflect the correct gallons-to-pounds conversion process in the quantity indicators, on-board systems have been designed to sample and compute the effects of density as an integral part of the measurement process.

Densitometers

These are mechanical devices designed to directly measure the weight of fuel in the tanks, and function in much the same manner as a hydrometer, which contains a calibrated float which is buoyed at a depth consistent with the specific weight of the test liquid.

Compensators

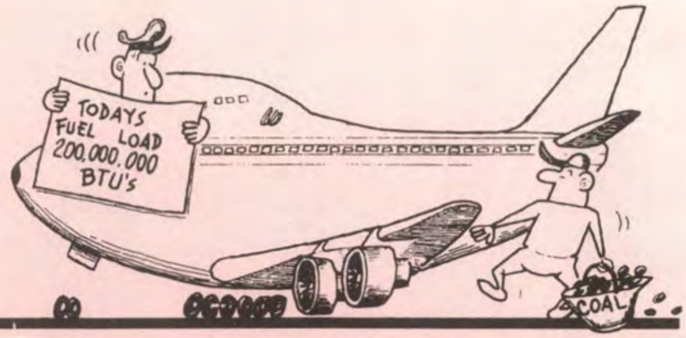
All of our aircraft flying today make use of electrical signals from fuel density compensators to convert measured fuel volume to pounds. Compensators differ from densitometers in that they provide no direct measurement of density, but operate electrically to generate correction signals to adjust any deviations from a "reference" density level.

The function of the compensator is to act as a condenser and to register electrically any change in its capacitance as a result of changes in the dielectric characteristic of the fuel between its plates. The circuitry is adjusted so that a known density will be associated with a preset value, and any variation from this "reference" density, due either to temperature or chemical composition, will produce

an electrical bias signal which can be used to adjust the value of density used in the gallons to pounds conversion process.

The Forgotten Flowmeter

Another basic component which must be included in our understanding of fuel density is the fuel flow meter and its representation of fuel consumption rate for each engine. The subject is pertinent because many believe that density adjustments are remotely input to this system. Such is not the case. Due to the fact that the fuel is in motion, certain applications of physics make possible the convenient measurement of mass flow, i.e., the direct readout in pounds per unit time. Flowmeters are located between the fuel control unit and fuel nozzle assembly of each engine. Their reliability is quite good (they are lubricated by the fuel passing through them), and their accuracy is well within limits necessary for engine



monitoring purposes. Flowmeters are designed to be most accurate in the cruise regime.

The Fueling Process—Tolerances

Because there is a high degree of confidence in the accuracy of the "gallons boarded" number from the fuel trucks, it is important that the truck reading always agree within tolerance to the before and after reading from the airplane gauges in pounds, converted to gallons. The Fuel Service Form has been specifically designed to accomplish this cross-checking procedure.

The application of the fueling tolerance is designed to permit the trucks to deliver the correct, and on occasion, slightly more gallons than may be required by the aircraft, but never less. In the event the tolerance value itself is exceeded, gauging system errors could be suspect and it is then required that all tanks be dipsticked and discrepancies noted.

Density and Combustion

Finally, the role of density in the combustion process should also be mentioned. While we tend to think of heavier, high density fuel as being the most advantageous product for us in terms of fuel capacity (more pounds on the gauge for each gallon delivered from the truck), or overall cost (we buy fuel by the gallon—we can get more pounds for the same price per gallon), the fact that lower density fuels generate more BTUs on a per pound basis is not generally recognized. Net heat of combination on a volume basis (BTUs/gallon) is directly proportional to density, but on a per pound basis varies inversely with density.

There have been instances where we have realized gains in volumetric heating value (per gallon), with a corresponding reduction in the number of gallons of fuel needed to complete a given trip in a given airplane. However, tied to this was the inevitable reduction in BTUs per pound. The impact was that a greater number of pounds of fuel was required to fly the trip, with an accompanying penalty in the cost of flying this incremental fuel. This often confusing concept can best be visualized by comparing physical properties of two different fuels:

	JP-4	Jet A	
Density			
Lbs/Gal	6.36	6.76	(increasing density) →
Volatility			
BTU/Lb	28,709	18,579	← (increasing BTU/Lb)
BTU/Gal	~~118,895~~ 118,989	~~125,620~~ 125,594 *	(increasing BTU/Gal) →

Our engines operate at almost 100% thermal efficiency to develop a net heat of combustion for whatever "unit" of fuel is burned. This heating value, in turn, produces thermodynamic relationships of pressure and temperature according to how much fuel is introduced into the combustion chambers on a rate basis. The fuel control unit then functions to sense and stabilize various engine parameters according to throttle commands.

Unfortunately, we do not have cockpit "BTU meters" to ideally represent the energy output of our engines, and since basic airplane and engine performance is expressed in pounds, consistence dictates that we continue to retain that convention and consider the combustion process in terms of gravimetric (i.e., pounds) heating value.

In playing the density game, then, keep in mind that our Fuel Purchasing Administration wants more BTUs per gallon, and that increased density will help them toward that end. Flight Operations, on the other hand, can burn fewer pounds each trip if the density is lowered and BTUs per pound are (accordingly) increased. It appears that a conversion to COAL (fixed density) might be the only equitable solution, once the engineering and Second Officer workload considerations are resolved! — Adapted from United Airlines *The Cockpit,* August 1979.

(Airline fuel is normally JET A, while USAF uses JP-4 and JP-8, densities for which are different from that of JET A. ed.) ■

* see correction in apr 1980 ASM

PW: ENCOUNTERS OF THE WORST KIND

MR. WILLIAM E. HARDY • 3613 C CTS • Homestead AFB, FL

■ Becoming a prisoner alters the normal routine of life by disorienting the prisoner. Survival training can approximate real events but nothing rivals the new PW's stress. The lack of humaneness the captor may be prepared to show presents an additional problem. Combined with the novelty of the situation, this becomes sufficient to tax the coping capacity leaving the prisoner little energy for anything but survival.

Some philosophers who spent time in civil prison in the past have somewhat negated the difficulty of the situation and left us with thoughts like, *you can hold my body, but not my mind*. This denial to the captor may not be too difficult if captivity consists simply of room and board and loss of excursion privileges. Given the orientation of any of our potential enemies, it is unlikely that captivity would be anything other than a deliberately planned battle for that which we would hope to deny, *the mind*. The prisoner's hostage value is guaranteed. Unless escape is possible, the enemy has the certainty of some benefit by simply holding prisoners.

It seems uncertain which would be the greatest threat to the PW — a sophisticated captor who is prepared to wage a convincing battle in the arena of mind raping, or a captor whose efforts result in his extreme frustration being vented on the PW with very imaginative forms of violence. In either case, it is fairly certain that once the coffee, cookies, and chit-chat routine has failed to produce the cooperation desired, some physical coercion is going to be applied.

To address all the ways that psychological pressure could be brought to bear would be beyond the scope of this article and the desire of most readers, but I should like to discuss a method, or level, of applying stress that is capable of striking hard at the core of the individual. It is dangerous because it attacks something as basic in us as our desire to live, the need to maintain psychological equilibrium. The fact that to be human is to be endowed with a tremendous will to live is accepted without question. The body works constantly to keep the biological functions in balance, ensuring organic survival. The most timid, mild-mannered individual would fight like the proverbial tiger to obtain air to breathe. To the best of our ability we avoid what we interpret as pain and seek to live, with life being an end in itself if we have no other goals.

There is another need that, fortunately, few people ever become acutely aware of, the need for psychological survival. To maintain our mental integration, we will exert as much or more effort as necessary to continue to live. We avoid psychological pain to the same or greater extent than we do physical pain. When the pressure becomes sufficient, release from mental stress becomes more important than life. If you doubt this, consider the instances in which people commit suicide because life is too painful for them to continue to endure the stress they perceive would be worse than dying.

In their search for explanations of human motivation, social scientists have become aware of the need for mental balance or equilibrium. When all things are consonant, or in balance, we are at peace within. Our thinking and behavior are compatible since we cannot tolerate incompatibility among our thoughts and/or our behavior, we take whatever measures necessary to reduce the lack of harmony or dissonance. If our thoughts and behavior diverge, we will change one or the other to bring them in line.

If we are faced with conflicts in our own ideation, the discomfort forces us to react to reduce the conflict. For example, when you watch a magician or an illusionist, you are amused because their act is intended to produce dissonance. You know you are not supposed to be able to reconcile the confusion that exists from watching something occur that you know is impossible.

Dissonance is not always fun, though. Suppose you fancy yourself as a person who really lives by his/her own values and find that you have violated one or more of those values. You have incompatible data. You might rationalize that this should be an exception, that some extenuating circumstances existed, or face the fact that you must face; you don't live by them or you have just changed your values.

Value or attitude change is often a learning objective that a captor has planned for the PW. If subtle appeals to the intellect do not produce the change and consequent increase in exploitation potential, there are other typical methods to use. As any parent who has children above the age of a few months has learned, you may not be able to "change someone's mind" instantly, but you can certainly change their behavior if sufficient pressure is applied. It is not important that their hearts are not in it, only that they are doing what you want.

The same applies to PWs. After a PW has shown cooperation beyond his desires, written or taped propaganda or whatever was required, he will be doing some considerable soul searching. His behavior has been at odds with that presumed of the professional soldier. He must reduce the incongruence that exists.

If he has truly resisted "to the utmost of his ability" as asked for by The Code, he can be comfortable in his own mind. He has done all that he could and all that could be expected, his best. If, however, his attitude was very unlike the Missourian and he had decided, *you don't have to show me, just hearing what you say you are going to do to me is sufficient,* then he is set for trouble.

After yielding, he has the gnawing realization that he might have avoided this, might have resisted harder, longer. He has no clear-cut justification for what he has done, unlike our first man.

To reduce this incongruence between his idea of "what he should have done" and what he did do, he must make some adjustments. The behavior cannot be undone. He can decide that it was not really that harmful, that he should not anguish over it, that he made the right decision. He may be happy enough with that for the moment but he has started a trend. Not only has he set himself up as a fruitful producer of what the captors want, he has also set himself up to continue – in small increments – getting in deeper. It will seem foolish to resist today something only slightly different from what was done yesterday.

As always, one day follows another and our man becomes more convinced of the rightness of his decision as he buries himself. If at some point

PW: Encounters of the worst kind continued

he decides to try to stop it all and bear sufficient abuse till he is left alone, then he is made acutely aware that he could have avoided all that in the beginning by the same type resistance he is now considering. He has not avoided anything, only postponed it. Given that, it suddenly seems more sensible to continue. Any established behavior pattern is more comfortable than an untried route. To maintain his inner peace, he is compelled to become more convinced of the rightness of his actions.

Unfortunately, one of the more common ways we convince ourselves of something is to find others who agree with us, or convince them that they should. The consequences and the continuing cycle here are obvious. If he convinces others, the problem is broadened. If he alienates them instead, he is cut off. If he becomes convinced that he has been wrong, he is miserable and significantly more vulnerable because of his low morale. There is no happy ending. If the enemy is perceptive enough to gather people like this together to reassure each other of their position, these people may soon begin to question the advisability or desirability of repatriation if and when it should become possible.

How does one prepare for, or combat, something like this? Reading articles like this is a beginning, for it indicates an interest at least. The next step is accepting the fact that the occupation you've chosen has greatly increased the likelihood of your becoming a prisoner some day. That is an event so unlikely for your hometown cobbler that he can completely dismiss the possibility of it occurring. For you to do the same would be less than wise. It would also make the event more traumatic, if it did occur, for there you would be witnessing the impossible come to pass and this time it is not in a magic show.

This denial is reasonably common, though. Survival and rèsistance instructors are frequently frustrated by their students' refusal to accept this possibility. No one asks you to believe that it WILL happen to you, just that it CAN. If I've not lost you yet, the next step is some attitude checking. A recent Chief of Staff of the Air Force popularized an idea about being "all the way in or all the way out" of the military. Are you all the way in?

Forbid that I say anything that could add to the problem of the exodus of fliers from the Air Force, but if you have any doubts, or have never considered it, a prison camp would be a heck of a place to decide you did not belong. It would be unlikely that you could defend ideas that you didn't hold.

This suggestion sounds grim, maybe even caustic though such is certainly not intended. Another step in preparation is to read the accounts of others who have been in similar situations. You cannot come to foresee every problem that another human may dream up for you some day, but you can eliminate a lot of surprises. Lastly, should the real event occur, your first encounter could perhaps at best be the worst one, after which the captor would, ideally, decide you are not the most easily exploitable person around and hopefully leave you alone.

I share with you the hope that such as this never befalls you. If it should, I give you this thought that does not come from my own experience, but from many former PWs that I have met and respect; no matter which direction you initially pursue, you can always stop but you can't back up.

ABOUT THE AUTHOR

William Hardy is a former Air Force Survival Instructor. His experiences include extensive travel throughout Southeast Asia during a four-year tour at the Jungle Survival School, in the Philippines, teaching, among other subjects, conditions of captivity. Upon the release of the PWs from that conflict, he was chosen as a debriefer for the men returning to Maxwell AFB during Operation Homecoming. No longer in uniform, he is now chief of a training branch within the 3613th CCTS, at Homestead AFB, FL, and Adjunct Professor of Psychology at one of the local colleges. The interest in PW affairs developed during his service continues now as a personal interest. ■

OPS topics

Ya Gotta Stay Alert

■ A recent near midair collision (NMAC) brought out that a traffic advisory is not always a traffic advisory. In this case one was issued to the leader of a flight of 2. Wing, however, was about a mile away. Less than five seconds after the controller called traffic at 2 o'clock, 3 miles (on Lead), a light aircraft passed within 300 feet of the wingie – too late for an evasive maneuver. Ya gotta stay alert these days.

Winter Wisdom

Be aware of the possibility that significant icing may occur in the area of intermittent or no precipitation just beyond the boundaries of a widespread area of steady precipitation and much less icing may occur within the precipitation area itself.

Of particular note is the stratocumulus cloud layer which forms in a cold air mass which has moved over a warmer water surface. As the low levels of the air mass gain heat and moisture very rapidly, the stratocumulus cloud layer is formed. Icing is often moderate or severe in the tops of these clouds. This situation is found frequently south of the Great Lakes and off the east coast.

Air Traffic Control departure delays seem to go hand in hand with low ceilings, low temperatures, and snow or freezing rain. . . . aircraft did experience long delays last winter awaiting takeoff (one hour plus) during heavy snows and we encountered particular problems with our three-holers. After the flights received takeoff clearance and when they were rotating for lift off, large amounts of snow and slush slid back along the fuselage and fed the No. 2 engine. Since engines don't operate too well on snow and slush, they experienced some compressor stalls and FOD damage.

Clear air turbulence is more common in the winter months because jet streams and storm centers are more intense and will have moved farther south than in summer. The arrival of these "winter winds" also means referring more often to the High Altitude Wind Trade Chart. – Courtesy *Flite Facts*, Oct 79.

Communications

From time-to-time we've printed items on the lack of or failure of communications. Most of those have been concerned with aircrew – controlling agency communication.

The following excerpts from a Dutch report, that takes exception to the Spanish report on the disastrous Tenerife collision of two 747s, underlines our concern.

". . . As I already said in the beginning of my argument, the eminent lesson to be drawn from this accident is the urgent need for improvement of the communication between aircraft and tower.

"Compared with other developments in aviation, radio-communication has lagged far behind in that the failsafe principle, which has been generally applied in modern aviation in the field of constructions, systems and procedures and which has materially contributed to a higher level of safety, does not apply to radio-communication. It is not failsafe.

"It is known that at several airports all over the world, and also during flights, a number of incidents have occurred in the last few years that arose from radio-communication. Although these did not result in accidents, some of them bore a great resemblance to the Tenerife accident. In my opinion the situation is more serious than is being presented. . . ."

". . . The problem of radio-communication is recognized. IATA has established a working group to study the best approach to handle this problem. The FAA has requested a number of research institutes to make a fundamental study of the communication problems, in which NASA also is involved." ■

CAPTAIN

Richard H. White

CAPTAIN

Wayne R. Kurth

3d Tactical Fighter Wing

■ On 8 February 1979 Captains White and Kurth, flying an F-4E, were number two on a Dissimilar Aircraft Combat Mission in which all events through the first engagement were normal. During the second engagement, Captain White started a full afterburner slice back into the fight when he saw the left engine fire light illuminate. He immediately called "knock it off," retarded the throttle to idle, started a climbing turn toward the base, and declared an emergency. The flight lead then joined with him and confirmed the fire. The aircraft was trailing smoke. The left engine was shut down and the master switch turned off at a point 20 miles from the base. The crew elected not to eject because all other aircraft systems were still responding normally. The fire began to diminish somewhat; however, 15 miles from base, the first of three explosions occurred. The first explosion gave no visible indications of damage other than the fuel gauge going to zero. Again the crew considered ejection, but since the right engine continued running and the fuel gauge began to cycle, they elected to continue their recovery. As a result of the explosion and cockpit indications, Captains White and Kurth suspected possible fuel venting or leakage. They decided not to make an approach end cable arrestment, thus eliminating an abrupt stop and the possibility of fuel in the aft section rushing forward and igniting. On 9 mile final, the second explosion occurred resulting in a large hole in the vertical stabilizer. The aircraft continued to respond normally, and based on observations provided by the chase crew, Captains White and Kurth again elected to continue their approach. They decided to fly a steep approach and maintain 200-220 knots while on final. At 1 mile on final, a third very mild explosion occurred with the only visible external sign being a small puff of smoke. Captain White landed the aircraft at 170 knots and deployed the drag chute. The drag chute failed, but because sufficient runway was available, the crew still elected not to take a cable. They stopped the aircraft on the runway and egressed from the right side. Fire fighting personnel extinguished the residual fire. The timely decisions of Captains White and Kurth, when faced with adverse and deteriorating conditions, allowed the recovery of a valuable aircraft and gave the investigators an oppotrunity to determine the cause of the fire. WELL DONE! ■

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UNITED STATES AIR FORCE

Well Done Award

Presented for outstanding airmanship and professional performance during a hazardous situation and for a significant contribution to the United States Air Force Accident Prevention Program.

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FIRST LIEUTENANT
Edward F. Trimble

401st Tactical Fighter Wing

■ On 7 March 1979 Captain Christopher and Lieutenant Trimble were on a night flight from Aviano AB, Italy, to Torrejon AB, Spain, in an F-4D. Approximately 30 minutes after takeoff, while flying at FL290 in IFR conditions, the aircraft had double generator failure which was accompanied by rapid cabin depressurization. They initiated checklist procedures for the problem and began a descent to lower altitude since cabin pressurization was lost. The nearest suitable airfield was determined to be Pisa AB, Italy. Degraded radio contact was established with Milano Control; however, the center was unable to provide radar vectors. With the aircraft in IFR conditions at FL150 the crew proceeded toward Pisa using dead reckoning. Several attempts to get the generators back on the line failed. Once positive radio contact with Pisa GCA was established, Captain Christopher and Lieutenant Trimble confirmed that they were clear of mountainous terrain, and descended to 5,000 feet in accordance with GCA instructions. When they requested vectors to a precision approach, they were informed that they had positioned themselves on a perfect GCA downwind using dead reckoning. The aircraft began experiencing UHF transmitter problems and Captain Christopher had to acknowledge all GCA instructions through his IFF/SIF equipment. Weather at Pisa was a 1,000 ft ceiling, 1 mile visibility with rain and a wet runway. The recovery was further complicated by their having to make a maximum gross weight landing because all fuel had to be retained in the event of lost communications or missed approaches. After rolling out on GCA final, Captain Christopher made one more attempt to cycle the right generator. It came on the line and the bus tie closed. He immediately lowered the gear and flaps and made an uneventful landing. The electrical problem was faulty CSD's, a bad left generator and a bus tie malfunction. Captain Christopher's and Lieutenant Trimble's outstanding systems knowledge and superior navigational ability resulted in saving the aircraft under extremely demanding circumstances. WELL DONE! ■

A pilot lives by his knowledge, skill, awareness, and integrity of his ground support people.