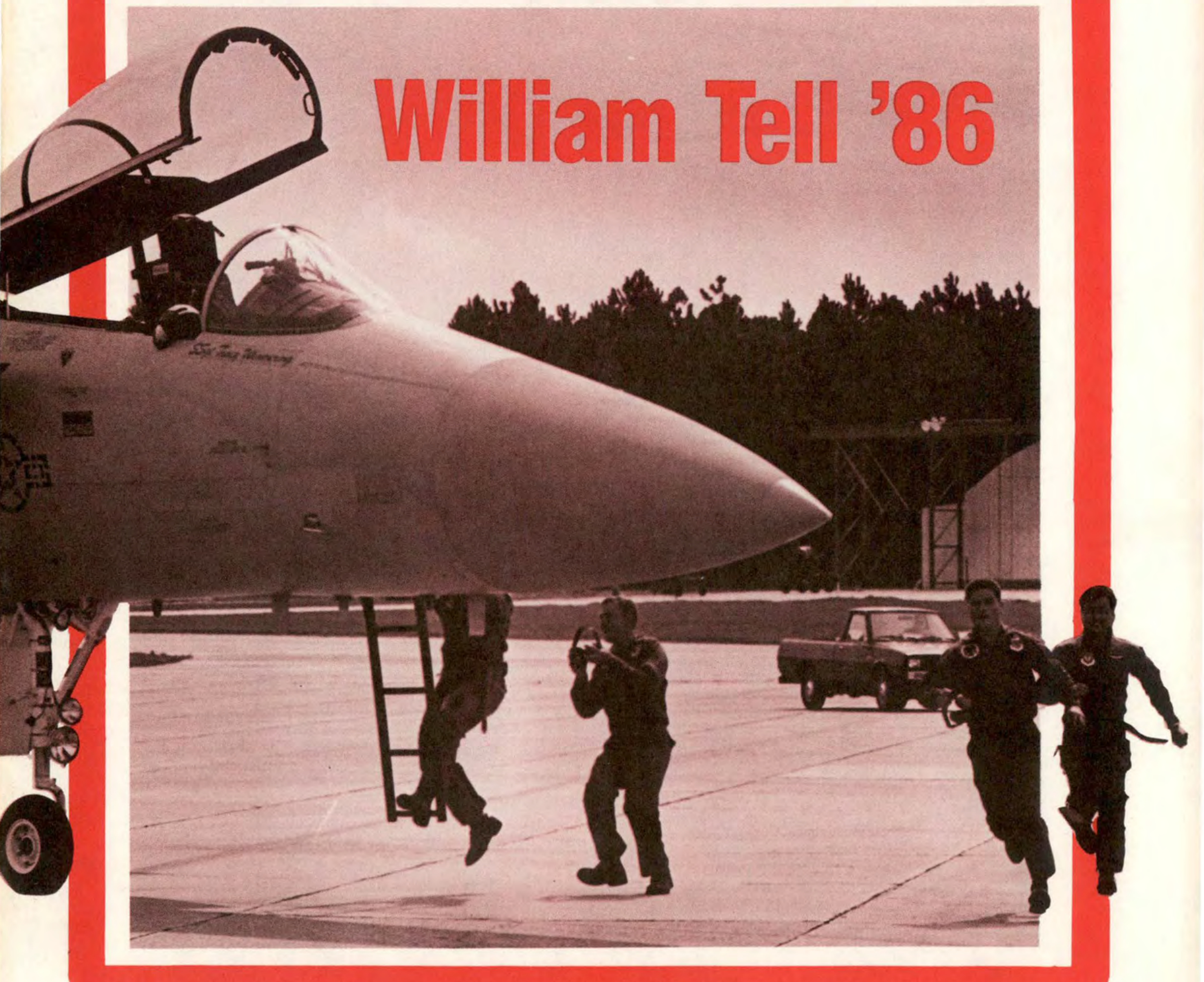
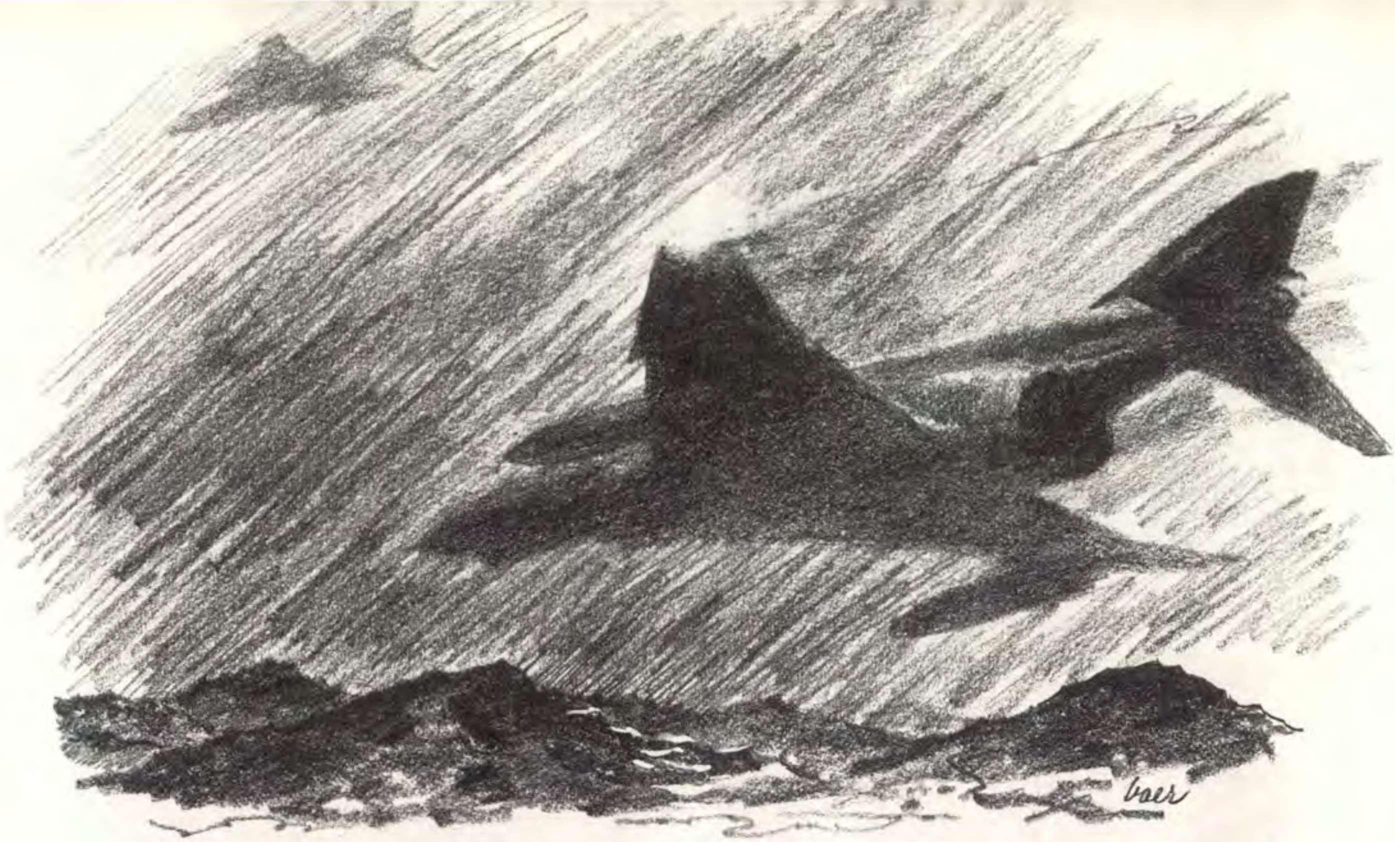
flying

SAFETY

DECEMBER 1986





THERE I WAS

■ An F-4 crashed at sea during a night ILS approach. Both crewmembers were fatalities. There was no indication of trouble. Their last radio transmission to the element lead was a request to back off to land in trail. The request was granted. What happened?

Both crewmembers were well experienced. The WSO had 1,600 hours in the F-4 and had been flying it continuously for the last 13 years. The pilot was an IP with 8 years and 1,200 hours in the F-4. Both were in good physical condition according to all who saw them prior to the briefing. The aircraft was in good running order. It was a code one on the call back during the recovery. The weather was 600 broken and 3 miles visibility. The NAVAIDS were up, and the pilot had flown this instrument approach many times. The events that led to the mishap are as follows.

After completing intercepts, the element rejoined for a planned ILS formation night approach. Lead was to land, and the wingman was to make a missed approach and another ILS to a full stop landing. The handoff to approach control was normal, except the wingman's UHF did not channelize to the new frequency.

The crew sensed the radio was not working because the flight was making turns and descents without receiving any transmissions. The radio was recycled, and the next transmission was from lead calling for the speed brakes in. The wingman was hanging on the wing in pitch black night, and the flight occasionally went through huge cumulus clouds.

Upon hearing the flight was No. 11 for the approach, the wingman decided to request to go trail and land on the first approach instead of being vectored around in the soup and getting low on gas. The wingman turned 30 degrees left from the lead and then 60 degrees to the right to gain separation.

Oblivious to the wingman, flight lead was supposed to be at 1,500 feet but had descended to 500 feet to stay VFR. The wingman lost sight of lead because of weather during the right turn for separation. As he looked into the cockpit, he saw his altimeter going through 20 feet in a descent as the aircraft crashed into the sea.

Fortunately, the above is not true because the wingman looked at the altimeter when it read 200 feet and was able to stop the descent and land safely.

Lessons learned: When backing off at night, use proper instrument cross-check procedures. WSOs, cross-check your instruments, and warn the pilot when not on the proper altitude. Leaders, remember your wingmen and what you may be doing to them. ■

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FRONT COVER: Crew Scrambles at William Tell '86. (US Air Force Photo by SSgt Phil Schmitten)

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SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

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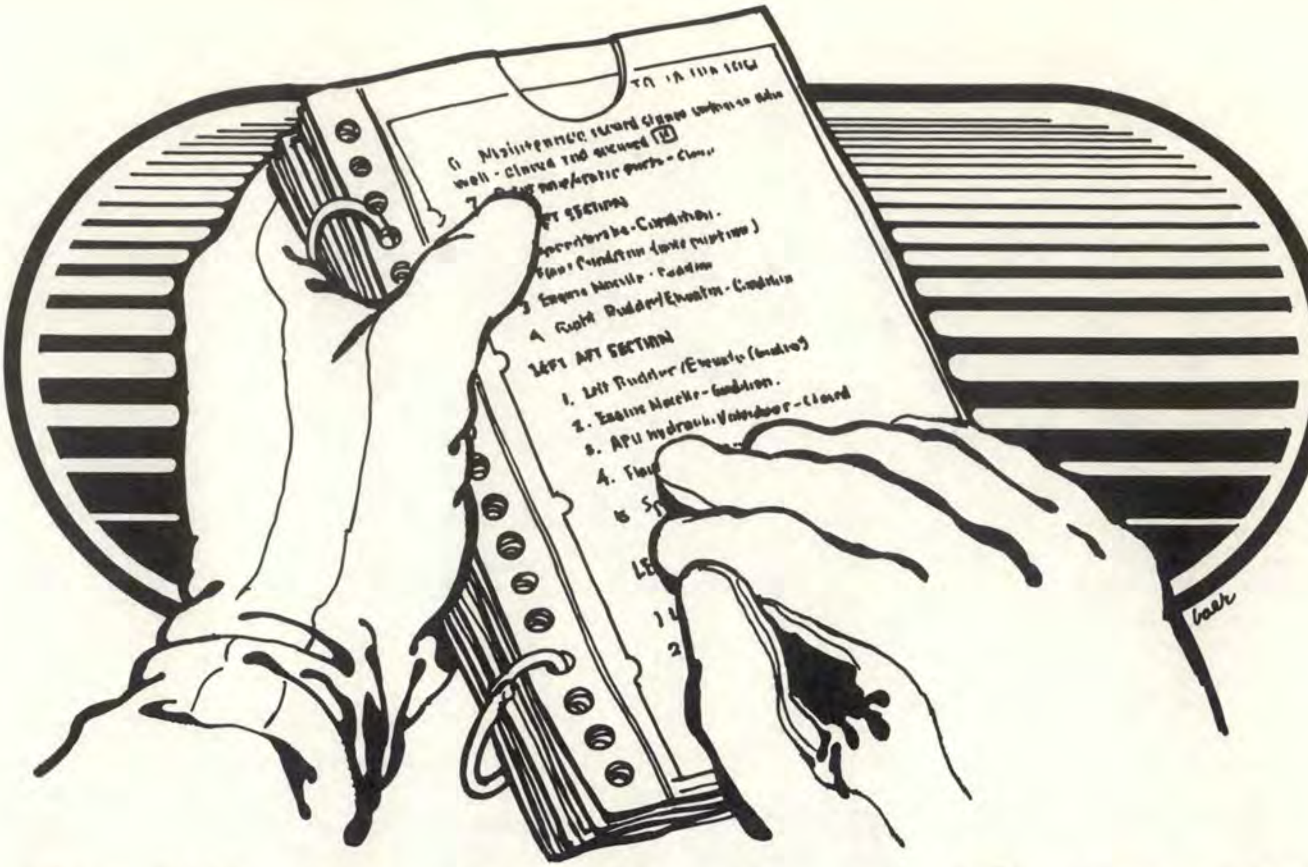


CHECKLISTS

LT COL JIMMIE D. MARTIN
Editor

■ Our aircraft today are a far cry from the ones flown by the fledgling US Air Force after World War II. But, there are still enough similarities to show they are indeed descendants of those earlier aircraft. They still have engines, although most don't have props. They still have wings, although at least one seems to have them on backwards.

Another similarity is the aircrew checklist. Even though the aircraft of that day were much simpler, they had checklists. The checklists were much smaller than the ones we have today, but still essential. We can also find a parallel in checklist use by crewmembers then and now. I found the following writeup in the August 1948 *Flying Safety* magazine.

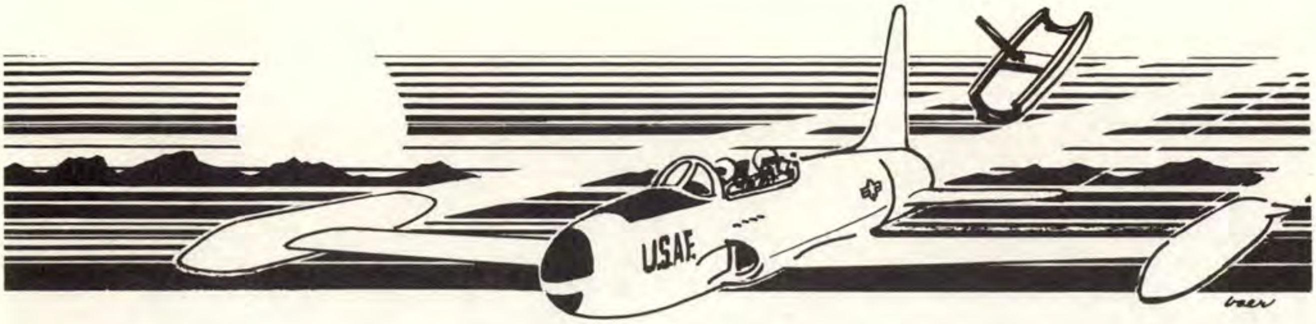
■ "The AT-6 went aloft one afternoon with a first lieutenant instructor pilot in the front seat and a student pilot under the hood. After the student had flown hooded instruments for an hour, the instructor pilot took over and returned to the base.

"He called the tower and received landing instructions. The pilot flew a normal traffic pattern and came in on a normal approach, flaps down and head up. Roundout was normal and the plane settled in nicely — on its belly. Part of the pilot's comment on the mishap was to the effect that when the plane finally stopped sliding, he cut the switches and noticed he had failed to lower the wheels.

"Could happen to anybody? You know it, brother. The payoff is that it happened to this pilot, who had over 2,000 hours with 820 hours in AT-6s. If any pilot in the world is qualified in the AT-6, this pilot was. The student pilot, a lieutenant colonel, was no greenhorn either, as both men were graduates of the P-80 school.

"The base CO put it nicely when he said recommendations for preventive action to preclude a mishap of this kind are difficult. When a man with over 800 hours in a particular airplane forgets to put down gear it can mean only one thing — he has become so sharp in the plane that he no longer needs a checklist. That's the thing to remember. In this Air Force you can do without your checklist like you can do without your head."

Have we solved the checklist discipline problem during the last 18 years of phenomenal growth in aircraft technology? No way. As the aircraft have grown more sophisticated, our aircrew checklists have grown thicker and even more important. But, the old phrase, familiarity breeds contempt, still applies. We do certain checks until they become almost second nature to us, and we tend to ignore the checklist because we think we don't need it. That's the same thing crewmembers did in 1948. Not using the checklist properly leaves us open to all kinds of human errors from simple memory lapses to breaks in habit patterns caused by interruptions. Consider the following mishap that involved a slightly more modern aircraft than the AT-6.



■ A T-33 was scheduled for a practice intercept mission. Everything had been normal and all checklists had been completed through the end-of-runway (EOR) inspection. After the EOR inspection, the pilot closed and locked the canopy because he expected to be cleared for takeoff.

He was then informed a runway change was being completed and was given taxi instructions to the opposite runway. The pilot unlocked the canopy so he could cool the cockpit if it got warm during the taxi to the opposite runway. But, since the outside weather was cool and wet, he decided not to raise the canopy.

The aircraft had to hold at the end of the runway for 20 minutes while the barriers were being changed. When finally cleared for takeoff, the pilot forgot to relock the canopy. He didn't notice anything unusual until he checked the cabin pressure at FL 180 and found the cabin altimeter reading 18,000 feet. In analyzing the cabin pressurization problem, he found the canopy unlocked. During the return to base, the canopy departed the aircraft.

This mishap could easily have been prevented by better checklist discipline. The pilot's normal habit pattern was interrupted when the takeoff was delayed and he unlocked the canopy. Since he didn't raise the canopy, he was denied the visual stimulus to relock it. Even though delayed for 20 minutes, he didn't reaccomplish the before-takeoff check which would have guaranteed the aircraft was properly configured for flight.

The next mishap is a good example of what can happen when a preconceived mindset is combined with a hurried preflight and missed steps in the checklist.

■ The A-10 flight lead was delayed in arriving at his aircraft for preflight due to transportation problems. As a result, he arrived at the aircraft only 5 minutes before his scheduled engine start time. The pilot completed his aircraft walkaround in 5 minutes and then discovered he had left his harness in life support and ran to get it. He arrived back at the aircraft 7 minutes after the scheduled engine start time.

The pilot quickly completed his interior checks but failed to notice the store loading windows didn't match the actual aircraft load. The loading windows showed practice bombs on pylon stations 3 and 9 only. However, the actual load was a training missile on pylon station 3 and practice bombs on stations 4 and 8. The pilot decided to delay his weapons system checks until airborne so he could make his scheduled takeoff time.

En route to the range, the flight was forced to deviate around weather and a restricted area which made them arrive at the range 7 minutes into their scheduled 15-minute range time. This caused another change of plans and placed more stress on the pilot. For his first bomb release, the pilot selected station 3 since he still thought the practice bombs were loaded there. Consequently, he jettisoned the training missile and its launcher on the range.

continued

CHECKLISTS continued

An unexpected series of events caused the pilot to rush and make many changes in the planned flight. He expected to see the practice bombs loaded on stations 3 and 9 and didn't realize the loading windows in the cockpit had been set improperly. He rushed through the ground checks and never completed all his weapons checks as directed by the checklist. Despite the delays and changes, following checklist procedures could have prevented this mishap.

The next mishap proves having more than one crewmember on board doesn't guarantee all checklists will be completed properly. Sometimes we just seem to depend too much on our fellow crewmembers.

■ The KC-135 was scheduled for a normal training mission with the mission pilot (MP) flying portions of the mission in partial chemical warfare defense (CWD) gear. The crew for this flight also included an instructor pilot (IP).

When the crew arrived at the aircraft, maintenance was still being performed. The crew began the interior inspection while maintenance worked the aircraft discrepencies. Maintenance activities required the MP to interrupt the interior inspection several times and to perform some items out of sequence. This slowed the completion of the inspection.

At 2 minutes prior to the scheduled engine start time, the MP left his seat to don his CWD gear. The copilot (CP) completed the checklist, called it complete over the intercom, and moved to the jump seat so the IP could take the right seat. The MP returned and took his position in the left seat.

Everything was normal from engine start through the initial part of the climb. Passing FL 260, the MP noticed excessive fuel flow fluctuations on engines 1 and 4 followed shortly thereafter by flameouts of engines 1, 3, and 4. The MP advanced the No. 2 engine to max power and began an emergency descent. Suspecting a fuel problem, the IP checked the fuel panel. He found the boost pumps for the Nos. 1, 3, and 4 main tanks were off. He turned the boost pumps on and restarted all three engines successfully.

Several mistakes in checklist discipline and crew coordination were made in this mishap. The first was trying to do the interior checks with maintenance people working in the cockpit. This caused many interruptions and forced the crewmembers to perform several checklist items out of sequence. A perfect opportunity for mistakes.

The second was that the MP left the cockpit before the checklist was complete to put on his CWD gear. He didn't tell the CP to finish the checklist or wait. The IP didn't fill in for the MP or monitor the CP. The CP finished the checklist, without the required crew coordination, and called the check complete over the intercom. Neither the MP nor IP were on interphone at the time.

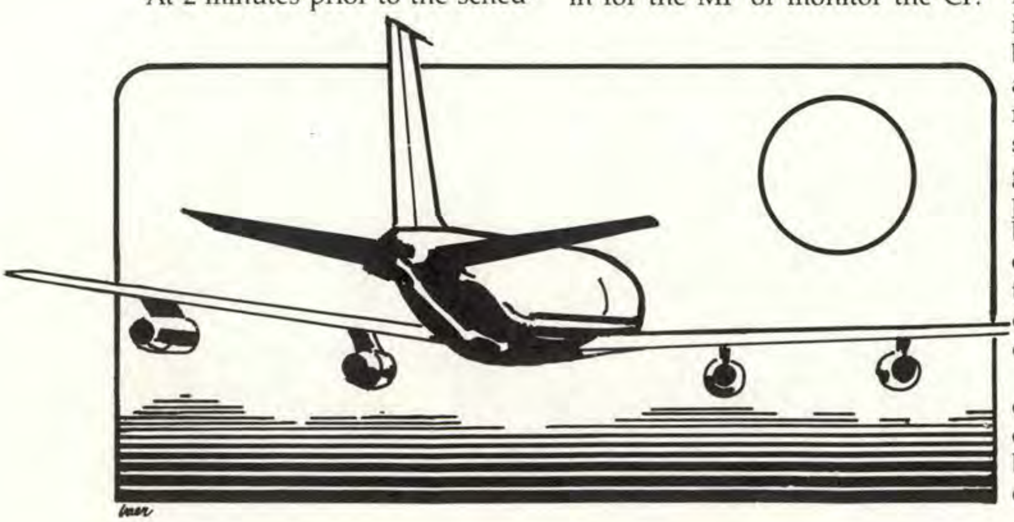
When he returned, the MP assumed the checklist was complete, but never coordinated with the CP or IP and didn't go over the steps he had missed. As a result, he didn't discover the CP had failed to turn on the fuel boost pumps for the Nos. 1, 3, and 4 main tanks. The CP had missed these same switches on a previous flight with the MP.

All four of these mishaps had one thing in common — a breach in checklist discipline. All could have been prevented if the appropriate checklists had been performed correctly. This means giving the checklist your undivided attention. If you get interrupted for any reason, make sure you resume the check where you left off. If you've lost your place, don't guess. Start over.

One technique for keeping your place is to run your thumb or finger down the edge of the checklist as you do each item. If interrupted, mark your place so you know where to start again.

Also, don't just read the checklist and look at switch positions. Sometimes we see what we expect to see. As you read the checklist, physically check the gear handle down, throttles off, flap handle down, switches in proper position, etc. This technique will help keep you from missing switches and handles that have been left in the wrong position. In a recent T-37 mishap, the nose gear retracted immediately after engine start on the ground because the gear handle had been left in the up position after maintenance had been performed. The two pilots checked the gear handles twice in their before-start checklists, but didn't actually touch the gear handles — just looked at them.

Don't rely on memory. Don't rely on sight. Don't take it lightly. The checklist can make the difference between a routine flight and an emergency or something worse. ■



One of Those Days

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■ It started out as a typical ROTC orientation day. The mission was planned with four trips over Cincinnati, circle downtown, fly over the local amusement park, and then return to home station. The first trip gave us hints it was going to be "one of those days." With construction at our base, a local flying demonstration, and unusually heavy traffic, it took us nearly 15 minutes to make our normal 5-minute taxi out for takeoff. Although getting into the air was a bit of a hassle, the first three trips went as planned.

On return to base following our third leg, our fuel gauges dictated the fourth leg would be only over the amusement park. Everything went fine as far as the flying aspects, but only now was the critical incident beginning to develop.

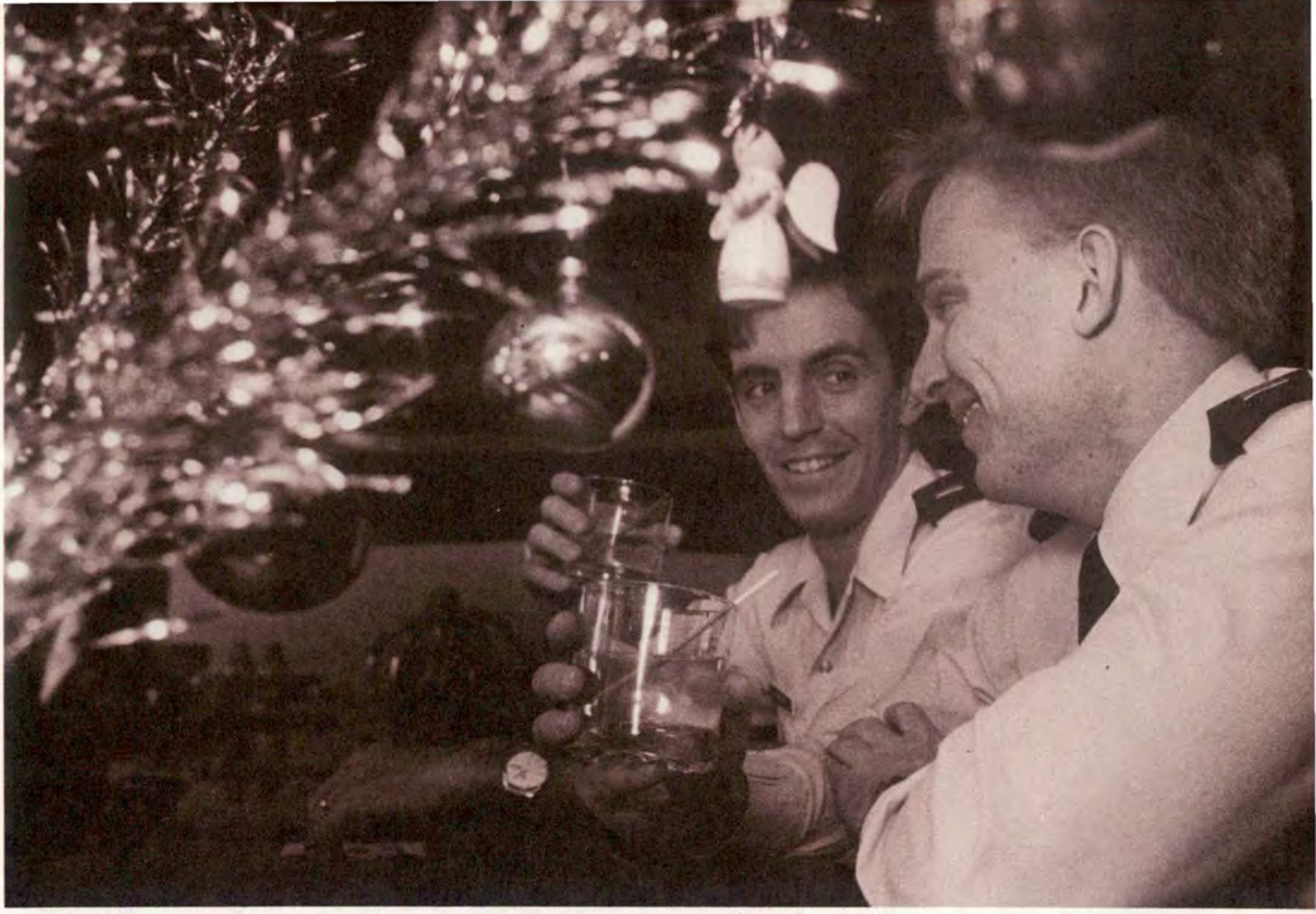
After 4 flights, totaling 2.7 flying hours, I was tired. Throughout the day, the weather had deteriorated with ceiling dropping, visibility decreasing, and turbulence increasing. As we taxied in to shutdown, we were delayed again with other taxiing aircraft. When we reached our parking area, our maintenance people did not meet us. We waited a few moments to no avail. I suggested to the AC that I marshall the aircraft in and he agreed.

I climbed out of the seat and exited the aircraft. When I attempted to close the door, the hand cable kept falling between the fuselage and the door, preventing proper closure. Repeated attempts of lowering the door, removing the cable, and raising the door were frustrating as the cable seemed to "have a mind of its own" and kept getting in the way! Finally, after numerous attempts (10+), I closed the door. I know the AC was wondering what I had been doing so I just had to hurry and get to the front of the aircraft to marshall him in. *Hurry, hurry, hurry.* Around the gear well, under the wing, and into the . . .

In the "heat of battle" (frustration caused by trying to hurry, and attempting to close the door with no cooperation from the cable), I forgot where I was and what I was flying. With my head down to avoid the engine blast, I hurried under the wing toward the marshaller's position. To my surprise, after clearing the wing and standing, I saw someone already in position to marshall the plane to parking.

As I turned around to face the aircraft, *then*, and *only then*, did I see what could have been the cause of my *death*. The 7' 10" diameter of the 4-bladed propellers which power our Beechcraft C-12F Super KING AIR stared me in the face. My knees began to shake as I realized I had not even considered their danger. Instead of walking into the marshaller's position, I could have walked into a propeller.

I have no idea just how close I came to walking head first into the left prop, but I am thankful it was far enough away to allow me to write this and maybe, just maybe, prevent a terrible mishap. The important thing to remember is, no matter what you are doing or what may be frustrating you, *always* know where you are and what hazards are around you. It is the one you forget about that will get you! ■



PEGGY E. HODGE
Assistant Editor

■ The holiday season is here! — a time to enjoy good friends and socialize. With this season comes lots of good food, delicacies, various snacks, and to wash them all down, a wonderful variety of drinks. It is these drinks that can override our joy of the holidays. The arch enemy I speak about here is *alcohol.*

There are some cautions with alcohol that Air Force crewmembers particularly should be aware of. Among these are the two major effects alcohol has on us, and why, as crewmembers, we need to be especially careful.

The first of these is the direct effect of alcohol on various body functions. We are all probably aware of some of the after-effects of alcohol. The more common ones include fatigue, headache, depression, thirst, and frequently, nausea and vertigo. These are symptoms our body chemistry must restore to normal operation.

Perhaps the most insidious of the after-effects mentioned so far is fatigue. It is often endured relatively unconsciously but it is the most consistently present after-effect.

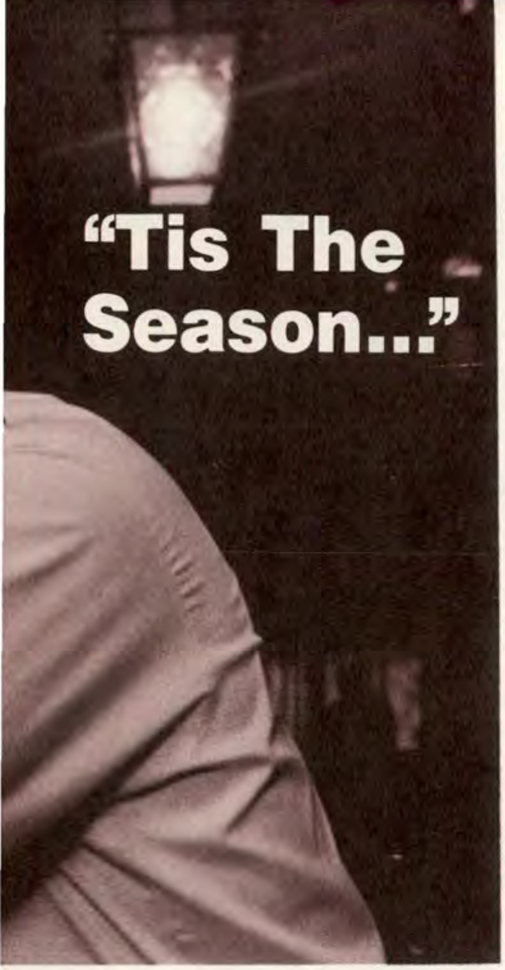
One of the reasons for this fatigue is lack of rapid eye movement (REM) or dreaming sleep. Drinking prior to sleeping can decrease or prevent REM sleep. Although there is research still being done on the problem, it is fairly well established that deprivation of REM sleep tends to not only contribute to fatigue, but also may impair concentration and memory and produce anxiety and irritability.

Alcohol also affects our central nervous system. The effect here is directly related to the blood alcohol level. The blood alcohol level is a result of total alcohol ingested and time available for elimination. By knowing the amount of alcohol ingested and the time since ingestion, we can determine our blood alcohol level and possible effects. Here is an easy way to remember the stages of alcoholic effects.

Chart 1
Stages of Alcoholic Effects

Stage	No. of Drinks	Effect
1	0-2	No apparent effect (although some capabilities are already compromised)
2	2-4*	Primarily affects behavior — euphoria, talkativeness, and sociability
3	3-4 or more	Definite changes in coordination and speech
4	12-16 or more	Unconsciousness or death

*This is a very dangerous state because there has been a decrease in coordination and ability to perform.



"Tis The Season..."

We all know the short-term effects of alcohol. But, do you really know the long-term effects? You may be surprised.

There are four easy stages to remember: (1) No effect and possibly dangerous, (2) noticeable effects and dangerous, but legal (which may vary from state to state), (3) illegal, and (4) unconsciousness or death.

You can memorize the numbers if you like, but it is easier to remember the symptoms and *approximately* how long it takes to get rid of the alcohol when those symptoms are present.

It should be noted that *no set time period can apply to all situations and still be practical*. In the past, specific time limits have been given for "bottle to throttle." The fallacy of this is evident. The time for blood alcohol to clear depends on how rapidly and how much alcohol was consumed. Blood alcohol levels depend on absorption variables, and elimination times depend on blood levels and individual metabolic variables.

The second problem alcohol causes is the long-term effect which persists after there is no longer any *measurable* alcohol in the body — the "hangover." Alcohol metabolizes at the rate of about ⅓ to ½ ounce an hour which is approximately one drink per hour. While the blood content has been reduced to zero, there is, however, increasing evidence that the behavior effects are still present after 24 hours.

We know from our mishap records that actual alcohol involvement in aircraft mishaps, as documented by blood tests, is quite minimal. What isn't known, however, is how many mishaps involving faulty perception, slow reaction times, or judgmental mistakes have been caused by the aftermath effect of a bout with alcohol.

Few people are dumb enough to fly when they know they are intoxicated or otherwise unsafe to do so, but how many have flown when they were at least a little hung over? Many, probably! Most of us are familiar with the hangover syndrome of loss of appetite, heartburn, thirst, tremors, headache, and fatigue, and realize there is a compromise in flying safety when crewmembers are below their maximum capability because of self-imposed stress.

Some of the effects I have described above are further compounded for crewmembers. Flying is a task with an extremely complicated control problem. The presence of detailed checklists in even simple aircraft indicates the complexity of routine operational procedures. Consequently, it is clear alcohol can significantly degrade the performance of an aviator at much lower blood alcohol levels than are required to produce equally dangerous results on the ground. A blood alcohol level as low as 15 mg%* (approximately one drink) can be critical for the flying task.

For the crewmember, there is also an increased susceptibility to hypoxia and vertigo and a decreased ability to track a target while pulling Gs and to perform complicated tasks such as shooting an ILS approach. Also, the visual field is constricted along with a decreased ability to see under dim illuminations.

Another factor which compounds our problems with drinking is atmospheric pressure. With decreasing atmospheric pressure, the effect of alcohol is greater. For example, at 8,000 feet, one ounce of alcohol (there is ½ ounce in a shot of 100 proof) exerts the effect of 2 ounces at sea level.

Finally, because of the uncertainty of hangover effects, its potential hazards should be emphasized. Also, crewmembers must remember blood alcohol levels can exist, and affect performance, when they may not be aware of any effect. During this period of time, flying performance can be significantly degraded by alcohol levels that show no effect while on the ground.

Our inability to compromise with time — the only "sure cure" for a hangover — lays the foundation for potential problems. This holiday season, or whenever you drink and are scheduled for a mission, remember your guidelines for alcohol use. ■

Chart 2
Length of Time Necessary to Reach 0 Blood Alcohol After a Certain Effect is Noticed

Stage	Effect	Hours
1	No apparent effect	5 to 10
2	Changes in behavior	10 - 15
3	Changes in speech and coordination	In excess of 15
4	Dead	Never

*15 milligrams of alcohol per hundred milliliters of blood

50 Below And Nowhere To Go

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■ In all survival situations, you will have to protect yourself from adverse environmental conditions. A shelter is one of the primary protective devices. Several types of shelters work well in most environments, i.e., the A-frame, the lean-to, tepee, etc. But if you find yourself in an arctic or arctic-like environment with temperatures 30, 40, or 50 degrees below zero, thermal shelters will provide the best protection.

The thermal shelter holds heat from at least three different sources: Radiated ground heat, body heat, and heat produced by external combustion, i.e., candle, heat tab, stove, etc.

Heat radiating from the ground varies from place to place. In the interior of Alaska for example, the ground will radiate approximately 18 degrees to 22 degrees Fahrenheit regardless of ambient air temperature. Even sea ice radiates temperatures of 15 degrees Fahrenheit.

I know what some of you are thinking. How can you call 15 degrees Fahrenheit heat? Well, look at it this way; if it's −60 degrees Fahrenheit outside and you can crawl into a place that's +15 degrees Fahrenheit, then you've gained 75 degrees! It still won't be a lot of fun, but it's definitely easier to survive at +15 degrees Fahrenheit than at −60 degrees Fahrenheit.

For the purpose of this discussion, it's radiated ground heat we're trying to contain. We simply have to find a way to encapsulate ourselves next to the ground.

The principles of the thermal shelter apply throughout the arctic and arctic-like areas whether you're down in the tree line, on barren land, or on the sea ice. The basic steps are simple.

The first step in building a thermal shelter is to find an area with adequate resources. In the tree line, locate a spot with plenty of snow for insulation and wood for a frame. On barren land or sea ice, look on the leeward side of hills, mounds, or riverbanks where the snow is deep and wind packed. Always select a shelter site free of natural hazards, i.e., dead standing trees, avalanche areas, open cracks in the sea ice, etc. Additionally, select a site that is flat and level for comfort.

When a suitable site has been found, you can start to work. Be careful, don't overheat; this will cause your inner layer of clothes to become damp. The moisture will decrease the insulation quality of your clothing and increase the likelihood of hypothermia.

Next, dig down to bare ground or sea ice to expose the primary source of radiating heat. (Keep the snow you shoveled from the shelter site nearby for reuse as insulation.) Then, construct the shelter over the cleared area. The shelter should be small, only large enough for you and your equipment. This allows for less space to be heated and less energy expended during construction. If the shelter is properly constructed, the inside air temperature will warm to within a few degrees of the ground temperature. Body heat, a candle, or a small stove will raise the inside temperature even more.

Warning! Do not use an open flame without adequate ventilation. Carbon monoxide is lethal! Two holes, each about the size of a silver dollar, will provide adequate ventilation. One vent hole should be in the area of the door; the other hole located two-thirds of the way to the top of the shelter.

Snow will provide insulation. Believe it or not, the tiny, dead air spaces between the ice crystals in a layer of snow provide good insulation. A layer of snow, 8- to 10-inches thick, will provide optimum insulation.

Caution! If the shelter is heated to a temperature above 32 degrees Fahrenheit, the inner layer of snow will melt, freeze, and glaze over with ice. This will reduce the overall insulation quality and increase heat loss.

Next, cut poles for the shelter framework. Cutting poles is easier with the snow saw but a thumb saw or hatchet will work. (If you have no tools, break off what is needed.)

To construct a framed shelter, you'll need a sturdy ridge pole 6- to 8-feet long, 2 sturdy poles about 6-feet long, and several other poles in a variety of sizes.

Lash the 6-foot poles together to form a bipod, spread them apart at about a 45 degree angle, and set your ridge pole in place. You should be able to sit upright underneath the bipod. Position the ridge pole and bipod poles so the doorway is 90 degrees to the prevailing wind. Now lean the other poles in place along the sides and in front of the

continued

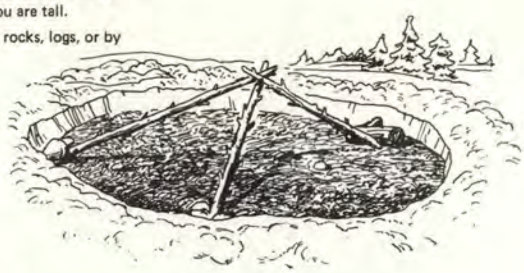
BUILDING A THERMAL A–FRAME SHELTER

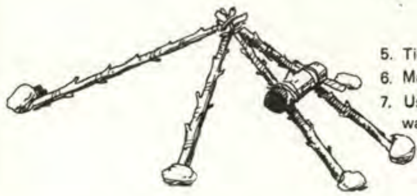
KEY CONSTRUCTION TIPS

1. Select a site safe from hazards of falling rocks, trees, and snow slides, with plenty of trees and snow for building materials nearby. It should be out of the wind, but in a clearing to facilitate spotting by air searches.
2. Make the shelter large enough for you and your equipment. Do not build too large or heating may become a problem. Follow the guidelines given below.
3. Shelter sides should be at a 45° angle or less to hold snow covering.
4. Select main support poles stout enough to handle the weight of 8" of snow covering.

BUILDING INSTRUCTIONS

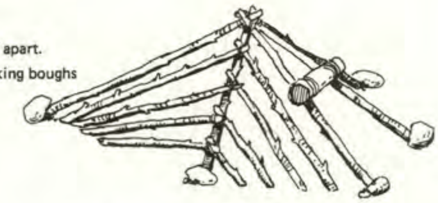
1. Clear snow away to ground level.
2. Make the ridge pole 1 ft longer than your height.
3. Make bipod poles as long as you are tall.
4. Anchor bottoms of poles with rocks, logs, or by seating in depressions.

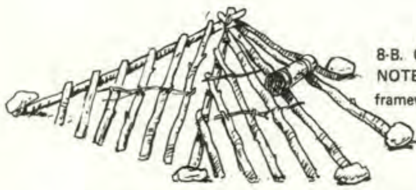




5. Tie joints of poles with parachute cord.
6. Make door poles 1 ft longer than your height.
7. Use 10" diameter log for door top and tie on at waist level.

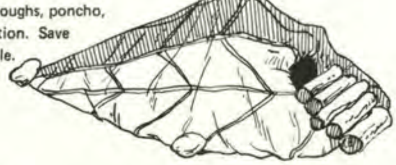
8-A. Place framework poles horizontally 8" apart.
NOTE: This method may be easier for hooking boughs (where available) for added insulation.





8-B. OR...Place framework poles vertically 8" apart.
NOTE: Smaller branches can be attached horizontally to framework poles for hooking boughs.

9. Add covering to framework using parachute, boughs, poncho, emergency blankets, etc., for additional insulation. Save sufficient amount for floor of shelter, if possible.
10. Stack on lower door logs.



11. Cover entire shelter with snow 8" thick (minimum).
12. Parachute / snow door plug (or other suitable material) inserted from within will seal the shelter.

shelter, at the same angle as the bipod. You'll need 2 good-size poles, about 5 inches in diameter and the same length as the ridge pole, to construct your door frame. Set these poles off the front of the shelter. Tie a door log at least 10 inches in diameter at waist level for the top of the door. Build up the bottom of the door with more logs. Rotten trees will work fine here, saving on energy. Make your door opening as small as possible.

To prevent heat loss, trim off the ends of any poles that stick out more than 3 to 4 inches above the shelter or that may protrude through the snow. Then, cover the shelter with a piece of parachute, boughs, or other available materials. Next, cover the shelter with 8 to 10 inches of snow.

To completely seal the shelter, you must improvise a door plug. Lay a piece of parachute or comparable material on the ground. Fill the center with snow, gather up the edges of the material, and tie off the plug as *tight* as possible. Set the door plug in place so it will harden and conform to the opening. This plug will completely seal the shelter.

On barren land or sea ice, a framed shelter is not feasible. Your support structure and insulation layer are the same in this case. Essentially, you're going to build a snow cave, with the floor of the shelter being bare ground or sea ice.

Tunnel in 2 to 3 feet (90 degrees to the prevailing winds) and then begin excavating the interior to form your living space.

Be sure to form an even, concave surface for your walls and roof. If the roof is too flat, it could cave in on you.

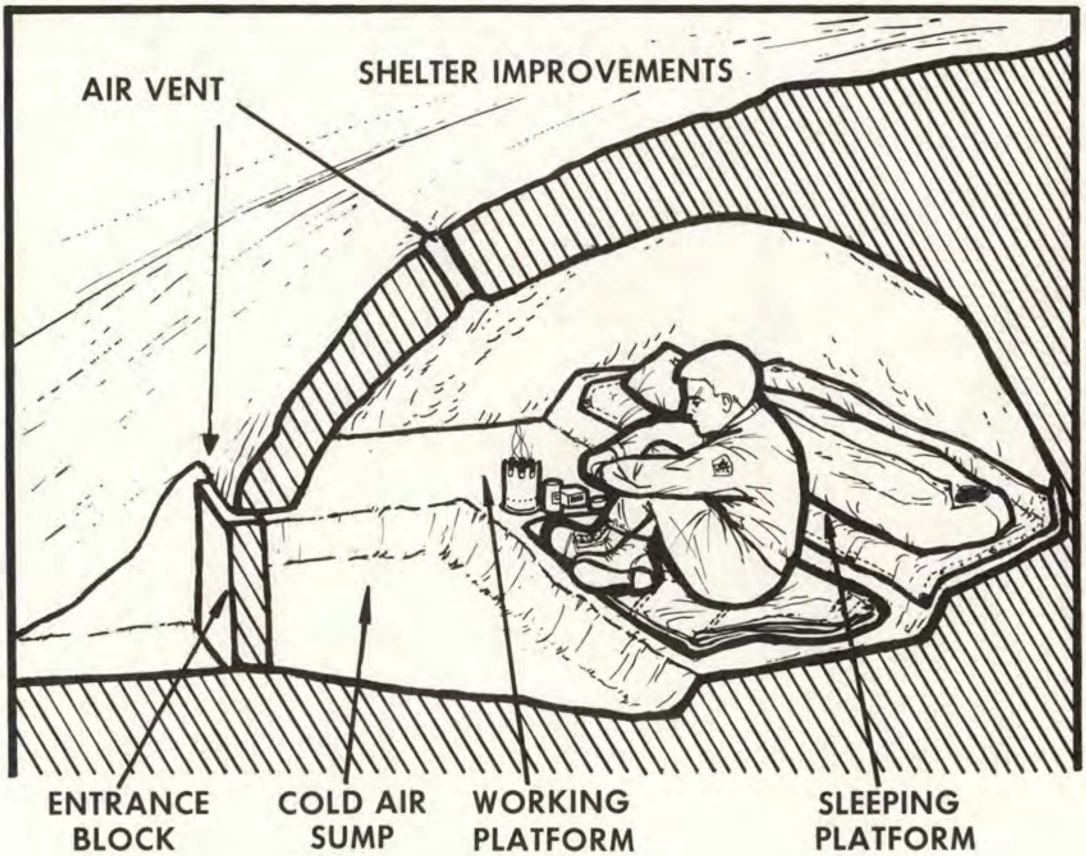
It's a good idea to carve out a sleeping platform a foot or two above ground level. This provides a cold air sump, allowing a place for the cold air to settle. The warm air will rise to the upper level — your sleeping platform.

The entrance should be as small as possible. A tight-fitting door plug can be formed from a block of wind-packed snow. Remember, a minimum of 8 to 10 inches of snow (insulation) is needed on all points of the shelter.

You should insulate yourself from the ground in any type of shelter, especially in the arctic as the ground temperature is still below freezing. Boughs, parachute material, foam rubber, or several inches of any other material providing dead air space will do.

The shelters discussed here are used only as examples. The construction techniques and final configurations are much less important than the principles involved.

Remember: We've simply put an insulated enclosure over a source of heat; namely, the bare ground. Cold and heat are relative terms. No matter how cold it gets outside, you can stay relatively warm inside a properly constructed thermal shelter. ■



FSO's CORNER

Opening Your Safety Meetings

CAPTAIN DALE T. PIERCE
919th Special Operations Group/SEF
Eglin AFB Aux Fld 3, FL

■ Fortunately, Air Force flyers enjoy a fraternalism that enables them to get the job done when push comes to shove. This fraternalism also causes them to flap their gums at every opportunity, and the dead time at the beginning of flight safety meetings is no exception.

Getting the flyers to shift gears at the appointed time can be a real challenge. Some FSOs use opening lines like, "Hey, can we get started now?" or "I know you are enjoying yourselves, but we really need to get started."

Getting started in a professional manner is sometimes difficult, but when accomplished, not only makes you, the FSO, more comfortable, but more in control. So how can a good transition to the flight safety meeting be made? Here's how one FSO dealt with the problem in a manner acceptable to all.

Captain Goebel of the 27th Tactical Fighter Wing (TFW) starts an "Air Power" film with some really good strike footage in it about 15 minutes or so (depending on the length of the film) prior to the scheduled start of the flight safety meeting. At the appointed time, the movie ends, and the FSO takes the floor with all eyes front. The flyers love it, and when used regularly, most are in their seats in time for all or most of the film. The key to using this technique is taking the floor "immediately" following the film.

After talking with Captain Goebel, I tried the technique and the results were as advertised. I continue to use the technique as often as I am able to obtain an acceptable film. Additional benefits to using this technique may include increased attendance if used regularly, increased audience participation in the meeting itself, and enhanced operational flavor.

Captain James W. Goebel, Chief of Flight Safety for the 27 TFW at Cannon AFB, New Mexico, provided this month's idea.

The FSO's Corner needs your ideas. What are you doing in your program that could help other FSO's if they knew about it? Call me (Dale Pierce) at AUTOVON 872-8537 between 0800 and 1600 central time, or send your name, AUTOVON number, and program idea to 919 SOG/SEF, Eglin AFB Aux Fld 3, Florida 32542-6005. ■

Air Force flyers love to talk, especially when you get them in a relaxed setting. Have you ever had trouble getting your group to quiet down so you can start the safety meeting? Try the idea above — you'll like it.

Communication: More Than Talking

1LT WILLIAM M. FISHER
41st Military Airlift Squadron
Charleston AFB, SC

■ A sick feeling came over Major Carpenter as he looked past the tail of his F-16 at the smoking remains of the C-141 he was escorting. He couldn't understand how his simple directions were misunderstood. He thought about the crew and the troops aboard the Starlifter, and it made him sick.

It all started about 3 days ago. The Russians began a full scale blitzkrieg-type operation across Germany, and a NATO fighter base was cut off behind the rapidly advancing line. They desperately needed reinforcements and parts before the A-10s and the base could be evacuated. That's when Major John Carpenter got the word from his commander, "John, I need you to take 4 Falcons and fly cover for a C-141 that will drop the parts and troops they need to get out of there."

Major Carpenter had to plan a difficult mission with an aircraft he knew little about and with an aircrew he knew even less about. John knew how to fly proper defensive positions with the Starlifter but, he had never coordinated an actual mission with a C-141, or any other transport for that matter.

In the past, this may not have been as difficult a task. Heavy and fighter pilots frequently rotated, and there was a wealth of people around with experience in both types of aircraft. There was more unity and esprit de corps between the pilots since many pilots had experience and friends in both heavies and fighters. Unfortunately, this crossflow resulted in less experienced and less proficient pilots, and in Vietnam, we paid for it with lost pilots and aircraft.

The C-141 would be piloted by Captain Steven Miller, a highly qualified flight examiner with a great deal of airdrop experience. He, too, knew his job very well but had never flown an actual mission with F-16 escort.

The pilots met one day prior to discuss the details of the mission. As they talked over the routes, threats, and formation procedures, they never realized what they really needed to talk about.

They should have discussed ways of helping each other out in combat. For instance, the heavy could be used as bait to drag the bad guys out into the open, to hide the fighters physically under its wings, or it could run and hide on its own. Many other tactics should have been developed but their training to this point had only developed the tactics of the individual pieces without considering the synergetic effect of all the pieces together.

They even had trouble understanding each other's jargon and terminology. Since the last common experience they had was Undergraduate Pilot Training, it's obvious why they had difficultly working together. Sure, they knew their positions according to the book and were very good at their jobs, but a lot more is involved than just flying proper position when you're actually escorting someone in a hostile environment.

The next day the mission went well at first. They avoided most of the threats by choosing a route intelligence reports indicated would be lightly defended. An attack by two Soviet Migs was quickly countered with Sidewinder missiles, but the formation proceeded into an area that was occasionally littered with ZSU 23-4 motorized anti-aircraft

guns. When Major Carpenter noticed a ZSU 23-4 about 4 miles ahead, he realized the F-16s could save their guns and missiles by simply avoiding the site. He called to the formation "Break right, break right — ZSU 23-4," and the 4 F-16s proceeded to the right with an easy (by F-16 standards) 4-G turn.

Captain Miller saw the fighters break to the right and knew his heavy C-141 couldn't follow the fighters' tight turn, so he thought the fighters must be attacking the anti-aircraft site. When Major Carpenter realized the Starlifter was continuing toward the ZSU 23-4, he again called "Break right! Break right!" The C-141 started to roll into a right turn, but its wide turn carried it right over the site. The ZSU 23-4 opened fire . . . The C-141 was detroyed with all aboard.

The same mistake occurred over the desert of Arizona when two C-141s flew right over an anti-aircraft site which the lead pilot of the A-10 escort had called out. These are mistakes that need to be experienced during training exercises, not discovered on the battlefield. Here are a couple of ways we could get the training we need with little, if any, additional cost.

First, combat air training schools should augment their friendly assessment training with direct contact between fighter and heavy pilots. This would give the pilots a common ground to work from and some face-to-face time.

Second, all airlift tactics training missions should include actual flight operations with heavy and fighter units. Missions should be coordinated, from at least the squadron level, on a regular basis if it's to be effective when we need it. RED FLAG is an outstanding program, but it's too short and doesn't reach enough pilots to do the job alone.

The above ideas will help, but a few ideas that will cost us a little more also need to be examined.

First, crossflowing a few select pilots could greatly benefit both heavy and fighter pilots so we can avoid the losses we have had in the past. For example, just a one-way crossflow would put a figher pilot with a heavy unit during his nonfighter (noncockpit) tour of duty. In this way, he would bring his fighter expertise to the heavy unit and return to his fighter unit with heavy experience and a career broadening tour in MAC (now only ATC seems to get this crossflow of knowledge). Crossflow could be beneficial if we do it for the right reasons and limit it to a few select pilots.

Second, we could send a few pilots TDY to live, talk, and drink the other guys' tactics, jargon, and beer. This experience would help bridge the gap between the two completely different worlds fighter and heavy pilots live in. It would improve communications, tactics, and esprit de corps while the cost would be minimal.

Finally, at the very least, we should send the tactical planners or weapons officers TDY to the units they're planning intercommand missions with. This face-to-face time would give them the opportunity to coordinate routes, tactics, and contingency plans.

At the 41st Military Airlift Squadron, Charleston AFB, South Carolina, we've been coordinating airdrop missions with fighter units across the country. We've seen "the writing on the walls." The next major conflict may happen very quickly; we need to train the way we'll fight; we don't have time to reexamine our tactics. And this needs to be done *now!*

Our tactical problems exist because of a lack of common knowledge. Trying to learn when coordinating mission details and ideas over the phone is a less-than-ideal learning situation.

The 41st MAS has taken the first steps to correct these problems by getting our planners together with fighter weapons officers. It has been very successful so far (especially with guard and reserve units), but this is just a beginning. We've discovered more questions than answers. (If you're in Charleston sometime, stop by and "chat" with us.)

In short, if we hope to change the results of Major Carpenter's and Captain Miller's fictitious mission, we must start now, and we need to include the Army, Navy, and Marines, too. Rapid deployment requirements don't allow us the time to find out how to minimize losses. Given our airlift shortfall, any "lifter" loss is unacceptable. ■

USAF Photos by SSgt Kay Pellum

THE BEST OF THE BEST—WILLIAM TELL '86

PEGGY E. HODGE
Assistant Editor

■ Top F-4, F-15, and CF-18 crews arrived at Tyndall AFB, Florida, from all over the world to prove they are the best the Air Force has to offer. The arrival of these crews marked the start of the intense 14-day competition known as William Tell. It is the biennial Air Force-sponsored air-to-air weapons meet, hosted by the Tactical Air Command, 12-25 October 1986.

The US Air Defense Weapons Center conducts and organizes the meet that is named after the famous Swiss archer and gives the Air Force's best jet fighter units the opportunity to compete in all aspects of air-to-air operations. This year, the ten competing teams represented the Tactical Air Command, US Air Forces in Europe, Pacific Air Forces, Air National Guard, and Canadian Forces Air Command.

The Way It Was

William Tell began in 1954 as the air-to-air rocketry portion of the third annual US Air Force Fighter Gunnery and Weapons Meet held at Vincent Air Force Base, Arizona. The first meet pitted the Aerospace Defense Command against the Air Training Command.

In 1956, nine teams representing seven major commands competed in the F-86 Sabre, F-89 Scorpion, and the F-94 Starfire. The contest expanded when it resumed in 1958 at its new home — Tyndall AFB — as the 2-year-old F-102 Delta Dagger entered the competition.

The F-102s highlighted the "new" William Tell, which had become exclusively an air defense competition. Radio-controlled drone targets and an electronic scoring system marked the changes occurring in air defense. Weapons changed from machine guns and cannons to air-to-air missiles and rockets.

All the subsonic aircraft had disappeared from the flightline by 1961. In their place were three jets specifically designed for protecting North America: The F-102 Delta Dagger, the F-106 Delta Dart, and the F-101 Voodoo.

More realism was added in 1963 when an "intruder" mission was created. A drone was launched from an unannounced point, and weapons directors had to hunt for it, scramble their flying teams, and guide them to the targets — all within minutes.

In 1965, the first foreign entrant appeared — Canada's CF-101 team was one of the 16 teams entered flying the F-101, F-102, F-104, and F-106.

After a 5-year intermission imposed by the demands of the Vietnam War, William Tell resumed in 1970 with F-101s, F-102s, and F-106s competing. The pilots and ground crews of these aircraft represented the Air Defense Command, the Air National Guard, and the Canadian Forces Air Defense Command. In 1976, F-4 Phantoms made their first appearance.

Reorganization of air defense forces in 1979 shifted sponsorship to the Tactical Air Command. The 10 competing teams in 1980 once again came from active duty, Air National Guard, and Canadian Forces units. For the first time, Strategic Air Command B-52s participated to give teams a more realistic simulation of bomber threats.

In 1982, the name for the meet was officially changed to the US Air Force Air-to-Air Weapons Meet. Also, in 1982, both the Pacific Air Forces and US Air Forces in Europe teams returned to the competition. Both flew the F-15 — the first time the Eagle competed in the meet. Individual competitions were added for weapons loading, maintenance, and weapons contollers.

William Tell Today

Today, William Tell aircrews must fly five different profiles against "hostile intruders" over the Gulf of Mexico. These "intruders" are comprised of support aircraft from other bases and unmanned drones. The competition is intense and closely simulates combat scenarios. Aircrews are given points in each profile based on their performance.

In Profiles I and II, the QF-100 plays the major role. An unmanned, remote-control drone, it is the target for live missile firings. The T-33 aircraft act as "chase planes" for the drones to ensure safe landings and takeoffs.

In Profile I, the drone, once over the designated Tyndall water range, is identified by the team's weapons controllers on the ground. They guide the competitor's aircraft to the target, and the pilot fires an AIM-7 Sparrow radar-guided missile head-on at the drone as the competing aircraft and the drone move toward each other. The pilot must keep his radar locked onto the drone to give the missile guidance to the target. As the QF-100 and fighter pass each other, the pilot begins maneuvering for the second part of the mission, Profile II.

In Profile II, the pilot must position for a stern (from behind) shot with an AIM-9 Sidewinder heat-seeking missile. The missile hones in on the drone's engine heat. (During the weapons meet, the missiles do not contain warheads.)

During Profile III, competitor aircraft must scramble in pairs against two unidentified aircraft (one F-106 and one F-16) using tactics at their own discretion. Fighters "loaded" with simulated armament have 10 minutes to get airborne, including 5 minutes for an end-of-runway safety check for each aircraft. Weapons controllers will guide competitor aircraft to the intruders. Pilots have 5½ minutes to find, visually identify, and simulate firing 2 missiles at each target.

In Profile IV, a team of 4 aircraft must defend a certain airspace for 45 minutes against a mass bomber and fighter attack while simultaneously allowing friendly aircraft through the area. The team must also fire simulated armament against enemy aircraft. Fighters will identify aircraft and then will receive further guidance from their weapons controllers.

During Profile V, competing aircrews fire 20mm guns at a target, 14 feet long and 2 feet wide, which is towed 2,000 feet behind an F-4 aircraft. Competitive aircraft are in pairs and must fire at the "sonic scoring circle" on the target within an indicated eligibility period or be disqualified. The target scores the rounds electronically. The tow pilot initiates all radio calls, and fighters are told when they have scored their first hit, as well as when to stop firing. Points are awarded for time to the first hit and for the total number of hits scored.

Winners — 1986

The competition produces winners in several categories. The winners for 1986 are listed below:

SSgt Peter D. Burger, 49th TFW, Holloman AFB, New Mexico, inserts a tail fin onto an AIM-7 missile during weapons loading competition.

William Tell is a meet with a mission carrying an important message to the American people. It defines current strengths and future needs. The experiences gained by the competitors and evaluators serve as the winning edge should our forces be called on to defend our freedom. ■

"The Best of the Best" — 1986

OVERALL WINNERS

Overall Winner of William Tell '86	33d TFW, Eglin AFB, Florida
Overall Top Gun Award	Captain John Reed* • Canadian Forces Air Command • 425 Squadron • Bagotville, Quebec
Top Shooter Award	Captain Stanley Kresge • 33d TFW • Eglin AFB, Florida
Best Weapons Controller Team	18th TFW • Kadena AB, Japan
Overall Top Maintenance Team	1st TFW • Langley AFB, Virginia
Top Weapons Load Team	425 Squadron • Bagotville, Quebec

*Captain John Reed is a USAF officer on exchange duty with the Canadians.

WINNERS BY CATEGORY

	F-4	F-15/CF-18
Top Team	119th FIG, North Dakota ANG, Fargo IAP, Fargo, North Dakota	33d TFW, Eglin AFB, Florida
Top Gun	Major George Tutt and Captain Larry Kemp 142d FIG, Portland IAP Portland, Oregon	Captain John Reed Canadian Forces Air Command 425 Squadron, Bagotville, Quebec
Top Shooter	Majors Ronald M. Moore and William C. DeJager, 142d FIG, Portland IAP, Portland Oregon	Captain Stanley Kresge 33d TFW, Eglin AFB, Florida
Top Maintenance Team	142d FIG, Portland IAP Portland, Oregon	1st TFW, Langley AFB, Virginia
Best Weapons Control Team	107th FIG, New York ANG, Niagara Falls IAP, New York	18th TFW, Kadena AB, Japan
Best Weapons Load Team	119th FIG, North Dakota ANG, Fargo IAP, Fargo, North Dakota	425 Squadron, Bagotville, Quebec

IFC APPROACH

By the USAF Instrument Flight Center, Randolph AFB, TX 78150-5001

AFM 51-37: Revised

CAPTAIN RONALD L. LIDDELL

■ The USAF Instrument Flight Center recently completed a major revision to AFM 51-37, Instrument Flying. If you haven't received a new copy of AFM 51-37 (15 July 1986), keep checking your mailbox. It should be there soon. The first thing you will notice is the new manual has 16 chapters and 5 attachments instead of the 8 chapters you are accustomed to. Don't panic! There isn't twice as much material. For years, the manual has been structured in a flight sequence. This tended to spread the material out and often made it difficult to find individual subjects.

The new manual has been restructured to make it more like a reference book than a novel. For example, how many of you fixed wing flyers have been studying for your annual instrument check only to realize that for the past half hour, you had been reading helicopter procedures?

The authors of AFM 51-37, hopefully, have solved this problem by putting all the helicopter-unique material into one chapter dedicated exclusively to basic instrument flying for helicopters. In general, the authors have attempted to locate all the information regarding a particular subject in one place to make the book easier to use.

The manual has also been updated with new graphics. Sorry, old timers, but those pictures of the T-Bird instrument panel just had to go! Besides the new structure of the manual, there's lots of new material in the book. Let's take a chapter-by-chapter look at the new book and point out some of the more prominent new or revised material.

■ Chapter 1 — Basic Instrument Flying — Fixed Wing: This is the "How to" chapter on attitude instrument flying for fixed wing aircraft. It contains a brief discussion of the head up display (HUD). A more detailed discussion of the HUD and its uses during instrument flight is found in Attachment 3.

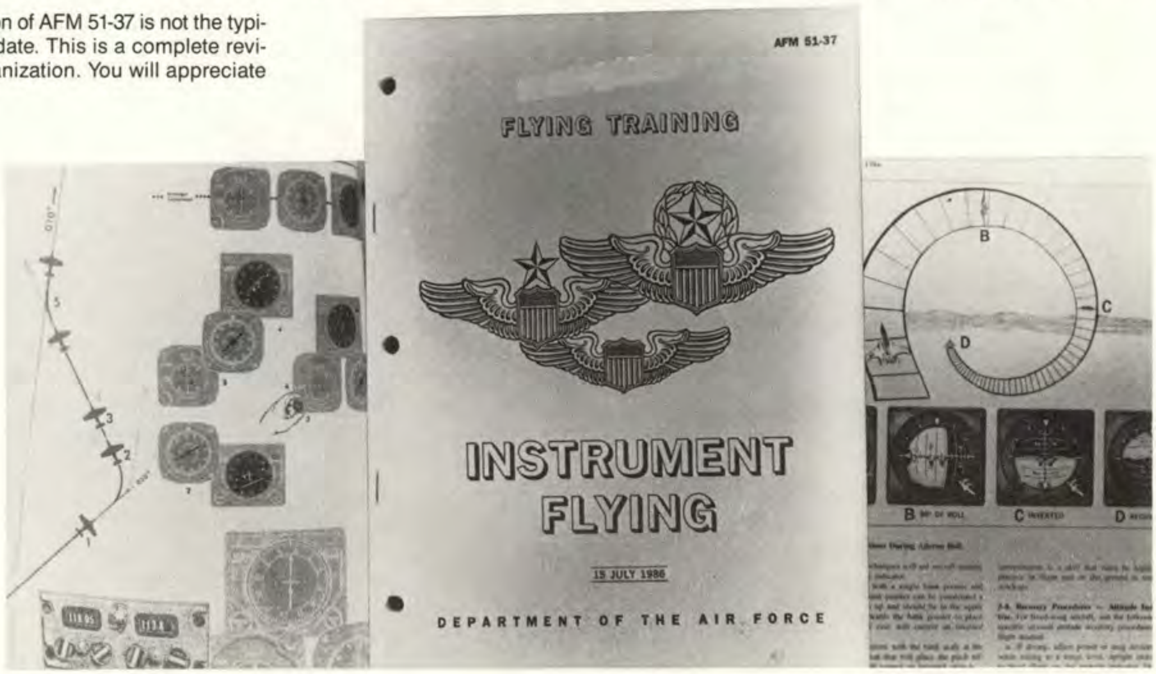
■ Chapter 2 — Instrument Flight Maneuvers — Fixed Wing: We added the vertical "S" maneuvers, wingover, and aileron roll to this chapter.

■ Chapter 3 — Basic Instrument Flying — Helicopter: This is a "COPTER ONLY" chapter. It contains the same type of information found in Chapters 1 and 2, but for helicopter flyers.

■ Chapter 4 — Navigation Instruments: With only minor revisions, this section contains a broad discussion of the cockpit gauges.

■ Chapter 5 — Electronic Aids to Navigation: There's lots of new information in this chapter. It includes

The latest version of AFM 51-37 is not the typical periodic update. This is a complete revision and reorganization. You will appreciate the results.



information on the microwave landing system (MLS), localizer-type directional aids (LDA), simplified directional facility (SDF), NAVSTAR global positioning system (GPS), and inertial navigation system (INS).

■ Chapter 6 — Navigation Procedures: This chapter about how to tune, identify, and monitor also contains an expanded discussion of area navigation (RNAV).

■ Chapter 7 — Preflight: For our friends who operate in the cold country, we included information on off-scale altimeter settings for those days when the altimeter setting (ALSTG) won't fit in the altimeter window. There's also expanded information on flight planning and the NOTAM system.

■ Chapter 8 (Departure) and Chapter 9 (En Route) are essentially unchanged from the old manual. We have added a section devoted to the standard terminal arrival (STAR) in Chapter 10 (Arrival).

■ Chapter 11 (High Altitude Approaches) and Chapter 13 (Final Approach) are unchanged while Chapter 12 (Low Altitude Approaches) contains new guidance which clarifies the altitude restrictions on some procedural tracks.

■ Two new types of approach lights, the precision approach path indicator (PAPI) and the pulse light approach slope indicator (PLASI), are discussed in Chapter 14 (Landing from Instrument Approaches). This section also defines procedures for executing the side-step maneuvers.

■ A note has been added to the information in Chapter 15 (Missed Approach) which clarifies the problem of when to fly missed approach or climb-out instructions. Chapter 16 (Additional Information and Guidance) contains information on automated radar terminal systems (ARTS), terminal radar procedures (TERPS), and turning performance which is essentially unchanged.

There are five attachments which round out the new manual. An expanded discussion on the HUD is found in Attachment 3, while Attachment 5 enlarges on aircraft surge launch and recovery (ASLAR) procedures. ■

MAIL CALL

EDITOR
FLYING SAFETY MAGAZINE
AFISC/SEDP
NORTON AFB, CA 92409-7001

"Why Do I Do It?"

■ Just a personal note to answer a question you had in an article you printed in the August 1986 *Flying Safety* magazine. Pages 22-24 had an *excellent* story written by a SSgt Stephen M. Moriset, 479th CRS. It was called "Why Do I Do It?"

You said you spotted it thumbing through a back issue (April 1981) of *TAC Attack*. Obviously, you thought highly of the story to reprint it, and I share the feeling.

The question you had, which I'm about to answer, was this: "Although we don't know *where* Sergeant Moriset is today, we're reprinting his letter because we think both aircraft 'operators' and 'maintainers' can still appreciate what the author is telling us."

I met Steve on the "Ferry," a 3-day journey en route to our present assignment. We took the Ferry from Seattle to Haines, Alaska, and drove the remaining 600 miles to Eielson AFB near Fairbanks.

Steve is no longer "Sergeant Moriset." He is still in the maintenance business, but it's *1st Lieutenant* Moriset. He's in the 6th CAMS/MAF, Eielson AFB, Alaska.

Just thought it would be interesting for you to know.

2d Lt Jerry D. Atwood, USAF
18 TFS
Eielson AFB AK

Thanks for your letter and your kind comments. We appreciate your letting us know where the author is now. It adds an interesting postscript to the article.

"Abort and Forget"

I want to thank you for your excellent article titled "Abort and Forget." While this pertains to a fighter aircraft, the lesson also applies to those of us in the transport business.

However, there is one error in the article. After 28 years of aircraft maintenance, I have never known of any Aerial Port Group (APG) that performed engine runs on any type of aircraft. I feel that APG, for airplane general, troops were slighted by this error.

There are those of us in the field that read both the *Flying Safety* and *Maintenance* magazines to learn from others' mistakes. Please continue to publish excellent magazines.

CMSgt Howard B. Gill, USAF
317 TAW/MA
Pope AFB NC

Thanks for your letter. We apologize to all the crew chiefs out there who were called Aerial Port Groups. I assure you we do know the difference. Aerial Port Group wasn't in the original story as Chief Hartung wrote it. We don't know exactly how or when that was added. We're blaming it on the gremlins.

We appreciate your comments on the magazines. Unfortunately, Maintenance *magazine has been canceled due to budget cuts. However, some of the material will be published in* Flying Safety. ■

Safety Warrior

Our Past Pays Off

PEGGY E. HODGE
Assistant Editor

■ In the old days, we relied heavily on the flight service station attendant for flying safety. He was great for shooing stray cattle off of the airstrip when necessary, stowing the mail, and seeing to supplies. When you faced a landing in darkness or poor visibility, he would be there to light the airfield with the best means at hand — automobile headlights, oil drums, flares, etc.

But as aviation progressed, his well-intentioned, but crude, operation left safety too much to chance. Aviation has come a long way from those early-day safety measures with significant advances in escape systems, runway lighting, cockpit aids, and system design. Today's safety advances leave little to chance — but getting to this stage was a difficult and often risky process. Here are just a few of the ways we got where we are today.

Ejection Seats

The Germans first experimented with ejection seats in 1938. They used a bucket mounted on four rollers which moved in two channels. In 1942, Sweden installed an ejection seat in their attack bomber. By 1946, the British had designed and tested its first ejection seat, the Martin-Baker seat. At the end of the war, the United States acquired several of the German seats and catapults which were evaluated for possible application to the F-80 aircraft. However, the German seat was inadequate for the F-80 since the catapult speed was insufficient for safe ejection at the F-80's maximum operating speed. A new ejection seat, patterned after the German seat, was designed in 1945.

The first human ejection test in the United States occurred at Wright-Patterson Air Force Base, Ohio, from a P-61B test aircraft on 17 August 1946. The first emergency ejection from a USAF aircraft occurred from an F-86 on 29 August 1949. Most notably — it was successful!

The primary technical problem addressed in the design of these early ejection seats was clearance of the tail. Since speeds and altitudes were relatively low by today's standards, the main problem was spinal injuries caused by the force of the ejection.

However, as the speed and altitude envelopes expanded, ejection seat design engineers faced new problems. The wind forces encountered at high airspeeds also created problems. Helmets and oxygen masks were being ripped off, and body extremities were being injured due to the high aerodynamic forces.

As speeds and altitudes increased still further, more catapult thrust was required to provide tail clearance. The rate of spinal injuries kept rising as a result of this increased catapult acceleration. Then the rocket catapult was developed — it provided additional tail clearance while decreasing the acceleration level.

To eliminate, or at least reduce, the severity of egress system deficiencies, the Air Force initiated a program in 1967 to develop an advanced concept ejection seat. The seat was to be a rugged, lightweight, easy-to-maintain system with advanced technology subsystems.

The Air Force's ejection survival rate for calendar year 1985 was 81 percent. There were 58 crewmembers involved in escape system-equipped aircraft mishaps; 43 attempted ejection and 35 of them survived. It was not quite as good as our record between 1982 and 1984, but it was considerably better than the 75 percent the Air Force averaged between 1976 and 1981. The most the Air Force ever had in one year was 262 in 1959. Historically, the primary cause of ejection fatalities has been initiation outside the envelope.

Recently, the Air Force initiated a program to develop a new generation escape system. With its Crew Escape Technologies (CREST) Advanced Development Program, a number of technologies will be developed to upgrade current systems which the Air Force plans to retrofit on the current ACES II seat.

Runway Lighting

Many advancements have been made in the methods used to light runways. A new generation of approach lighting aids is rapidly being developed to improve visual characteristics, reliability, and to reduce cost.

Some of these systems are already operational, others are undergoing testing, and still others are being refined in the laboratory. The precision approach path indicator (PAPI), the pulse light approach slope indicator (PLASI), and electroluminescent and radioluminescent lighting sources are important aids in runway lighting discussed here.

Developed in England, PAPI is designed to provide sharper and more specific indicators for glideslope position than the visual approach slope indicator. The PAPI display provides five different combinations of light to the pilot, each representing a specific indication of approach position.

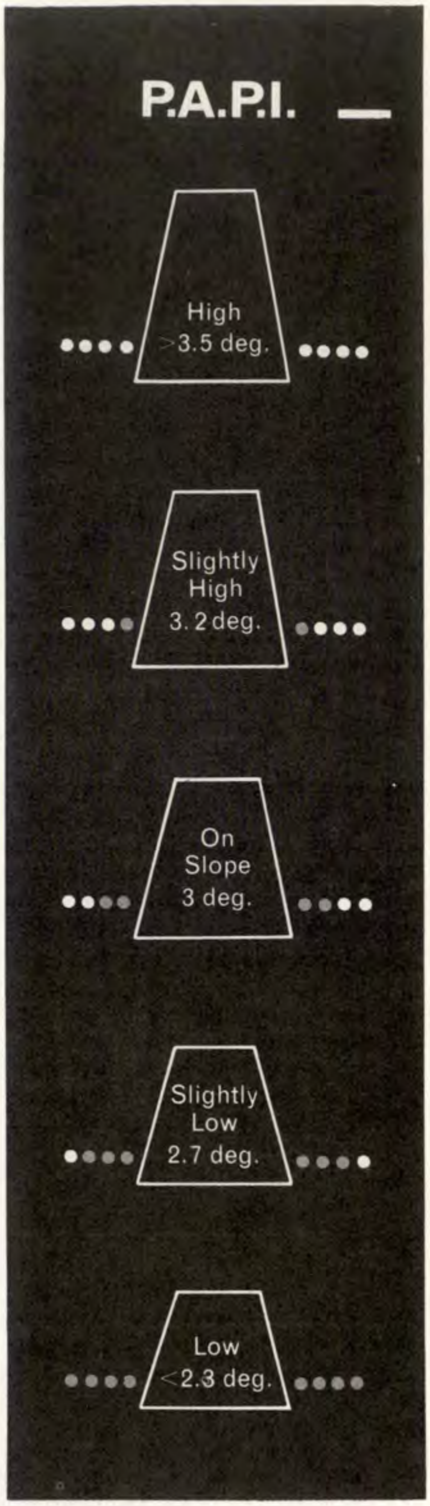
The second generation approach aid is the PLASI. PLASI is a single-source unit that uses a pulsing light to provide glidepath information. Deviation below glidepath results in the pilot seeing a pulsing red light, and above glidepath, a pulsing white light. When the correct approach path is flown, the pilot views a steady white light.

Two new technologies have been undergoing research and development and offer promise in augmenting incandescent sources that have been the mainstay of aviation lighting. These are electroluminescent and radioluminescent lighting.

Electroluminescent lights use phosphors sandwiched between two electrodes, one of which is translucent to allow for light transmission.

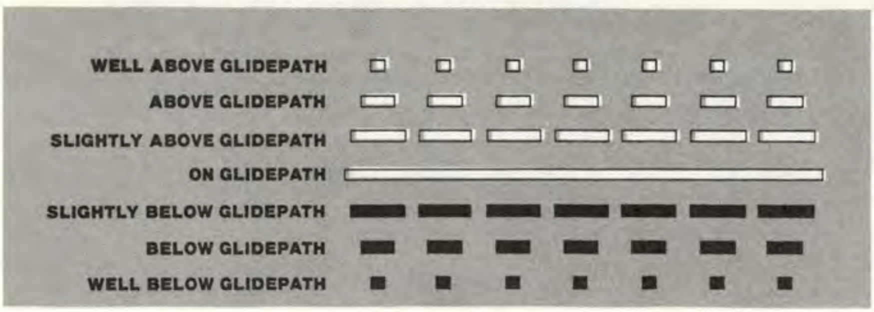
The second of the new lighting technologies is radioluminescent lighting. Existing airfield lighting systems require a great deal of energy to operate an airfield. Radioluminescent lighting is totally self-sufficient, requiring no externally

continued



The PAPI uses five different combinations of red and white lights to more accurately display the aircraft's approach angle. The colors transition from all white for a very steep approach to all red for a very shallow approach.

PLASI LIGHT INDICATIONS



With the PLASI, the pilot would see a steady white light when on the glidepath. A steep approach would be indicated by pulsing white lights, and a shallow approach would result in pulsing red lights.

provided power source. Light is produced by phosphors activated by radioisotopes.

Cockpit Aids

Still in the experimental stages is the concept of flying by pictures and color coding. The Flight Dynamics Laboratory at Wright-Patterson Air Force Base, Ohio, is working on several programs which could give pilots advanced displays using pictures of flight information and mission status.

Because a person is able to interpret information more easily from pictures than letters and numbers, the Air Force would like to give the pilot pictures to fly by as much as possible. Color coding would make the pictures even more meaningful. For example, enemy threats could be one color — friendly forces, another color.

One specialized adaptation of the fly-by-picture concept is an electronic terrain map. The main display would give airborne pilots perspective views of terrain with both natural and manmade features added. The map would permit pilots to see what's ahead and below despite weather and darkness.

System Design

There have also been significant advances in aircraft system safety over the years. System safety strives to ensure critical failure modes are eliminated during the design stage of our systems. The Air Force has been a primary participant in the development and implementation of system safety within the military services.

This important role began with the introduction of system safety engineering programs into ballistic missile systems development in the early 1960s. Later, the role expanded into application to aircraft and other systems.

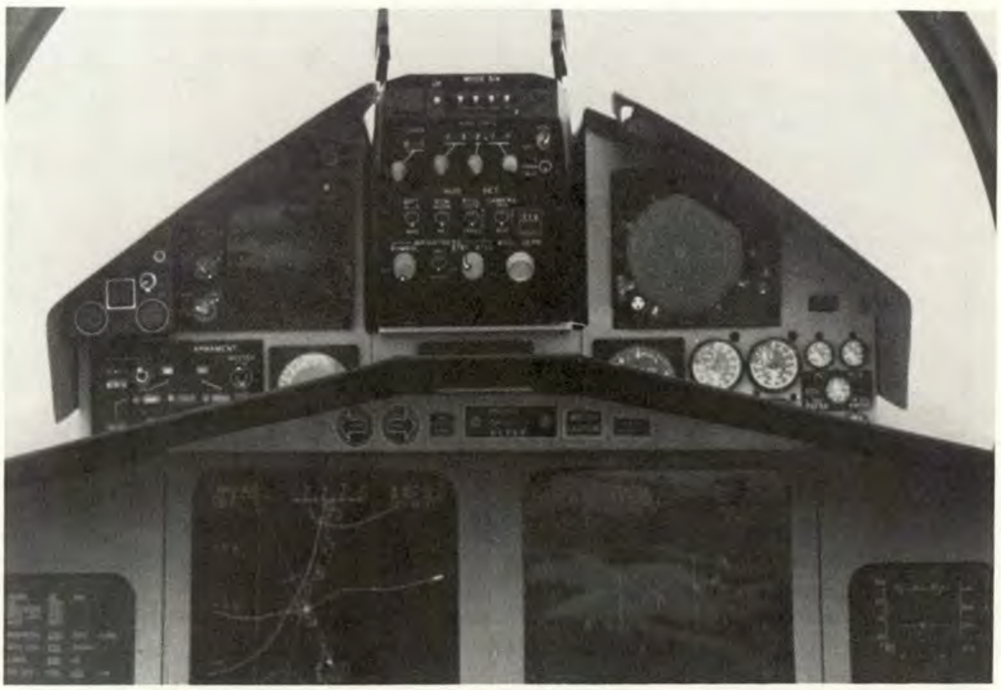
This flat panel display is only 3 inches deep and can fit where bulkier mechanical dials and CRTs can't.

In 1969, the Department of Defense approved Military Standard 882, System Safety Program Requirements, for all Department of Defense agencies and departments to use in developing system safety programs. This was the first military standard issued for system safety.

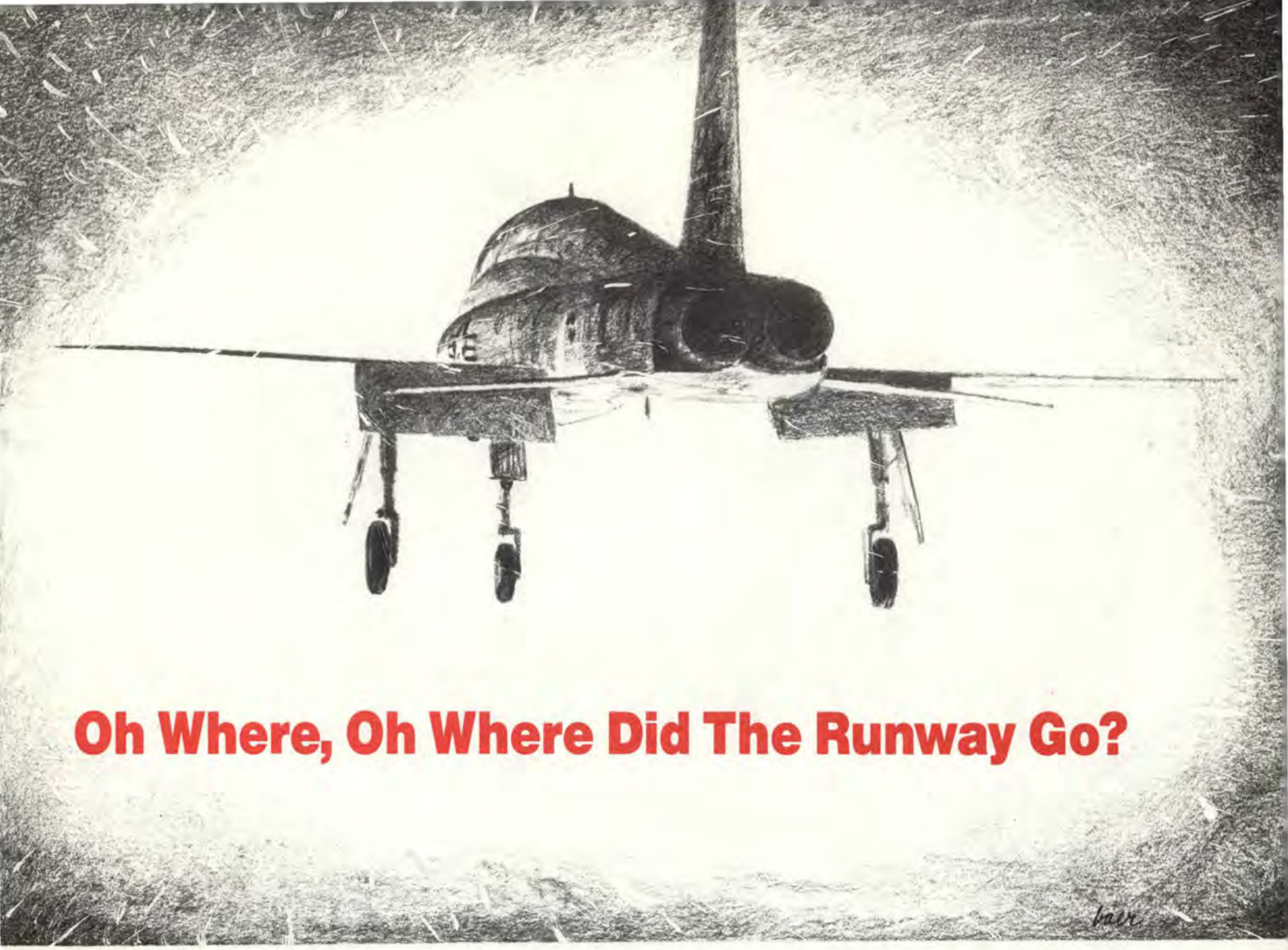
Air Force support of system safety in weapon system development and their activities has been largely responsible for the establishment of the system safety discipline.

The bleakest year in flight safety is considered to have been 1943. But only 42 years later, the Air Force recorded its best year in flight safety. These technological improvements contributed significantly to allow the Air Force to have come so far in safety.

Air Force flight safety has progressed in its programs, practices, and system and technological designs. Continued dedication to this program by the Air Force and its people will ensure safety in the skies. ■



These cockpit mockups show how the electro-optical displays enhance the F-15E. This represents only part of the many possibilities for an electronic cockpit.



Oh Where, Oh Where Did The Runway Go?

■ Many aircrews don't fly regularly in regions that get snow, let alone while it's snowing. As the winter season approaches, we may occasionally be faced with this condition, especially on cross-country missions.

Flying during a gentle snowfall presents a peaceful atmosphere, but don't be lulled into its tranquility. I was caught in a situation I was totally unprepared for.

Shortly after sunset, we were returning from an out and back. The weather was 1,500 broken and 2 miles visibility in snow showers (a typical December evening in Michigan). The RCR was reported at 22 with light snow on the runway. A B-52 landed as we approached the final approach fix and reported the braking action was poor on the last 2,000 feet (no problem on an 11,000 foot runway).

As we flew down final, the reflection of the landing lights off of the snow was a unique sight. We picked up the runway lights at about 4 miles. The runway and centerline were visible through the thin covering of snow, and everything was normal until we began to flare. At that point, the landing lights did their thing and it was as if we were inside a milk bottle. The combination of lighting up the snow on the runway plus the falling snow caused us to lose all depth perception. Not even the runway remaining markers were visible. Luckily, we touched down smoothly after the initial rotation and were able to pick up the centerline again once the nose lowered.

After my blood pressure settled, I wondered how I could have been unprepared. This was my third winter up north, and I thought I had a thorough understanding of all weather procedures. Obviously, I didn't, but it really isn't addressed directly in any of the manuals. Flying in snow showers during daylight does not present nearly as many problems as at night. This is because visibility in daylight is the same in all directions, while at night you are limited to seeing only what the landing lights are pointing at.

The lesson I learned is to be prepared for this situation. Use caution when snow is predicted because visibility is different in snow than in rain near the runway environment. This is especially true at night. The landing lights shine through the rain whereas the snow crystals reflect the light back at you. Another option might be to hold while the snow plows clear off any accumulation. Diversion in this situation might very well have been the best (and safest) answer. —Courtesy Capt Mark Hamilton, 559 FTS, and the ATC Kit, Randolph AFB TX. ■

KING OF THE AIR

SQN LDR ALASTAIR G. BRIDGES, RAAF
Directorate of Aerospace Safety

■ In the last issue, I talked a little about reporting in the interest of crosstell and in light of the raised Class C threshold. I should have emphasized the C-12 AIG Number 9388. This AIG is for our exclusive use and must be used in all mishap reporting. A very recent C-12 mishap report had only two addressees on it.

I mentioned, too, the C-12 warning horn modification. We have just learned the C-12F warning system does not require modification; it will still sound during simulated single-engine operations with the gear up. Modifications are continuing on the A models and will be conducted on the D models.

The Army and Navy have reported a number of instances where cowlings were opening in flight and caps (fuel and oil) coming off. About 2 years ago, the Air Force lost an engine cowling from a C-12F; it was suspected the cowl had not been correctly secured after the preflight.

A C-12A required an engine change following loss of engine oil due to a loose oil cap. The cap was suspected to have loosened in flight. The other services have had similar oil cap problems which have also resulted in smoke and fumes inside the cabin. That particular cap is difficult to get at, so never hurry the oil check.

The other services have experienced a number of fuel siphoning incidents from improperly installed or sealed fuel filler caps. I have found caps replaced incorrectly at intermediate stops, so it pays to check them closely, particularly where there is no Beech Aerospace Services, Inc. (BASI) support. While on fuel, do ensure the refueler is familiar with the C-12, its fuel type, and where to put it. There have been instances of aircraft being

filled through the sextant port or any other suitable opening.

Engine cowlings have proved troublesome to the other services as well as to civilian operators. Cowls have been lost or come loose and stayed attached. In all instances, the cowling had been improperly closed; no material failure was involved. One cowling was fully latched and looked OK but was still not aligned and locked. On the preflight, one should check cowling security by trying to pull it open. Although little or no damage has been inflicted on the aircraft as the cowl departs, the potential remains for major damage to the empennage area, thereby leading to loss of control. The potential also exists for personal injury or property damage on the ground.

Other operators of C-12 aircraft have had crosswind problems during landing. In particular, one C-12C attempted landing on a runway 13 with winds reported as 220 degrees at 30 knots, gusting to 47 knots. With the aircraft receiving the full crosswind component, it is not surprising the flight control stops were reached. At that point, a go-around was initiated and a safe landing conducted 5 miles away. The 25-knot crosswind limitation on the C-12 is realistic and must be adhered to. Additionally, the crosswind limit must take full account of the gust factor. A wind of 16 knots, gusting to 26, is unacceptable if it is at 90 degrees to the runway direction since it could result in a crosswind component of 26 knots.

Another problem with crosswind landings and takeoffs is blown tires. Adjust your seat and rudder pedals to allow for full and easy control inputs, otherwise you may inadvertently apply some brake while holding full rudder. This is thought to have resulted in blown tires. Again, make sure you have your seat and rudders adjusted so you can obtain full control when required.

With winter here, I'd like to pass on a couple of items from last winter. The C-12 seems to be susceptible to the freezing of various controls. The pilot of a C-12C could not move one engine power lever after he flew through heavy rain and then into $-47°C$ temperature air. During the descent, the power lever became free. This was believed to be a lubrication problem on the high idle linkage.

A C-12F had a similar problem resulting in binding elevator trim. Again, this was tracked to improper lubrication which allowed freezing to occur. Not much the operator can do to prevent these problems, but be aware if you do have sticking or binding, it may be a freezing problem and a descent into temperatures above freezing, if possible, should return the control to normal.

Last winter, it was suggested to me that during ground power unit (GPU) starts on icy ramps, it may be a good idea to start the left engine first. In this way, the GPU can be removed without the fear of anyone or anything slipping into the rotating right prop. I bring it up only as a consideration; if you do try this procedure, follow the checklist closely and don't get your lefts and rights mixed up!

And a final report on a brandnew C-12L. After departure, the aircraft lost all radios. The crew squawked 7600 and used all the standard lost radio procedures. It's rare to hear of a problem like this these days, so we tend not to think about it. The incident shows old problems are still around, and we should not forget the old remedies. This crew performed by the book and had no problems.

Many of you are operating in overseas locations where your problems may be multiplied by air traffic controllers not understanding your situation. I strongly urge you — talk to the local agencies and ensure you are up to speed with local procedures.

That wraps up all our topics for this edition. I have a number of issues I'd like to explore in some detail next time; however, I'll be home in Australia by then watching the America's Cup Races. I will draft out the next installment and let Major Phil Simpson do the hard work as he will be the next AFISC C-12 project officer. All those letters, articles, or suggestions you have been saving for me, please send to Phil. Keep up our enviable safety record; think safety all the time — at home, in the car, and while flying. Safe landings. ■

tech topics

CARTRIDGES FIRED — WHY DOES IT HAPPEN?

A rash of explosive mishap reports have come across our desks, and a few are worth discussing to remind all of us of the importance of explosive safety.

After the last jet fighter returned from a night sortie at 2330, the weapons expediter provided a load crew with a list of tail numbers and requested dearms on each. The list indicated one aircraft was already dearmed, which coincided with a weapons tail number/cartridge log. Actually, while our mishap aircraft had been dearmed earlier in the day to correct a release malfunction, it was rearmed for the night mission.

After the avionics technicians performed their radar system checks, a weapons crew was dispatched to the mishap aircraft and performed a stores system confidence check, which required activation of the external stores jettison system. A short time later, another crew was dispatched to arm the same aircraft for the next day's sortie. During their walk around the jet, this load crew noticed the external fuel tank pylon breeches were not reversed. Upon removing the cart retainers in preparation for their checks, the crew found expended carts.

Another mishap involved impulse cartridges that were dropped in flight. As the aircraft entered the bombing range for delivery of practice bombs, the pilot hit the release button but nothing happened. So he returned to base with all six bombs still hanging from the aircraft. Not only that, two of the six breech caps with corresponding explosive cartridges were missing, while the remaining breeches were dangling loose.

What happened? On a previous sortie, the same aircraft was written up with a "no release" discrepancy. During troubleshooting, the carts were removed, and the discrepancy was worked and corrected. The weapons technician who performed the maintenance placed the carts back in the breech caps but only screwed them in a few turns without documenting the AFTO Form 781A of his actions.

Once again, we need to emphasize the grave importance of proper munitions arming and dearming procedures, as well as proper procedures for documenting the aircraft forms.

THE ROLLING MB-2

The unmanned aircraft towing tractor (MB-2) was parked on the ready line when it suddenly rolled 160 feet across the ramp and struck a parked KC-135. If you guessed the tractor parking brake wasn't set, you're right!

On the day of the mishap, two maintenance workers used the MB-2 for familiarization training consisting of a hands-on review of preoperation procedures. The supervisor, who was qualified as a vehicle operator but not as an instructor, stood outside the vehicle while explaining instructions to the trainee seated inside. After completing the training, both individuals left the area.

Their failure to set the parking brake, coupled with a gradual parking ramp incline, allowed the MB-2 to roll almost two-thirds the length of a football field, smack into the KC-135. The mishap, which occurred one hour after the training, cost the Air Force several thousand dollars. In case you're wondering, there were no extenuating circumstances: The winds were calm, and no other aircraft engines were running prior to the mishap.

That parking brakes work only when set is an obvious lesson here. Yet there are some other points to consider. You may want to ensure your own unit has developed a training course or outline for special purpose vehicles such as MB-2s. Also, check that only those people who are designated as qualified instructors within the organization train and supervise student operators. If curbs are not available, as is usual on the flightline, chocks should be used to prevent vehicles from rolling.

Observe all of these and any other commonsense precautions, and you'll prevent mishaps such as this from occurring.

tech topics

ELEVATOR INOP: USE STAIRS

The EC-135 was scheduled for its first flight following a phase inspection. While the pilot was performing the control and trim check as part of his ground checks, the crew chief reported the right elevator did not respond to control inputs. Upon removing the access panels, the crew chief found the elevator control rod disconnected at both ends. In reviewing the previous maintenance, here's what the investigators found.

During the last phase inspection, the elevator was removed to accomplish sheet metal repairs. Although the tech data only calls for one end of the control rod (the end connected to the elevator) to be removed, maintenance personnel, out of habit for ease of operation, disconnected the rod at both ends and moved it out of the way. The 781A writeup for the control rod removal didn't specify a task and step number or reference the diagram in the job guide.

Ten days later, the elevator was reinstalled, but the disconnected control rod that had been placed back out of the way was not discovered. The people who signed off the "control rod removed" writeup had connected several control rods associated with the elevator, but not the one in question.

Although an inspection was completed and the "elevator removed" writeup was signed off, personnel failed to accomplish the "elevator and control tab travel check" as required in the tech data. With the disconnected control rod hidden out of the way and not seen, the phase crew reinstalled the aircraft panels.

This unit briefed all maintenance people on the two areas which led to the control rod remaining disconnected: (1) Writeups which could cause confusion should reference a task and step number or reference the diagram in the job guide, and (2) final inspections prior to signing off a writeup will include all of the checks with direct reference to the TO.

In this particular instance, people worked around the tech data because it didn't work. Yet no one took the time to submit a change to ensure maintenance would be performed properly. After this incident, the unit submitted an AFTO Form 22 to include removal of this elevator control rod at both ends.

If you know of a problem in tech data, tell someone about it, and use the system to incorporate those critical changes.

Tips From The Field —
COMPRESSED AIR CAUTION

An aviation mechanic with a small cut on his finger washed machine parts in cleaning solvent. Then, holding the parts in his hand, he dried them by blowing compressed air over them. Shortly afterwards, he complained that his body and head felt as though they were going to explode.

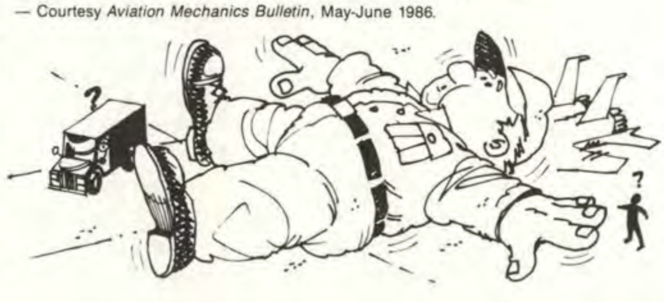
The hospital diagnosed his condition as air bubbles in his bloodstream caused by compressed air entering the bloodstream through the small wound on his finger. The mechanic recovered, but the air bubbles in the bloodstream could have been fatal.

Injuries to the ears and eyes when compressed air is used to clean dust and dirt from a job are not unusual. There also have been cases in which a blast of air directly behind a worker startled him and caused him to fall against moving machinery.

To reduce the potential for such accidental injuries, observe the following precautions when working with compressed air:

- Wear eye and other special protective equipment required for the job.
- Check the air hose carefully before use to ensure it is in good condition.
- Do not bend the hose to stop the air flow. Always turn off the air at the control valve. Turn off the valves on both the tool and the air supply line before leaving a pneumatic tool.
- Avoid the use of compressed air for any type of cleaning except as a last resort. In these cases, the pressure should be reduced to less than 30 psi, and effective chip guarding and personnel protection equipment should be used.
- Never point a compressed air hose nozzle at any part of the body or at another person. ■

— Courtesy *Aviation Mechanics Bulletin*, May-June 1986.



OPS

Flying & Colds

■ A T-37 crew was making an en route descent to a cross-country base. As the aircraft passed through 17,000 feet from FL 210, the student pilot (SP) complained of ear discomfort. The instructor pilot (IP) took control of the aircraft and leveled off. The SP tried various ways to clear his ears while the IP kept the aircraft at altitude. The SP was able to partially relieve the pressure in his ears, and the IP made a gradual descent to a landing.

After the landing, the SP admitted he had a slight head cold before the flight, but didn't tell the IP about it. The IP had not seen any symptoms before the flight. The SP had received the appropriate physiological training and understood the risks involved in flying with a head cold. The flight surgeon placed the SP on DNIF status, and he was sent home by ground transportation.

Every year at this time we see an increase in physiological incidents caused by crewmembers flying with slight colds. Don't take the risk. It isn't worth it. Let the flight surgeon get the problem cleared up before you fly. It's a whole lot easier then.

Know Your Equipment

A tactical fighter pilot was forced to eject after a midair collision. The pilot's chin strap was loose and caused minor abrasions to his jaw. He was not wearing a glove on his left hand and received first- and second-degree burns from the radiant heat of the seat catapult. A combination of high speed, rapid roll of the aircraft, poor grasp on the ejection handles, and open sleeves resulted in flailing injuries to the pilot's left shoulder and right knee.

During the descent, the pilot was unable to locate or pull the four-line releases. After landing, he found his survival radio and used it to contact rescue forces. However, he did not know how to operate the personal locator beacon.

The pilot was hospitalized for 5 days and recovered in approximately 8 weeks. His injuries were caused by a lack of proper preparation for ejection. His post-ejection equipment problems were probably caused by a lack of hands-on training. Do you really know how to operate your personal equipment? Make sure.

Stuck Elevator

While awaiting takeoff, a light transport aircraft encountered rain turning to sleet. When cleared, the aircrew took off after observing no ice accumulation on the aircraft.

Light icing conditions existed to 10,000 feet, but the aircraft broke out of the clouds at 4,000 feet. When the copilot attempted to level off at 10,000 feet, he couldn't move the control column forward or aft. The ailerons also felt heavy.

The pilot took control and tried to lower the nose using his control yoke, but was unable to do so. He then tried using nose down trim, but that also was unsuccessful. He finally got the nose down by banking the aircraft.

With both pilots applying forward pressure, they were able to partially free the elevator. The control yoke would move approximately 2 inches forward and 1 inch aft. The pilot declared an emergency and diverted to a field with clear weather.

After a controllability check, the pilot decided the aircraft could be safely landed. Since the elevator would not move aft beyond the neutral position, he used partial flaps and made a power-on landing.

When they deplaned, the crew found the elevator jammed by ice. They found ice accumulations over the entire tail area, on both wings, and on the nose. After the ice melted, a comprehensive mainte-

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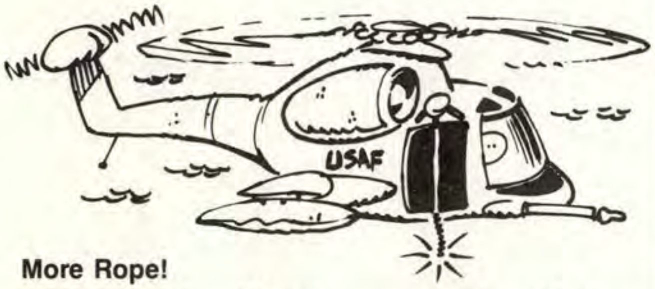
nance inspection found the aircraft was undamaged.

The moral is obvious. Don't push your luck in bad weather conditions. If you think you may have picked up some ice or sleet accumulations before takeoff, have the aircraft thoroughly checked by someone who can see it all. Clear ice is very hard to see from the cockpit. It can look like the aircraft is just wet.

You may need deicing fluid sprayed on the aircraft to remove ice or to prevent moisture from freezing as you climb through the colder air. This is especially true if you know you're going to be climbing through icing conditions. Use anti-ice equipment before accumulating ice.

How much ice can you accept on the aircraft surfaces before takeoff? None!



More Rope!

The crew of an HH-3E were performing fast rope training with pararescuemen at night. A total of three alternate insert/extract fast rope inserts were made. The first two inserts were made without incident. The last insert was made at a different location.

As the aircraft hovered over the area, the pararescueman team leader deployed the fast rope when the "ropes" call was given by the pilot and instructor flight engineer (IFE) who was the safety man. The IFE and the team leader confirmed at least 5 feet of the rope was on the ground before the team deployed.

The team leader was the first one out and deployed without incident. As the other team members deployed, the copilot who was doing the flying inadvertently allowed the aircraft to climb. The second pararescueman fell approximately 2 feet from the end of the rope to the ground. The third man down the rope fell about 6 feet and broke his right ankle. The last man down fell about 7 feet, but was uninjured.

During the deployment, the IFE made two adjustment calls to the copilot. He called "down three" and "down five." However, the copilot was confused by the terminology and thought "down three" meant there were three pararescuemen on the ground rather than an altitude adjustment.

Both pilots' radar altimeters were set at 25 feet, but no crewmembers were monitoring the altimeters. The search and landing lights were on, and both pilots were using outside references to maintain altitude. Neither pilot noticed if the radar altimeter light went out during the hover.

Not only did the crew fail to communicate clearly with each other, they also failed to use all available aids to maintain altitude. Crew coordination and clear communications are essential to performing all missions. But, they are even more important as the tasks become more demanding, such as at night when references are less available and more deceiving.

Who's In Control?

Two pilots were on an accelerated copilot enrichment (ACE) cross-country training mission in a T-38. The front cockpit (FCP) pilot was performing a touch-and-go landing. As the aircraft was accelerating through 140 knots in a takeoff attitude with both engines stabilized in military power, it encountered a flock of birds. Both pilots noted impacts on the aircraft, and the rear cockpit (RCP) pilot saw the right engine RPM decreasing through 60 percent.

The FCP pilot decided to continue the takeoff and placed both throttles to maximum afterburner. However, the RCP pilot called for an abort and pulled both throttles to idle. The FCP pilot initiated an abort and held the nose up for aerobraking. After he lowered the nose to the runway at 106 knots, both pilots began braking.

Both main tires blew out approximately 200 feet before the end of the runway. The throttles were cut off as the aircraft ran off the end of the paved surface. It came to a stop 126 feet off the end of the

continued

OPS TOPICS

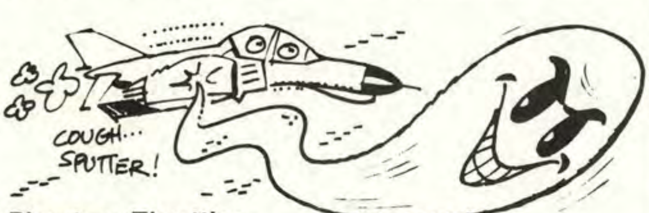
runway, and both pilots deplaned without injury.

Subsequent computations confirmed the aircraft should have been able to stop in the remaining runway, but continuing the takeoff would have been the safest option.

The major problem here was crew coordination. On all ACE sorties, the FCP pilot is the pilot in command. In this case, the FCP pilot deferred to the RCP pilot's rank and reverted to copilot status when challenged. Rank must never be a factor in the decision-making process, and both crewmembers have to accept that fact.

The FCP pilot was flying the aircraft and made the decision to continue the takeoff. However, the RCP pilot disagreed and not only directed a change in the decision, but also interfered with the other pilot by pulling the throttles to idle. He then compounded the error by helping on the brakes. Two cannot fly an aircraft at the same time. Either take command or stay off the controls.

The change in decision also cost precious time in initiating the action. In critical situations such as the one these two pilots faced, the decision must be made quickly and followed through. This is no time for changing your mind in midstream. If it will work, stick with it.



Phantom Throttles

During a level practice bombing pattern, the F-4 pilot took his left hand off the throttles to make a switch change. He then noticed the No. 2 engine throttle move to the cutoff position, and the engine flamed out. The pilot made a knock-it-off call and began a climbing turn toward the base.

During the return to base, the crew performed three separate airstarts of the No. 2 engine. For each airstart, the pilot and weapon systems officer had to hold the throttle above the cutoff position. But, after the engine started each time, the throttle moved to the cutoff position, and the engine flamed out. Also, during the airstart attempts, the No. 1 engine throttle appeared to be stuck in military power.

Prior to landing, the crew was able to regain control of the No. 1 engine throttle. They then completed an uneventful single-engine approach and landing.

Maintenance found the No. 2 main fuel control had erroneous servo pressure output. This caused the torque booster to drive the throttle aft and shut off the No. 2 engine.

I've heard of automatic controls, but automatic engine shutoff is going a bit too far! Seriously, this is a good example of the weird things that can happen in the flying business when the gremlins get loose. It pays to never be complacent and always be ready for the unexpected.

F-16 Steering Woes

The F-16 pilot was making a full stop landing. The center of the runway was clear, but the outer edges were snow packed. After landing on centerline, the pilot aerobraked to 110 knots and lowered the nosewheel to the runway. As the nosewheel touched the surface of the runway at about 80 knots, the aircraft turned hard left. This put the aircraft in a 40-degree right skid on the hard packed snow.

The pilot's immediate response was to raise the speed brakes, pull the stick full aft, push full right rudder, and cycle the nosewheel steering (NWS) button on and off with a good light. The aircraft corrected to the right, but entered a left skid. A rapid reversal of controls brought the aircraft back to the left, and it came to a stop facing 90 degrees to the runway heading, but still on the runway. The pilot used differential braking to taxi clear of the runway.

Maintenance found an internal failure of the NWS feedback potentiometer had caused the problem. The pilot's quick reactions were all that prevented the aircraft from departing the runway and possibly suffering severe damage.

F-16 pilots, be sure you follow the after-landing guidance in Chapter 2 of the Dash-1, "NWS should be engaged only if required to prevent departure from prepared runway surface." ■

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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 Mishap Prevention Program.

CAPTAIN

Van P. Bentley

CAPTAIN

Robert E. Suminsby, Jr.

27th Tactical Fighter Wing
Cannon Air Force Base, New Mexico

■ On 20 December 1985, Captain Bentley, pilot, and Captain Suminsby, WSO, were flying a routine low-level mission in an F-111D. While at 500 feet above the ground and 510 knots groundspeed, the nose of the aircraft struck a 2.5-pound red tail hawk. The impact completely shattered and unraveled the fiberglass radome. As a result, the pitot boom snapped back and cracked the right canopy, and pieces of the radome were ingested into both engines. The forward visibility of both crewmembers was totally obscured by bird remains and an 8-foot section of upturned radome.

Captain Bentley immediately initiated a climb and maintained aircraft control in spite of severe airframe vibration, a constant stall warning horn, pedal shaker inputs, and the loss of all primary and secondary pitot static indications.

With no airspeed indications, Captain Bentley maintained a safe power setting and wing sweep combination and turned toward Cannon AFB, 65 NM away.

While en route to Cannon AFB and waiting for the chase aircraft, the left engine compressor stalled and could not be recovered above idle. The right engine appeared to be working satisfactorily, though TIT and RPM indications were fluctuating.

With no forward visibility and unreliable instruments, Captain Bentley flew a wing approach and formation landing — not normally practiced by F-111s. Selecting afterburner several times, he made a flawless single-engine approach and landing.

The superior airmanship and outstanding crew coordination displayed by Captains Bentley and Suminsby prevented possible loss of life and the loss of a valuable aircraft. WELL DONE! ■

Enjoy The Season...

But Stay Within Reason