flying
SAFETY
SEPTEMBER 1990

The Stabilized Landing Approach

Forecast For Disaster

They're Not Just Gliders

Youse Pays Yer Monies An' Ya Takes Yer Chances

# Special Focus: OFF-DUTY FLYING

# THERE I WAS

■ I am a parachute rigger who has been a member of the aero club since I joined the Air Force. I think the first real challenge a student pilot gets in the aero club is the check ride with the senior flight instructor (SIP). This ride is to determine if you are ready for your first solo. My turn with the SIP came in the summer of 1985. On this flight, I would not only prove I was ready to solo, but also even a parachute rigger has the capability to crash an airplane. On this flight, I would nearly do it twice.

It was a hot Saturday with the temperature in the high 90s. The Cessna 152 I was going to fly had a full load of fuel, and the SIP was big—over 200 pounds. I was a little nervous, but I checked out the airplane and we were soon taxiing.

As soon as I was cleared for takeoff, I pulled out on the runway. The last 2,000 feet were under construction, but we still had plenty of room. I could see the workers on the other end of the runway through the heat waves. Knowing how important this flight was, I wanted to do everything by the book.

The book called for rotation at 50 knots. I wanted to rotate closer to 60 knots, but with the SIP watching everything I did, I rotated at 50 knots. As soon as we broke ground, I heard the stall siren screaming. I felt the main gear hit the runway and we bounced back into the air. We were less than 10 feet in the air, and the aircraft was bouncing around like it was in some wake turbulence.

I wanted so badly to just close the throttle and put the airplane back on the runway to get control. But I stayed with it and tried my hardest to keep it in the air until I could get my speed up and regain control. Before I got the speed up, the airplane was yawing badly to the right. I can recall looking through the front window at an A-10 on the ramp.

The speed finally came up, I got the airplane straightened up, and started the climbout. We had about 200 to 300 feet as we passed over the construction area. I was ready to call it quits right then and try again another day, but I pushed on. I completed all the area work without much problem. The flight was not one of my best, nor was it an enjoyable one.

Now it was time to do some touch and go's. I really wasn't looking forward to this after the wonderful takeoff I had made. About 4 miles out from the downtown airport, I received clearance to enter a downwind. We were right over a park with the city to our left when something caught my eye. I looked to the left and my heart began to race. What had gotten my undivided attention was a green-and-white Piper we missed by about 500 feet.

The Piper had four people in it. The pilot was a big guy with a white, short-sleeved shirt, blond hair, and a partially bald head. I quickly turned to the SIP and said, "Did you see that?" He said, "See what?"

I was mad. The control tower never advised me of the traffic. The SIP never saw it. I didn't see it until too late. This really completed my day. Not only did I nearly crash on takeoff, I also nearly had a midair. In spite of all this, I passed the check ride.

I learned one thing that day—to trust in my common sense. I had all the room in the world for takeoff in the Cessna 152. Since the airplane was heavy and I had room to rotate at a higher speed, I should have done so. Also, even though you have clearance and someone is watching you, you still have to watch out for other airplanes. ■

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# flying

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## SPECIAL FEATURES



## REGULAR FEATURES



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# The Stabilized Landing Approach

**JEFFREY A. ROY**

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■ It does not matter what type of airplane you fly, big or small, twin engine or single engine, land or sea. As a pilot you always feel a sense of accomplishment when a flight has been successfully completed.

Think about what the last memory of a flight is . . . "the landing." Suppose you are on a commercial airline flight and you have good food and service, smooth, air, everything is just right. But when you arrive at your destination you sit through a rough landing, the airplane hits hard, jolts you, and the heavy use of thrust reversers pins you to your seatbelt. What do you say when you get off the plane? Gee, *what* a flight!

Now image you are the pilot on your flight. Again, everything is perfect. You hit all your checkpoints, the airplane is running

great, beautiful day, great scenery... but then the landing at your destination is not your best. A few bounces, not too proud of that one! The same story: What a flight!

But just reverse the circumstances. The weather is lousy, you missed your ETAs, but you grease the landing. You walk away from the flight with a sense of pride and accomplishment. You look at your friends, fellow pilots, and say, "Did you see that one? That was mine. I made that landing."

The approach and landing makes or breaks a flight, and hopefully, it will not break you. Historically, more mishaps and incidents occur during this phase of flight than any other. For example, over the past few years, FAA's New England Region has had a low of 40 percent and a high of 60 percent of all mishaps take place during the landing phase. These statistics show the importance of increasing your skill in landing and your pride in your ability to fly an airplane.

## No Big Secret

Successful landings are no big secret. I have instructed pilots for years on a simple technique which helps ensure good landings through a simple-to-understand, *stabilized* approach technique. I have used this technique in all types of airplanes from Cessna 150s to *King Airs* and jets. The method varies slightly for power-off approaches and retractable gear airplanes, but the procedure provides the basic foundation for all approaches and landings (IFR or VFR).

First of all, we must understand what a stabilized approach is. A stabilized approach means on *glidepath*, proper descent angle and rate; and on *airspeed*—proper speed for pattern position, aircraft configuration, and weight.

## VFR Approaches

First let's look at the proper airspeed. Airspeeds for landing are based on the reference speed, VREF, which is the targeted airspeed for 50 feet above the runway. VREF is based on the airplane's stall speed and landing weight (VREF = 1.3 X VSO). For most light airplanes the manufacturer has not provided a VREF. In most cases, they give you a *published approach* speed which is targeted for the point in your approach when you are 50 feet over the surface.

For example, a Cessna 177 has a published approach speed of 72 mph IAS. For a Piper *Cheyenne*, it is 111 knots IAS. These speeds are only given for the maximum landing weight. Other aircraft like the Cessna 310 have different published speeds at various landing weights.

Having a specific target speed for each segment of the approach is critical to the proper execution of a stabilized approach. The manufacturer does not normally provide these figures, but we can develop our own, based on the aircraft's VRF or published approach speed.

continued

## THE STABILIZED LANDING APPROACH continued

The formula that works for me is simply to add 10 mph for downwind and another 10 mph for pattern entry.

Let's use the Cessna 177 as a practical example. The landing distance table for the airplane specifies an approach speed (at 50' AGL) of 72 mph IAS. How did Cessna arrive at this? Well, VSO is 53 mph calculated airspeed (CAS), 1.3 X 53 = 69 mph CAS, which converts to 72 mph IAS. Just like VREF! To plan our segment speeds for the Cessna 177, we would write down VREF as 72 mph IAS. Final approach 82 mph, base leg 92 mph, downwind 102 mph, and entry speed of 112 mph.

If you relate these speeds to other necessary speeds for landing the 177, you will see they are all in the ballpark. Maneuvering speed maximum for this airplane is 101 mph; flaps 10, 130 mph; flaps 30, 105 mph; etc. . . . you can see there is plenty of margin to these target speeds under all configurations. Furthermore, the same 10 mph increment works for most general aviation airplanes including twins and even some light jets. Use mph or knots according to the manufacturer's example.

The second element of the stabilized approach is to compute the approach power setting. The power setting is the main element that will maintain glidepath angle and the appropriate rate of descent. Remember, flying a stabilized approach requires the proper relationship of pitch and power. A reduction of power without a pitch change will steepen the glidepath and lower the speed. Therefore, pitch and power must be adjusted together to ensure proper glidepath and airspeed.

The power setting required for a stabilized approach is the manifold pressure, rpm, or torque setting necessary to maintain straight and level flight at VREF + 40. Remember, *straight and level.* If you are descending or turning, you cannot accurately compute the target power setting for that approach. So you must plan to arrive at the traffic pattern altitude on the entry leg straight and level, at a stabilized airspeed and power setting.

Once the power is computed, that power setting becomes the target power setting. If properly computed, it would not have to be adjusted until the wheels touch down, given perfect conditions.

In actual practice, of course, power may have to be adjusted due to all the outside factors that affect the approach such as turbulence, traffic, pattern deviations, etc. But all changes are related to the target power setting. For example, the aircraft you are flying maintains straight and level flight at VREF + 40 at a power setting of 19" of manifold pressure (MP) at 2,200 rpm. Even though aircraft configuration changes, the proper change in pitch attitude will allow the airplane to descend continuously at appropriately that power setting and to return to that setting shortly after any necessary deviations.

You may not have to make your first decision about changes in power once you turn final. If you roll out on final too high, then you will have to decrease power. But decrease power only 3" to 4" of MP from the target of 19" of MP. This will increase your rate of descent 300 to 400 fpm (1" of MP = 100 fpm descent rate). Once you return to your proper glidepath angle, move power back to 19" of MP. The same procedure is used when you are undershooting, but in this case, increase power from the target speed to about 22" of MP and hold this until you return to glidepath. This power setting change should result in a 100 to 200 fpm descent. *Remember when changing power, adjust pitch to maintain target speed.* Making small power setting changes on

final small will result in a stabilized approach and landing.

### Adjusting for Weight and Gusts

VSO and VREF for a light airplane are based on maximum gross landing weight. You can safely lower your VREF speed by reducing it by one-half of the aircraft's weight reduction from maximum gross. For example, your airplane is 20 percent below maximum gross weight, you may reduce your VREF speed by 10 percent.

Wind and wind gusts also have an important affect on landing. When you encounter gusty conditions, you need to add some speed. But do not guess! Take one-half of your wind gust spread and add it to your approach speed. For example, the wind is 180° at 10 knots with gusts to 20 knots. In this case, you have a 10-knot spread, so add 5 knots to your approach and segment speeds. With these two additional factors, we have everything we need to put our approach and landing anatomy together.

### The VFR Approach and Landing

Let's review the approach and landing procedure in a Cessna 177RG. We have determined the manufacturer's approach speed, like VREF, is 72 mph. The segment speeds are: Final 82 mph, base leg 92 mph, downwind 102 mph, and pattern entry 112 mph.

When we arrive at our pattern entry location, we slow the airplane down to 112 mph from our cruising speed, complete our descent/arrival checklist, place landing lights on, descend to traffic pattern altitude, and adjust power to our predetermined power setting of 19" MP. At this point we check to ensure the power setting maintains our airspeed at 112 mph.

Turning downwind, we go to 10 degrees of flaps and adjust pitch to maintain a speed of 102 mph. A slight change of power may be necessary to prevent "ballooning." This depends on the aircraft. At this point we can complete our before-landing checklist. Abeam our touchdown point, landing gear down, adjust pitch to begin reducing speed to base leg target speed of 92 mph. Let the change in aircraft configuration do this for you. continued

## Civil Aviation Glossary of Terms

**MAJOR ROY A. POOLE**
Editor

■ Although we all share the same skies, frequently we don't use the same language when it comes to describing how we operate our aircraft. Here is a glossary of terms used in the preceding article.

**"Grease the Landing"**—A rarely achieved, but nevertheless, smooth touchdown.

**"IAS"**—Indicated Airspeed in either miles-per-hour or knots. Either works well, but don't mix the two.

**"Maneuvering Speed"**—The "safe" speed at which maximum control deflections may be made without bending the aircraft.

**"Manifold Pressure"**—A reading of the intake manifold pressure on aircraft engines with constant speed propellers. Manifold pressure is adjusted by using the aircraft's throttle.

**"VREF"**—A reference velocity computed for the approach. A good pilot will actually have the airspeed indicator stay on VREF for more than 14 seconds.

**"VS0"**—The aircraft's stalling speed in the landing configuration. The only time you want to see VS0 is when the wheels are actually on the runway. ■

# THE STABILIZED LANDING APPROACH continued

When you slow to 92 mph, adjust the pitch attitude, not the power, to maintain 92 mph. The aircraft will begin to descend. At this point begin your turn to the base leg.

Depending on your altitude and position, set your flaps to 20 degrees. Do not adjust power. Play the base leg to adjust for the altitude. If you seem low, angle into the runway. If you seem too high, extend out—etc.

When you turn final, complete your final checklist and set full flaps. Again, let the change in aircraft configuration slow your speed to 82 mph and then adjust pitch to maintain it. Now correlate the pitch and power to maintain airspeed and rate of descent. At 50 feet, reduce power and adjust pitch to VREF of 72 mph and continue to round out for landing. If you have a crosswind, 50 feet is the appropriate place to begin your slip for runway alignment.

The demands of flying instrument approaches increase a pilot's workload. The stabilized approach provides more time to complete all the procedures smoothly and accurately.

### The IFR Approach and Landing (in the Cessna 177)

An instrument approach is accomplished in the same manner as the VFR approach with only some minor differences. You want to plan to arrive at the outbound fix in level flight with the descent and arrival checklist completed, at the appropriate altitude, and at 19" of MP and at a stabilized speed of 112 mph. Turning outbound from the fix, you will lower flaps to 10 degrees. Begin to slow the airspeed to 102 mph for the procedure turn and descend if necessary. The aircraft will remain in this configuration until the procedure turn is completed and the aircraft is established on the final approach course.

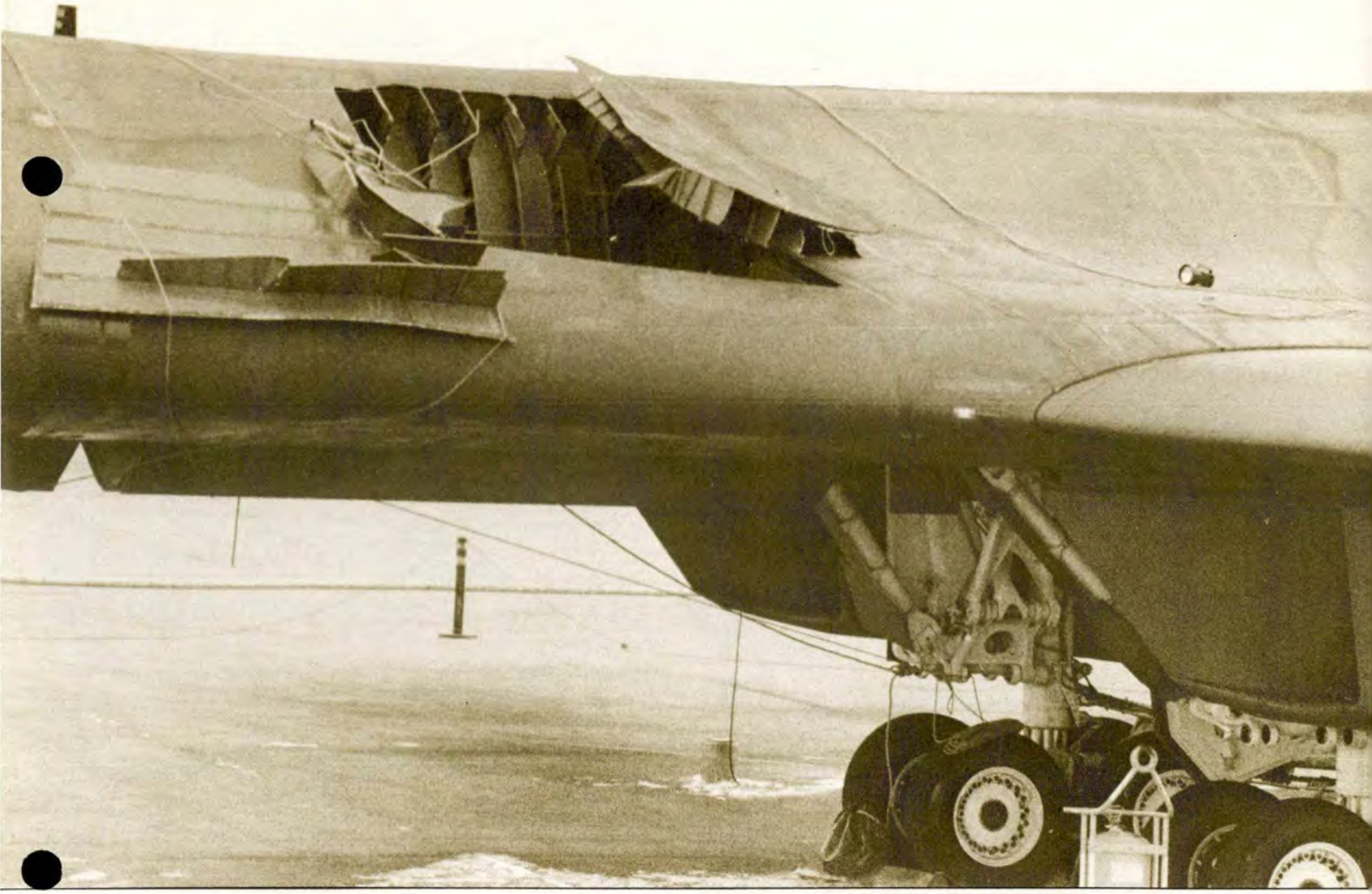
When established on the final approach course, adjust the power as required to descend to the appropriate final approach fix crossing altitude and slow to 92 mph, which will be maintained through the remainder of the instrument phase of the approach.

Complete all checklist items prior to reaching the final approach fix. Trim the aircraft to the approach flap configuration and lower the landing gear. Adjust power as necessary to maintain the appropriate rate of descent, using small changes based on the target power setting of 19" MP. When the runway environment is in sight, you will go to full flaps and slow the airplane to 82 mph until 50 feet and then slow to VREF of 72 mph. If it is a precision approach, you will continue the airspeed reduction from 92 mph to VREF.

This procedure does work—try it. You will find your landings improve and your proficiency increases. Have a safe flight and a happy landing! ■

NOTE: This article was originally prepared by Jeffrey A. Roy, Aviation Safety Program Manager at FAA's New England Region, for delivery at the 1989 EAA Convention and Fly-In at Oshkosh.

Mr Roy is a veteran instructor whose methods have enjoyed wide success. However, his recommendations here—which may not apply to all aircraft or conditions of flight—are not intended to replace or take precedence over manufacturer's instructions. Interested pilots should verify the data for themselves, with caution.



# FORECAST FOR DISASTER

**CMSGT ROBERT T. HOLRITZ**
Technical Editor

■ Aircraft 129 was on the refuel pad for a refuel and leak check after fuel cell maintenance. Two hours into the operation, the fuel system specialist in the cockpit heard a sound like an aluminum can being crushed. Seconds later, the same sound was followed by a groan from somewhere toward the rear of the aircraft. Then, a loud bang was followed by the noise of fuel rushing from the main tank. The fuel specialist on the ground confirmed a massive fuel leak and told the specialist in the cockpit to shut off power and "get the hell out!"

Another fuel specialist, who was acting as fireguard, shut the power unit off. A sheet metal specialist, working on an engine cowling, saw the wall of fuel and leaped from his ladder just before it was knocked over by the deluge. The fuel truck operator immediately shut off the truck and evacuated. A blue flame started from under the wing and quickly engulfed the entire forward fuselage of the aircraft, knocking down the sheet metal specialist in the inferno. The fuel specialist, who had been in the cockpit, sloshed through the fuel and made it out of the spill area just seconds before it ignited.

Although the fire department responded within 2 minutes, the aircraft was a total loss. In less than 30 minutes, the fire had destroyed an aircraft, a fuel truck, and a power unit. Worse, it resulted in severe injury to a fuel specialist and the fatal injury of a sheet metal specialist.

The massive fuel leak and fire were the result of an overpressurization caused by refueling the aircraft with a fuel vent plug installed. The following is the sequence of the events which led to the disaster.

Shortly before 1100, the aircraft was towed to the flight line for a final leak check after major fuel system maintenance. As part of the aircraft preparation, a young fuel system specialist installed a fuel system vent plug to allow the system to be pressurized during the

continued

# Forecast for

...there are very few mishaps which are not an echo from the past. Perhaps it's because we don't think it can happen to us or maybe we just don't get the word, but for some reason many of us don't take advantage of the warnings provided by mishap reports.

# Disaster continued

check. Since this was the first time he performed this task, he did not notice the red maintenance streamer was missing from the plug. After he installed the plug, he notified his supervisor, who then made the appropriate red X entry in the aircraft forms. The leak check was negative and all equipment was removed—all except the vent plug.

During shift change, the day-shift supervisor briefed the swing shift the leak check had been complied with, and all that remained was to refuel the aircraft. The swing-shift supervisor, a MSgt, had 15 years fuel shop experience, but less than a month on this type of aircraft. There were two other fuel specialists also working the aircraft on swings—a SSgt with 2 years experience (but notorious for violating tech data and taking shortcuts) and an airman just out of tech school. It was obvious the fuel shop NCOIC had put all of his shining specialists on day shift and sorely neglected swing shift.

The MSgt called for fuel trucks. During his review of the aircraft forms, he noted the open red X for the vent plug being installed. He directed the airman (inexperienced) to climb on the backbone of the aircraft and check to be sure the plug had been removed. The airman had not performed the task before and was unfamiliar with the vent plug. However, since there was nothing which looked like a plug inside the panel, and since there was also no red streamer as called for in the TO, he assumed the plug was removed. He then notified the supervisor who signed the entry off in the "Inspected By" block.

The stage was already set for disaster. However, it was compounded when a sheet metal specialist was granted permission to work on an inboard engine cowling, in spite of the fact the TO states "All personnel not required to perform the fueling operation shall be evacuated from the area."

After the fuel truck arrived, the supervisor made final checks to ensure the aircraft was ready. Probably because he was unsure of what he was doing, he failed to have the fire department standing by as required by the TO.

The refueling operation continued until approximately 2,000 gallons of fuel were pumped into the main tank. The supervisor noticed the aircraft was extremely slow to take on fuel, but since he was new on the aircraft, he thought this was normal. About an hour into the operation the specialist in the cockpit heard a bang (which was caused when a 4-foot section of the main fuel tank blew out).

In only a few seconds, nearly 2,000 gallons of JP-4 poured out of the aircraft. The fire guard shut off electrical power, and the fuel truck operator shut the ignition off. Up to this time, there was no fire. Then, when the wall of fuel knocked over the sheet metal specialist's ladder and the tool box on top, it generated a spark which ignited the fuel.

The basic premise in the Air Force's mishap reporting system is to learn from the mistakes of others. In fact, we, at the Air Force Inspection and Safety Center, know there are very few mishaps which are not an echo from the past. Perhaps it's because we don't think it can happen to us, or maybe we just don't get the word, but for some reason, many of us don't take advantage of the warnings provided by mishap reports. Unfortunately, a heedless attitude toward mishap reports continues to cost us dearly in both assets and human suffering.

In the past 10 years, there have been eight major mishaps involving fuel system vent plugs. As a result, two aircraft were destroyed, one sustained major damage, and five others received minor damage. Tragically, there was one fatality. Total cost was $35 million. The senseless thing about these mishaps is, except for the names, aircraft, and places, the mishaps are almost identical. Failure to follow tech data, poor tool control, inadequate training, and poor supervision were factors.

Fortunately, the mishap depicted in this article did not actually occur. Not yet. But it doesn't take a state-of-the-art computer to figure out that unless supervisors intervene, the mishap described above will occur, almost exactly as portrayed, in the very near future. Bet your career? Bet your life? ■

## F = P x A
## Formula for Disaster

■ The consequences of leaving a fuel vent plug installed during refueling can be, and usually are, horrendous. An 80-square-foot hole in the fuselage of a bomber, and the wing of another bomber broken in half are some of the more notable results. Where does the tremendous force required to cause this catastrophic damage come from?

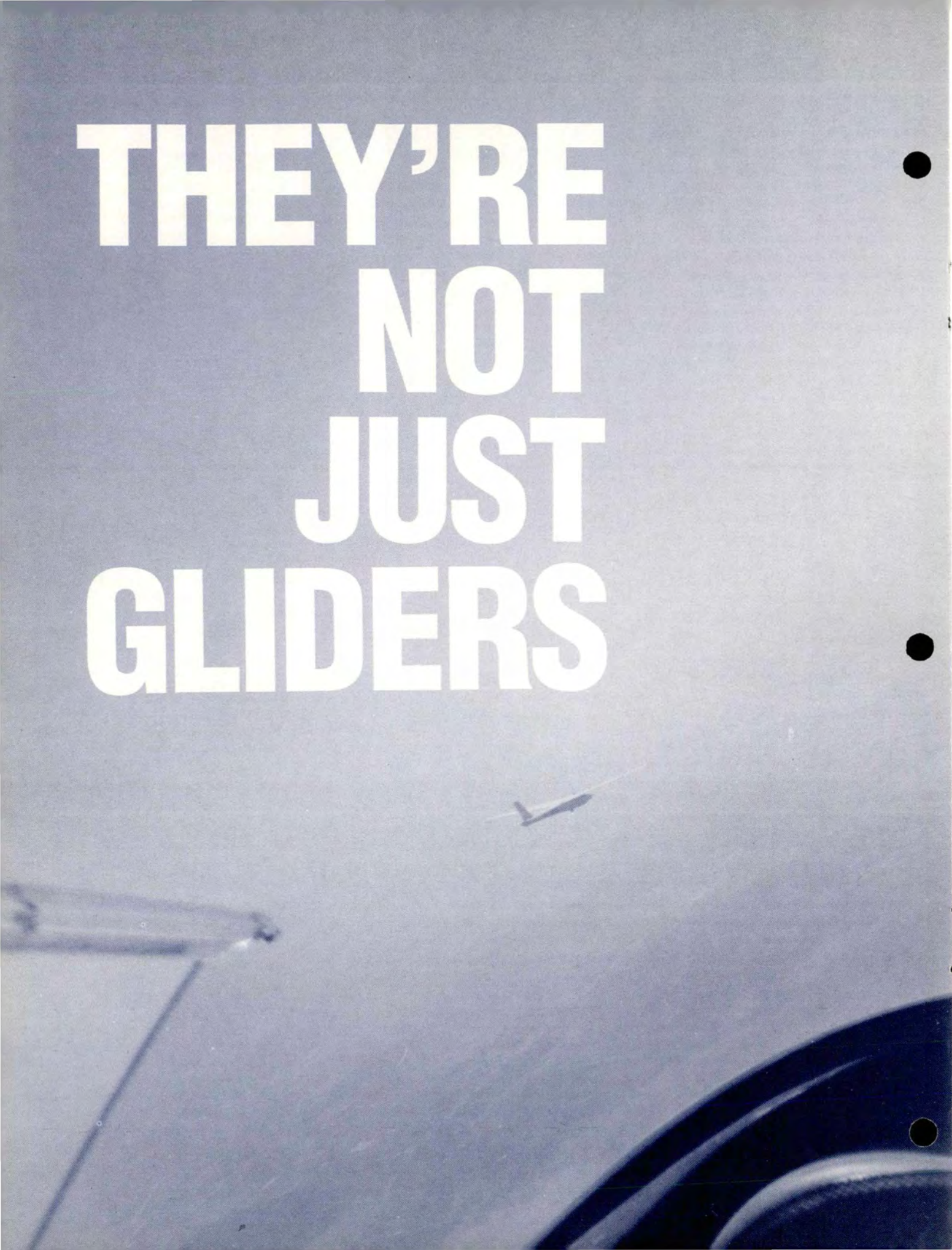
The answer is in a simple formula well known to all pneudraulic specialists.

F = P X A

Where F equals the force generated, P is the pressure, in pounds per square inch (psi), and A is the area the pressure is acting on.

Consider this: Most fuel tanks are designed to function at a pressure no greater than 5 psi. At this pressure, a 1-square-foot area of the fuel cell wall is subjected to 5 psi X 144 square inches, or a force of 720 pounds. This pressure is rarely exceeded because fuel systems are vented to prevent pressure buildup. But, with the vent clogged or sealed, pressure rapidly builds up.

Since refueling hose pressure for most large aircraft is in the neighborhood of 20 psi, this would create a force of about 2,800 pounds per square foot which will cause a catastrophic failure! ■


THEY'RE
NOT
JUST
GLIDERS

**For pure understanding of the principles of flying, the condition of the air and how it affects flight, and how to read Mother Nature's signposts, look to the skills of the experienced sailplane pilot. He's the one with the smile from ear to ear.**

**MAJOR ROY A. POOLE**
Editor

■ With two tugs of the yellow knob, the rope stretched out in front of us coiled away like some giant snake, chasing the departing Piper Pawnee. J. J. Johnson was beginning his first flight in a sailplane.

Not a glider, mind you. The Space Shuttle is a glider—it *will* come down at a steady rate. Modern sailplanes, however, are capable of sustaining flight for many hours. They use a combination of ridge, thermal, or mountain wave lift to carry pilots hundreds of miles.

Sailplane design and performance have continued to improve during the 11 years since J. J.'s first flight in a glider at El Mirage Dry Lake in the California desert. Modern sailplanes use carbon fiber composites for their construction. They have achieved glide ratios better than 50 to 1 (50 feet forward for every 1 foot of altitude lost). It's safe to say modern sailplanes may *look* simple to fly, but these looks can be deceiving.

A high performance sailplane has a retractable landing gear and requires extra vigilance by the pilot. It may have a wingspan exceeding 60 feet and produce adverse yaw without an experienced hand at the controls. And for achieving some of the extraordinary performance, these new sailplanes are fitted with flaps which can move from -10 degrees to 90 degrees of deflection. Talk about an increase in drag!

Each sailplane is designed differently and performs differently, so there is no shortcutting a thorough training program. Fortunately, many of the training models of these sailplanes are more benign and allow the new pilot to gradually move up to the highest performance models. A good commercial operator, or a well established club, are your best insurance for getting the best training program. Either should be using materials recommended by the *Soaring Society of America.*

Sailplane pilots need to know more about the weather than almost any other pilot. Contrary to popular ideas, when a sailplane pilot is forced to land at a farmer's crop dusting strip, it's not because "the wind quit." Everything from the instability of the air mass, to the action of the cold front, to the movement of the jetstream, all affect the success or failure of a planned cross-country flight in a sailplane.

Cross-country flights in sailplanes require more safety discipline than any other aspect of soaring. The flights may last more than 5 hours so proper nutrition and an adequate supply of water are essential. The close quarters of a sailplane cockpit under a plexiglass canopy can bake the coolest pilot (experienced pilots have their favorite broad-brimmed cotton hats and bottle of sunblock lotion with them at all times).

Unlike powered flight where you simply follow the straight lines on the map, a sailplane must frequently deviate from the planned course to find the best lift. The pilot must constantly update the sailplane's position and the effect of the wind upon the desired course.

continued

Sharing a thermal with other sailplanes requires constant vigilance to avoid midair collision.

# They're Not Just Gliders

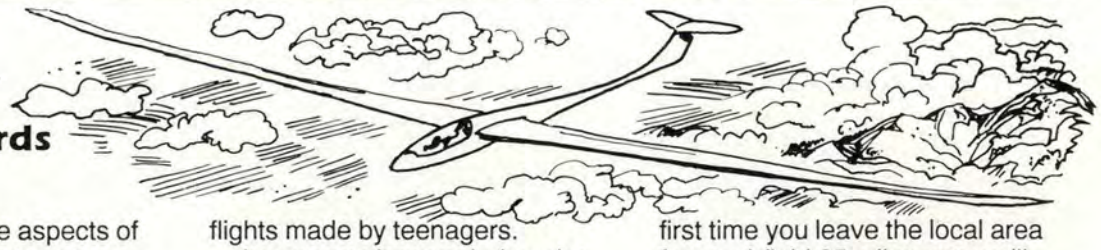
continued

When the aircraft can no longer find rising air, it's time to search for a safe landing site.

More sailplanes have been broken or bent during attempts at off-field landings than any other cause. Field selection must consider the slope, the crop, power lines, fences, cattle, and much more. A good training program will prepare you for selecting a safe alternate landing field. Although not truly an emergency, an off-field landing does require as much attention. Any carelessness will reinforce the soaring pilot's favorite credo, "You only go around once in life."

But on this flight, J. J. and I were not going cross-country. We stayed in the local area and found thermal lift which kept us airborne for almost 2 hours. Circling in a thermal with other sailplanes is not without risks. At one time, five sailplanes were within 500 feet of one another in a narrow column of rising air. Abiding by the "rules of the game" and maintaining a constant vigilance are the only means to avoid collisions.

By the time he landed back at the airfield, J. J. had discovered what most soaring pilots have known for a long time—soaring is the source of the "sport" in flying. It's not as easy as it looks, it challenges your skills as a pilot, and it leaves you with a big grin as you walk away from the airfield. ■



## For the Records

■ One of the favorite aspects of soaring is the chance to set records. Some are simply a record for yourself, and others are recognized internationally by the Federation Aeronautique Internationale.

The most common records are set as part of the "badge" program which awards bronze, silver, and gold badges for sailplane flights up to 300 kilometers, flights gaining 3,000 meters in altitude, and flights lasting 5 hours. Other programs recognize flights up to FL400, flights by two-person crews, and flights made by teenagers.

In case you're wondering, the world record for distance in a sailplane is more than 1,000 nautical miles. The maximum altitude reached (thanks to the aid of pressurized suits) is over 48,000 feet above sea level. Duration flights longer than 5 hours are no longer recorded, ever since someone sat in the tradewinds over the Hawaiian Islands for more than 3 days (this wasn't seen to be a test of skill, but rather, a test of boredom).

But you don't need to challenge these records to set your own. The first time you leave the local area for an airfield 25 miles away will remain a proud achievement. Likewise, your first flight lasting more than a few minutes will be as rewarding as any world record.

No matter what record you're seeking to set in a sailplane, all attempts require the maximum attention to detail and adherence to sound safety principles. Flying more than 300 kilometers won't count as a record if you crash the aircraft while turning from base leg to final. ■

# THE WEATHER BRIEFING FLOW CHART

**Preliminary Flight Planning - Getting The "Big Picture"**

- Media
  - AM Weather on public TV stations (consult local TV listing for exact time).
  - Newspaper weather maps
  - Commercial and Weather Channel TV reports, radio reports
- Transcribed Radio Broadcasts
  - NOAA weather radio
  - Transcribed weather broadcasts (TWEB) on nondirectional, low frequency navigational aids. Available by telephone at some locations (TEL-TWEB)
  - Automatic weather observing system (AWOS) and automatic terminal information service (ATIS) on published VHF frequencies and by telephone at some locations.
- Recorded Telephone Weather
  - Pilots automatic telephone answering service (PATWAS)
  - Telephone information briefing service (TIBS) Dial 1-800-WX BRIEF

**The Preflight Weather Breifing**

- In person from either:
  - A FSS, or
  - NWS briefer
- By telephone, from either:
  - A FSS briefer, or
  - Direct user access terminal (DUAT)
  - A NWS meteorologist via "a ring-through" connection through FSS, or
  - Contact the nearest NWS office directly
- "Self-brief"; visit a NWS office and personally review the following:
  - Weather maps...analyses and forecasts, including the weather depiction chart
  - Area forecasts
  - Hazardous weather, including severe weather outlooks, SIGMETs/AIRMETs, and severe weather watches/warnings
  - Terminal forecasts
  - Sequence (i.e., hourly) weather reports
  - Radar summary charts
  - Weather radar observations
  - Freezing level chart
  - Winds and temperature aloft forecast
  - PIREPs
  - Stability chart
  - Satellite pictures

THE "GO" OR "NO-GO" DECISION

**Before Making The Go Decision, Consider The Following:**

- Current and forecast weather
- The capability of your aircraft
- Your level of experience and proficiency
- Your physical and mental state

Do not allow factors such as machismo or "get-home-itis" to impair your judgement.

Remember "When in doubt, wait it out."

THE "NO-GO" DECISION

If you don't go .... your alternatives are:

- Delay/postpone (and get a current weather briefing), or
- Cancel

THE "GO" DECISION

**Sources Of Inflight Weather Information**

Assuming you make the GO decision, you are still faced with a continuing decision making process, i.e., continue, land short of your destination or divert. Several sources of weather reports and forecasts are available in flight to help with this process:

- Via VHF radio:
  - EFAS (i.e., "flight watch" on 122.0 MHZ for "real-time" weather)
  - FSSs
  - Air traffic control will broadcast a SIGMET alert once on all frequencies, upon receipt, and
  - To the extent possible, air traffic control will issue pertinent information on weather and assist pilots in avoiding hazardous weather areas when requested.
- Transcribed radio broadcasts:
  - TWEBs
  - HIWAS (Hazardous Inflight Weather Advisory Service)
  - ATIS
- Automated weather observing system (AWOS)

Refer to the appropriate Airport/Facility Directory, AOPA's Aviation USA, or other aviation reference publications for frequencies and telephone numbers.

Reprinted from the AOPA Safety Foundation

# Write A Dumb Caption Contest Thing


The United Organization of Dumb Caption Writers of America (UODCWA) think (we know) they've been made to look foolish each month when your contest entries top theirs. So they decided they were mad as hell, and they weren't going to take it anymore. They took a vote and went out on strike last Wednesday at 11:27. Unfortunately, they forgot they were in the Government Workers Chapter (UODCWA/GWC) and could not strike. Besides, they didn't want to be late for lunch so they ended their strike at 11:29 and submitted their latest caption by 11:30 just as the lunch wagon truck pulled up.

The odd part is this caption is probably one of their best so far, and we think may actually have a chance at beating even your entries. However, if you don't agree and really want to win the world famous and most coveted CHEAP LITTLE PRIZE along with international fame and adoration of winning this contest, don't delay—send us your entry now. Oh yes, don't worry about the dumb caption writers going on strike and missing lunch . . . they've been out to lunch for years.

Write your captions on a slip of paper and tape it on a photocopy of this page. DO NOT SEND US THE MAGAZINE. Use balloon captions for any person in the photo or use a caption under the entire page. Entries will be judged by a panel of dumb humor experts in December 1990. All decisions are relatively final. Also, please remember to put your name and address on the back of your entry. Remember, bribes of over $100,000 attached to your entry will get you our very best consideration and a personally handwritten thank you note from Tahiti. (Oh yes, please make it in small unmarked bills.)

Send your entries to **"Dumb Caption Contest Thing"** • *Flying Safety* magazine • HQ AFISC/SEPP • Norton AFB CA 92409-7001

# Once Again, Thanks For Your Support!

AND THE WINNER
FOR THE MAY 1990
DUMB CAPTION CONTEST
IS . . .

**TSgt Tom Lyons**
171st Air Refueling Wing
Greater Pittsburgh ANG Base
Pittsburgh, Pennsylvania


And they said the dumb caption writers' caption couldn't be beaten! Ha! It is you folks who wiped them out!!! You are great! Of course, it took the super genius of **TSgt Tom Lyons** to finally beat all the other entries, at least in the decision of our poor judges. They were so pressed by the strain of the selection process that when the judging was over, two of them left and haven't been seen since, another decided to retire, one applied for a cultural exchange position in Mongolia, three took up residence at Happy Acres Sanitarium dormitory, and the rest are sitting around with wide-eyed, blank stares and periodically twitching and going into intense high-pitched fits of the giggles. Anyway, Tom, your world-renowned CHEAP LITTLE PRIZE is on its way to you in its plain brown wrapper. And all you other geniuses can now look for your name amongst those terrific Honorable Mentions below. Oh yes, to try for this month's CHEAP LITTLE PRIZE, see the new contest on page 14.

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### Honorable Mentions

**1. Look me in the eye and tell me this isn't a honeymoon cruise you'll never forget, Myrtle?? Just like I promised!!!**
Capt William A. Malec, Systems Acquisition Support Office, Hanscom AFB, MA

**2. (Water) Aw, have a heart! Can't a guy make one little mistake without you pilots getting all bent out of shape? (Raft) Sure, just as long as you make your navigation errors over dry land. Now get back down there and find the plane!**
Name blurred on entry.

**3. Nice boat! But the sticker that reads, "My other boat is the Queen Mary" has got to go!**
SSgt William Rainey, 103 CAMS/MAFF, Bradley ANG Base, East Granby CT

**4. See, I told you Mom liked you better!! She just packed me a lunch!**
SRA Ron Brown, 130 MSF/SICP (ANG), Yeager Airport, Charleston WV

**5. (Raft) Oh, come on Joe—sing it one more time!! (Water) Okay, here it goes—row, row, row your boat . . . . . .**
SSgt David C. Sandstrom, 137 CAM SQ/MAE, Oklahoma ANG, 5624 Air Guard Drive, Oklahoma City OK

**6. I said "We should lunch out. Not punch out!!"**
SSgt Henry R. Harlow, 907 CAMS/MAAA, Rickenbacker ANGB OH

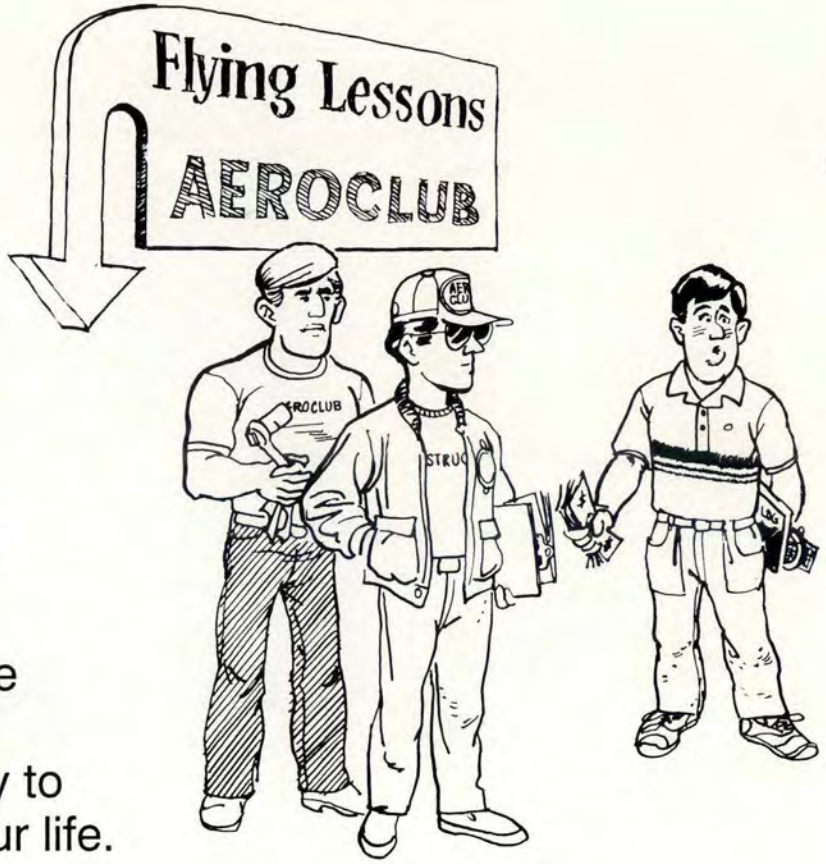
**7. What do you mean you're still waiting for your salute.**
Sgt Michael A. Aguilar, 93 BMW/DOX, Castle AFB CA

**8. Oh sure! Catch a hop with the Rangers! What could possibly go wrong?!! You and your bright ideas to save money!**
SSgt Bierbaur, 6 SRW/MAMP, Eielson AFB AK

**9. Hey! Your hour is up. It's my turn to sit in the raft! . . . And don't look at me like that. Remember you pulled the ejection handle by mistake.**
Sgt Ayo O. Olanipekun, 31 CRS/Photo Shop, Homestead AFB FL

**10. Now I can see why officers' life-preservers carry a different stock number from the enlisted.**
Sgt Michael A. Aguilar, 93 BMW/DOX, Castle AFB CA

# YOUSE PAYS YER MONIES AN' YA TAKES YER CHANCES




If you're going for private flying, take a good long look at how you're ready to risk your money and your life.

**MAJOR ROY A. POOLE**
Editor

■ After many years of putting it off, you finally decide to go out and get your civilian pilot's license. Or, you've not used your license in a number of years and now is the right time to start flying light airplanes again. Where do you go? As the old saying goes, "You pay your money, and you take your chances."

In most cases, you can reduce the element of chance while increasing the safety of your recreational flying by joining your local Air Force aero club. It's not that the fixed base operator (FBO) at the local municipal airport is unsafe, they simply don't have the benefit of the Air Force and aero club safety programs.

If statistics are any measure, you're twice as likely to have a mishap when you don't fly with your local aero club. The most recent figures show general aviation mishaps hovering around eight mishaps per 100,000 hours of flying. Aero clubs average closer to four mishaps per 100,000 flying hours. Perhaps the reasons are found inside the aero club offices.

First, you must become a member of the aero club. This requires a review of your background. People with a demonstrated history of carelessness are politely turned away (and usually go to a local FBO for their rental aircraft). Also, despite the amount of experience your log book shows, you will still have to take a written test for each aircraft you plan to fly. Then you will take a flight test in each aircraft with the Chief Pilot.


A local municipal airport offers pilots a professional environment to form good, safe flying habits.


To demonstrate just how serious your local aero club is committed to safety, you only need to look at a recent aero club incident. The pilot had earned a license more than 40 years ago, but had not exercised the privileges of the license for most of those 40 years. The aero club admitted the pilot as a member, but only upon the condition the pilot enroll in ground school and take all the club's flight checks as if there was no license. To make a long story short, the pilot swerved off the edge of the runway on a solo flight with little damage to the aircraft. The FAA investigator looked at the training folder and commented how great the training was, and how unfortunate more operations couldn't provide as thorough a checkout to low-time pilots.

A dirt strip operation may not only lack finishing touches, but may be a sign of serious shortcomings.

Another example of how aero clubs are set up to ensure a safer flight takes place at the sign-out desk. Unlike the FBO operation where you walk up to the 20-year-old at the counter and ask for the keys to N4626P, the aero club has a clearing authority who will check to make sure you are current in the aircraft (including written or flight tests, landing currency, and safety meeting attendance).

Safety meetings for the customers of FBOs are almost unheard of. The FBO depends upon the efforts of the local FAA safety specialist to get the safety message out. Needless to say, this isn't very effective at reaching every pilot. On the other hand, aero clubs schedule monthly (mandatory) meetings for all members. Most clubs even go so far as to videotape their meetings to guarantee the safety message reaches every pilot before their next flight.

As any professional pilot will tell you, a safe flight is the result of teamwork. When you fly with your local aero club, you get an incredibly large team of professionals from the maintainers to the wing safety office to the base air traffic control facility. FBOs do the best with what they have, but frequently, their "team" is not as big as ours.

If you are unable to take advantage of an aero club, look back over this article for the key elements you're missing at the FBOs: A thorough checkout in the aircraft, mandatory attendance at any safety meetings offered by the FAA, and a strict adherence to the FARs and the FBO's guidelines. Build your own team to ensure a safe flight. ■

# SUMMER ....ICE

**MAJOR ROY A. POOLE**
Editor

■ The flight was rather routine for the Cessna pilot. Takeoff from El Monte, California, airport and dodge the various ARSAs and TCA sectors until south of Laguna Beach. The temperature at altitude was a balmy 65 degrees Fahrenheit. Only a few clouds were visible, and they were well out over the sea.

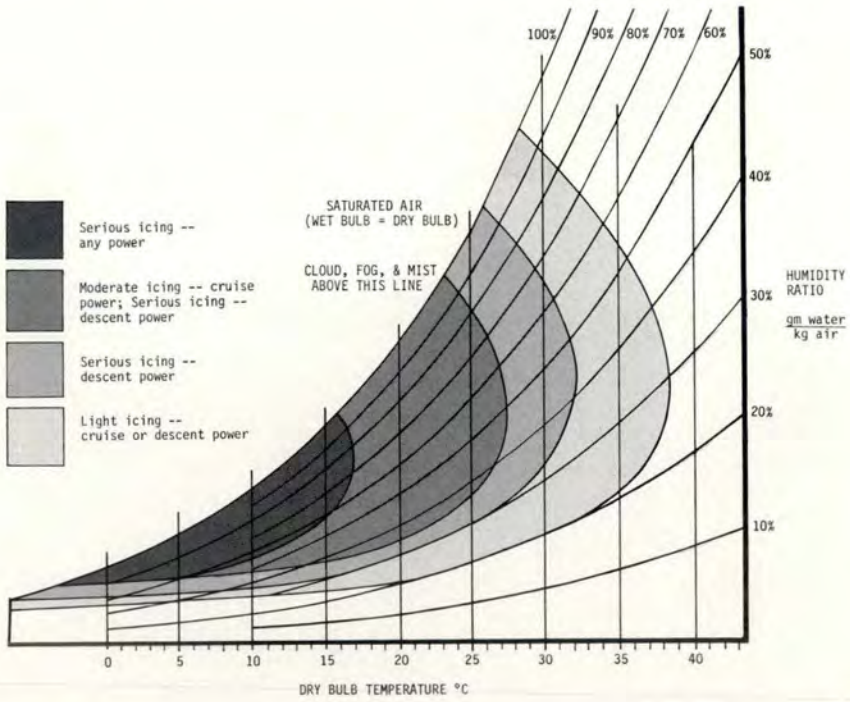
As the Cessna passed the Oceanside airport, the engine rpm seemed to decrease a little. The throttle was advanced and the rpm came back up. Perhaps it was only a change in headwind or a loose friction knob.

Two minutes later, the rpm again dropped off, only this time it was more serious. The throttle was in the same position for 2,350 rpm but the gauge showed only 1,400 rpm. Before panic set in, the pilot turned back for Oceanside. The only logical reason for losing rpm had to be the magnetos, but they both checked good. And it was too hot outside for carburetor ice.

The Cessna entered downwind for the pattern a few hundred feet low, but it wasn't too low to make a safe landing. The engine quit completely during the turn to base leg, but the landing was made without incident.

The mechanic could find nothing wrong with the engine or the fuel. The most likely problem lay with the pilot who forgot two basic rules for carburetor icing:

1. Somewhere, you have a clue to tell you carburetor ice has formed or will form.



2. Ice is COLD and needs HEAT to melt.

The first clue should have come from the outside air temperature and the relative humidity. Had the pilot paid attention, the mix of 50 percent relative humidity with 65 degrees would have shown a moderate likelihood of carburetor icing (see figure).

Other clues would include:

- Was the rpm drop during the carb heat check of your runup good?
- Did you monitor your rpm, manifold, and temperature gauges to determine the reason for the drop?
- Did you apply carb heat FIRST, before reducing power?
- Did you apply power FIRST, on a go-around, before applying carb heat?

These last two clues are reminders of the second fact of carb icing. Ice is cold and needs HEAT to melt. If you apply the carb heat after pulling the throttle back for descent, you won't have all the heat you need. Naturally, the reverse is true when adding power for a go-around.

Aviation history is too full of stories about perfectly sound aircraft making forced landings because of nothing more complex than carburetor ice. Ice may be good for a lot of things, like iced tea and hockey games. But there's no place for ice in an aircraft engine's carburetor. ■

## You're Busted!

■ One pilot's "goof" is often the FAA's "violation." Here is the "Top Ten" list of violations as reported by the FAA as of May 1990.

1. Careless or reckless operation (FAR 91.9).
2. Failure to follow a clearance (FAR 91.75 (A)).
3. Flying without a valid medical certificate (FAR 61.3).
4. Failure to follow air traffic control instructions (FAR 91.75 (B)).
5. Not getting a clearance while operating at airfields with control towers (FAR 91.87 (H)).
6. Flying without the aircraft registration aboard (FAR 91.27 (A)(2)).
7. Flying a nonairworthy aircraft (FAR 91.29 (A)).
8. Flying too low over congested areas (FAR 91.79 (B)).
9. Not having your pilot certificate with you, or performing flights not approved on your certificate (FAR 61.3).
10. Flying too low over other than congested areas (FAR 91.79 (C)).

Of course, *you* know exactly what the regs require, and you would *never* violate any of these. ■

## OOPS!

■ Despite the image of flawlessness we like to maintain about our flying skills, the reality is we sometimes make mistakes. According to NASA's Aviation Safety Reporting System, the following represent the most frequently reported "goofs" of civilian pilots.

- Failure to follow your clearance or adhere to the FARs (52%).
- Inadvertently entering the wrong airspace such as TCAs, ARSAs, or ATAs (14%).
- Getting too close to another aircraft in flight (13%).
- Overshooting your altitude (11%).
- Flying an airplane without all the required equipment functioning (10%).

Nobody's perfect. Right? Yes... but these errors are not over particularly difficult tasks. Maybe it's time to admit we aren't as committed to safer flying as we ought to be. ■

## **Drunk Driving** to Keep **You** Down

■ The Federal Aviation Administration (FAA) adopted a new regulation on 26 July 1990 which is designed to identify and "ground" pilots involved in alcohol or drug-related motor vehicle offenses which result in convictions.

According to FAA Administrator James B. Busey, "This regulation gives us the tool we need to deal with pilots who drink and drive. This kind of behavior indicates an attitude that we believe is not compatible with safe flying."

The new regulation has three key provisions:

- Individuals applying for an FAA-required medical certificate must consent to the release of information from the National Driver Register to enable the FAA to obtain and review motor vehicle offense information.
- Pilots must provide a written notification to the FAA on each alcohol or drug-related driving conviction within 60 days.
- The FAA can deny an application for a pilot certificate, or revoke an existing certificate, for two or more alcohol or drug-related driving convictions within a 3-year period.

The new rule supplements the FAA's already tough stance on drinking and flying. The "8 hours from bottle to throttle" rule and the maximum blood alcohol level of .04 percent by weight is tougher than almost any state's driving law prohibiting driving while impaired. ■

# Semper Vigilans

**LT COL JAMES E. LA MARCA**
Directorate of Aerospace Safety

■ Semper Vigilans. Always vigilant—the Civil Air Patrol (CAP) motto that applies to its mission and its safety program.

As the official, civilian auxiliary of the United States Air Force, CAP is tasked with a threefold mission incorporating safety at every step: Provide humanitarian assistance through emergency services, promote aerospace education for the general public, and develop and motivate youth to leadership and responsible citizenship through an interest in aviation.

### Emphasis Is On Safety

"Providing emergency services, such as search and rescue, civil defense, and disaster relief, is taken very seriously by CAP," emphasized Maj George M. Florer, Commander of Group 18 in Southeast California. "People's lives and well-being are very much in the balance during many of our emergency missions. That's why we emphasize safety in all our operations."

"It's no exaggeration to say safety indoctrination begins when a new member joins CAP," explains Flight Officer Jason Sirney, Safety Officer for the Norton AFB, California, Composite Squadron. "We give new members a thorough briefing on the CAP safety program, as well as local ground and flight hazards. Each new member also receives, as part of their initial training and membership materials, a safety policy letter from Brig Gen Warren Barry, CAP National Commander. The General makes it real clear. 'Everyone is a safety officer' is our motto. 'Strive for safety all the time, not only when you fly but also during ground operations.'"

"Last year, CAP flew approximately 21,000 hours during 10,000

sorties in support of 2,600 emergency missions," said Capt George W. Link, Jr., Squadron Commander for Norton AFB Composite Squadron. "In the process, we located about 1,900 'search objects' (missing aircraft or vehicles) and are credited with saving the lives of 65 people. We can't afford to be careless or inattentive and become part of the emergency services problem. We strive to make every member a part of the solution, which is quite an undertaking when you consider the fact that CAP has over 40,000 seniors (adult members) and 27,000 cadets (members 13-21 years old) in 1,600 squadrons across the country flying about 7,500 member and CAP-owned aircraft."

"CAP's safety program mirrors, to a large extent, Air Force safety programs," Flight Officer Sirney points out. "It emphasizes both flight and ground safety on a continuous basis. Our monthly safety briefings keep our membership focused on key seasonal safety issues from recreational safety to survival techniques. An enhanced safety consciousness on the part of seniors and cadets is the goal of our safety bulletin board, squadron newsletters, and safety read files. We try very hard to be proactive with hazards and have in place a hazard reporting system. Our squadron commanders pay special attention to the annual safety surveys conducted by the unit safety officer. We take a close look at our facilities, our aircraft, and especially our procedures."

"Accident prevention is a mix of flight safety and flight training in CAP," Maj Florer explained. "Just to fly our aircraft, a pilot must complete a written exam for his aircraft type and then pass a flight check with one of our standardization and evaluation check pilots. To fly on emergency services missions, it gets more complicated. First, a pilot must have 200 hours experience as pilot-in-command. They fly a minimum of three practice search-and-rescue missions and attend one of CAP's flight clinics. When all the initial training is complete, our pilots complete another flight check to earn mission pilot qualifications. Each pilot's basic flight qualifications are reviewed annually with a flight check, and biannually, he receives a mission pilot flight check."

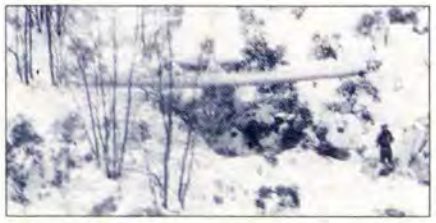
**Some Training Opportunities**

"CAP offers some outstanding opportunities to improve your flying skills and enhance flight safety," declared Capt Link. "CAP-sponsored flight clinics are 2-day events. Day one covers essential ground training subjects such as FAA regulations, emergency procedures, flight planning, aviation weather, and navigation procedures. Day two is a comprehensive practice and evaluation of flight maneuvers required to operate an aircraft safely. Some flight clinics, such as California's High Altitude Search and Rescue Clinic, are highly specialized workshops that deal with special flight problems. CAP helps pay some of the costs of many of the flight clinics, just as it funds some of the expenses involved in many practice search-and-rescue missions. It's definitely an investment in flight safety by CAP."

**An Effective Program**

"Our safety program is broad and very effective," declared Maj Florer. "Protecting our limited resources is always very much on our members' minds. 'Every man a safety officer' is more than a motto; it's a heartfelt commitment and clear responsibility of all our CAP members." ■

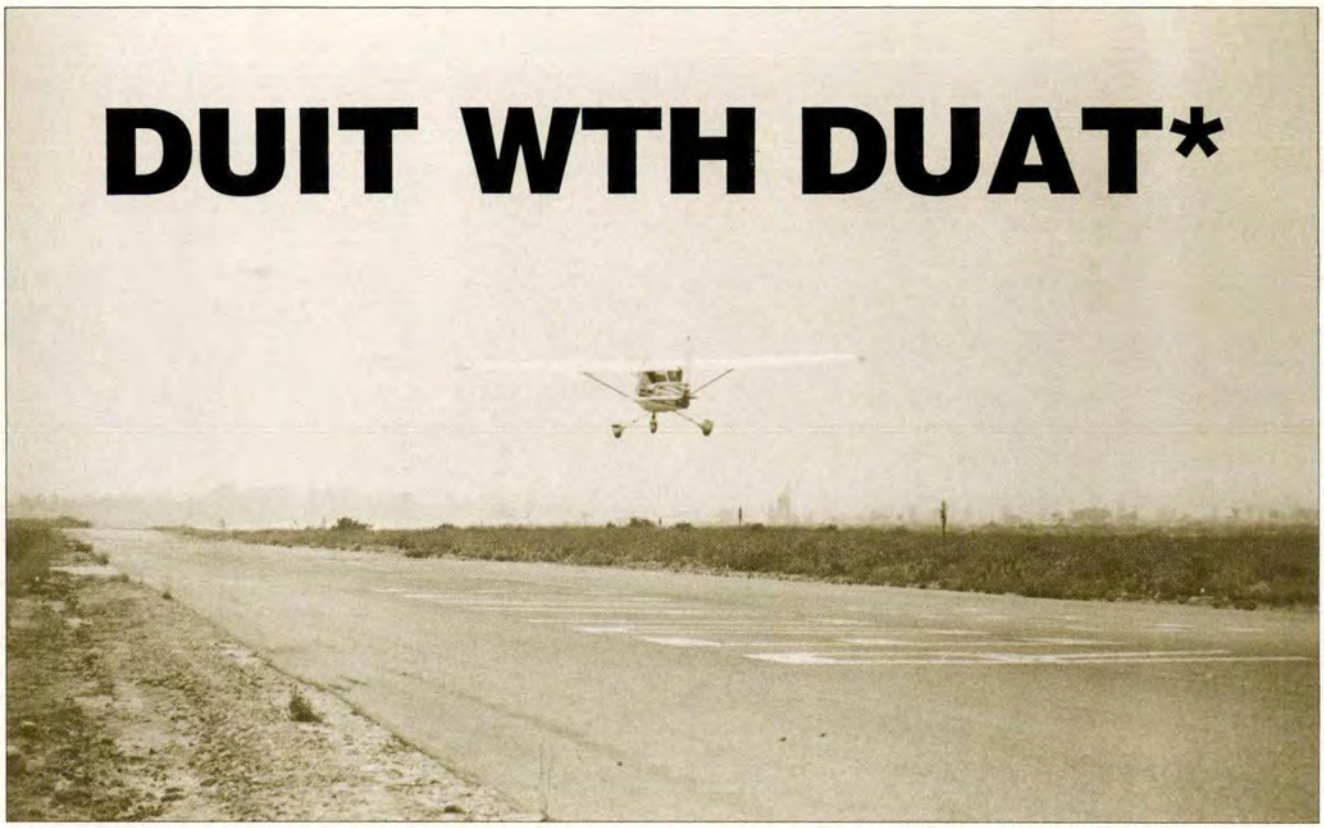
The CAP runs regular electronic checks to make sure inadvertent distress signals are spotted and eliminated.



Distress signal devices should be heard only when there is a downed plane that needs help to be located.

When an aircraft is reported missing, a coordinated and welldirected immediate response can save lives. Here a team sets up search areas on a gridded map.

# DUIT WTH DUAT*



## *Do It With DUAT

Even the simplest of home computers, set up to use a modem, can provide pilots with immediate access to weather information across the nation. In addition to a weather briefing, pilots can file their flight plans at the same time.

**MAJOR ROY A. POOLE**
Editor

■ For those of you who are used to waiting on "hold" for hours to get a weather briefer, the Federal Aviation Administration has come to the rescue with its Direct User Access Terminal (DUAT). Any licensed pilot (you must also have a medical certificate) may connect to DUAT with their home computer. The FAA doesn't exactly provide you with direct access, however. You must make your connection through one of three companies.

These companies provide for free connection through "800" numbers, and, if you're interested, they offer additional services like decoding the cryptic language used by DUAT. Compuserve (800-848-8199), Data Transmission Corporation (800-CHK-DUAT), or Contel Federal Systems (800-345-DUAT) are the three companies which the FAA has approved for providing DUAT services.

Currently, these companies support the IBM or MS-DOS computer

**Thr is a nw wy fr genl avtn plts to get a wx brfg frm the cmfrt of hme. Lckly, it is ezr to uz thn it is to read.**

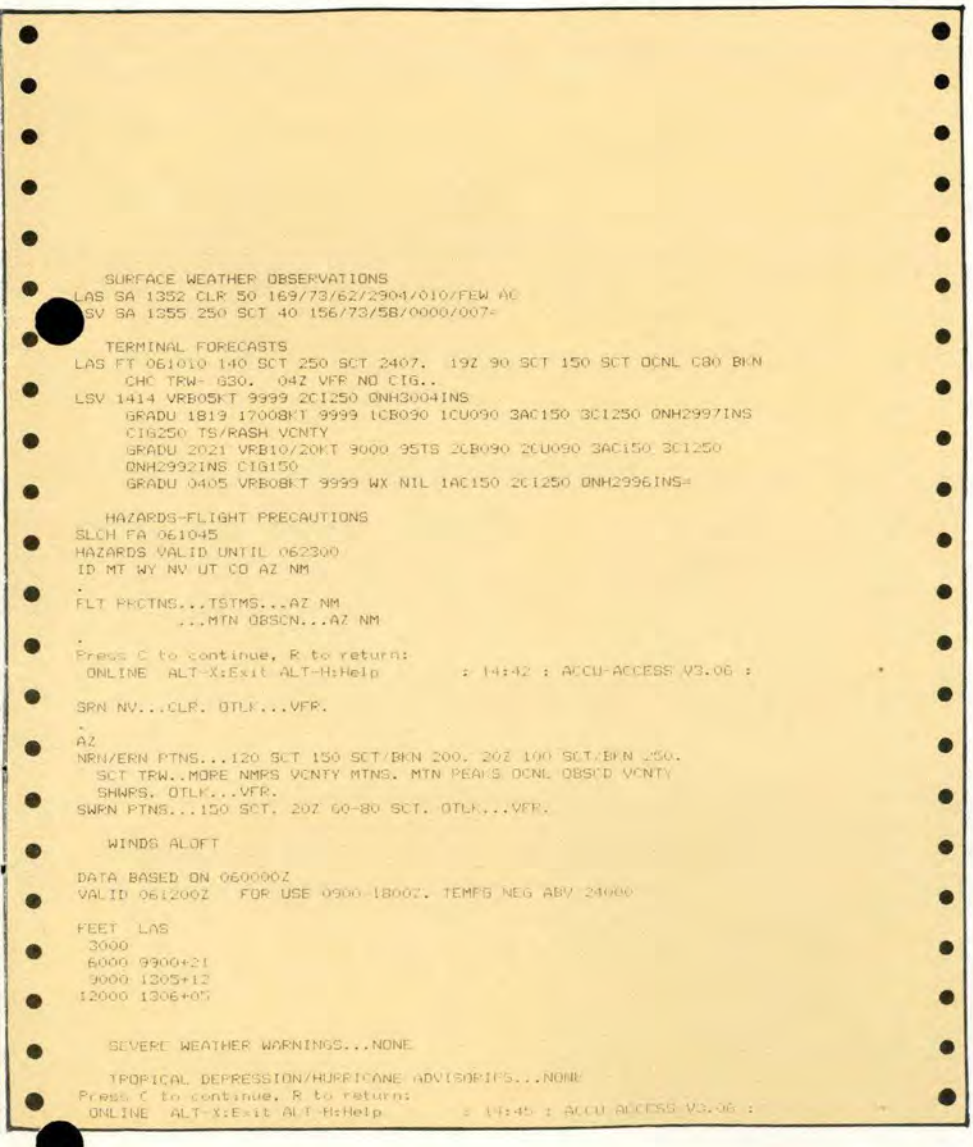
formats, but users of Macintosh computers can get everything, except the maps, with no trouble. By simply calling one of the companies, and answering the list of questions required to establish an access code, you will be able to get your own weather briefing as often as you want.

### Inside DUAT

Once "inside" DUAT, what do you get? First, you get a weather briefing program. You are guided through route, area, and local weather briefings for your proposed flight. If you ask for a "Standard Briefing," you will be shown area forecasts, severe weather warnings, SIGMETS, convective SIGMETS, AIRMETS, tropical depressions and hurricane advisories, surface weather observations, terminal forecasts, pilot reports, winds aloft forecasts, radar reports, and NOTAMS.

About this time, you may have realized it's a good idea to capture the rapid flow of information and save it on your diskette for slower reading than computers like to offer. After digesting all this information, you may want to ask for selected local weather briefings for your departure and arrival airfields. Go ahead—like all of the FAA DUAT services, it's free.

Now that you are armed with all the weather and NOTAM information needed for your flight, you can file a flight plan with DUAT as well. By calling up the Flight Plan Processing menu, you can file a new plan, amend a previous plan, or even cancel a flight plan. DUAT even offers you a choice of "prompting" for input to make sure you fill in all the blocks.



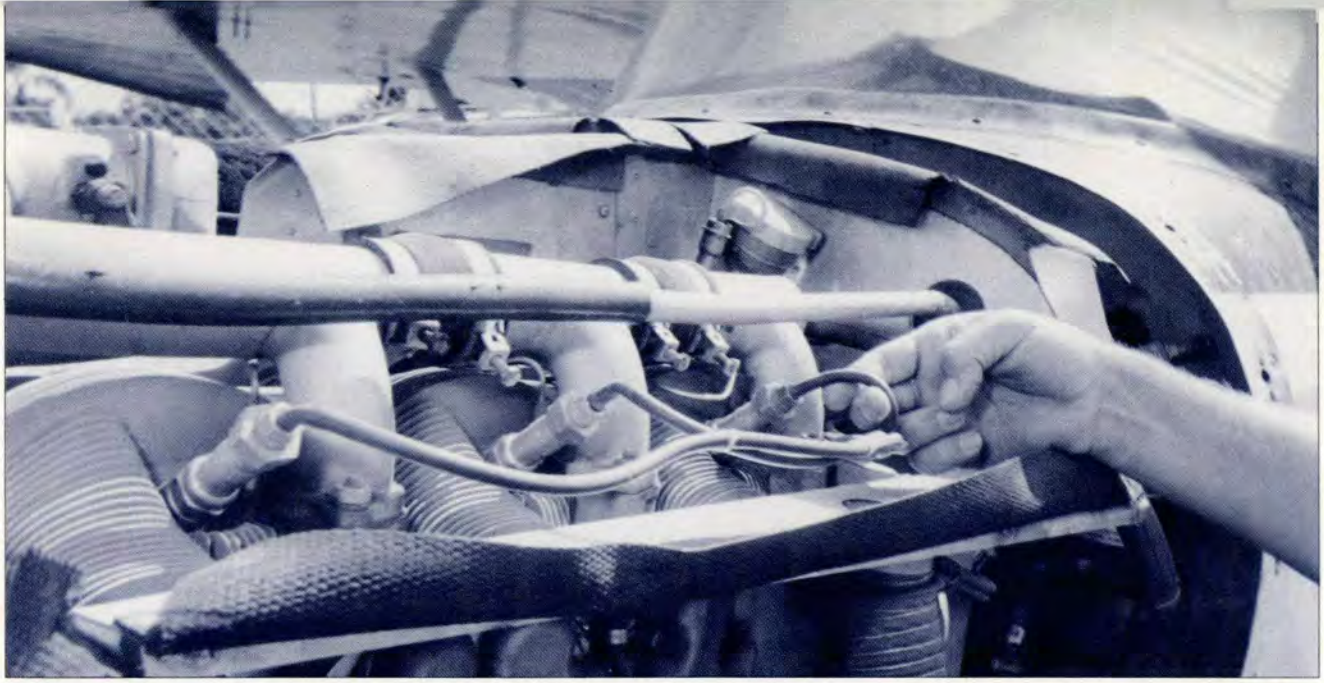

### Value Added Services

While value added services vary from company to company, they are worth considering for the increase in safer flights. These services might include weather graphics, a flight log tailored to your aircraft, expanded weather products, route optimization, and even descriptions of special use airspace you may encounter.

### Automated Flight Planning

The FAA has already moved toward more automated weather briefings. If your ears don't catch the particular route or local forecast you're looking for, you may have to sit through the whole recording again. With DUAT, you can get the weather facts at a rate you can handle, and make decisions about the safety of your planned flight in the comfort of your home.

And finally, the headache of waiting for a very busy Flight Service Station person to take your flight plan is gone forever. DUAT allows you to enter a flight plan at *your* convenience, and know it will be ready when you use your radio to activate it. Now, if they can just think of a way to close it automatically after the aircraft is tied down for the night. ■



# Maintaining Your Own Aircraft

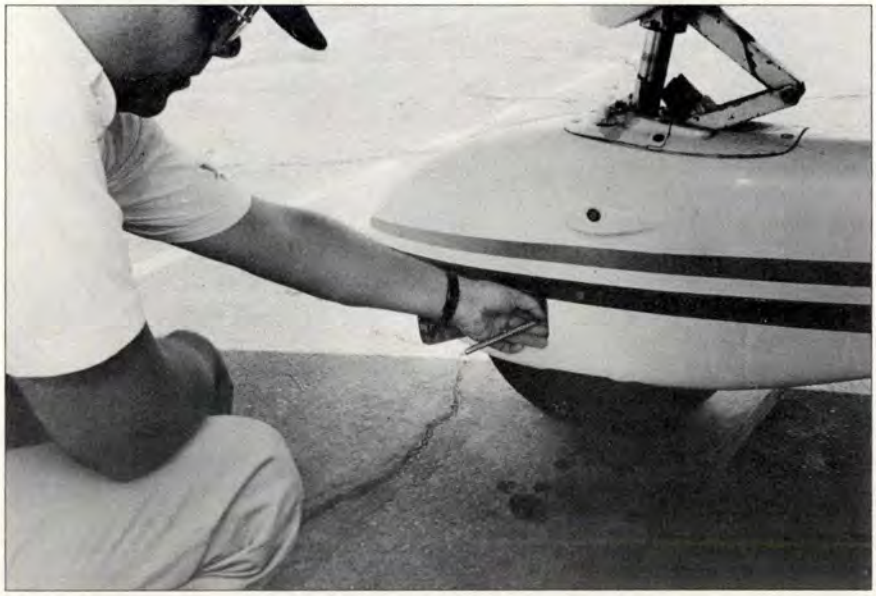
**CMSGT ROBERT T. HOLRITZ**
Technical Editor

■ There are many advantages to owning your own airplane. Among them are pride of ownership and the ability to fly where and when you want unencumbered by aero club or leasing agreements. And then there is the membership in the elite club of airplane owners who spend hours in the airport coffee shop spinning yarns of the adventures they have shared with their beloved aircraft. But slipping the surly bonds in one's own aircraft has its drawbacks. Instead of just turning in the keys and paying for the HOBBS time, the owner/pilot trades the rental fee for the expenses of maintaining the aircraft in an airworthy condition. Along with this is the expense of hangar or tiedown fees, insurance, and the ever-increasing cost of fuel. This can add up to a large piece of change.

Unfortunately, there is little the aircraft owner can do to control the cost of insurance, hangar fees, and fuel. But, with a little bit of elbow grease and ingenuity, the aircraft owner can save big bucks by performing minor maintenance and inspections which are authorized by the FAA. The FAA's definition of minor maintenance is "Simple or minor preservation operations and replacement of standard parts not involving complex assembly or operation."

Most pilots are surprised at the amount of maintenance they are authorized to perform on their aircraft. FAR 43 Appendix A contains a list of 29 maintenance tasks which may be performed by the owner/pilot. Included in the list are many safety of flight tasks such as replacement of side windows, seatbelts, and prefabricated fuel lines. Generally, owner operator maintenance is considered preventive maintenance.

Checking tire pressure before the first flight of the day can save an aircraft owner on tires and landing gear repairs.



### Preventive Maintenance

Preventive maintenance is basically a three-step process: Cleaning, inspection, and maintenance.

**Cleaning** is the first and probably the most difficult part of preventive maintenance because it requires a lot of elbow grease. It is important to clean the aircraft in accordance with the owner's manual, using only approved soaps and chemicals. While there are waxes

## MAINTENANCE TIPS

■ The FAA has some good tips for owners performing maintenance.

- Be sure all maintenance is performed in accordance with the manufacturer's current maintenance manual. If a manual has not been published, FAR 43-13 provides excellent generic guidance on aircraft maintenance.
- Not everyone is experienced enough to perform all authorized owner maintenance. If you feel you are not qualified to do a certain task, get the help of a certified mechanic.
- Use the proper tools and equipment. Be sure torque wrenches are used when required and properly calibrated. Never try to guess a torque. Overtorquing is a major cause of leaks and fastener failure. Using an adjustable wrench or pliers in place of a socket or open-end wrench is hard on both the nut and the knuckles.
- Do not reuse expendables such as safety wire, cotter pins, and seals.
- Use only manufacturer's or PMA (parts manufactured authorized) replacement parts. Parts that look alike may not be alike.
- Familiarize yourself with FAR 43-13. Often referred to as the aircraft mechanic's bible, it contains just about all the information needed to perform quality preventive maintenance.
- Keep an accurate and well-documented log book. This not only makes maintenance and inspection easier, but according to some aircraft brokers, a well-kept log book is the single most important selling point of an aircraft. Be sure to make a log entry for each repair, describing the work performed, the date of completion, the name, certificate number, and the type certificate held by the person performing the work. ■

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formulated specifically for aircraft, a good automobile wax will do the job. A clean aircraft is easier to inspect, and removal of excess grease, oil, and exhaust deposits often reveals minor corrosion and cracks if undetected could lead to major problems down the road. Frequent washing also helps to prevent corrosion, especially in aircraft which operate in or near a wet, industrial, or salt environment.

**Inspection** Once the aircraft has been cleaned, it is ready for inspection. You will need some tools such as a flashlight, screwdrivers, ratchets, a tire pressure gauge, a 10-power magnifying glass, and a calibrated torque wrench. Good lighting is important, so park the aircraft outside, weather permitting, or in a well-lighted hangar.

Using the **current** manufacturer's maintenance manual, divide the aircraft into three separate inspection areas—airframe, powerplant, and avionics. Most aircraft manufacturers publish 50- or 100-hour inspection checklists showing specific inspection points on the aircraft. These are available at most FBOs. Follow the checklist step by step, and make a list of all discrepancies. Be sure to record each discrepancy in the applicable aircraft or engine log book. When the inspection is complete, compare the list of discrepancies with the list of owner operator authorized repairs in FAR 43 Appendix A. Then make a list of repairs you are authorized to perform.

Always use a tow bar to move a light aircraft. Pulling an aircraft by its prop can damage the prop and lead to expensive engine repair.

**Maintenance** The key word in preventive maintenance is "quality." Poor maintenance will eventually take its toll either in the wallet or as a compromise to safety. More than one pilot has found himself making an unplanned landing as a result of his own shoddy maintenance. Another reason for ensuring quality owner maintenance is most reputable certified mechanics and inspectors are reluctant to sign off work performed on aircraft which have been butchered by slipshod maintenance, and the owner will ultimately pay the cost to have the job reaccomplished correctly.

### The Advantages

Performing your own maintenance can drastically cut the cost of owning an airplane. Participating in its maintenance gives the owner/pilot a better understanding of the aircraft. It also provides owners an advantage over renters because owners can be confident their aircraft has been maintained with care. In the words of the FAA: "A well cared for aircraft is a safe aircraft." For additional information on owner/operator maintenance, contact the local FAA district office. ■

# MAINTENANCE MATTERS

### Checked the Forms Lately?

■ Not too long ago, a Cessna 175 Skylark was half-way through the takeoff roll when the pitch "picture" changed radically.

With full power applied and the aircraft accelerating at a brisk rate, the nose wheel fork failed causing the nose of the aircraft to drop to the runway. The prop stopped instantly (causing a great deal of damage to the engine), and the aircraft skidded to a stop after grinding away a good portion of the engine cowling.

The investigator from the FAA examined the aircraft forms and noted Airworthiness Directive (AD) 71-22-02 had not been complied with. This AD ordered the replacement of the nose wheel fork assembly prior to 1,800 total hours. The Skylark's fork had over 3,000 hours and had been on the aircraft since it was manufactured.

By the way, for those of you flying or fixing Cessna models 150, 172, or 182, AD 71-22-02 applies to these aircraft as well. If it has been complied with, it should be noted in the aircraft logs.

### Propeller Spinner Failures


From the FAA's "General Aviation Airworthiness Alerts" pamphlet, AC No. 43-16, comes this sobering view of the pointy end of many light airplanes.

The FAA continues to receive reports of propeller spinner assembly failure on a variety of aircraft models. Some of these failures have occurred on aircraft with as few as 500 hours.

If you observe cracking problems on the spinner assemblies with low operational times, it's time for a thorough check for excessive vibration. Propeller or engine vibration can be caused by any of the following conditions:

- Out-of-balance propeller, including spinner.
- Worn engine mount bushings.
- Worn or out-of-tolerance engine vibration dampeners.
- Improper engine ignition timing.
- Low cylinder compression (on one or more cylinders).
- Improperly adjusted propeller governor.

*Where* the spinner goes after it fails on a running engine is food for thought . . . or nightmares.

### Gently! Please

If you missed it in the news, recent made-for-TV movies highlighted the catastrophic failure of fuselage skin on an airliner over the Pacific ocean. According to the FAA, the probable cause of the failure was skin cracking along stress concentrations generated by scratches on the aircraft skin.

The National Transportation Safety Board has determined these scratches were caused by improper marking of the skin by maintenance personnel performing structural repairs.

There are many general aviation aircraft which are pressurized for flights at high altitudes. And these aircraft are subject to the same failures caused by similar improper maintenance practices. Although the maintainers have information about how to perform the work, they may not realize how a simple mark will affect the part when under stress.

Scratches, dents, dings, scrapes, and other apparently minor damage, while sometimes appearing insignificant, will modify the load path through the structure creating undesirable stress concentrations.

Before beginning any work on a stressed aircraft structure, mechanics should consult the manufacturer's structural repair manual. This will not only provide the correct method for evaluating the structure, but give a list of correct tools, methods, and equipment for doing the job safely. ■

# OPS TOPICS

### What's Getting Killed?

■ Ultralight aircraft are the closest thing to a return to the good ol' days of early aviation as you can ever hope to find. But the good ol' days also included enough mishaps to make the average pilot more of a "survivor" than a hero.


One ultralight pilot was enjoying the view from 100 feet up when the motor quit. The only option, and the pilot's only idea, was to attempt a full stall landing into the treetops. As luck (BAD, of course) would have it, the ultralight missed the trees and fell to the ground from about 40 feet.

After leaving the hospital, the pilot could not find anything wrong with the engine. However, a recently installed "kill" switch for the engine was apparently in just the right position to be activated by the left leg. The "kill" switch almost worked too well.

Ultralights are still unregulated by the FAA, and any number of do-it-yourself modifications may be added without the benefit of safety concerns. Perhaps there's a reason why the good ol' days are old.

### Student Pilot Extra "Assistance"

For those of you just getting started in civilian aviation, you may soon find yourself on a solo flight to a local tower-controlled airport. According to the *Airman's Information Manual* (AIM), paragraph 193c, you can expect "extra assistance and consideration" if you add the words "Student Pilot" to your call sign. Well, maybe not.

During the course of a light airplane investigation, the NTSB discovered "extra assistance" is a nebulous term. Nowhere else does the AIM describe what assistance can be expected, and the FAA Air Traffic Control Handbook does not include guidelines for additional assistance to student pilots. Of course, a good controller will be able to provide extra assistance when a student pilot is in the pattern. But if the information is not passed to the tower, you're on your own.

The best course of action is to announce your student pilot status to each new controller, and to recognize the final decision for your safe flight is always in your hands.

### Introducing the Stealth Cessna

Have you heard about the new "stealth" Cessna? It's available in almost any model from the basic trainer model 152 through the classic family model 172. Unlike the Air Force's stealth fighter, the Cessna version comes in many colors, with red and white being the most popular.

No, this is not another story of a European student landing in the middle of Red Square. This is a story about a good ol' 'Merican pilot trying to fly up and down the central valley of California. The pilot managed to skirt the edge of most ARSAs along the route. But, like most pilots paying rental rates today, this one didn't avoid the ARSA by very much.

Not that it would have made much difference to our story. Just as an Air Force heavy aircraft was exiting the ARSA, the close encounter with the Cessna occurred. The Air Force crew had no advanced warning of any

continued

# OPS TOPICS

## Introducing the Stealth Cessna continued


traffic ahead of them, and the air traffic control facility wasn't talking to the Cessna. How could the controllers *not* see the Cessna on radar? Because it was hot.

That's right. Hot. The radar had been modified to overcome shadows associated with severe heat thermals in the valley. The "enhancement" also made it possible for a light aircraft to transit the radar coverage area, with transponder off, and be "enhanced" right off the radar screen.


So there you have it. Modern technology has given us the first stealth Cessna (or Piper, or Beechcraft, or...). Modern technology has also given us an easy method to reveal stealth Cessnas. It's called a working transponder. And if you're the aircrew who hates the idea of running into stealth Cessnas, you've got equipment on board to detect them as well. It's known as the "Pilot's Mark I, standard issue, Eyeballs."

## The Winds of Change

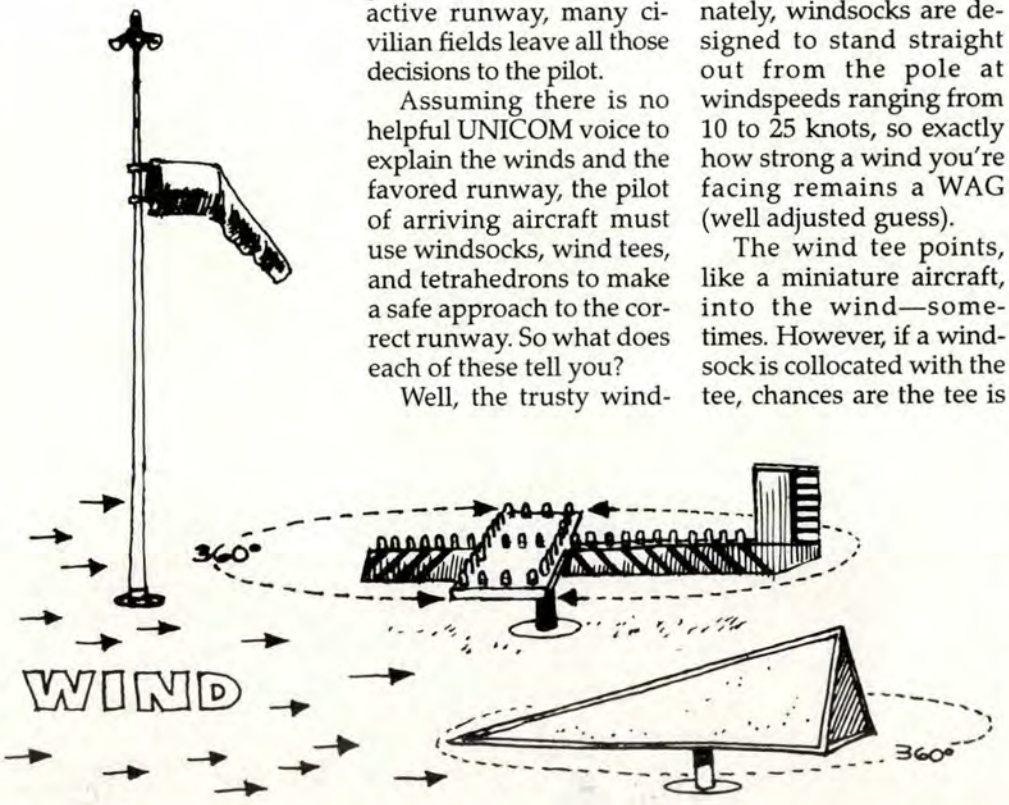
Unlike military airfields, which are nice enough to have a tower to provide the winds and the active runway, many civilian fields leave all those decisions to the pilot.

Assuming there is no helpful UNICOM voice to explain the winds and the favored runway, the pilot of arriving aircraft must use windsocks, wind tees, and tetrahedrons to make a safe approach to the correct runway. So what does each of these tell you?

Well, the trusty windsock tells you the direction the wind is coming from and a little bit about the windspeed. Unfortunately, windsocks are designed to stand straight out from the pole at windspeeds ranging from 10 to 25 knots, so exactly how strong a wind you're facing remains a WAG (well adjusted guess).

The wind tee points, like a miniature aircraft, into the wind—sometimes. However, if a windsock is collocated with the tee, chances are the tee is positioned manually to indicate the favored direction of landing.

Last, is the tetrahedron. It could be indicating wind direction, but the *Airmans Information Manual (AIM)*, para 222, advises against using it to indicate wind direction. Or, it could be a landing direction indicator, but AIM, para 222, advises us it may not be a reliable aid during calm wind situations.




Sounds like a great system, right? To safely land on the correct runway, always plan on using everything: UNICOM, the common traffic advisory frequency, the windsock, the wind tee or tetrahedron, and plain common sense. A little preflight planning and even a phone call to your destination may make for a smoother approach and landing . . . on the correct runway. ■



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UNITED STATES AIR FORCE

# Well Done Award

MAJOR
**Raymond R. Terry**

FIRST LIEUTENANT
**Keith A. Schell**

**155th Tactical Reconnaissance Group**
**Lincoln MAP (ANG)**
**Lincoln, Nebraska**

■ Lt Keith A. Schell, pilot, and Maj Raymond R. Terry, instructor weapons systems officer, were no. 2 in their RF-4C on a two ship, low level continuation training sortie. At 300 feet above ground and 480 knots ground speed, they lost all attitude, communication, navigation, and cockpit interphone systems. Lt Schell began a climb and attempted to regain interphone but was unsuccessful. Maj Terry passed a note to Lt Schell informing him of smoke and the smell of electrical fire in the rear cockpit. Both crewmembers selected 100 percent oxygen, and the generators were turned off.

Lt Schell and Maj Terry completed emergency action checklists and selected ram air turbine power, but did not get attitude indicators, navigation equipment, or interphone communication. The lead aircraft noted the wingman climbing and attempted to contact him by radio but was unable to communicate. The flight lead declared an emergency with ARTCC and rejoined on Lt Schell who visually signaled they had electrical problems. Lt Schell noted his utility hydraulic and pneumatic systems were decreasing, and after passing notes between cockpits, they elected to lower the landing gear, flaps, and hook. All operated normally and indicated down. The flight lead coordinated for an approach end arrestment with probable total electrical failure, and led the mishap aircraft back to Lincoln for an uneventful emergency approach, arrestment, and landing.

Lt Schell and Maj Terry exhibited superior flying skills, judgment, and aircrew coordination in handling this emergency situation under difficult circumstances. As a result, they saved a valuable reconnaissance combat aircraft.

WELL DONE! ■

*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*

# HEAVY HEAVY

## Hangs Over Your Shoulder?

**The crowded sky can close in on any of us anytime. Stay alert... scan the sky. *SEE AND BE SEEN!***