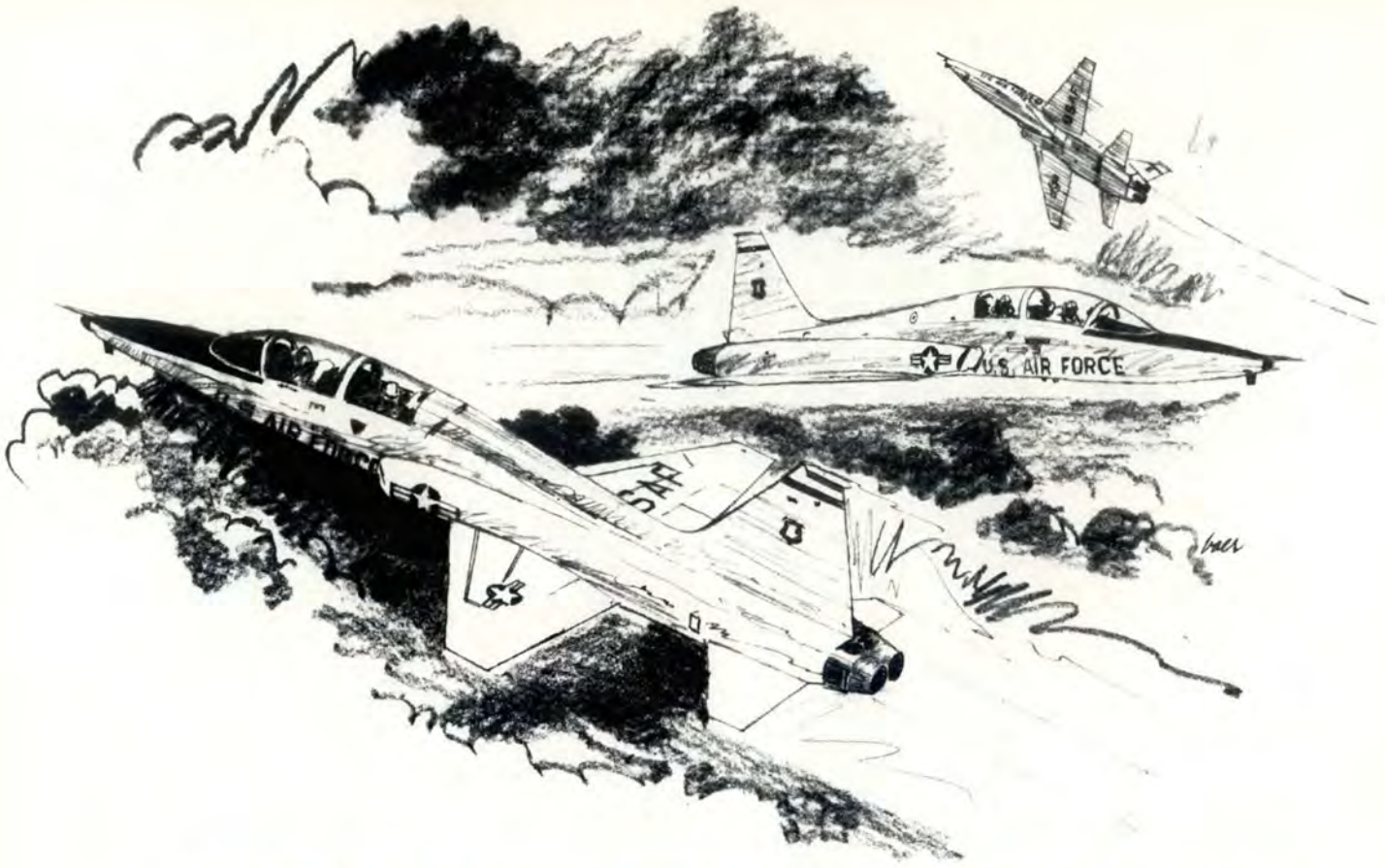
flying
SAFETY
MARCH 1991

Mishap Summaries

Observation and Training Aircraft



THERE I WAS

■ The afternoon schedule had two, two-ship missions scheduled against a pair of minitransport jets as part of a drug interdiction profile. We were 41 Flight and were to follow 31 Flight after they completed their mission. We planned a formation takeoff, followed by a system check on the way to the airspace. The formation takeoff was uneventful, and I began to prepare for the system check as we climbed on runway heading.

I had looked back to check on my wingman when out of the corner of my eye, I saw a small aircraft pass under us. It was too close, and we let tower know it. The tower said although they were aware our flightpaths were close, they thought the small aircraft would be clear by the time our flight was airborne. We felt, since we were under tower's control, there was less chance of a small aircraft passing through the airspace undetected. This time both the tower and I assumed a situation incorrectly.

We continued on our way to the airspace with no further problems. Just before we entered the airspace, air traffic control told us to be at flight level 190 or lower because 31 Flight was to exit at flight level 200 or above. Both flights acknowledged the altitude blocks. We had radar contact and assumed it to be 31 Flight. As the 31 Flight lead flew over us, his wingman was climbing up to altitude and split our tactical formation! We decided to discuss what happened, face to face, with 31 Flight after we landed.

The 31 Flight crew said they thought we were further away, so 31's wingman could practice some simulated gun passes. On their last pass, they got low and were in the process of climbing back to altitude when he split our tactical formation. Two close calls in one flight made me wonder if maybe my cross-check procedure was inadequate. During takeoff, my attention was channelized on my aircraft systems and my wingman's position. I neglected to clear our flightpath as well as I do in a single-ship takeoff. Then, as we entered the airspace, I mistakenly assumed my radar contact was a flight.

In my future cross-checks, I will assume nothing until I know what the situation is completely. I was very thankful when I realized this was one afternoon which could have had a different ending. ■

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SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, OSAF

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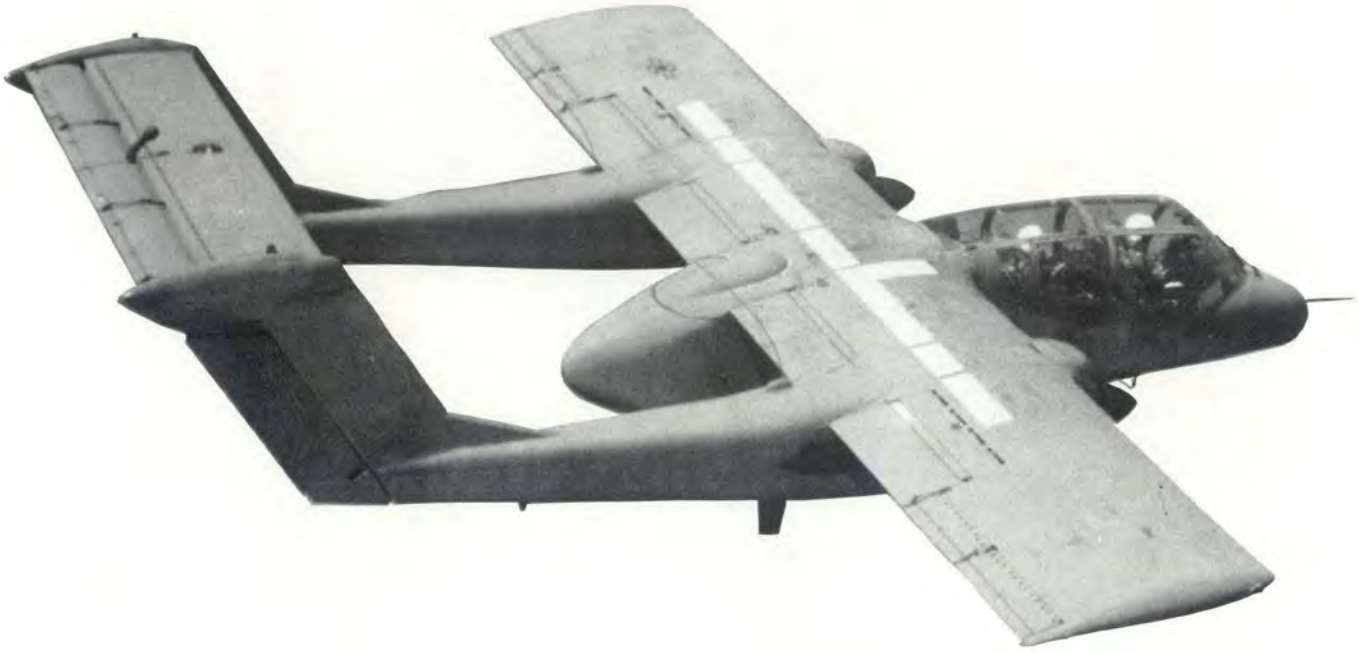


OV-10

LT COL PETER H. N. SCHALLER-KALIDE, GAF
Directorate of Aerospace Safety

■ After not hearing from me last year, it is time I talk to you in this year's edition. Being new in the business and especially in the OV-10 aircraft, I first had to learn about your aircraft and the operation. HQ TAC gave me the opportunity to fly with the 27th Tactical Air Support Squadron (TASS) at George AFB, California, as a permanent passenger, and I took advantage of this offer as often as I could. So I learned about your operations, tasks, problems, and concerns, at least from one perspective — the high and hot desert fliers. You surely remember the FY88 mishap!

Even though the 27 TASS was taken out of commission on 8 June 1990, the high altitude and hot weather problems are still with us. And you, again, did an outstanding job in handling single-engine confrontations and bringing home those aircraft. Since FY88, there have been 38 cases of single-engine problems (24 in FY89, 14 in FY90 to 24 Jul) with 5 on takeoff or landing and 3 during low level flying. "Well done!"

Too bad we could not carry the FY89 Class A zero mishap rate through FY90. We lost an OV-10 while performing a simulated single-engine, full stop landing at the end of an instrument qualification check flight. The nose gear collapsed on touchdown and the bird caught on fire. Our mishap rate rose to 3.69 by the time I wrote this article in August. But there is still 1½ months of flying, and with no further Class A mishaps and lots of flying hours, it will go down.

Since the OV-10 was introduced into the USAF in 1968, you kept the Bronco in the air for almost 1,000,000 hours — to be precise, at the end of FY90, it reached its projected 985,628 total flying hours.

The 33 losses during this period give us a mishap rate of 3.35 (combat losses of time are not included in this figure), which puts the Bronco in pretty good shape in the fighter/attack community with an overall mishap rate of 6.61. I compare the OV-10 with this community because it is flown in almost the same en-

vironment and under almost the same conditions.

The Class A Mishap

The mishap sortie was an initial qualification and instrument flight evaluation. The mishap pilot was in the front cockpit, and the Stan Eval flight examiner was in the rear cockpit. After instrument work and several VFR patterns and landings, the mishap pilot set up for an overhead pattern, simulated single-engine full stop. The aircraft touched down on all three wheels, ballooned, and then began a porpoise between nose and main gear. During the last oscillation, the nose gear collapsed and punctured the centerline tank. Sparks from the nose gear ignited the residual fuel, which set the aircraft's right side on fire. The mishap crew emergency ground-egressed the left side of the aircraft uninjured.

When you read these lines, you start asking yourself: How in the world could this happen? What did the mishap pilot do or not do? Why did the check pilot not intervene? There are many questions which need to be answered to warn others to not make the same mistakes. You will get those answers when the Safety Investigation Board and HQ AFISC come up with the findings and recommendations.

Class C Mishaps

Of primary concern is the failure of an engine, whatever the reason: The feather/unfeather pump, high EGT, oil pressure problems, failure of any other kind, or just a flameout. The consequences are always the same, and you should shut the sick engine down and fly the Bronco to a safe landing on one engine. You Bronco riders have proven over the years you can handle this — not always easily though when one considers the power one engine puts out, especially on a hot day or at high elevation fields. I remember days at George AFB when the single-engine ceiling for the configuration was at field pressure altitude by 0700. So, plan ahead for such a situation, and be prepared to respond with the appropriate procedures. Professionalism is demanded, and you are the professionals! Keep up with your outstanding work in turning potential Class A situations into Class Cs. One thing is for sure — there will be no improved engines for the OV-10. You have to continue to live with low power and continue to master it. Good luck!

Fully loaded, the Bronco needs both engines to maintain level flight.

Safety Modifications

You are familiar with "Pacer Bronco"? If not, it is a refurbishment program set up because of the intense corrosion problems of the Bronco. Besides taking care of the corrosion, the program included overhauling the landing gear, flight control modification, new external tank wiring, radar warning receiver installation, secure voice installation, and a bearing distance heading indicator for the rear cockpit. Twenty-two aircraft underwent the program before it was terminated. So the rest of the 75-aircraft fleet will not be treated. This is not good news. If you don't know already, budget constraints are also affecting the OV-10 community. Be prepared to bury them in a boneyard.

Outlook

The Bronco will reach its 1,000,000th flying hour in 1991. It took 23 years to perform this tremendous job with only a little more than 100 aircraft. Congratulations to all for the excellent performance. Continue your professionalism on all fronts — at operations, at flying, at maintenance. We all know about the Bronco — its weak points and its strong points, so let us operate it in the same professional manner as we did in the past. Good luck and "Hals und Beinbruch," as we say in Germany. ■

Hot days require early-morning takeoffs to meet the single-engine abilities of the Bronco.

A/OA-37

LT COL JAMES M. TOTHACER
Directorate of Aerospace Safety

■ Since becoming operational in 1967, A/OA-37 aircraft have flown more than 700,000 hours. During this time, there have been 36 Class A mishaps that destroyed 32 aircraft and resulted in 25 fatalities. Twenty-three of these mishaps were due to operational factors, 10 were logistics related, and 3 were categorized as miscellaneous or undetermined. The lifetime Class A mishap rate per 100,000 flying hours is 5.03.

One Class A

During FY90, there was one OA-37 mishap. The mishap pilot (MP) was on the first solo, forward air control mission in the OA-37. The MP entered initial for a fullstop landing in accordance with local bird aircraft strike hazard conditions. While in the final turn, the aircraft departed controlled flight. The mishap pilot initiated successful ejection and was rescued by a local fishing boat. The aircraft was destroyed upon water impact.

The Problems

Like its T-37 cousin, there are no new problems to report on the OA-37. As with other J85-engined aircraft, flameouts account for many of the reportable incidents. The OA-37 averages approximately one flameout for every 1,000 hours of flying time. This is certainly not a good rate but one the operators are handling well and will probably have to put up with until the aircraft's retirement.

As shown by the opening paragraph, nearly two-thirds of all OA-37 mishaps have been due to operations causes. Ground collisions, both on and off range, have accounted for a significant number of these mishaps. The ground attack mission, by definition, places aircraft in the high risk, low-altitude environment much of the time. It is up to the operator to be keenly aware of the inherent dangers. All flying requires the highest degree of alertness — low-altitude flying absolutely demands it!

The OA-37 safety record is consistent with our front line attack aircraft, but there is always room for improvement, especially in operations-related mishaps. Flying smart will help make FY91 a mishap-free year. ■

T-37

LT COL JAMES M. TOTHACER
Directorate of Aerospace Safety

■ History repeats itself is an old adage that came to life in a most welcome form for the T-37 community in FY90. For only the second time in its 34 years of proud service as the Air Force's primary jet trainer, the T-37 did not have a single Class A mishap this past fiscal year. It took a long 31 years (1987) to have the first Class A mishap-free year, but only 3 more years to repeat! Is the T-37 truly like a fine wine that only gets better with age?

Its Record

When the T-37 was first "uncorked" to serve Air Training Command's fledgling pilots, you could report you saw Elvis on the street without being quoted in a supermarket-stand tabloid. Of course, you may have gotten the same quizzical look such a report should bring today because the year was 1956, and like the Tweet, the "King" was somewhat of an unknown.

Since that time, the sturdy Cessna trainer has logged over 10½ million flying hours. Remarkably, especially when you consider the primary jet trainer mission, there have been only 128 Class A mishaps, with 125 aircraft destroyed and 73 fatalities. FY90 marks the seventh straight year for no fatalities associated with T-37 flying. The lifetime Class A mishap rate for the T-37 is only 1.21 per 100,000 flight hours. By comparison, the T-33 had a lifetime mishap rate of over 13 — quite a difference!

The Good and the Bad

In addition to the unblemished safety year, the good news for the Tweet is there is nothing new. That is, no new "surprises" have jumped up as problem areas. Physiological mishaps continue to be a fact of T-37 life. The unpressurized cockpit, limited air-conditioning system, lack of anti-G suit system, healthy G-onset rate, and student pilots' low experience levels all combine as factors to make the Tweet the league leader in physiological incidents. Major aircraft changes to combat this problem are not forthcoming. Therefore, you are the key. Proper anti-G straining maneuvers, adequate rest, good diet, and awareness will all lower your chances of being a physiological victim.

The bad news for the Tweet is there is nothing new. I know you thought that was the good news, but like "tastes great, less filling" — both are correct. The T-37 isn't new or getting any newer. Translation: Aging systems will become more and more difficult to support and maintain. Maintainers and pilots alike will have to stay at the top of their game to keep the Tweet strong into the 1990's.

It isn't completely correct to say nothing is new with the T-37, for a structural life extension program will replace fatigue critical structures in the wings, empennage, and horizontal stabilizer. However, this program extends only airframe structure, not systems that are already technologically antiquated.

The T-37 is not really getting better with age, but is aging graciously thanks to the professional treatment it gets from the people who work with the jet. The skills, abilities, and judgment of these dedicated people are making the Tweet, like Elvis to rock and roll music, the "King" of training aircraft! So, keep up your excellent work. Treat the venerable T-37 with the respect its age dictates, and make FY91 another mishap-free year. ■

T-38

LT COL JAMES M. TOTHACER
Directorate of Aerospace Safety

■ In this year's T-37 mishap summary article, I alluded to the T-37 as the "King" of trainer aircraft. Arguably, the T-38 could lay claim to this title and, if not the "King," the T-38 is, at minimum, the crown prince of trainers. Whatever you would like it to be, I submit the Talon is one rugged, beautiful, and extremely safe aircraft.

Its Record

Since its introduction, the T-38 has experienced a total of 182 Class A mishaps through FY90. These mishaps have resulted in the destruction of 176 aircraft and 131 fatalities. With over 10.6 million hours flown, this translates to a Class A mishap rate of 1.7 per 100,000 flying hours — an incredible figure given the training environment and pilot experience. Of the 182 total Class A mishaps, 110 are categorized as ops-related compared to 59 log-related mishaps. The remaining 13 mishaps are categorized as undetermined or miscellaneous.

Two Class A's

In FY90, we experienced two Class A mishaps and two Class B mishaps in the T-38. The following is a summary of these mishaps.

One Class A mishap occurred on a two-ship basic fighter maneuvers sortie. During the second engagement, the solo mishap pilot was maneuvering the aircraft at high speed when it departed controlled flight. Determining the aircraft was not responding to recovery control inputs and being below the uncontrolled ejection altitude, the mishap pilot ejected successfully, incurring only minor abrasions.

The other Class A mishap happened on a dual navigational training sortie. The mishap aircrew was in VMC on an IFR clearance being radar vectored for a practice instrument approach when it collided with a light civilian aircraft. The mishap aircraft went out of control, and both crewmembers ejected successfully. The civilian aircraft was force landed on a highway with neither of two crewmembers sustaining injury.

Two Class Bs

The first Class B mishap occurred on a two-ship navigational proficiency flight. Enroute, the flight lead mishap pilot canceled the flight's IFR clearance and descended to low altitude. The mishap aircraft struck and severed three high tension power lines suspended 110 feet above the ground, sustaining damage to the left wing, left stabilator, aft fuselage skin, and travel pod. The flight recovered to their home base without further incident.

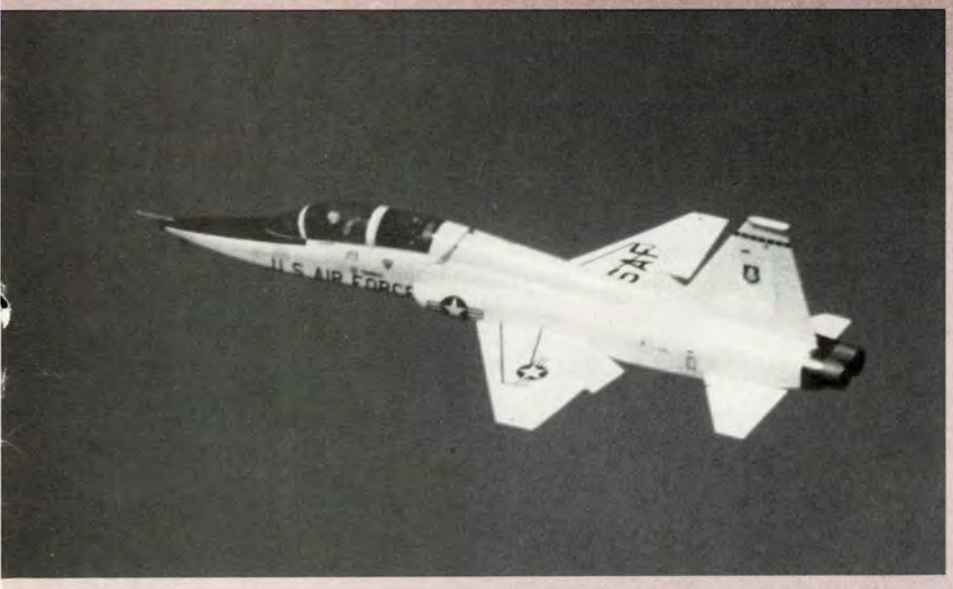
The second Class B mishap occurred on a single-ship, out-and-back proficiency sortie. At the outbase, the mishap aircraft entered the overhead traffic pattern. The mishap aircraft impacted in the overrun, the right main gear collapsed, and the aircraft departed the runway. The remaining gear collapsed, and the aircraft skidded to a stop with substantial damage to the right wing, right stabilator, and underside of the aircraft.

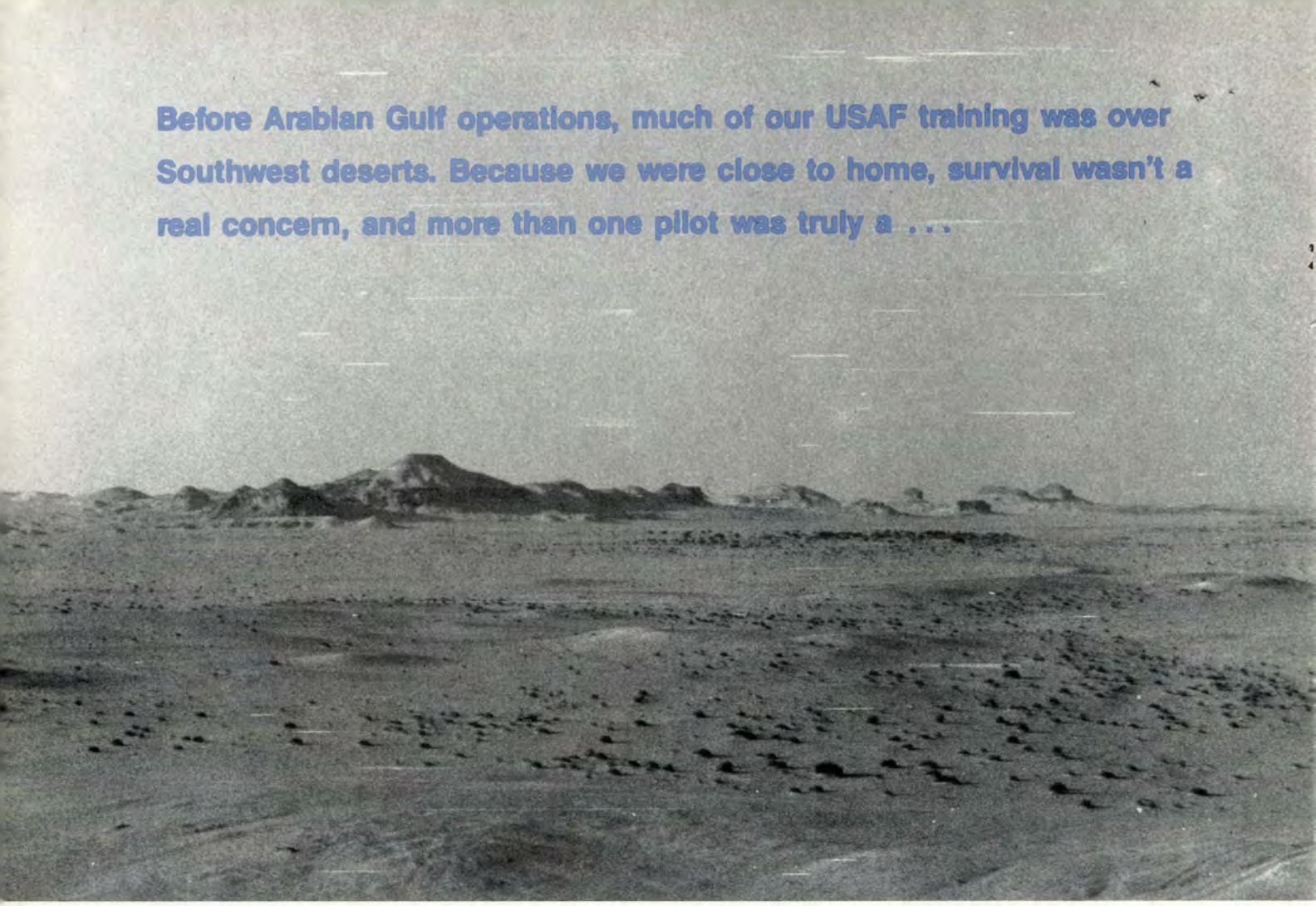
Both mishap crewmembers emergency ground-egressed and walked away with minor injuries.

The Future

Although not quite as old as the T-37, the T-38 has been traversing the skies for some 3 decades now. As with any aircraft, aging always brings structural fatigue worries. The program aimed at combatting these concerns is Pacer Classic. This integral program of airframe, engine, and avionics refurbishment will extend the operational life of the Talon into the 21st century.

Much effort is being expended to make sure the machine can meet the safety challenge and we must, likewise, make every effort to minimize the human factors risks we will continue to face. Almost two-thirds of all T-38 Class A mishaps are operations related, and this past year's Class B wire strike (described above) is a classic example of an ops mishap that was wholly preventable. To prevent human factors mishaps, we must all be aware of our daily changing attitudes and limitations and maturely operate within them. The machine will be ready for FY91. Let's make sure the human is ready. ■





Before Arabian Gulf operations, much of our USAF training was over Southwest deserts. Because we were close to home, survival wasn't a real concern, and more than one pilot was truly a . . .

Stranger to the Desert

SSGT BRYAN L. KASMENN
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■ In survival, it comes down to the basics. Desert survival is no different. To return from the desert, a survivor must have a working knowledge of the environment, know what immediate-action steps to take, understand the importance of water, and have a strong will to survive.

Deserts are places of extremes. They are, for the most part, hot, barren areas receiving less than 10 inches of rain a year. There can be extreme temperature differences between night and day, sometimes up to 70 degrees Fahrenheit. Winter temperatures can reach freezing, and desert winds have been known to reach hurricane force. The low clouds aid the sun in creating extremely bright and glaring days.

If it rains, it is usually one single violent storm adding the hazards of flash floods and difficulty in traveling. Great distances span between sources of water and vegetation. Wildlife has adapted itself to the extreme conditions of the desert. About 4 percent of the world's population lives in some type of desert, but, more importantly, any stranger to the desert can adapt to the environment.

Ration Your Sweat

If you find yourself lost in the desert, immediate action is needed. First, get out of the sun! Get under some shade! Stop and think! Conserve sweat! Make sure the uniform covers the entire body, sleeves down, cover the head, use a scarf

or T-shirt to protect the neck. Clothing will hold the sweat against the body and aid in cooling off. Clothing will also protect against the sun's rays and the wind.

By minimizing activity, not talking, breathing through the nose, and properly using your clothing, the water the body now has will not be used up so fast. Use this inactive time to plan, prioritize, and think out upcoming actions. Wait for the cooler parts of the day, dusk through dawn. Never waste energy — it is water. *In effect, ration your sweat, not your water!*

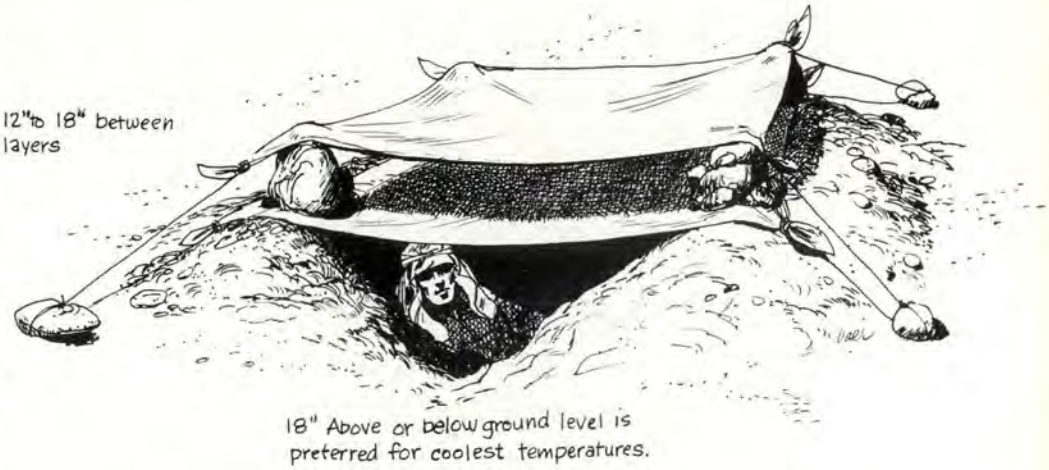

Figure 1. Conserving your body fluids by avoiding activity during the heat of the day will act as a supplement to your water.

Preventing Dehydration

Prevention of dehydration and the procurement of water in the desert are of greatest importance. Water requirements will vary with individuals and tasks they perform. On the whole, the body will use 3 to 4 quarts of water a day just maintaining basic body functions. When moderate work and the sun (100 to 110 degrees F) are added, the body may need as much as 8 to 15 quarts of water per day. Without this water, dehydration — loss of body fluids — will set in.

Americans usually start out about 1 percent to 1.5 percent dehydrated. Dehydration is recognized by several signs and symptoms. These are thirst, drying of the mouth, weakness, fatigue, dizziness, headaches, nausea, loss of the skin's elasticity, and infrequent and reduced urination. Urine will be very dark, have a strong odor, and may become very painful.

Remember thirst and a dry mouth are indicators water is needed, but not how much is needed! Dehydrated individuals will have behavior changes such as loss of appetite, impatience, sleepiness, apathy, emotional instability, trouble speaking, and mental confusion. In fact, when a person is just about 2 quarts of water down (about 2.5 percent dehydrated), one out of four decisions made is wrong (you've lost 25 percent efficiency). Treatment for dehydration is to drink water! Water should be consumed in small quantities at frequent intervals throughout the day to total the amount of water needed. Eventually, dehydration of more than 15 percent will lead to unconsciousness and then death.

Water Indicators

In most situations, a survivor is just not going to have the water, so where can it be found? There are several indicators of possible below-ground water sources. Look for drainages and low areas, places with an abundance of vegetation of a different variety, large clumps of lush, green vegetation, swarming insects, and scratched depressions dug by animals looking for water. Pockets of water may be found at the foot of cliffs (cliffs of lava formations are best) and at the concave bend in a dry riverbed. Look for these signs, and within a few feet of the surface, water may be found. While digging, if damp sand is not found within the first 12 to 18 inches, stop digging. Don't waste any more energy.

There are also indicators of above-ground water sources. Water is sometimes found in cracks of rocks, especially with the added sign of bird droppings around the outside. The doughnut-shaped mounds of camel dung often surround wells and other water sources, but wells may be tapping a water supply at a depth of 100 feet. The "V" formed by intersection animal trails may point towards water, and birds will regularly fly from water sources in the morning and to water at night. The early morning dew may be collected for drinking.

Water Stills

There are also three types of "water stills" which "create" water in the

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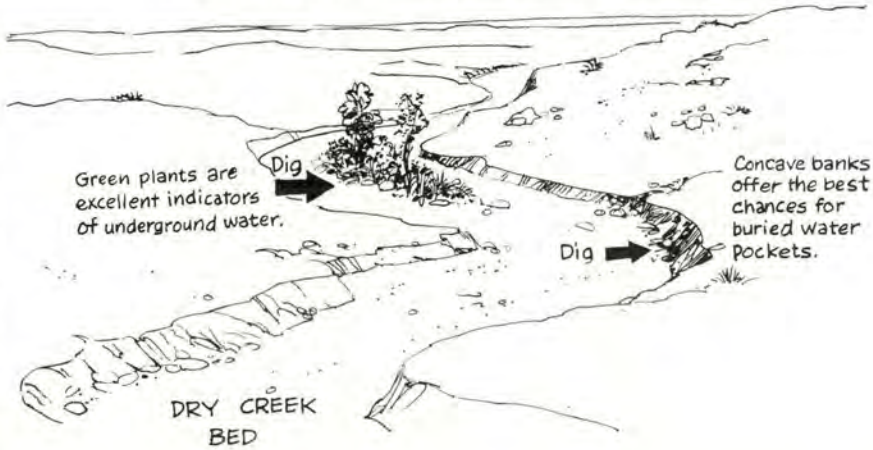
Figure 2. Ground water may be present if you know how to find it. Be careful not to expend too much sweat digging dry holes.



Stranger to the Desert

continued

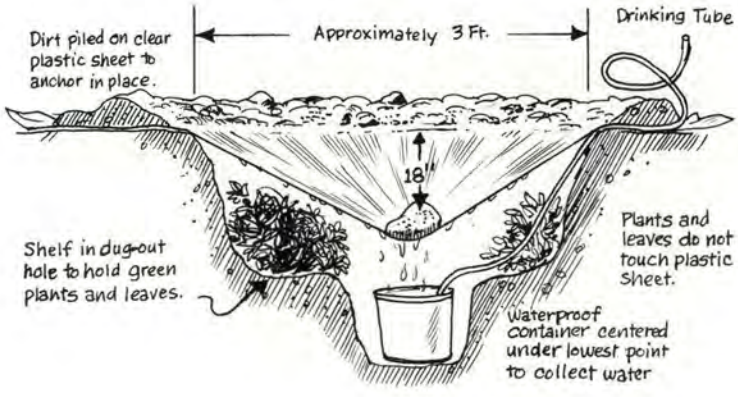
desert. The first "still" is called a solar still. The solar still is constructed below ground. Site selection must begin at a moisture area (use the below-ground water sources indicators) where the soil is easy to dig and where it receives the maximum sunlight possible. Proceed by digging a bowl-shaped hole approximately 3 feet across by 2 feet deep. Place some type of container upright at the bottom of the hole. If there is tubing available, place one end inside the container, extending the other end of the tubing beyond the lip of the hole. Place a *clear plastic sheet* over the hole, covering all edges with soil to hold the plastic in place. Place a small rock in the center of the plastic. Then lower the plastic into the hole about 15 inches below ground level. This forms the plastic into an inverted cone with the rock at the center. Make sure the tip of the cone is directly over the container and the plastic is not touching the inner sides of the hole. In about a half hour, water vapor will rise from the hole, collect, condense on the inner side of the plastic, and drip down. If no tube is available, lift the plastic off after dark.

Moisture from plants and brackish or polluted water will aid a great deal in the output of water by the solar still. On the average, a solar still may yield only 1 cup per day, so other means of water procurement may be necessary.

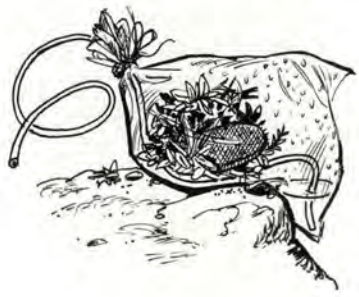
The second type "still" is called a **vegetation bag.** Take a clear plastic bag and fill about a third of it with vegetation, then fill it the rest of the way with air. Seal the bag shut, and put it into the sun. The moisture of the vegetation becomes water vapor which rises and condenses in the bag. The water "created" may have a "bitter" taste, but it is palatable. On the average, a "veggie" bag will generate 1 to 15 ounces per quart-sized plastic bag per day. A rock can be used to weight the bag down, or tubing can be used as a straw. Make sure the vegetation you use is not poisonous.

The third type "water still" is called the **transpiration bag.** A large, clear plastic bag is placed over a live branch of a tree or shrub. Then expand the bag with air and seal it shut on the branch. Tie the branch at a downward angle to allow the water to pool easier. Water amounts will vary with the types of vegetation, but, on the average, I have collected about a gallon of water per day. A rock put in the bag can help pool the water, and tubing can be used as a straw. A branch can

Solar Still



Vegetation Bag



be reused, but try to switch branches. Make sure the plants used are not poisonous. The transpiration bag surpasses all other methods in yield, ease of construction, and taste.

Never eat while on short water supplies because it will take more water to digest the food. Always carry more water than you think you will need in the desert, but if you must procure water, never try to do it in the heat of the day. More water will be wasted than procured. In the desert, water means survival.

The Importance of a Shelter

To help retain the body's water, the protection of a shelter is needed. The shade the survivor has been using might have been good enough for an immediate-action shelter, but improvements are much needed.

Desert shelters must consider the extreme heat and the sun's rays and, if possible, the cold of night. The roof of the shelter should be multilayered, each layer having 12 to 18 inches of dead airspace in between. This will moderate inside temperatures. Shelter floors should be about 18 inches above or below the desert floor, making them always cooler than the actual desert floor. By using these principles, I have lowered the inside temperature of a survival shelter from 114 degrees F to 92 degrees F.

Other principles should be considered in site selection and construction. If possible, use natural protection, but avoid animal inhabitants. Shelter sides should be movable. This allows some protection from high winds and the cold of night. Large rocks will store heat during the day, so build day shelters away from rocks, and take advantage of this at night. The windward side of sand dunes may have a cooling breeze. Riverbeds can flash flood, so stay away from them. Shelters should be safe, provide protection from the environment, and be large enough for the survival and any equipment.

The lack of materials and great distances between settlements make it imperative to carry a desert minimum survival kit. A personal kit can have almost anything, but there are a few essential items.

These include a few large, clear plastic bags for water procurement and storage, a mirror to signal with (mirror flash has been seen over 150 miles away), water purification tablets, space blanket for shelter and signaling, a water resistant sunscreen or sun block, insect repellent, 100 feet of line, 6 feet of rubber tubing, fire starter, compass with a luminous dial, a hat, and a large handkerchief. These are just the basics — not even scratching the surface of a personal kit.

As important as anything discussed so far is the *will to survive.* Without it, no matter how well equipped a survivor is, there is no hope. The will to survive can be enhanced. Consider the following methods.

- Learn specifics about the environment and how to survive in it.
- Stay ahead of any possible medical problems and keep physically fit.
- Have a personal survival kit.
- Make sure the family is taken care of prior to anything happening, i.e., wills, insurance, and explain what could happen.
- Always try to find something positive to focus on.
- Realize fear is a normal and healthy reaction, and it must be identified and overcome or panic will take over.
- Having something to survive for, such as family, friends, belief in God, or a strong belief in yourself, will aid in survival. Remember, you are not alone.

During World War II, a US pilot was shot down over what is today the Saudi Arabian desert of Nefud. He survived for 5 days on only 2 quarts of water and a minimal survival kit. He had the additional stresses of suffering a broken leg and trying to evade the enemy. Even with all this, the pilot survived and evaded 22 miles to friendly forces.

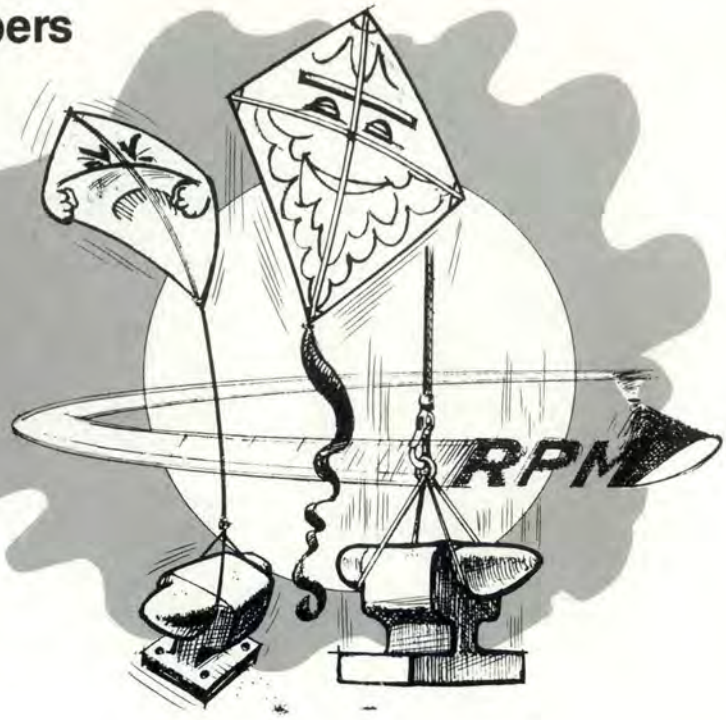
You may have additional problems, such as evading enemy capture, trying to stay concealed, and medical injuries. But by using the knowledge of desert survival and a strong will to survive, you will return. ■

Water Transpiration Bag

Sunlight passing through clear plastic bag tied around branch(es) of living plant causes evaporation of moisture. Condensation collects moisture on bag, then runs down to pool at bottom ready to sip through preset plastic tubing.

When you're flying choppers and you need to autorotate to safety . . .

RPM is Life



CAPTAIN "BUCK" JOSLIN, USMC
Marine Corps Air Facility
Quantico, Virginia

■ There are contradicting schools of thought when it comes to selecting the best main rotor RPM when autorotating* a helicopter. One says, the higher the better, and the other says the lower. Interestingly enough, every helicopter pilot has an opinion one way or the other which he will swear is the "only way to do it." Actually, the optimum RPM is a function of the characteristics of the main rotor system, and what you are trying to achieve in the way of glide distance, rate of descent, or RPM in a flare.

To evaluate the optimum RPM, we need to look at the aerodynamic environment of the rotor blade in an autorotation. For simplicity's sake, we will look at a completely vertical autorotation to avoid dealing with the reverse flow region present on the retreating blade in forward descending flight. Additionally, this discussion is limited to the aerodynamics in an autorotative descent and does not address RPM considerations in the flare prior to touchdown.

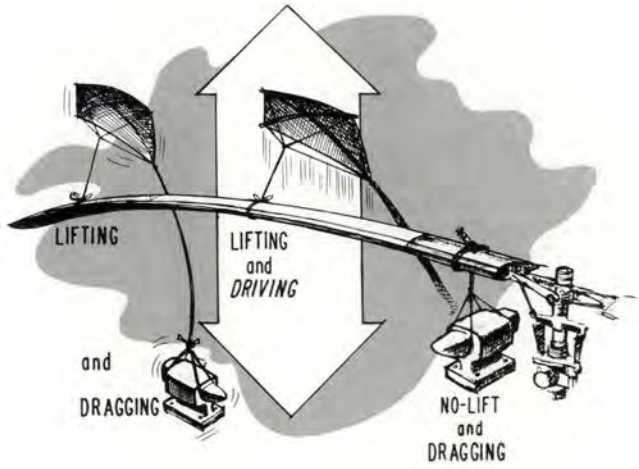
*Autorotation: Power-off glide with rotor blades automatically rotating as the air flows up through them.

Three Flow Regions

Three distinct flow regions exist on a main rotor blade in a vertical autorotation. Progressing from hub to tip they are a stall region, autorotative (driving) region, and a propeller (driven dragging) region (figure 1). The stall region is similar to a stalled wing on a fixed-wing aircraft where, due to its excessive angle of attack, provides no lift and is a source of considerable drag. The autorotative region creates lift and provides its own rotating power (autorotates). This is the region we want to maximize!

The propeller or driven region provides lift but needs to be rotated, just like a propeller provides thrust but must be "driven" by some external source. The vector analysis of these regions is beyond the scope of this article; however, suffice it to say that as main rotor autorotative RPM varies, these regions shift. Decreases in RPM tend to slide the regions outward whereby the propel-

Figure 1
Main Rotor Blade Flow Regions in a Vertical Autorotation



ler region contracts and the autorotative and stall regions expand. Increases in RPM produce just the opposite effect (figure 2).

Initially, most of the stall region is confined to the blade cutouts and hub attachment points, which would produce very little lift anyway due to their low velocity. Consequently, the effect of the stall region initially is negligible. However, if the RPM gets excessively low, this stalled region expands outward and may cover a substantial portion of the blade area, resulting in a significant loss of lift, accompanied by extremely large and unrecoverable rates of descent.

Nevertheless, until we reach this RPM stall limit, this reduced RPM will increase our autorotative blade region, hence lift, and act to decrease our rate of descent and extend our glide. For example, figure 3 has characteristic UH-1N rate of descent and glide ratio data, as a function of rotor RPM, and illustrates the initial favorable decrease in rate of descent and increase in glide ratio as RPM decreases from 100 percent to 91 percent.

Other detrimental features of excessively low RPM are that certain electrical equipment, such as generators and the systems they power, will drop off the line at low RPM, thereby compounding the emergency. The tall rotor also derives its antitorque power directly from the main rotor RPM; therefore, you can expect a loss of tail rotor authority and directional control when RPM is allowed to get too low.

On the other hand, excessively high RPM can produce large centrifugal loads on the main rotor hub attachment points, similar to the forces you feel when you are driving around a curve and are thrown towards the outside of the curve more and more violently the faster your velocity is around the curve. These centrifugal forces can create stresses on the rotating components in excess of their material strength, causing permanent deformation and failure. High RPM in an autorotative flare prior to touchdown is quite beneficial and is related to the inertia of the rotor system; however, this discussion is confined to the aerodynamics in an autorotative descent.

High or Low RPM?

So what is the answer? High or low RPM? Performing an autorotation at low RPM is beneficial to maximize glide distance and minimize rate of descent by maximizing the autorotative region of the blade; however, it can be catastrophic if the RPM is allowed to get excessively low, resulting in an excessive stalled region.

It appears, then, that knowledge of the positive and detrimental features and boundaries of a low RPM autorotative descent can be the difference between a successful landing or an uncontrolled impact. Yes, RPM is life! Sometimes! ■

Figure 2

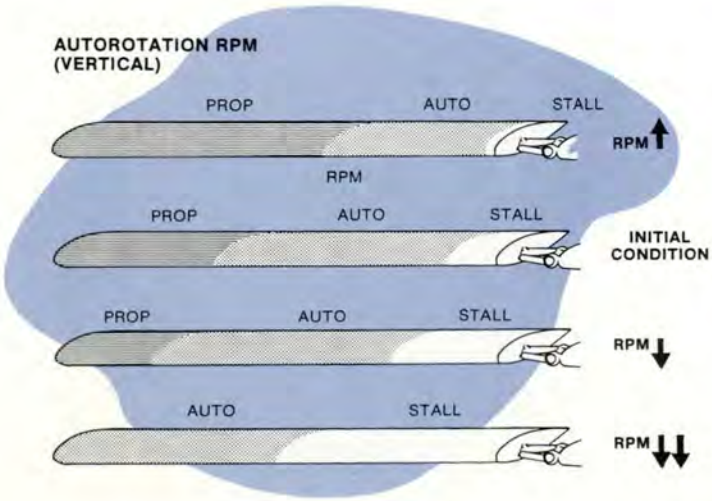


Figure 3A

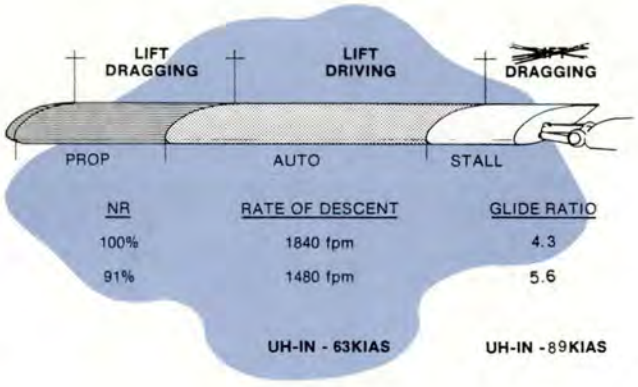
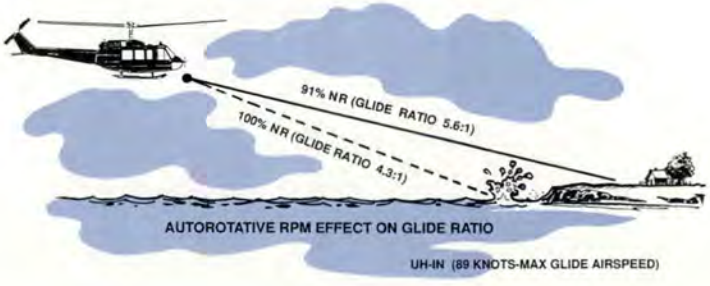


Figure 3B



Once Again, Thanks For Your Support!

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

Lt Col Bill Stroud
HQ TAC/DOS
Langley AFB, Virginia

Recently, rumors have reached our ears that some of you out there seem to think there is no United Organization of Dumb Caption Writers of America (UODCWA). At the very least, some of you have intimated that Byron Q. Lackluster is the only member of said organization. Frankly, we're hurt to think you may believe we are making this all up.

For example, one of the long-standing members of the UODCWA is Mr. Gascon P. Martine't. At 82, Gascon is as sharp as he ever was. Forty years of writing the captions for billboards along Highway 16 have made Gascon an expert. Who can ever forget, "Eat Here and Get Gas"? Or the equally famous, "Sunset Motel — Clean Rooms and Clean Sheets." But Gascon P. Martine't is not the only member of the UODCWA.

The newest member, and one who promises to bring an international flavor to the organization, is Mr. Ahmed "Al" Takriti. Al has joined the UODCWA following a long and distinguished career as the Assistant Undersecretary to the Administrator of Public Information for a former world military power in the Middle East. Most recently, Al was responsible for aiming the portable dish antennas for western reporters. Even as a lowly undersecretary, Al had his moment of glory with the world-famous caption, "It's really a baby's formula milk factory."

As you can see, *we* do not make these things up. Just as clearly, you can see there is more than a little competition for this month's contest. Get your entries in now and help keep the legendary CHEAP LITTLE PRIZE out of the hands of Gascon (he'd only drop it) or Al (he'd send it to Baghdad).

Honorable Mentions

1. **Does anybody have the time? I just shot my watch.**
   Lt Col Joe Boyles, AFISC/IGL, Norton AFB, California
2. **OK, so I wear prescription sunglasses, it doesn't mean a thing. Now where's that plane . . . it was right here . . . I know it was right here somewhere.**
   Jim Burt, Academic Training, NAS Corpus Christi, Texas
3. **There I was in the supermarket when this guy with 25 items cut in front of me at the express lane.**
   SSgt Joseph P. Ficklin, AFROTC Det 835, BYU, Provo, Utah
4. **Can you guys believe they took me off flying status just 'cause one arm's a little shorter than the other?**
   Major Dennis Kotkoski, 127 CAM/MAM, Selfridge ANGB, Michigan
5. **Look, this arm is longer than my left arm.**
   MSgt Mark Godinez, Air Force Two Flight Mechanic, 89th MAW Maintenance Control, Andrews AFB, Maryland
6. (Captions for multiple individuals in photo.) **1. There I was at sea level. 3.** (thinking) **Sleeping standing up . . . I think I have it perfected. 4.** (thinking) **He's so uncoordinated, he'll probably have a "midair" with his hands. 5.** (thinking) **I'll smile at anything. 6.** (thinking) **I'd rather be fishing. 7.** (thinking) **Oh no, here goes — Capt Terrific again. 8.** (thinking) **This thing is killing my foot.**
   Colonel Stu Bradley, 12 FTW/MA, Randolph AFB, Texas
7. **6. But Sir — when you fly like Superman, don't you extend *both* arms?**
   Michael Sell, HQ AFLC/XPOX, Wright-Patterson AFB, Ohio
8. **Ah, Ah, Ah, Ah, Stayin' Alive, Stayin' Alive, Ah, Ah, Ah, Ah . . .**
   TSgt Vince Anctil, 142 CAMS, Portland ANG Base, Oregon
9. **2-8** (thinking) **Oh, no! Not another of the major's "There I Was . . ." stories!**
   SSgt Joseph P. Ficklin, AFROTC Det 855, BYU, Provo, Utah
10. **Look, guys! If you're not going to give me my white cane back, at least guide me to the plane!**
    SSgt Joseph P. Ficklin, AFROTC Det 855, BYU, Provo, Utah

WRITE A DUMB CAPTION CONTEST THING

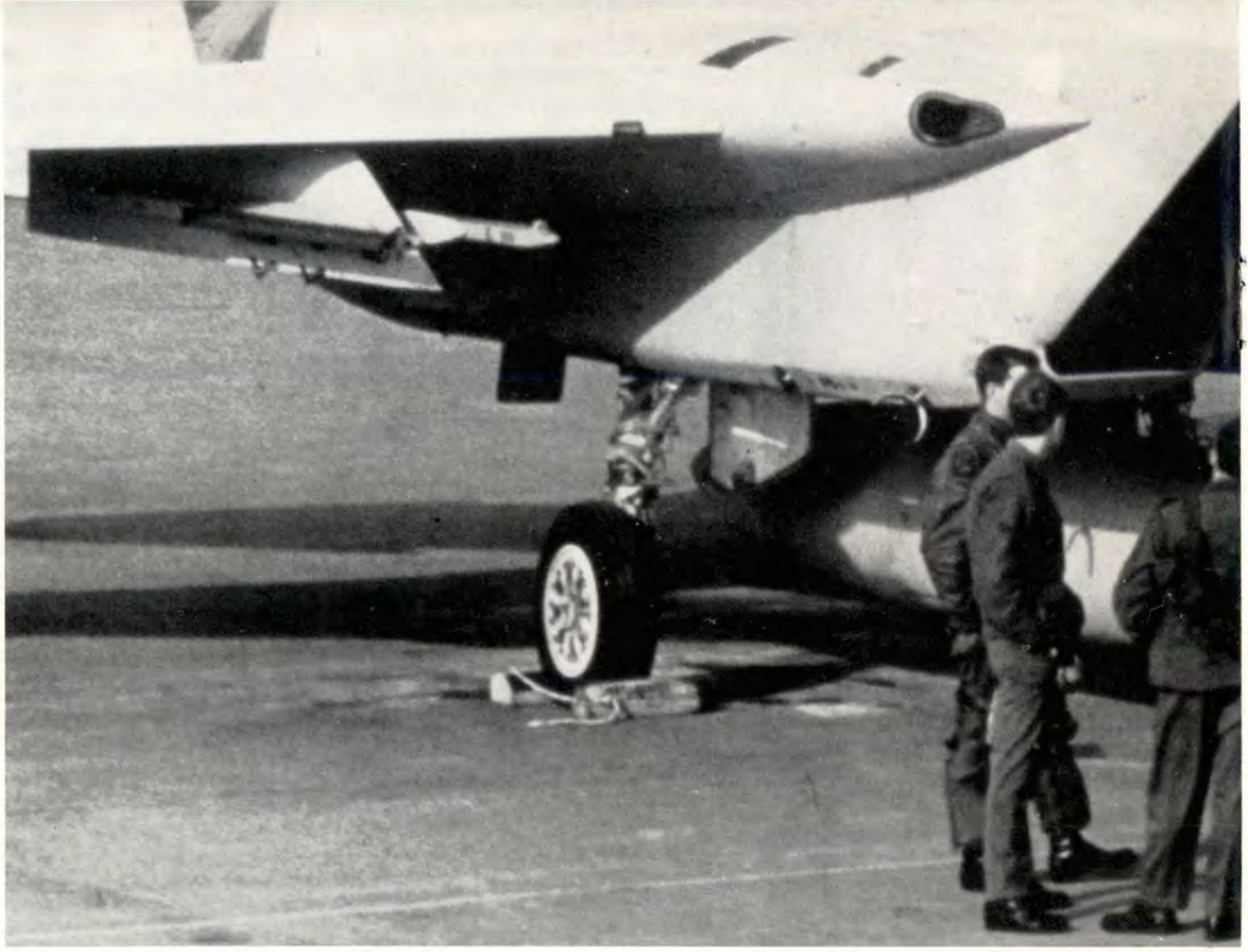
Contestants beware! It has come to our attention that one Byron Q. Lackluster, President and Leader for Life of the United Organization of Dumb Caption Writers of America (UODCWA) has found a new tactic to bring his writers some longed-for recognition. Along the lines of "if you can't beat 'em, join 'em," Mr. Lackluster is attempting to recruit new members from the ranks of our contestants.

Whether you are an experienced contestant, as this month's winner Lt Col Bill Stroud is, or an unranked beginner, the UODCWA wants YOU. Application forms are being anonymously sent to contestants in plain brown envelopes. DO NOT BE DECEIVED. Membership in the UODCWA will never bring you fame or fortune. As you can see from the list of 10 Honorable Mentions, not one contestant was from the UODCWA. And, as for fortune, we use real gold on our legendary Cheap Little Prize. (It may only be 3 molecules thick, but it is *real* gold.)

To join the ranks of the truly famous, all you need to do is enter this month's contest. After all, even a bribe to our judges is cheaper than Lackluster's monthly dues.

Write your captions on a slip of paper and tape it on a photocopy of this page. DO NOT SEND US THE MAGAZINE PAGE. Use "balloon" captions for each person in the photo or use a caption under the entire page. Entries will be judged by a panel of experts on humor. All decisions are open to bribes in excess of $100,000. In fact, make it big enough, and we'll go back and make you the winner of previous contests. Hey, we're flexible, gang, and we've still got to feed all these dumb caption writers.

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



The Other Side of the Glare Shield

MAJOR THOMAS A. FARRIER
Chief, Human Factors Studies
Military Airlift Command

■ It probably comes as no surprise to most of you to hear those of us who are detailed to doubleknits (or, "skating on the staff," if you prefer) spend at least a portion of our idle time fondly reminiscing about our carefree crew dog days. While recently engaging in this very pleasant pastime, I considered what fun it would be to fly my very own air machine — no Air Force rules, no crew duty day hangups, no regular, reliable maintenance . . .

Great Maintenance

The daydream ended pretty abruptly at that point. I realized, with some surprise, as great as it might be to blast around in a personal plane as capable and complex as the ones I'm accustomed to, I wouldn't have one-tenth the confidence in it without the kind of maintenance (I humbly confess) I take for granted in the Air Force.

Think about what you do with your aircraft on a regular basis. Now ask yourself the $64,000 question: "Would I be willing to push my own bizjet (or helicopter, or Cessna) the way I do my _____?" (Insert your warbird here.) I'm reasonably willing to bet you wouldn't, unless you're one of those gluttons for punishment with an ATP *and* an A&P.

This raises the obvious followup question, namely, "Why do I trust my USAF-issue aircraft as much as I do?" The answer to this one is really pretty easy, although we "masters of the skies" tend to overlook it. We trust our aircraft and fly them as hard as we do because, deep down, we trust the people who work on them.

It's worth taking a few minutes to consider this more closely. After all, we're talking about the folks who haven't been able to figure out that quirky recurring writeup on the flight control system, right? These are the same all-stars who "work 'em, but don't have to fly 'em," right? Well, maybe. Still, we should take a good look at these perceptions objectively.

They're just stereotypes — convenient ways of ventilating and expressing our frustration with balky airplanes, scratched sorties, and

missed block times. Taken in this light, it's easy to be a little bit ashamed of yourself for generalizing, isn't it?

Some Firsthand Experience

I can offer two personal examples of the flip side of the headaches mentioned a moment ago. I have two brothers-in-law in BDUs, both of whom bend wrenches. The maintainer's code of professionalism shines pretty brightly in both of them. Each has contributed a little bit of consciousness-raising to a hard-headed pilot — namely, me.

The older of the two is a tech sergeant in the Reserves. Before he went weekend warrior (a term which may soon fall out of fashion), he was assigned to, among other places, Goose Bay — the garden spot of Labrador. He and I have swapped a few lies about our respective cold weather experiences, but it's only been recently the underlying message came through.

When I went out to fly one morning so cold the preflight had to be done in the hangar, my usual thoughts were along the lines of "Okay, how much cold can the airplane take?" or "Damn, I wish the APU was on so we could get some heat in here!" If the step was in the afternoon, after a morning local, they were more like, "Is it cold-soaked?" "I wonder how fast I can do my walkaround?" or other similar sentiments.

All too often, I'm afraid I didn't give proper credit to the Mark I, Mod 0, crew chief who finished the preflight outside because takeoff time was moved back, or who half-froze refueling, then thruflighting the bird for the afternoon go. It's a funny thing. We have a whole list of specs which say our airplanes have to function from X degrees below zero to fry-an-egg hot, and we forget to keep in mind the men and women who face those same extreme temperatures, do their jobs, and make the mission launch.

My older brother-in-law did this day in and day out for a solid year, always helping transients or the occasional involuntary overnight guest continue on their way. Sometimes he could smooth out what ailed a cranky visiting aircraft and sometimes he couldn't, but he was always out there trying.

My younger brother-in-law is a first-term avionics specialist. Unlike my older brother-in-law, I've had the chance to see him at work. A few years ago, I flew a cross-country mission which made a refueling stop at his base, so I made plans to grab lunch with him and take a look at his shop.

Before I could even get off the ramp, he was out to greet me, looking over my aircraft with obvious interest. Since he didn't see much variety among aircraft in his command (its initials being ATC), I thought

continued

The Other Side of the Glare Shield continued

he'd take a respectful peek at mine and then, duly humbled, show me where to eat. Not so. He buried his head in my aircraft's avionics bay and proceeded to amaze me with an obvious grasp of how the ankle bone was connected elsewhere in my sturdy (though aged) steed.

After a stan-eval style grilling on the AC, DC, gyro, and navcomm systems, he relented and pointed me toward the bowling alley. I figured I'd been had, but discreet inquiries elsewhere assured me mine was probably the first aircraft of its type to put rubber on this particular ramp in the last few years.

After lunch, he took me into his shop and proudly displayed a newly repaired landing light assembly which had resisted repeated efforts at fixing — his and those of others in his area. An allegedly simple piece of equipment like a landing light shouldn't be too hard to put back in order, but glitches can develop which aren't dealt with until you're pretty deep into the troubleshooting guide, if at all. Sometimes a component will bench check fine and then go to worms again as soon as it goes back on an airplane.

As my brother-in-law's coworkers grew used to the fact somebody wearing Nomex had actually ventured into their establishment, I got an earful about repeat writeups (and incomprehensible writeups) which frustrated the living daylights out of this small group of low-rank, high-pride craftspersons.

The conversation brought home to me the fact they hate the same obnoxious nitnoys the crews do, but while three consecutive crews may walk away from an aircraft in disgust, the same tech may get to beat his or her head against it over and over and over.

Think About It

Probably most of this is no great revelation to the majority of you when you stop and think about it. That's the catch though. We probably don't give proper consideration to these bottom-line truths when we're on our way to fly. We "just do it." On the rare occasions when we think hard about whether we really want to take a mission, our concerns usually cluster around the ops end of the spectrum: How's the weather? Does everybody have crew rest? Am I up to the challeng-

The sight of an aircrew member in a maintenance shop is bound to turn heads. Rarely is it purely a social visit. Too often it is to air gripes.

Visiting the so-called "back shops" can serve to remind fliers of the complexity of the systems and equipment they depend upon.

es (for the really thoughtful ones)? And so forth.

Very rarely do we have serious doubts about an aircraft's readiness to fly. Sure, there may be annoyances and disputes from time to time, but we pilots get paid the big bucks to make some tough go- and no-go calls. It's genuinely rare for someone on the line to try to sell you a bad airplane if you really have a safety-of-flight concern about it.

As proof of this sweeping statement, I can offer a simple test. Think about the number of sorties you've flown since you first started UPT. Now think about the number of heart-to-hearts you've had with a ramp "super" or job control. Now, quick, what was the exact condition you were complaining about?

If you're like most people I've talked to over the past few months, I'll bet you may have been able to think of maybe one or two such confrontations which were really over something serious. The key is whether you remember your gripe as being potentially life or property threatening. I've had only one really memorable set-to with maintenance in my 11 years of active flying, and I don't think that's unusual. On the other hand, the half-baked things I've been asked to do in a perfectly good aircraft number in the dozens — *they're* the source of all the good war stories, not maintenance.

A Good Word

By now, I hope you've picked up on my central theme: We fliers are cocky, confident, resolute, and a whole lot of other adjectives when we step to our aircraft because the quality, concern, and professionalism behind their maintenance is so uniformly good, we notice it only when there's a problem.

The complexity of today's aircraft is so great, and the fineness of the tolerances within which certain components have to function is so precise, it borders on miraculous we launch with the degree of reliability we do. My brothers-in-law helped me finally crack this code. I hope I can return the favor to their side of the glare shield if, and when, I get back into the cockpit.

Meanwhile, the favor I'd ask of the flying community reading this is to let maintenance hear a good word every now and then. If you asked, you'd probably find most of them would jump at a chance to ride along on the object of all their hard work. Since so few of them can, the least we can do is let them know we feel safe, thanks to them. You'll probably find, as professionals, it's the best compliment you could give them ... and it's one they earn every day. ■

Dialogue between specialist and aviator can be a learning experience for both and is time well spent.

Safety Warrior

During, and just after, World War II, 3,960 Boeing B-29 Superfortresses were built in five different factories. Each of these B-29s was identified by both a unique tail number and by a mission design series (MDS) designator. The first production B-29 was designated a B-29-1-BW and given the tail number 42-6205. The last B-29 was designated a B-29-100-BW and given the tail number 45-21872. This story will answer the question . . .

Whatever Happened To The Last B-29?

CAPTAIN STEPHEN M. MORRISETTE
21 EMS Project Warrior Officer
Elmendorf AFB, Alaska

■ The engines of the last B-29 first drew breath in Wichita, Kansas, less than 2 months after General MacArthur announced, "These proceedings are closed," aboard the battleship *Missouri* in Tokyo Harbor. The last B-29 was a gleaming weapon of war with no war to fight. The story which follows is through the eyes of the crew, who, like warriors of another era, referred to their fighting craft as a female companion.

She was unceremoniously flown to a storage depot at Pyote Field, Texas, and then later to Kelly Field. The fact she was so new, however, made her a candidate for a new job. She was to have her bomb racks removed and was redesignated as an RB-29A.

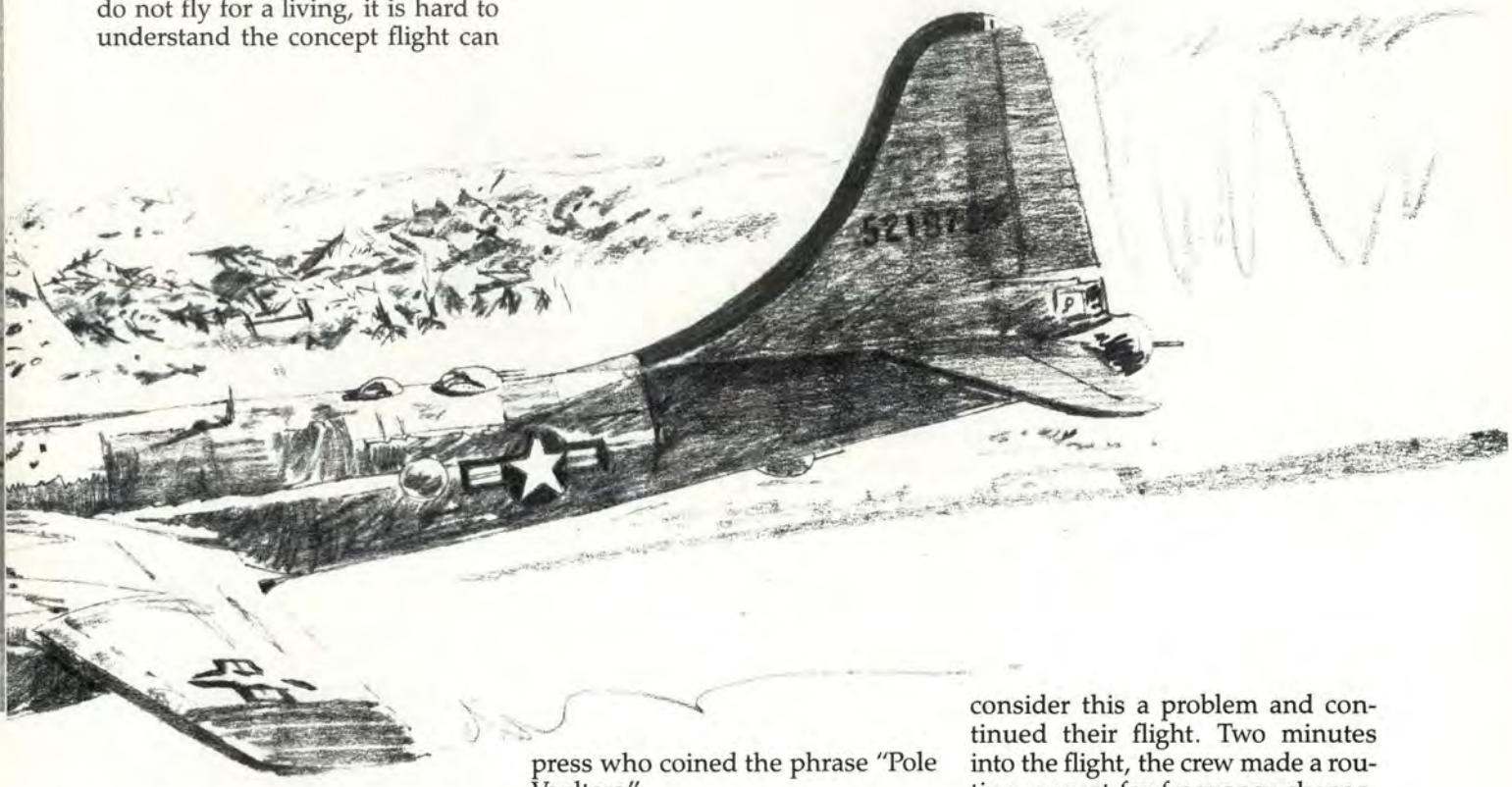
She was then assigned to the 373d Reconnaissance Weather Squadron (RWS) at Kindly AB, Bermuda. Her job was to feel the air looking for tropical depressions which would become weather systems many days later. She was later transferred to Andersen AB, Guam, and wore the colors of the 514 RWS.

In June of 1950, the last B-29 missed another opportunity to fulfill her original purpose as a bomber. Only days after she was flown to the depot at Sacramento to be refitted and redesignated as a WB-29, 7,000 Chinese soldiers invaded Korea. America again needed bombers. But a different destiny awaited the last B-29. By February, she was again patrolling tropical skies, this time with the 57th Strategic Weather Reconnaissance Squadron at Hickam AFB in Hawaii. While assigned to the 57th, the last B-29 was sent TDY to Kwajalein in the Marshall Islands. This deployment coincided with the dates of Project Green House. Project Green House was the first thermonuclear detonation on Bikini Atoll. The last B-29 was there when the first hydrogen bomb was detonated.

In August of 1952, the last B-29 flew to the depot at Warner Robins in Georgia. One of the last modifications made to her at Warner Robins was the application of a new paint job. She now sported a bright

red tail and outer wing panels. This new paint scheme was required as part of her arctic retrofit. The last B-29 was to be assigned to the world famous "Pole Vaulters" of the 58th Strategic Reconnaissance Squadron at Eielson AFB in Alaska.

For those unfortunate people who do not fly for a living, it is hard to understand the concept flight can become routine and boring, but it can. Even a flight into the world's worst weather in a giant state-of-the-art reconnaissance aircraft can become monotonous. The 58th Strategic Reconnaissance Squadron had been doing this very thing for years. In fact, they had done it successfully 1,871 times. The 1,872d time was to take place at 0730 on 25 September 1953.



The appointed hour was 0730 when day after day, week after week, year after year, the men of the 58th would fly into the semipermanent Aleutian low-pressure area located near the end of the Aleutian Chain. The observations they made on Monday were used to predict Wednesday's weather on the west coast. They called these flights Loon Echoes. Other weather tracks were known as Loon Dogs, Loon Charlies, and so on. These loon flights were what the men of the 58th did. They did them well. They did them every day. They did them as routinely as most of us do our jobs. The men of the 58th were frequently interviewed by the press. On some flights, the press was even allowed to ride along. It was the press who coined the phrase "Pole Vaulters."

Loon Echo 1,872 was to be just like Loon Echo 1,871 the day before, and 1,870 the day before that, and so on. Eleven men would climb into their WB-29 and "sniff" the skies of Alaska. The pilot in command of Loon Echo 1,872 was Capt William Barrett. Also on board was instructor pilot Maj William Dowd. Three other officers and one enlisted man climbed into the nose of the last B-29 that morning. Lts Howell Smith and Jack Denardo were the navigators. Capt Charles Baker was the weather officer, and MSgt Robert Callies was the flight engineer. Capt Edward Nash was scheduled to fly as a second weather officer but was crossed off the flight orders earlier that morning. Five additional men climbed into the aftercompartment. There were three radio operators, one dropsonde operator, and the crew chief.

At 0725, Capt Barrett and Maj Dowd pulled back on the yokes of WB-29 (tail number 45-21872A), and she rose into the cold morning air. There had been a slight overspeeding of all four propellers during the takeoff roll, but the crew did not consider this a problem and continued their flight. Two minutes into the flight, the crew made a routine request for frequency change. The tower granted permission and wished them a good flight.

It must have been only seconds after this radio transmission that hours and hours of boredom were interrupted by one of those proverbial moments of stark terror. The no. 4 engine fire warning light illuminated on MSgt Callies' instrument panel. The crew quickly and professionally responded to the emergency. The no. 4 mag switch was moved to the off position, the fuel selector valve was closed, the propeller was feathered, and the fire handle was pulled. Capt Barrett leveled the aircraft at 2,000 feet AGL and declared an emergency. He swung the giant aircraft back around and headed for the runway. The tower had already granted permission for a straight-in approach for runway 13R.

The pucker factor had gone pretty high but was about to go higher. Capt Barrett was driving a three-

continued

Whatever Happened To The Last B-29? continued

Today, KC-135s routinely travel over the crash site on their approach into Eielson's runway 13R without ever seeing the remains of the last B-29.

engined gas tank and was at a very low altitude. He did not need another emergency, but he was about to get one. The no. 4 propeller began to creep out of its feathered position. As it did so, the propeller started to rotate. The aircraft immediately banked to the right and lost most of its precious altitude.

The flight crew again responded admirably to this new emergency. The pilots righted the aircraft while both men held the feather button in. The no. 4 propeller did go back into its feathered position and stopped rotating. The aircraft was now only a scant 900 feet above the ground. Airspeed was 165 miles an hour, gear down, flaps up, and the runway was in sight. Perhaps just as Capt Barrett may have thought he had it made, the no. 4 propeller came out of its feathered position again and drove to flat pitch.

The propeller assembly mated to the WB-29's Pratt and Whitney R-3350 engines consisted of four huge Curtis Electric blades. It should be remembered not only was the propeller damming the air because of its frontal area, it was also inducing drag by rotating, and unlike a child's pinwheel, those blades did not just spin freely on a shaft. The propeller assembly was mechanically linked to a gear reduction box that attached to a crankshaft. This crankshaft drove 18 massive pistons and 36 valves.

Additionally, the windmilling propeller drove a variety of pumps, motors, and generators. All of this added up to a tremendous amount of friction. The drag created by all of the friction was almost like sticking a 16-foot solid disk out in the airstream. That type of asymmetrical drag would be more than most pilots could handle.

Somehow, Capt Barrett and Maj Dowd did recover from this second episode. They still had airspeed, three good engines, and positive control of the aircraft. What they did not have, however, is something they simply could not do without — altitude. The WB-29 began to fly through the tops of the taller trees

A fragment of the huge glass nose of the aircraft. One of the many windshield wipers is still connected to the twisted framework.

Pieces of the main fuselage are scattered at the wreck site. Most of the wreckage was removed shortly after the mishap.

in the area. Every tree they hit was like a giant hand grabbing at the aircraft, slowing it down, and causing it to sink a little lower. Finally, the last B-29 stopped flying and fell into the trees. About 119,000 pounds of aluminum, av-gas, and men crashed through the trees and slammed into the ground.

The wings slowed down faster than the fuselage, tearing the wings off the airplane. The engines did not slow as fast as the wings. The engines tore themselves free of the wings. The fuselage decelerated at different rates. At one point in time, the nose decelerated faster than the tail. This caused the tail to snap off. At another point in time, the left side of the aircraft slowed faster than the right. This put a torque on the fuselage which wrenched it apart in several places. Metal shattered like glass and tore like paper. The energy released itself in the form of compression, torsion, tension, and shear forces. Additional energy was released in the form of heat, light, and noise — a lot of noise.

Then for 1 or 2 incredible seconds, there was an awesome silence. The aircraft, or more accurately, pieces of aircraft, had all come to rest. The branches torn from the trees by the falling aircraft had now all fallen to the ground. The engines, pumps, motors, and gyros which had been alive with noise only seconds earlier were now stone silent. The only noise to be heard was the tinking made by the cooling fins on the engines as they began to quickly chill in the cold air.

The silence lasted only momentarily. Incredibly, men began to move! They coughed and groaned and began to unbury themselves from crumpled aluminum and broken trees. Ten men began to climb, crawl, and leap from the wreck. The realization came to each of these men they were alive, and they instinctively began to egress, and egress quickly!

Lts Smith and Denardo, along with Capt Baker, had been thrown from the aircraft as the nose section separated from the rest of the fuselage. Maj Dowd and MSgt Callies scrambled from what was left of the nose section, but Capt Barrett was pinned in his seat. A new, but expected, sound filled the men's ears — the sound of fire and then a series of explosions. A postcrash fire now threatened the lives of the pilot and the five men trapped in the rear compartment.

Maj Dowd and Lt Smith crawled back into the burning nose section and freed their trapped commander. In the aftercompartment, the five enlisted men searched frantically for a way out of the flaming wreckage, but every avenue seemed to be blocked by fire. Finally, all five men crawled through the hatch which used to lead to the bomb bay, and they found themselves standing safely outside of the wreck.

As the men assembled together, they found they had all survived the mishap except Capt Baker. They also discovered even though most of them had received serious injuries, A1C Edward Provencher had walked out of the wreck with barely a scratch.

In the days following the mishap, life quickly returned to normal. Loon Echo 1,873 took off as scheduled. The wreckage of the last B-29 was removed, and the owner of the property was paid $100 for the damage to some trees. The entire front page of the base paper, "The 26 Mile Post," was dedicated to the 33 to 16 win of the Eielson Outlaws over the Ladd Raiders in the annual football grudge match. Page 2 of the paper featured the fishing editor PCS'ing south. There was a 4-inch article on page 3 reporting the demise of the last B-29 and the fate of her crew. On page 4, a very sharp one-owner Studebaker could be had for $1,640.

On the 16th of July, 1954, the honorable Harold E. Talbott, then Secretary of the Air Force, dedicated the newly constructed base gymnasium to the memory of Capt Charles F. Baker.

Baker Field House serves to remind us: The most common of us doing the most common task may be called upon to give our all in defense of this nation. Fighter pilot, weather officer, cook, or cop, we are all warriors. ■

The no. 2 propeller of the last B-29 still remains. Its tremendous size is apparent against the background of dogwood trees.

After nearly 40 years, a decal of the logo of the Curtiss Company is still legible.

SAY AGAIN

Air to ground communications — a primer

LT COL JAMES BRONOWSKI
Chief of Safety
452 AREFW (Reserve)
March AFB, California

■ Communication as a human function began as body language. When one caveman faced another and raised his club, a pure form of communication was born. Here was a sender, a message, a receiver, and feedback.

The hairy caveman with the club (the sender) communicated his message to stay away from the dark-haired girl by raising his club. The other hairy caveman (the receiver), who, by most accounts was much smaller than the guy with the club, provided feedback to the sender by running away. A simple message transmitted, received, and acknowledged as the receiver realized he had better hit a few singles bars because good medical care was hard to come by.

Air to Ground Communications

We have come a long way in the aviation world but not a whole lot in the communications field. About 55 percent of our ability to receive and correctly interpret communications comes from body language. The rest is from the spoken word (around 7 percent) and voice inflection. Right at the start, our ability to effectively communicate between ground and air is cut by 55 percent!

Think about body language and how effective it really is. From the top row, upper deck on the third base line, you can correctly interpret the communication between the umpire and manager over the former's decision of a close play at home. The "yes" and "no" motions of the head are universal as is most body language. The more exaggerated the movement, the more emphasis for the message.

A while back, a friend of mine was scheduled to fly a large trans-

Oral communications, without the benefit of body language, is not only less then perfect, it's less than half as effective.

port aircraft. The airship was beset with a multitude of problems, and maintenance was doing their best to get it fixed for flight. Finally, the last screw was tightened with the crew chief frantically getting the last writeup signed off. The engines were started, and the crew chief was marshaling the aircraft out of parking. As he finished his portion of the marshaling, instead of rendering the normal salute to the pilot, he crossed himself. Talk about effective communication! My friend never forgot that flight nor the heightened interest he took in all the systems of that particular aircraft.

With the exception of initial taxi and parking, all communications between people on the ground and people in an aircraft is done by radio. An oral communication with no body language and a less-than-perfect transmission medium. It's a wonder we get requests and instructions correctly at all.

The first communication between a pilot and someone on the ground was messed up in a big way. As Orville sat in the seat of the Wright Flyer with the engine banging away, the props whirling, and the bicycle chains rattling, his brother was hanging on to the wingtip. What Orville thought he heard Wilbur yell was: "If it starts shaking, come back on the power!" Orville nodded in the affirmative and started moving himself and his machine into the history books. What his brother really said was: "If you don't make it, can I have your car?"

They were able to resolve this misunderstanding 120 feet and point one flying hour later. Through the years, many others have not been so fortunate.

We are still in that aviation communications rut nearly 90 years later. The aircraft has made more technological advances than any of man's other great achievements except possibly the disposable diaper. Yet, we are back in the dark ages when it comes to effectively communicating with each other.

A recent crash of a wide-body commercial cargo aircraft with a highly experienced crew highlights the tragic consequences of a failure in air and ground communications. The 747 was flying an approach to a civilian field in Malaysia where the minimum descent altitude at the final approach fix was 2,400 feet. The controller gave them instructions in English to descend "*two* four hundred feet." The crew, not referring to the approach plate, interpreted the instructions as descend "*to* four hundred feet." The aircraft impacted the ground 1 mile prior to the final approach fix at 450 feet MSL. Granted, the basic problem was the crew not complying with the minimums depicted on the approach plate. But obviously, an error in communications was a definite contributing factor.

The controllers throughout the world do a commendable job in speaking English, but their accents can prevent total or even partial understanding of the meaning of the spoken word. Of course, to them, we have accents also which garbles up two-way communication. It is odd a very expensive study done some years ago proved no one thinks they have an accent, at least that's what 100 percent of those surveyed reported. I know I don't have any accent. In fact, I sometimes have less trouble understanding Tokyo Center than Houston Center.

Understanding the Message

It is human nature not to admit you don't understand someone. Let's put the shoe on the other foot. Back in the early days, French was the international language of aviation. There wasn't much transoceanic traffic at the time so it didn't hurt to let the French have their way while we played in our own back yard. However, when the ICAO was formed, it was by the margin of two votes that English took its place as the voice of aviation and left French as the language of love. Just imagine if the vote was different, and we all had to learn French to be able to fly. The French language was designed to be spoken at or near the speed of light with content not as important as proper pronunciation. Even the "MAYDAY" distress call comes from the French word m'aidez which means help me. Of course, this adaptation was understandable when you consider how badly the French Air Force was once outnumbered.

The secret to handling hard-to-

continued

The tense "body language" of a busy controller can't be conveyed over the mike, so 55 percent of effective communications will be lost.

Say Again continued

Air to ground communications—a primer

understand communications is to practice the two "Ps" — patience and politeness. When foreign controllers get overloaded, it may require several attempts to get the "ungarbled word," so be patient and stay calm. Politeness works very well with all controllers as long as it is not carried to the extreme.

Some very good advice on radio procedures was published in the Air Force North American Supplementary Flight Information Publication (FLIP) nearly 40 years ago: "In radio telephone communications, the accuracy with which messages are received depends on the transmitting pilot's and/or operator's clearness of speaking. Correct understanding of all speech over the radio must be effected through clear enunciation. Speak in a moderate tone of voice, holding the microphone squarely in front of your mouth with the lips almost touching the mouth piece. When numerals are to be transmitted, as in altimeter settings, a slight pause before and after each will materially assist. Radio telephone transmissions will be made in a concise and businesslike manner, omitting irrelevant words and phrases."

There have been significant advances in radio technology since those instructions were written. They are smaller, generate less heat, look nicer, and it's easier to see and set the frequencies. Unfortunately, they don't sound any better, and the nature of the people at each end of the speaker and microphone haven't changed one iota since shoes were brown, props were wood, and fires were used for night navigation.

It's Always a Concern

Misunderstood radio communications are as deadly as thunderstorms. They have no regard for the size, shape, or speed of any aircraft. They are not seasonal and can come at any time, and they can be lethal.

There is no shortage of old pilot tales concerning communication misunderstandings and near mishaps because of instructions received and perceived. These old pilots are around to tell them because they were alert and questioned the instructions, someone on the ground was alert and caught the mistake, or they were just plain lucky.

Well, fellow aviators, if you depend on luck to play this game, your chances of finishing it are mighty slim. In the field of air and ground communications, LUCK stands for *L*isten, *U*nderstand, *C*onfirm, and *K*eep alert. If you do those four things, your communication problems will be limited to remembering your call sign. ■

Some Advice

■ The secret to the communications problem when the controller is hard to understand is to anticipate what he or she is going to ask for. Had the commercial aircraft crew been anticipating a clearance to 2,400 feet as the approach plate indicated, there would not have been a failure to communicate. Of course, it is not always possible to anticipate clearances so everyone in the cockpit should listen up whenever the controller is hard to understand (or any other time for that matter).

Finally, always read back, clearly and slowly, any clearance you receive from foreign, or hard-to-understand, controllers. ■

MAIL CALL

Address your comments to Editor, Flying Safety Magazine • AFISC/SEPP • Norton AFB, CA 92409-7001

Employing a good idea

As difficult as it is to believe, in the course of the last 5 years (2½ years Naval Safety Center, 2½ years Naval Postgraduate School), I have participated in an excess of 200 aviation safety surveys worldwide. One of the major benefits of observing *different* aircraft communities is unique proactive programs which improve a command's safety posture are frequently noted on those surveys. Further, I have found, often with little or no modification, these unique and effective "homegrown" ideas are applicable to virtually *all* aircraft communities.

On a recent visit to Argentina for a Naval aviation safety symposium, I noted the innovative idea shown in these article pictures. Rubber doughnuts are spaced along ground electrical power cables on the flight line. The presence of these doughnuts prevents the cable insulation from directly contacting the flight line surface, therefore minimizing chafing and abrasion on the cables.

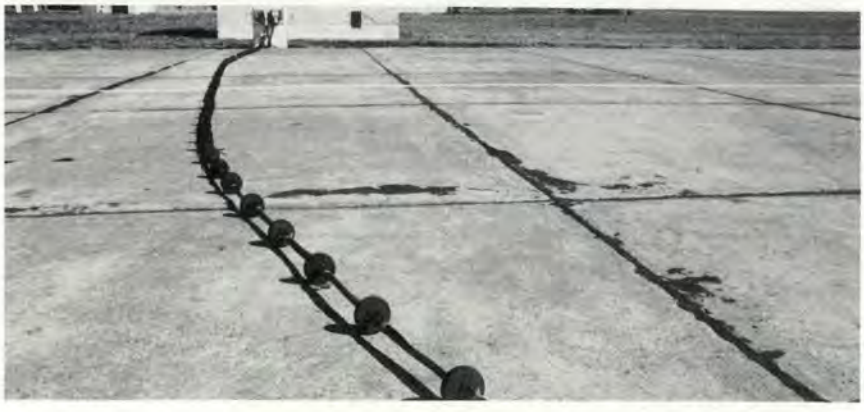
While this flight line cable idea is just one innovative idea, there are countless others in existence everywhere in the world . . . all you have to do is be alert to them and be willing to plagiarize, or, as I tell the aviation safety officer students, "In the military, there are no extra points for originality."

And, by the way, I believe this is true regardless of which service one plagiarizes the idea from . . . Air Force, Army, Navy, and Marine Corps — beware! You are all fair game!

D. D. Barclay, Lcdr, USN
Head Mishap Investigation Branch
Aviation Safety Programs
Naval Postgraduate School
Monterey, California

Editor's Note: For all of you who have had the opportunity to work with flying units from around the globe, take those new ideas to your friendly FSOs — they'll know the best ways to get them reviewed for Air Force use.

Rubber doughnuts prevent cable insulation from directly contacting flight line surface, minimizing chafing and abrasion on the cables.



Lieutenant General Charles A. Horner

The staff of *Flying Safety* offers their sincerest apologies to one of the Air Force's leading warriors, Lieutenant General Charles A. Horner. A typographical error in our February 1991 issue incorrectly stated his rank. General Horner's leadership as CENTAF Commander during Desert Shield and Desert Storm presented the Air Force at its best during some of the worst possible conditions.

Flying Safety, along with all members of the United States Air Force, will continue to recognize and honor the contributions of Lieutenant General Charles A. Horner to air power and peace.

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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.

STAFF SERGEANT

Samuel J. Alden

616th Military Airlift Group
Elmendorf AFB, Alaska

■ While flying a C-130H personnel airdrop mission to Malemute Drop Zone, Staff Sergeant Alden's crew experienced a drop malfunction. Sgt Alden was the primary loadmaster stationed at the left paratroop door. Staff Sergeant Barry Stone was the secondary loadmaster stationed at the right paratroop door. Ten jumpers exited from each side of the aircraft, and the Army jumpmaster reported all jumpers clear.

Sgt Alden noticed Sgt Stone was having trouble manually retrieving the jumper's static lines from the right door. Sgt Alden quickly informed the pilot of the problem and positioned himself in the doorway, head and upper torso outside the aircraft, to look back. In the pitch dark behind the aircraft, he spotted the paratrooper entangled in the trailing static lines. Sgt Alden set up for emergency retrieval. By the time the pilot was notified, the aircraft already escaped from the drop zone and was flying over a large channel of icy water which precluded cutting the jumper free. Within 30 seconds, the retrieval began.

Sgt Alden anchored himself to a life-line and stood in the doorway while Sgt Stone operated the static line retriever. He knew if the static line retriever snapped while retrieving the jumper, the jumper would likely sling back and separate from the aircraft. As the static line retriever reeled the jumper closer to the doorway, Sgt Alden, with complete disregard for his own safety, stepped into the doorway and grabbed the parachutist still in the slipstream. At that moment, the retriever line broke! As he felt the jumper lurch back, he mustered all of his strength and hauled the jumper and himself back into the aircraft.

As the crew set up for an emergency return to Elmendorf AFB, Sgt Alden administered first aid to the trooper. He is alive and back with his unit as a result of Sgt Alden's quick thinking, professionalism, and selfless devotion to duty.

WELL DONE! ■

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UNITED STATES AIR FORCE

Well Done Award

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

LIEUTENANT COLONEL
John E. Hill

SECOND LIEUTENANT
William S. Brinley

27th Tactical Fighter Wing
Cannon AFB, New Mexico

■ Lt Col John E. Hill, Aircraft Commander, and 2Lt William S. Brinley, Weapon Systems Officer, were lead of an F-111 two-ship surface attack tactics training sortie. Their aircraft entered the low level route and was descending through approximately 1,500 feet when they encountered snow geese. Ten to twelve geese struck the aircraft. Bird remains entered the cockpit, and a combination of bird remains and debris was ingested into both engines.

The no. 2 aircraft rejoined and stated fireballs were shooting out the back of lead's aircraft. The crew retarded the no. 1 engine to idle and selected minimum afterburner on the no. 2 engine. This eliminated a great deal of engine vibration.

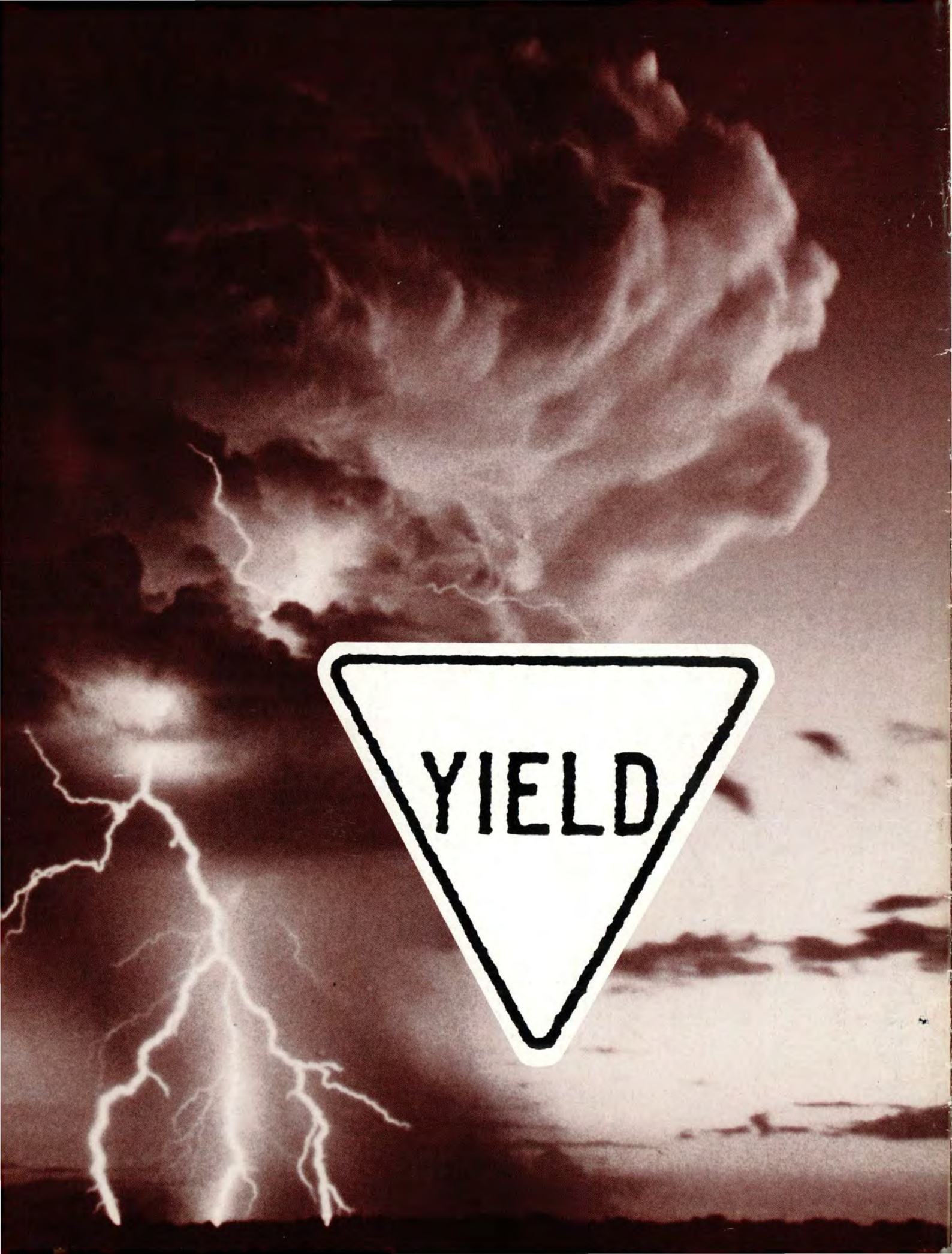
The aircrew now had one engine stabilized in minimum afterburner, one in idle, no airspeed or altitude information, limited forward visibility, a heavy fuel state, and a load of eight Mk 82 inerts. As the crew began a descent, Lt Col Hill deselected afterburner on the no. 2 engine. The engine RPM immediately rolled back to about 65 percent.

While advancing the throttle, the engine compressor stalled. On the third attempt, the engine stabilized. The approach would have to be flown with one engine in minimum afterburner and the other in idle. A controllability check showed enough stability to attempt an approach.

Max afterburner was selected on the no. 2 engine to assess go-around capability. Again, the engine compressor stalled. When restarted to minimum afterburner, the compressor stalls stopped. The crew decided a faster-than-normal approach would have to be flown to allow for the possibility of a missed approach.

With the chase aircraft providing airspeed, altitude, azimuth, and glide slope information, Lt Col Hill was able to visually acquire the runway and perform a flawless landing in a critically damaged aircraft. The crew was able to successfully stop the aircraft short of the departure end cable.

WELL DONE! ■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