flying

SAFETY | SEPTEMBER 1988

According To Noah

Good Service Makes A Difference

"Well, Doc . . . I Could Clear My Ears"

"To Eat Or Not To Eat?"

In God We Trust

CREW COORDINATION

Don't Leave Home Without It

THE FLYING STANDDOWN

■ I'm delighted to be on board as the Director of Aerospace Safety, and I look forward to working with all of you in meeting the challenges of the future. I am committed to maintaining the highest possible mission capability while preserving those critical combat assets of people and equipment. One of my immediate concerns is the upcoming flying standdown.

Budget constraints have required some units, and even MAJCOMs, to curtail flying. Few of our flying units will avoid lost missions or sorties. Some will be faced with layoffs long enough to result in problems with proficiency, currency, and mission status. When we start over again in October, any loss of mission capability will be temporary. However, if we attempt to pick up right where we left off, the loss of aircrew and aircraft that may result will be permanent.

In the past, commanders have dealt with this problem with varying degrees of success. End-of-year flying programs and budget considerations will disrupt schedules, and history has shown there are several major concerns during periods of standdowns or cutbacks.

■ **Loss of Currency** What's the best way to regain currency, especially if IPs also lose it? How do you schedule mass event requalifications without overloading airspace systems or shorting the degree of training needed to *really* requal someone? Treat each event and individual separately. Follow the requal rules, even if it affects the mission status. If waivers are necessary, again treat each case individually, and make sure the background is there to make the waiver a calculated, but reasonable, risk.

■ **Loss of Proficiency** This is faced by all crews after a DNIF, leave, or TDY; so the only new aspect may be the number of crews involved if a whole unit stands down. Start back slowly, with a building-

continued on page 2

When we start over, the loss of mission capability will be temporary. However, if we attempt to pick right up where we left off, the loss of aircrew and aircraft that may result will be permanent.

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SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, OSAF

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THE FLYING STANDDOWN

continued from inside front cover

Plan the early missions to regain and demonstrate superior skill one element at a time, and don't require the total sum of all skills during the first 15 minutes of flight.

block approach that emphasizes nondemanding events and sorties until the basic airmanship skills return. Our mishap records are full of examples of skills that diminish with time: Instrument/night proficiency, formation and refueling, weapons deliveries, and low-level flying. An associated problem is lack of coordination. Not just headstick coordination, but also between crewmembers, aircrew and air traffic control, fighters and GCI, etc. Also included is deterioration of the ability to withstand the physical aspects of flight. Watch for lower G tolerance.

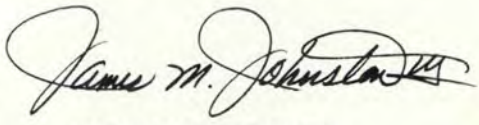
■ **Pressing** Supervisors, as well as aircrews, need to be aware of the insidious effects of the desire to requalify or return the unit to mission-ready status. Recognize that the negative results of a disruption like this may last much longer than the disruption itself, and that the desire to get back to normal could result in accepting a mission that exceeds capabilities. Schedule the cosmic mission scenarios after everyone is back up to speed.

Another factor is overconfidence — a flier's self-image or the image he or she has of others (wingmen, crew, etc.) may exceed the person's actual capability after a layoff. This could result in pressing or even exceeding limits. Plan the early missions to regain and demonstrate superior skill one element at a time, and don't require the total sum of all skills during the first 15 minutes of flight.

■ **Maintenance Status** The aircraft maintenance status is another unknown. Will the downtime result in a fleet of fully mission-capable jets, or will there be more problems after an extended downtime? What effect will these disruptions have on the critical skills of munitions handlers?

Finally, what effect will these multiple factors have on the numerous independent situations units will face? Risk factors tend to multiply, and these factors can change August's routine flight into October's highly demanding mission.

In summary, the challenge is to avoid mishaps caused by distraction, channelized attention, discipline breakdowns, and complacency that may result from disruptions to normal training and routine mission schedules. It is up to each individual to accept the challenge. Whether you're turning the wrenches, packing the parachutes, moving the controls, or controlling the schedule, you are a key player. All of us working our mission together can ensure our combat capability is not diminished. ■



JAMES M. JOHNSTON III
Brigadier General, USAF
Director of Aerospace Safety

The Ten Commandments of Crew Coordination

MAJOR JOHN WOODRUFF

I AIRCRAFT COMMANDERS

Think People!

Remember you are working with people who have feelings of worth, need, and dignity.

II AIRCRAFT COMMANDERS

Set The Tone!

If you are the director of a one-man band, you won't foster much crew coordination. You, the pilot, set the tone of the crew. If you encourage and are receptive to an exchange of information, you'll probably get it. Also, let each crewmember know what you expect of him or her.

III AIRCRAFT COMMANDERS

Solicit Information!

Ask for opinions or suggestions. It's not a sign of command weakness to ask what the other crewmembers think.

IV AIRCRAFT COMMANDERS

Use Other Crewmembers' Experience!

That old engineer probably has a lot of experience that can help you. Use it.

V CREWMEMBERS

Don't Be Shy!

If you've got something bothering you, speak up. You may know something someone else doesn't.

VI CREWMEMBERS

Be Persistent!

Keep the pilot and other crewmembers informed. Don't let one crewmember snuff you out.

VII CREWMEMBERS

Remember Who's in Command!

Make your input to the boss, but remember he or she makes the final decision.

VIII AIRCRAFT COMMANDERS AND CREWMEMBERS

Be Tactful!

Don't close the channels of communication in crew coordination through immature or unprofessional behavior.

IX AIRCRAFT COMMANDERS AND CREWMEMBERS

Reinforce Good Coordination!

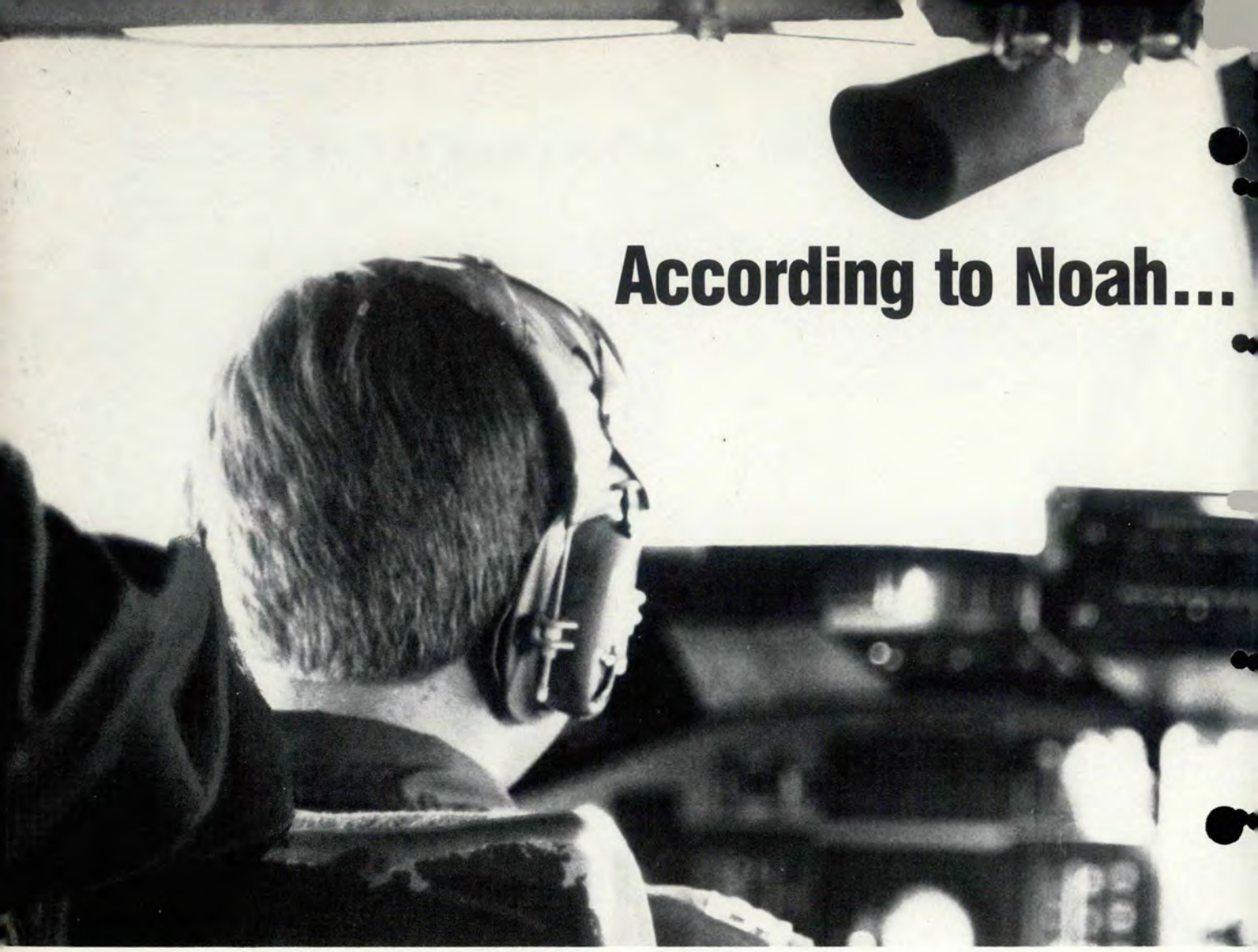
When your crew flies a successful mission, it involves a lot of successful efforts by your crew and other support people. Reward people for special efforts with a "thank you" or a letter to their commander. Remember, a small "thank you" goes a long way with the other crewmembers and team players.

X AIRCRAFT COMMANDERS

Don't Shirk Your Responsibility!

Think people; set the tone for crew coordination; solicit information; use experienced people; reinforce good coordination; BUT, remember you must make the final decision and be responsible for it.

Reprinted from *Aerospace Safety* January 1978



According to Noah...

LT COLONEL MICHAEL F. JACOBS

Reprinted from *Flying Safety*, June 1982.

■ *Crew (KROO) n (O.F. creue "growth, increase," fr. criestre "to grow").*

The body of men manning or trained to man a machine . . . or the like, or employed under one officer or foreman.

— Webster's New Collegiate Dictionary.

Isn't it strange that the very word we use to define a group of professional aviators means such a broad variety of things?

You probably noticed that Noah hedged his definition so that a "crew" may or may not be trained or led. As it stands, almost any group of people would fit — virtually anything from a mob to a gang to a team. Where are we, as military aircrews, supposed to fit?

Although it's not Noah's fault, we've seen the entire range over the course of the years. War stories always come from the extreme ends of the spectrum — the "mob" that flew a perfectly good aircraft into the ground — the "team" that brought back a bird that "couldn't possibly fly." What made the critical difference?

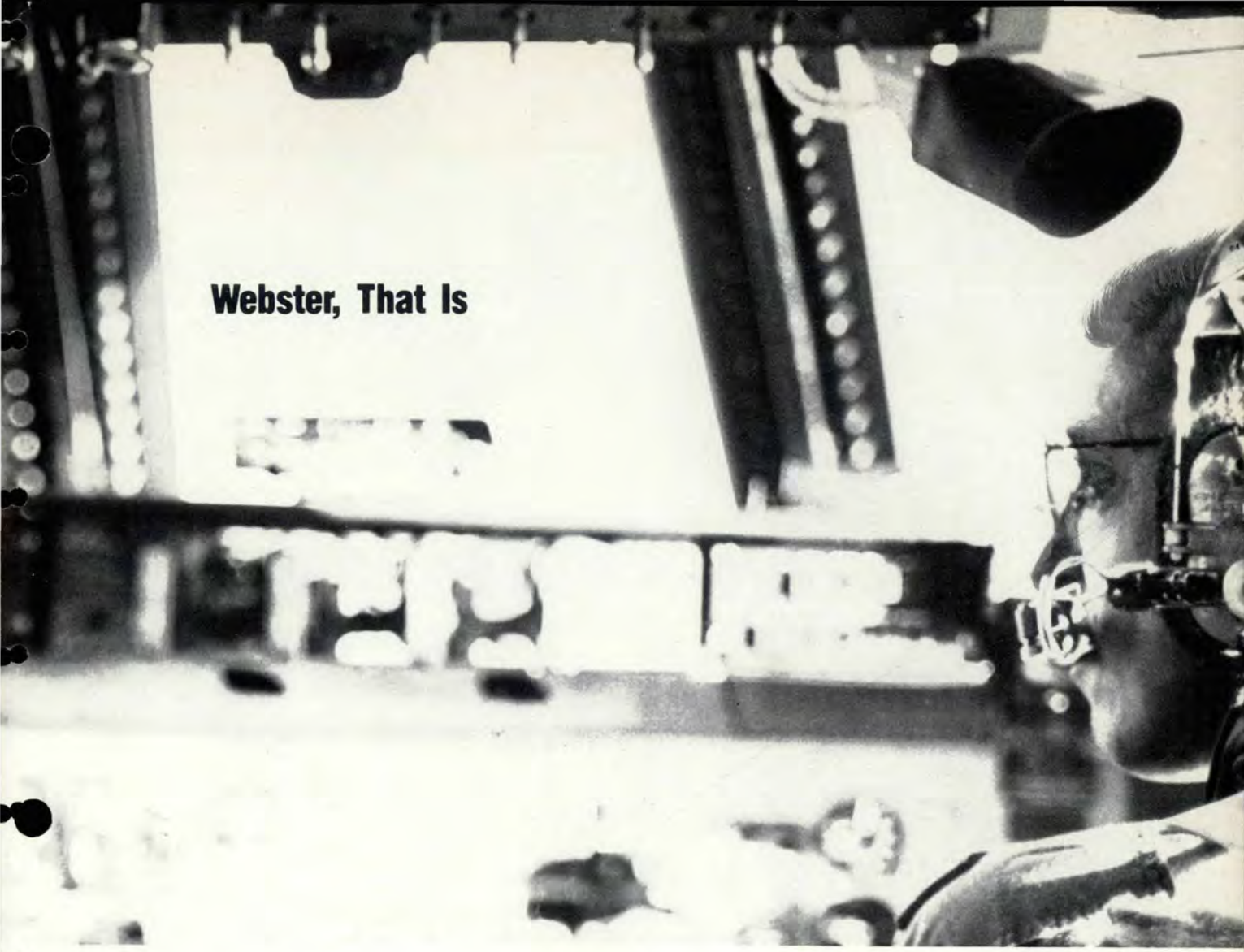
The vital link was coordination. In Noah's words: Coordination *n* harmonious adjustment or functioning. Thus, crew coordination is the "harmonious functioning" of our "body of men" that are "trained to man a machine." There is no doubt that the team bringing back a broken bird under impossible conditions had all the elements — the "mob" didn't.

Crew coordination is a phrase that has been used (and misused) from the first days of aviation. It is frequently blamed for mishaps or inefficiency. Yet, it has remained a gray area of instruction and regulation due to the broad variety of individual duties. Like the word "judgment," it is difficult to pin down.

Using Noah's definitions, let's investigate some of the elements necessary for effective Air Force crew coordination.

- Training
- Leadership
- Harmonious functioning

Training generally starts with the formation of the "crew" on paper.



Webster, That Is

After completing courses in aircraft systems, emergency procedures, and mission elements, the group goes on to continuation training designed to maintain proficiency. It is possible to complete all phases of training without efficient crew coordination if tasks are complex, individualized, and not compared to the overall effect.

When precise, yet widely differing specialties are involved, instructors at all levels must ensure their students are trained and evaluated on their contributions to the rest of the crew. Emphasis must be placed on smooth, efficient mission accomplishment.

Leadership may also be misused to preclude the formation of a "coordinated" crew. Supervision that suppresses or excludes the weak individual or that operates in a dictatorial manner divides the unit into "mobs" that often work against mission accomplishment.

Misuse of leadership also includes lack of direction or self-isolation by the designated boss. The leader must have a thorough understanding of the mission goals and the individual elements required to achieve them. The leader's decisions must create an atmosphere that ensures instant response at the appropriate level to mission demands. Abdication of this responsibility will guarantee failure and may set the stage for a tragedy.

Harmonious functioning is too often misinterpreted to mean the creation of a "happy herd." From sun-up to sundown, they mill around together without a specific purpose. The smiles on their faces often imply total integration where none exists in reality. When the "crew" becomes a social club, the frequent result is a breakdown of discipline when it really counts. Conversely, open hatred between members may also indicate a continual lack of discipline. Most desirable is an atmosphere such as may be present in an orchestra. The violinist and the flutist are professionals who feel neutral toward each other, but work with the conductor to produce a beautiful symphony.

What, then, is the answer for effective crew coordination? In simple terms (Noah's, in fact), the team must consist of expertly trained troops with good leadership who have free and open communication while they are accomplishing the mission. ■

Good Service Makes A Difference

CMSGT AUGUST HARTUNG
Directorate of Aerospace Safety

■ When traveling cross-country in your automobile, you know the mark of a good service station. It usually has an inviting appearance. Along with that, you can probably count on the people who work there to be friendly, knowledgeable, and professional.

On the other hand, how often has your spouse or friend said, "Don't stop at that place! The service is just awful!"

You might wonder how this applies to the Air Force, whose primary mission is to fly and fight if it has to. To accomplish this mission, the Air Force must not only have trained fliers, but good airplanes maintained by expert technicians. Many of those technicians are assigned to "service stations" around the world, best known to fliers as "Transient Alert."

Let's take a look at the importance of transient alert and a profile of one with a very unique mission.

Importance of Transient Alert

Why is transient alert service so important to aircrew members and their aircraft when stopping at an airfield away from home station? To find out, I asked a C-141 pilot in the 14th Military Airlift Squadron at Norton AFB, California.

Captain Jose L. Hernandez, Jr., explained that as worldwide airlift providers to all services, he and others in the Military Airlift Command rely heavily on the support from transient alert units. He went on to say how people in these units not only provide service to his aircraft, maintenance and proper aerospace ground equipment, but frequently also help aircrews in other ways. "Many times, transient alert people will provide a lift to billeting, command post, or the snackbar when the transportation squadron is busy."

The C-141 pilot went on to explain how transient alert folks coordinate with their unit's job control for expeditious maintenance support, if the aircraft has a problem. He also stated that a transient alert team, with assistance from their respective unit's maintenance shops, can usually fix the problem and get the aircraft and crew on their way.

Colonel Dwight F. Wilson, Chief Flight Safety Division at the Air Force Inspection and Safety Center (AFISC), periodically flies with various Air Force units and considers the transient alert function an important role. He said that pride in the way these people do their job is refreshing.

"There is nothing more reassuring to a pilot and his or her crew than proper transient alert services immediately after landing the aircraft," said the AFISC colonel. "Safe, efficient, and reliable service gives the aircrew confidence in continuing their mission. Conversely, there are few things so disconcerting as poor

or unsafe service. Taking chances or cutting corners to get the job done can easily lead to a mishap."

He went on to explain that at several bases, maintenance troops sometimes got dangerously close to the engine intake of his aircraft. Since similar incidents in our Air Force have led to serious mishaps, some even with fatalities, Colonel Wilson informed the proper people so they could fix the problem in a timely manner.

Since transient alert units are important to the successful completion of our mission, let's look at a very unique unit. We will see what elements are necessary for success.

A Transient Alert Profile

Timeliness in service, safety in operation, and courtesy to aircrews and passengers are key priorities to the success of any transient alert unit. The transient alert team at Clark Air Base, Republic of the Philippines, exemplifies these priorities. MSgt Greg Bastyr, the 3d Tactical Fighter Wing's (3 TFW) Transient Alert Section Chief, explains.

"First, the real challenge for a transient alert unit is to service aircraft in a timely manner. We know the handling of aircraft stopping at a base can be a direct contribution or hindrance to the job the aircrew must accomplish. For that reason, we consider our team to be an integral part of the Air Force mission. Timeliness in service is an important part of our business."

He went on to explain how a transient alert unit must include safety in their operation. That's not to say that safety is secondary to timeliness in service, but rather, is incorporated in it.

Sergeant Bastyr and his team are keenly aware of the trust that aircrews place in the knowledge and accuracy of transient alert. "If a transient alert crew takes risks, they could contribute to either a delay in mission accomplishment, or worse yet, a mishap," said the team's leader. "Safety is a must!"

Sergeant Bastyr concluded by emphasizing that courtesy is contagious. "It's important for each of us to personally provide favorable first and last impressions to all travelers stopping at Clark AB," said the sergeant. "Since aircrews and their passengers carry that impression wherever they go, the team at Clark AB works hard to make it a favorable one."

A Unique Mission The transient alert people at Clark perform a unique mission. Most of us work with only one aircraft at a time. This is not the case for the people at Clark. Parking, servicing, and starting many different types of aircraft, they quickly learn a cautious approach to business.

When asked what aircraft they typically handle, TSgt Willie Freeman, Assistant Supervisor, 3 TFW Transient Alert, produced a formidable list ranging from fighters to heavies. The list also included aircraft assigned to foreign governments as well as our own Presidential fleet.

In addition to servicing a vast array of aircraft, this transient alert unit performs another important tasking — crash recovery.

This involves responding to an aircraft in trouble, safing it, and removing it quickly from the runway. Such emergencies demand swift, capable, and calm action from those who must respond. In the aircraft maintenance world, the last line of defense between an emergency and a catastrophe can be the crash recovery team.

As I talked with the team members in their newly refurbished facility, the secondary crash telephone rang. In the few seconds it took Airman John Lee to write down the pertinent in-flight emergency (IFE) information, his coworkers began to experience the sense of urgency associated with every IFE.

Responding swiftly in their vehicles, the team reached a predetermined vantage point on a taxiway and watched a pilot land his F-4 and take the barrier successfully. Quickly, MSgt Bastyr and his team safed the jet, freed its tailhook from the barrier, and got the aircraft off the active. With a major operational exercise in progress, it was a busy flying day, and the base desperately needed the single runway. Within a few minutes, it was all completed successfully.

continued

Clark Transient Alert members proudly wear the patch they designed. Their pride extends to the mission and is reflected in the professional way each person performs. Effective and regular training is an important key to maintaining their outstanding record of service.

Good Service Makes A Difference

continued

Quality transient service begins with ample notification of arriving aircraft. Here, A1C John Lee, a member of the Clark AB transient support team, updates the daily servicing log.

A1C Gage Davis, a team member, remembers other emergencies such as the A-10 that sheared a nose strut on landing; and the F-4 that blew a tire on takeoff roll, skidded off the runway, and caught fire.

The entire team is proud of their reaction time in getting disabled aircraft off the runway quickly. However, SrA Codola Williams, another team member, stressed that time isn't the only factor — it had better be done safely.

As you might expect, this unique mission requires some specialized training. Becoming an expert in either transient alert or crash recovery isn't easy. For that reason, the section holds specialized training sessions to practice procedures and sharpen skills. Although the specific lessons may change each month, members review everything from disabled aircraft recovery and alternate towing methods, to safety procedures and courtesies to all visitors.

"The training is good because it allows us to respond to virtually any situation in a calm, professional manner," explains SSgt Nick Soniega, shift supervisor of the wing's transient alert team. "Both functions take real teamwork and require constant and continued attention to safety."

The in-house training and daily experience with a variety of aircraft have not only produced skilled and safety-conscious technicians, but just as important, a group of people who take pride in what they're doing.

Rex Riley Transient Services Award

Years ago, a string of automobile service stations across the country used the phrase "You can always trust your car to the man who wears the star — the Texaco® star!" Today in our Air Force, there is a "star" recognizing excellence in transient services to aircrews — the Rex Riley Transient Services Award.

Symbolized by a blue-and-gold patch and a special award certificate bearing the same name, the Rex Riley program has become synonymous with exceptional aircrew treatment and aircraft servicing.

But it takes more than that to receive the award. It takes a team effort from many services on a base. These include base operations, messing, transportation, billeting, maintenance, and other areas which could directly, or indirectly, affect aircrew frame-of-mind or fatigue levels.

Because of their enthusiasm, attention to detail, and desire to provide the very best service possible, the 3 TFW at Clark AB is one such unit that proudly displays this honorable award.

A1C Gage Davis listens intently as assistant supervisor TSgt Willie Freeman stresses the importance of flight line safety. At Clark AB, quality is never sacrificed for quantity.

Benefits

Timeliness in service, safety in operation, and courtesy to aircrews and passengers are the benefits to those who transit all bases that proudly display the Rex Riley award. It is their excellence we all depend on, and it is this edge of professional service that ensures our mission is completed ... and completed safely. ■

WELL, DOC . . . I COULD CLEAR MY EARS.

CAPTAIN KURT A. FICHTNER
Chief of Aeromedical Services
Loring AFB, Maine

MAJOR J. PAUL MEYER
Chief of Aeromedical Services
Vance AFB, Oklahoma

CAPTAIN JEAN L. COMBS
Flight Safety Officer
Vance AFB, Oklahoma

■ As aircrew members, we must understand the problems we may encounter with our ears and sinuses. Keeping them clear is necessary for safe flying and mission completion. Our mishap reports repeatedly describe missions aborting because an aircrew member could not successfully clear his or her ears, or because they were experiencing a sinus problem.

Two base safety offices are doing something about it. Their flight surgeons — Major Meyer and Captain Fichtner — have prepared briefings on the ear and sinus anatomy and the valsalva maneuver. For your information, we offer portions of their briefings and some of their good advice. — Ed.

If we are unable to valsalva (clear our ears), certain physiological conditions may occur which often lead to safety hazards as well as prolonged (2-3 weeks) groundings. We can prevent any problems by a little understanding of our anatomy and some physiologic incidents that may occur, and a willingness to admit that we are *not* fit to fly with cold symptoms.

Two Types of Barotrauma

The two most common physiologic incidents you may experience are middle ear barotrauma (barotitis, ear block) and sinus barotrauma (barosinusitis, sinus block).

Middle Ear Barotrauma Middle ear barotrauma is a condition where either the lining of the ear is injured resulting in fluid or blood accumulation, or the eardrum is ruptured. These conditions are a direct result of the unrelieved buildup of a pressure differential between the middle ear and ambient air pressure.

Figure 1 shows the anatomy of the middle ear. Normally, ambient pressure equals middle ear pressure. This is maintained by swallowing and valsalva maneuvers which open the Eustachian tubes (the only openings from the middle ear to the

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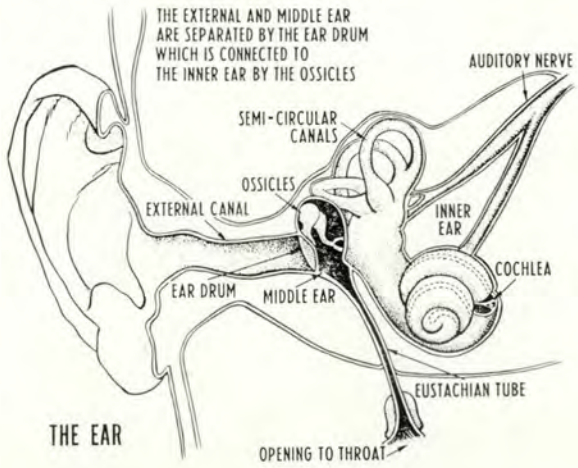
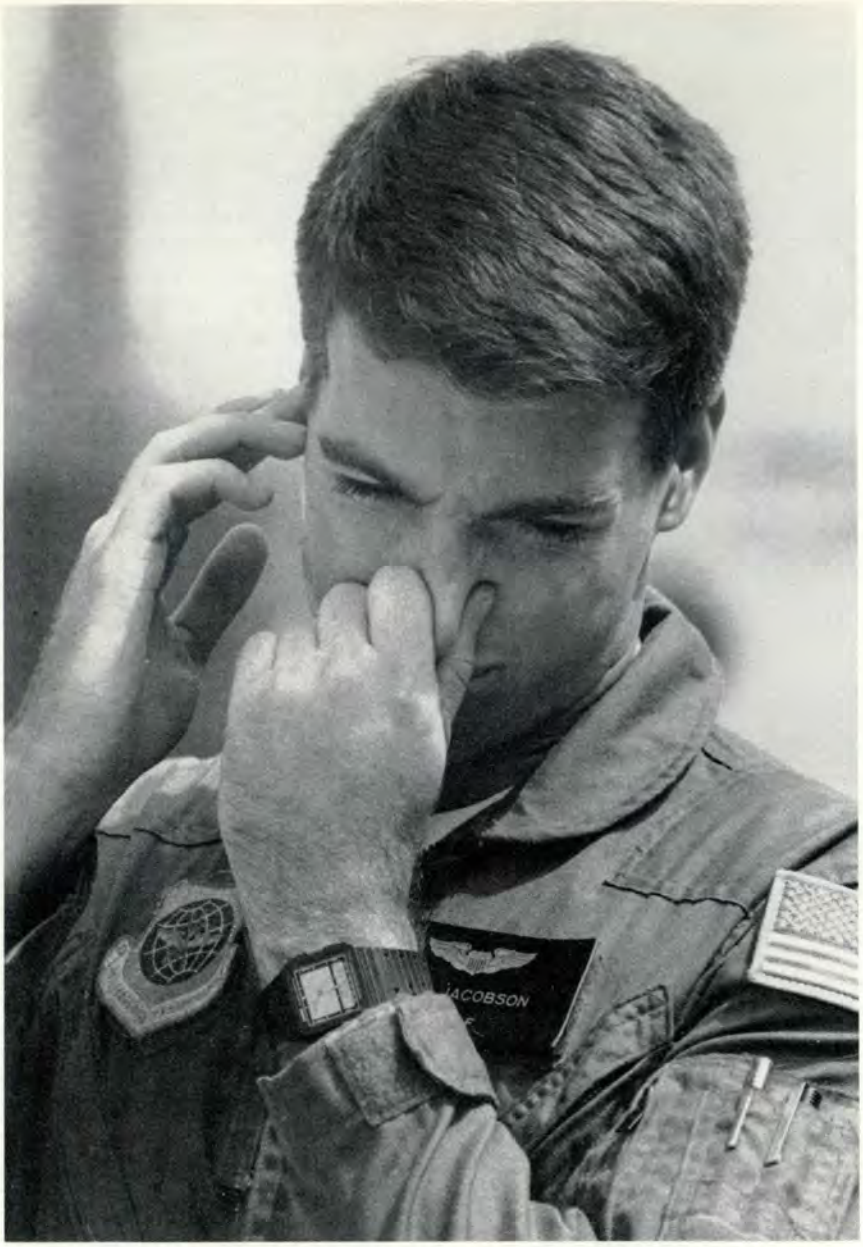
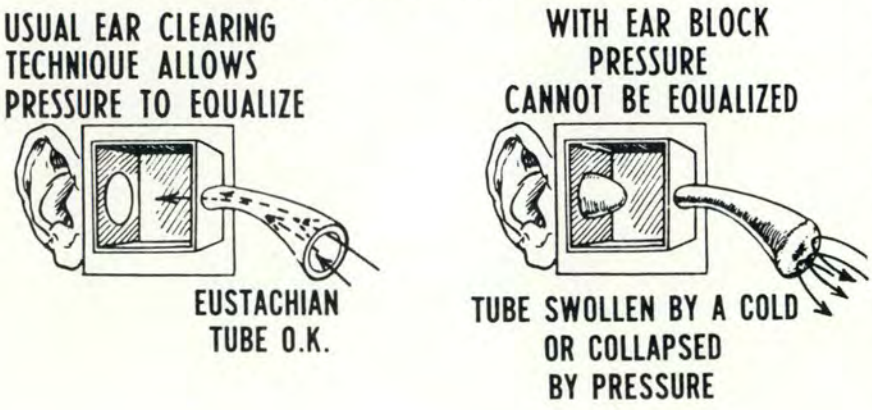


Figure 1. Cross Section of the Human Ear Opening to Throat. The ear is divided into three main parts — the external ear consisting of the auditory canal, the middle ear located in the bone of the skull, and the inner ear which is responsible for hearing and equilibrium.



Equalizing the pressure in your ears during changes in barometric pressure is very important. If you are unable to do so, an ear block will most likely occur. There is seldom any difficulty while climbing — most often, the difficulty occurs during descent.

Figure 2. Pressure Effect During Descent



"Well, Doc . . . I Could Clear My Ears" continued

back of the nose and throat) to the atmosphere.

However, conditions such as the common cold can cause swelling of the tissues around the openings of the Eustachian tubes and prevent you from being able to open them and equalize the pressures.

It is important to note here that our ability to valsalva on the ground does not assure we will be able to do so at altitude, nor does it tell us anything about our ability to ventilate the sinuses. So, the old excuse, "Well, doc . . . I could clear my ears," should be a thing of the past.

Another type of barotrauma to the middle ear is often seen in individuals who have "flown" the altitude chamber, or who fly combat aircraft breathing 100 percent oxygen. This "delayed" form occurs sometime after the flight due to the absorption of 100 percent oxygen by the middle ear, which once again, causes a pressure differential between the middle ear and the ambient atmosphere.

Normally, this is not a problem in the healthy, awake individual. However, in the sick individual, or the person who goes to sleep after a late night sortie where decreased swallowing prevents pressure equalization, the end result can be an ear block or less often, an eardrum rupture.

Sinus Barotrauma Less frequently, you may experience sinus barotrauma. Figure 2 shows that the numerous sinuses in the skull open to the nasopharynx through common channels. These channels are distinctly separate from the eustachian tube openings of the middle ear. The mechanism of injury is similar to that for an ear block; however, an unrelieved pressure differential injures the sinus lining. Most often, the common cold causes a swelling of the tissues around the sinus openings and prevents pressure equalization between the atmosphere and the intrasinus spaces.

Interestingly, because the sinuses are rigid cavities in entirety (unlike

the middle ear which is bordered by the flexible eardrum on one side), we have no perception of whether we can ventilate the sinus and thereby equalize any pressure differentials. Most importantly, however, is the realization that if the sinuses ventilate on the ground, this does not guarantee they will do so at altitude.

The Problem of Descent

The Ears As you come down from a high altitude, 20,000 feet down to below 10,000 feet for instance, the atmospheric pressure increases. While you are descending, the pressure on the outside of your ear is trying to cave in your eardrum. If you get enough pressure, not equalized by a valsalva maneuver, from the outside inward on your eardrum, you will experience pain. At times, your ears will equalize without you doing anything. At other times, you will need to perform the valsalva maneuver to equalize the pressure.

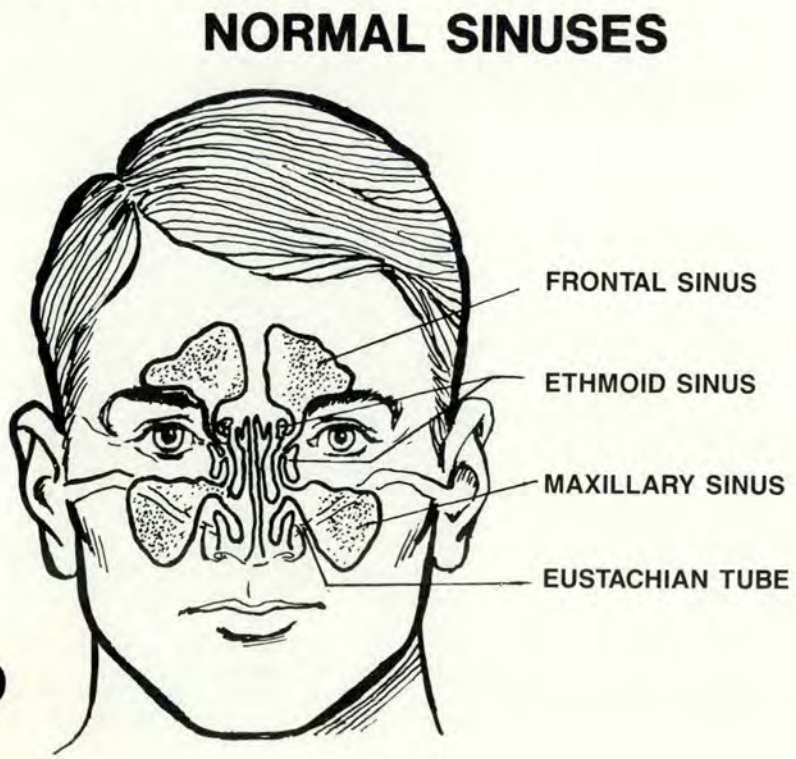
One of the reasons you get into trouble during high rates of descent is the possibility of reaching what is known as "closing" pressure. During rapid descents, external pressure changes are not only trying to cave in your eardrum, but also are exerting an external pressure on the eustachian tube to close it. When this happens, it is much more difficult to perform a valsalva maneuver. The whole point of this discussion is to remind you to perform the valsalva maneuver early enough and often enough to avoid reaching the closing pressure.

If you continue a descent after an ear block has occurred, you are increasing the pressure in the ear and making the situation worse. Climb to at least 2,000 feet above the altitude at which the ear block occurred. This will help equalize the pressure and may enable you to valsalva and clear the ears. Once the pressure has equalized at the higher altitude, it may be possible for you to continue the descent at a decreased rate. Once safely on the ground, be sure to stop by the flight surgeon's office for examination.

The Sinuses Our sinuses present a different problem for us. Most of the sinus barotrauma we may experience occurs during descent. The reason this happens is that as we ascend, the air in the sinus cavity expands and naturally leaves the sinus through the sinus opening. Even if there is some swelling of the tissues around the sinus opening (as during a cold), it usually does not prevent the air from escaping the sinus.

However, on the descent, the atmospheric pressure usually is not great enough to overcome the mechanical blockage of the sinus opening caused by the tissue swelling. As we descend, we can clear our ears through the valsalva maneuver. We, in effect, overpressure the ear. By doing that, we are forcing air into the ear. The problem with the sinus cavity is that it is not expandable. It is very difficult to force the air into the sinus cavity because it is a rigid structure.

Figure 3. Normal Adult Sinus Cavities. The sinuses most often involved with pressure changes are the frontal and maxillary sinuses.



Prevention

How can we prevent ear and sinus blocks?

- Don't fly with a cold. A cold can be treated while DNIF for a few days; an ear or sinus block caused by flying with a cold results in treatment requiring approximately 10 days to 2 weeks of DNIF.
- Keep up with the valsalva maneuver during descents to avoid reaching closing pressure of the Eustachian tube.
- Avoid excessively steep descents, if possible.
- Do clearing turns to make altitude restrictions or ask to have the altitude restrictions deleted, if symptoms of an ear or sinus block have developed.
- Climb to at least 2,000 feet above the altitude at which the ear or sinus block occurred, if you experience an ear or sinus block in flight. This will aid in relieving the pressure and enable you to continue the descent at a decreased rate.

The Bottom Line

The bottom line is that physiologic incidents such as ear and sinus blocks are preventable. We only need a knowledge of the limitations of our anatomy, a willingness to respond to the symptoms we experience, and a commitment to refuse to fly with colds. ■

ENGINE SAVING INSPECTIONS

Which is most important in saving our aircraft engines — the Joint Oil Analysis Program or magnetic chip detectors? The answer may surprise you.

HENRY L. LITTLEJOHN
Directorate of Aerospace Safety

■ Over the past year, the USAF has lost three valuable aircraft and severely damaged a fourth because of oversights or improper training in the inspection of engine lube system magnetic chip detectors (mag plugs), and failure to heed Joint Oil Analysis Program (JOAP) indications of impending engine failure.

These statistics are quoted not to point blame at anyone or any organization. They are given only to demonstrate the extreme importance of these engine indicating systems and the need for all involved with engine maintenance and aircraft operation to understand the correct procedures and what to look for. Obviously, these nondestructive inspections (NDI) are more important for our single-engine aircraft than for the rest of the fleet since an engine failure in a single-engine aircraft usually results in loss of the aircraft. However, an engine failure in a multiengine aircraft is also a serious matter.

Two Different Programs

Although JOAP and mag plug inspections complement each other, each program has its own particular purpose. JOAP may not indicate a bearing problem where the contamination generated from the bearing is in relatively large particles. A magnetic chip detector inspection may not show accumulation of contamination when the contamination being generated is very small and in small quantities. Consequently, both programs should be faithfully accomplished.

Do not assume that since the magnetic chip detector was inspected and showed no impending problems that JOAP sampling is not required or vice versa. Likewise, if either program shows an indication of impending engine problems, the other inspection program's trend may offer additional information that can help in the evaluation of the situation.

Joint Oil Analysis Program

JOAP is governed by TO 33-1-37 which comes in three volumes. For the JOAP, oil samples are drawn from each engine's oil reservoir as soon as possible after engine shutdown and before any fluid is added to the system. The oil sampling frequency is different for the various aircraft in the inventory; however, single-engine aircraft normally require sampling after each flight. Refer to applicable tech data for your particular aircraft's required sampling frequency.

Once the oil sample is obtained, mark the sample bottle with the engine's identification. Next, complete DD Form 2026, Oil Analysis Request, and route the sample to the nearest JOAP laboratory for analysis. By the way, the aircraft commander of a transient aircraft has the right to request analysis of the oil sample before continuing the next leg of his or her flight.

The JOAP lab will analyze the sample to obtain the amounts of wear metals in the oil. They will then compare the current levels with previous readings to see if a trend is developing. Recommendations that result from the lab's analysis will range from "sample results normal" to "do not fly or operate."

If the Joint Oil Analysis Program lab finds exceptionally high levels of wear metals in the oil, the engine is put on surveillance. Then it is important to monitor the trend. Rising levels of metals in the oil may point to a serious problem. The oil must not be changed during this time, as it will destroy the data and an impending engine failure may not be detected.

Accuracy is vital to the NDI Program. When taking oil samples, mark the sample bottle with the engine's identification, fill out the oil analysis request, and place both in the marked container before taking other samples. Lab people must be just as careful when analyzing the oil.

A note of special importance is that if a particular engine is put on surveillance, it is important not to drain and flush the oil system since that action will destroy the ability to trend the contamination levels. Many times the contamination trend is the criterion used to identify an engine in need of repair.

Magnetic Chip Detectors

Inspection of the engine's magnetic chip detectors is equally as important as JOAP since some types of oil system components generate wear metal that is in relatively large pieces. These large pieces may not be detected by the JOAP but can easily be accumulated on the mag plug if they are composed of ferrous material.

Each aircraft's tech data include information about how to interpret the wear metal found on a magnetic chip detector. You should reread these instructions to assure that you know what the engine is trying to tell you.

Because of concern of possible confusion with F100 engine tech data in the area of magnetic chip detector wear metal interpretation, Pratt & Whitney and San Antonio ALC have issued a detailed pamphlet known as the "red book." (The book's cover is red.) It contains excellent photographs of damaged oil system components, photographs of wear metal found on magnetic chip detectors, explanation of the causes of component failures, and instructions to be followed for instances where wear metal is found on the magnetic chip detector. This pamphlet is used to supplement F100 engine tech data until revisions to F100 TOs can be completed.

Making Them Work

The bottom line is we have NDI programs in use that will forewarn of engine bearing, gear, spline, and pump failures — JOAP and magnetic chip detectors. Both programs must be faithfully accomplished, used independently, used together, and watched for a trend if engine failures are to be reduced.

JOAP and mag plug inspections may not catch 100 percent of the engine lube system failures, but if correctly followed, they will help identify almost all of the impending lube system component failures. It takes your continued attention and good inspections to keep our engines operating safely. Only you can make these NDI inspections work. ■

"TO EAT OR NOT TO EAT?"

Air Force Survival School
Fairchild AFB, Washington

■ To many people, the thought of a diet consisting only of plants is often distressing. However, in survival situations, especially in areas where wildlife is not abundant, plants may be a survivor's only source of food.

In wilderness areas, many plants are not going to be edible, and many can even be dangerous. A survivor must be able to distinguish edible plants from inedible plants. To help determine whether or not a plant can be eaten safely, there are some general rules which should be followed and an edibility test which should be performed.

"Before a survivor even starts the edibility test on a plant, he or she should check to make sure it doesn't have any characteristics of a nonedible plant," said Sergeant Stephen D. Knecht, an instructor at the Air Force Survival School.

Inedible Plant Characteristics

Some general types of inedible plants you should avoid are:

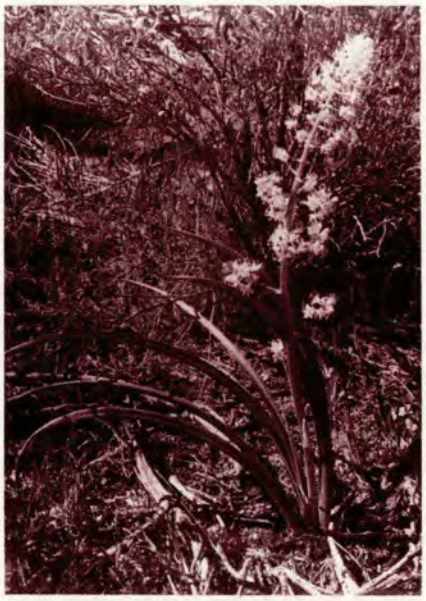
- Mushrooms and fungi. Most have toxic protein-based poisons which have no taste
- Plants with umbrella-shaped flowers. One of the most poisonous plants, poison water hemlock, is a member of this family.
- All of the legume family (beans and peas). These, such as locoweed, should be avoided because they absorb minerals from the soil.
- All bulbs. Two examples of poisonous bulbs are tulips and death camas.
- Plants with shiny leaves. Consider all these to be poisonous.
- Plants with milky sap. This is a sure indication of a poisonous plant.
- White and yellow berries. These are almost always poisonous. Approximately 50 percent of red berries are poisonous; however, blue or black berries are generally safe for consumption. Aggregated fruits and berries are always edible.
- Plants that irritate the skin. Poison ivy is a good example.

"These rules are general. There are exceptions to every rule, but when selecting unknown plants for consumption, these characteristics should be avoided," said Sergeant Knecht. "If none of these characteristics apply to the plant, that doesn't mean it is safe to eat. Always apply the edibility test to the plant," he added.

Edibility Testing

"The edibility test is a general

False Hellebore or Skunk Cabbage. **Life threatening!** The entire plant is poisonous.



Death Camas. **Life threatening!** The entire plant is highly toxic, especially the bulb.

Black Locust. The bark, leaves, and seeds are toxic, but *usually* not life threatening.

rule. There are exceptions. If you are unsure of the identity of the plant, you must follow this rule to the letter," said Staff Sergeant Charles H. Cunningham, Air Force Survival Instructor. When determining the edibility of a plant, test only one plant at a time. If some abnormality does occur, it will be obvious which plant caused the problem. The edibility test is a step-by-step process.

- First, crush or break the plant and look at the color of the sap. If the sap is clear, proceed to the next step.
- Next, touch the sap or juice to a sensitive area such as the inner forearm or tip of the tongue. If there are no obvious ill effects, such as burning, stinging, bitterness, or numbing, then proceed.
- Prepare the plant or plant part by boiling it for at least 5 minutes in two changes of water. The toxic properties of many plants are water soluble or destroyed by heat. Boiling in two changes of water will lessen or completely remove any possible poisonous material. "You should test all parts of the plant to include the roots, stem, leaves, seeds, nuts, or fruits," said Sergeant Cunningham.
- Next, place about 1 teaspoonful of the prepared plant in your mouth for 5 minutes and chew, but do not swallow it. If no obvious side effects occur, then swallow the plant and wait 8 hours. "It is desirable to perform this part of the test before you retire for the evening," added Sergeant Cunningham.
- After waiting 8 hours, if there are no ill effects such as nausea, cramps, or diarrhea, eat about 2 tablespoonfuls and wait another 8 hours.
- If no ill effects occur at the end of the 16 hour and 5 minute test, then the plant may be considered edible. "Keep in mind that large quantities of any new or strange food may cause digestive problems. Use restraint," cautioned Sergeant Cunningham. "If you render the plant edible by cooking, then each time you plan to eat the plant, you must prepare it in the same manner or perform the edibility test on the uncooked plant."

Application

In an emergency situation, the ability to gather wild foods and to be self-reliant gives one a feeling of pride and security. "Your ability to identify and harvest wild plants can be key in any long-term survival situation. It is extremely important to do research on edible plants in your area," concluded Sergeant Cunningham. ■

Poison Ivy. **Life threatening!** Touch it and itch. Eat it and die!

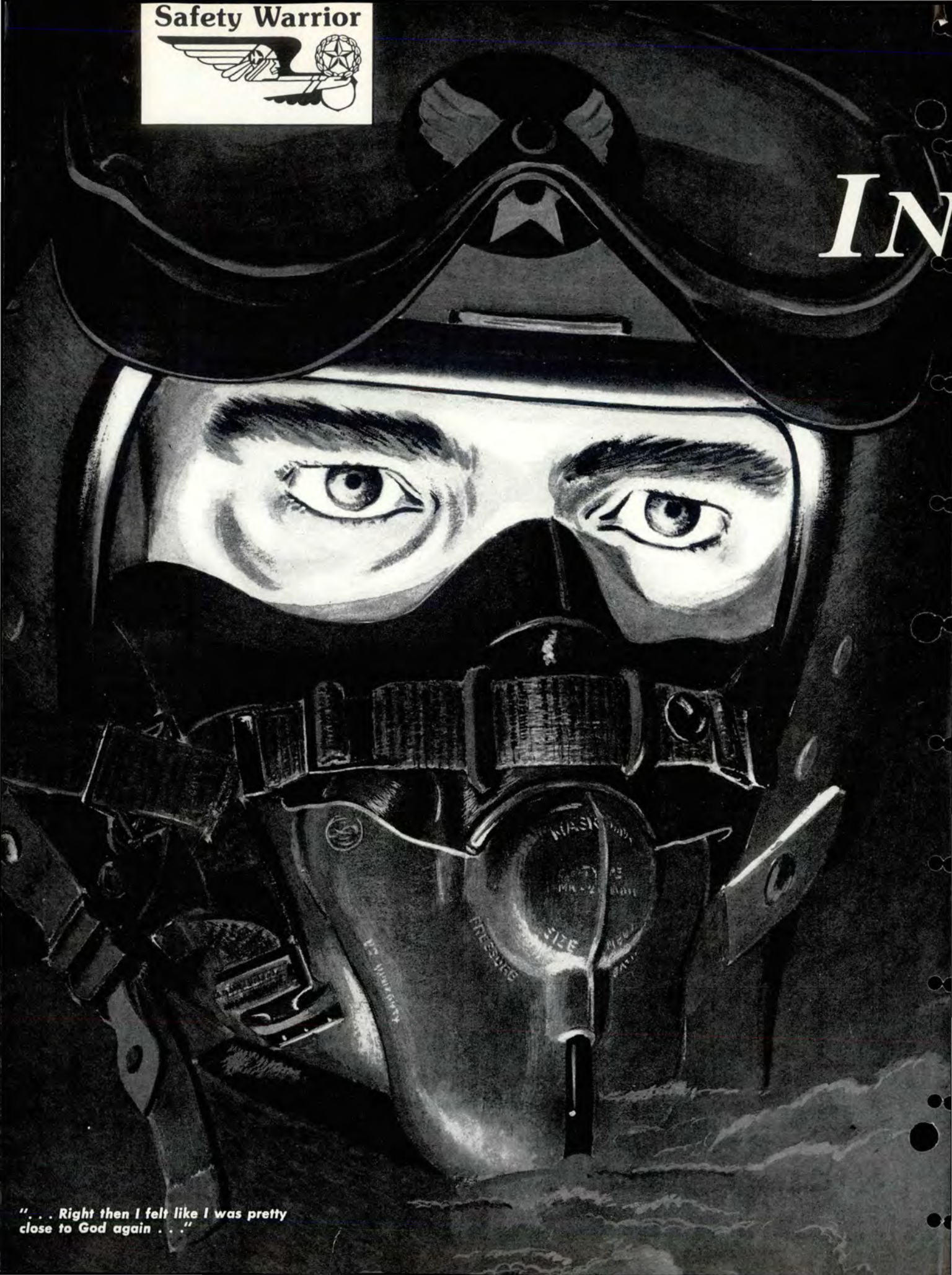
Snowberry. The fruit is toxic; the rest of the plant is suspect. Probably not fatal.

Fly Amanita. The entire mushroom is toxic. Produces severe illness, but usually not fatal.

Red Elderberry. **Life threatening!** The entire plant is toxic, especially the root.

Water Hemlock. **Life threatening!** The entire plant is toxic; possibly fatal in 15 minutes.

Beautiful, but deadly. That describes these and other poisonous plants you may find in the wilderness. If you don't know for sure the plant is edible, use the edibility test found in this article.



". . . Right then I felt like I was pretty close to God again . . ."

To avoid embarrassment to those concerned, the names of the pilot and all geographical locations have been omitted or changed. At the same time, full credit should be given the author for his voluntary report.

GOD WE TRUST...

The following true story was printed in the January 1953 *Flying Safety* magazine. As they say, only the names were changed to protect the innocent (or guilty). It is an entertaining narrative with some excellent lessons. The pilot made a lot of mistakes, but so did some of the people on the ground who were there to help. We're still making some of the same errors today — 35 years later. See how many you can find. — Ed.

■ It was one of those weekend trips when absolutely nothing goes right. I was on my way to Boontown, near Philadelphia, in a T-33. I made a refueling stop at Alpha AFB without official orders, and a discrepancy was filed against me. This is when my bad luck started.

Before taking off from Alpha, I checked all the NOTAMS and even the Airman's Guide for anything on Boontown. Everything looked OK, so I took off. When I arrived over Boontown, the tower told me that the people I was to meet were over at Oakville. "Great," I said, "but my clearance says I'm supposed to land at Boontown."

The tower came back and said, "Well, you can land here if you wish, but we only have 3,100 feet of runway due to construction going on." I told them that the NOTAMS didn't say anything about it, but they said, "Well, it's true anyway," so I changed my flight plan to land at Oakville.

I came over the airport, called on initial, called on the pitch, and on the base leg. As I turned onto the final, the runway up ahead of me looked like it was 6 inches long. I called and asked how long it was, and they said it was 4,000 feet long. The shortest runway I had ever landed on was 5,000 feet.

I had about 360 gallons of fuel aboard. At the approach end of the runway was a fence, a road, and some of those large Colonial-type houses with tall, peaked roofs. I don't think they'll need any coal this winter; I warmed them up pretty well with my tailpipe coming in.

I landed just down from the approach end of the runway, with plenty of room to stop. Somehow I had pitched at the right spot and turned on base and final at the right places, and I had made a perfect approach for landing.

Since the longest runway at Oakville was 4,000 feet, I said, "Don't put over 60 gallons of fuel in each tiptank. I'll go on to Lima AFB and refuel there in the morning." "Roger," they said.

A New Start

After making out my clearance the next morning, I walked out to the aircraft. Instead of putting only 60 gallons in, they had put in the full 230 gallons in each tiptank. The runway didn't look even as long as it had the day before. In addition to the obstructions at the head of the runway, there was a hill at the end of it with what had been three tall, sturdy oak trees. Now there were only two trees; someone had chopped the middle one down.

I cranked up and taxied to the runway. I sat there for a while at 92 percent, burning out some of my fuel. There was practically no wind, but fortunately it was fairly cool. I don't know how much fuel I burned out, but finally I said to myself, "Well, I think I can make it." I pulled my flaps up, moved onto the runway, and ran 'er up to 100 percent with the brakes on.

After releasing the brakes and starting my takeoff roll, I discovered something else — not only was the runway only 4,000 feet long; it was also uphill! As the airspeed came up

". . . there I was, at 35,000 feet on instruments with my first flameout . . ."

IN GOD WE TRUST

continued

to about 100 mph, I put the flaps down to 30 degrees. I brought the nosewheel off and finally staggered off — between the two remaining oak trees, clearing the high tension wires by inches.

After misreading my radio compass and missing Lima AFB by about 20 miles or so, I finally found the field and landed, ahead of my ETA. The winds were almost 180 degrees opposite from those I had been briefed on.

It was now Sunday afternoon. I hadn't planned on doing any night flying, so I hadn't brought a flashlight. I tried to get one. Everything was closed. Base Ops had none; Personal Equipment section had none they could give me, so I thought, "Well, I won't need one anyway."

I filled out my clearance and went out to the airplane, knowing that I would have some slight wait before my ARTC clearance was ready. I sat in the cockpit with an APU plugged in, standing by on the radio. When the clearance came, I copied it down, repeated it back to the tower, and signaled to the crew chief to watch for the start. The start was a good one.

I reached over to grab hold of the battery switch, looked back to signal the crew chief to pull the APU, and as I did, I caught a glimpse of a red flag out of the corner of my eye. Looking back up to the top of the canopy, I saw that the canopy pins had not been pulled. I called the crew chief. Here's where I really slipped up — in calling him over to pull the pins for the canopy and ejection seat, I had taken my hand off the battery switch, and I forgot to turn it on.

Instrument Time

I made an uneventful takeoff and climbed out on course. I broke into the overcast at about 6,000 feet and continued climbing on up to 35,000 feet, which was what my clearance called for. I hadn't run into any layers as the weather office had predicted. It was a solid overcast all the way up to 35,000, and it wasn't a bit lighter up there than it was when I went into it.

I continued on course until I figured I was pretty close to Leetown, North Carolina. As all of you know who've tried to tune in and identify a station on the ARN-6 radio compass in the T-33, when you are in visible moisture, clouds, or in the vicinity of a thunderstorm, the static is so complete on the set that you can't identify the station. All you can do is crank the handle close to the KCs and hope it's the station you want. I knew I had an effective headwind of approximately 80 mph, so by dead-reckoning I thought I was near Leetown.

I had not been briefed on any icing. As a matter of fact, I was supposed to be clear of all clouds, no visible moisture, so I hadn't worried about any ice. Here's where I made another big mistake. I had taken off IFR into possible icing conditions although I had not been briefed on ice, and I had not turned on the pitot heat. The airplane started to get sluggish. I looked out at the tiptanks and saw about 7 inches of ice cones sticking out on the leading edges of the tanks.

". . . I saw about seven inches of ice on the edges of the tanks . . ."

I figured then that if ice was collecting there, I was getting some in the pitot tube. I reached down to the right and turned on the right console lights and looked back up at the flight indicator. I straightened out my wings and then reached down to locate the pitot heat switch. I felt it and took a quick glance down — flying in bumpy weather

". . . I don't think they'll need any coal this winter; I warmed them up pretty well with my tailpipe coming in . . ."

with my left hand — straightened out the wings again, took another quick check of that switch to make sure I had the right one, and I pressed it.

Quiet Time

Never in my life have I ever felt so lonely! It was quiet, real quiet — it was the quietest quiet I've ever heard. There I was — at 35,000 feet on solid instruments with my first flameout in an aircraft with which I was not too familiar — I only had about 150 hours in the T-33.

I started immediately to get panicky and was about ready to begin an airstart, when suddenly it occurred to me that an airstart should not be attempted above 25,000 feet. I was at 35,000, had 10,000 feet to lose, so I decided to lose it right quick, make an airstart, and come back up again. I lowered the dive flaps and lowered the nose to pick up that 25,000-foot level as fast as I could, paying strict attention to the rpm. As I got to 25,000, I drained the tailpipe. I might mention here that the hardest thing in the world to do when you're on instruments is to drain the tailpipe.

As I hit the airstart switch, the rpm had dropped to 20 percent. The lights dimmed, the radio went out, and I had no more electricity. I knew that as soon as the electric power went off, I'd be flying by the airspeed, period. However, remembering that the needle and ball are the last of the gyro instruments to go out, I went immediately to airspeed, needle and ball, and rpm — trying to keep my rpm up to the desired 10 percent. I pulled up the dive flaps so I could achieve the desired rpm and the airspeed necessary to hold it without losing too much altitude.

I made seven panic airstarts. I still couldn't get it started. I knew that in the vicinity of Leetown, the highest mountain was somewhere around 6,900 feet. I also knew that way down before that I was going to have to get out of this thing if I couldn't get 'er started. As I passed through 10,000 feet, I tried my seventh airstart, and this time I went directly by the checklist to make

". . . all I could think of was my wife waiting for me . . ."

sure I wasn't forgetting anything.

I still didn't get it. I immediately hit the panic button again and started to get out. I moved all the baggage, the maps, and everything else away from the right side so I could pull the yellow handle and blow the canopy off. I had already practiced three or four times putting my feet in the stirrups. I had lowered the seat as far as I could get it, and I was ready to leave. Right at that time, all I could think of was my wife waiting for me at Base Ops. I thought, "She's sure going to be mad about this — I'm standing her up."

I managed to control myself for just a few more minutes and started to think of reasons why I wasn't getting an airstart. There were two reasons.

Number one — I wasn't getting any fuel. I discounted that one because below 10,000 feet, the fuselage tanks feed by gravity. Number two — I wasn't getting any spark. I already had it figured out that my battery had probably gone dead on that first airstart — could have been an old wornout battery. Then I thought, "Well, maybe the battery switch is off." I said, "No, the battery switch is on, because I remember turning it on back at Lima. Well, don't be so stupid," I said. "At least look at it!" I reached over and felt the switch — it was off. I turned it on. The radio came back on, the lights went on, and the instruments started bobbling around where they should have.

Right then I felt like I was pretty close to God again. He had been away from me for awhile. When I tried my next airstart, she fired up just as though nothing had ever happened — as though it was written in the book that way.

Stand By

I was around 8,000 feet, so I rode it on down to 6,000 feet and got my rpm up enough and airspeed enough to get my throttle around the horn. My radio was now operating, so I immediately started calling in the clear for any D/F station that read me to give me a call on "D" channel. Sierra AFB answered me and said they were reading me loud and clear. I told them to please notify all appropriate agencies that I had flamed out and I had come all the way down through Green 5 from 35,000 feet to 6,000 feet with no radio contact.

I also told them I was going to climb back up to at least 25,000 feet, to an altitude consistent with good fuel usage. They said, "Stand by." They came back and said, "ARTC advises that you remain at 6,000 feet VFR. They have heavy traffic in that area." I called Sierra and said, "You can tell ARTC that I'm lost, I don't know exactly how much fuel I have left, and I'm going up to 25,000 feet or higher to an altitude consistent with good fuel usage." They said, "Roger, stand by."

So I stood by a little longer, and they came back with, "ARTC insists that you remain at 6,000 feet VFR." I called back and said that I could not remain there and I was going up to 25,000 feet. "I've declared an emergency, and if they have other traffic in the area, have them get that other traffic cleared out." They said, "Roger, stand by." They finally came back and said "ARTC clears you to 25,000 feet."

As I climbed up through 14,000 feet, I gave Sierra my first tone for a steer. My heading to Sierra was about 201 degrees.

I had been pretty proud of my instrument flying prior to the flameout. I had been holding my heading within 3 to 4 degrees either side and my altitude to within 100 to 200

continued

IN GOD WE TRUST continued

feet in bumpy weather at 35,000. I was really proud of it. After the flameout, and after I had climbed to 25,000 feet, Sierra would occasionally call me and ask for my present altitude. I would say, "27,000 feet." They would call me about 5 minutes later and I'd say, "22,000 feet." I couldn't hold it within 5,000 feet of the desired altitude.

Come on Down

I called Sierra and asked them what their weather was down there. They came back and said they were OK to come on down. I called them again and requested their weather once more. Sierra said, "We're OK. We can get you in fine. Come on down." I called a third time and Sierra said. "There's no sweat." I called again, and said, "I DEMAND the weather." Sierra said, "We have a 700-foot overcast with 100-foot scattered, visibility 1 mile with rain and fog." I immediately started a 180 and told them I was sorry but I wasn't going down there, and started calling for any other D/F homer that could read me.

Samtown, South Carolina tower called me and said Apple Valley D/F homer was reading me, but they had a weak transmitter, and I could not read them. There was a long distance telephone line open between Apple Valley and Leetown for this emergency, and they would be glad to relay any steers from Apple Valley to me. Apple Valley's weather was 3,000 feet overcast. I transmitted for 1 minute for a steer. They came back with a heading of 110 degrees. I called Sierra and told them I was going to Apple Valley but would they please stand by for any D/F steers.

Help at Last

Echo Radio called and said, "I understand you are having a little difficulty. Can we help you?"

"Roger," I said, "I have a heading of 201 degrees to Sierra and 110 degrees to Apple Valley. Get out your maps and rulers and tell me where I am and how far it is to Apple Valley." They called back in about 2 or 3 minutes and said I was about 175 miles from Apple Valley. I looked at my fuel gauges and had plenty. I had enough to mess around a bit, and that was fortunate. I kept getting my steers from Apple Valley and some from Sierra, then I'd transmit them to Echo Radio, and they'd spot me again.

". . . We're OK. We can get you in fine. Come on down . . ."

I was again in the soup at 25,000 feet, and I couldn't tune that radio compass. Here's another big error. I had no map of the Apple Valley area. I had run out of maps when I first started going back to Apple Valley. I had no Radio Facility Chart because I couldn't get it out of the map case. It was lodged between the East and West Handbooks and the Jet Letdown book. I even tore the cover off of the West Handbook trying to get it out.

I had no way in the world of knowing the frequency of the range station at Apple Valley. By the time I was worrying about that, I was nearing Apple Valley, so I called them and asked them to give it to me. I had to ask them about four times before they were convinced I was in trouble. I tuned as close to the KCs as I could get. I flicked over to the compass position. I noted that the tune for max needle was deflecting when the station identification letters were sounding. I heard an "M" and a jumble of static, then a "P," so I figured I had the right station tuned in.

Echo Radio had me in pretty close to Apple Valley. The compass needle was reading about 4 or 5 degrees off my nose. When the needle swung to the full rear position, I called the tower and told them where I was and asked for the heading of the range leg where I was to make my letdown. They said for me to make a standard jet penetration.

After calling them about two or three times, I finally got out of them that they wanted me to let down on the southeast leg on a heading of 140 degress. I turned back in 180 degrees to the range station and hit it, tracked out for a minute or a minute and a half, and made a high-speed letdown at 325 miles per hour, made my jet penetration turn, and started back in.

At an altitude of 3,000 feet, I figured to break out under the overcast. At 3,000 feet, however, I was still in the soup. I called for anybody who could read me and asked them to give me a call. Finally, Lima tower, up in Virginia, said they could read me, but weak. I was reading them fine, told them so, and asked for the minimum altitude and weather. They gave it to me; it was 3,000 feet overcast with 5 miles visibility. I kept on at a 320-degree heading, broke out about 1,100 feet over the ground, and called back to ask what the heading from the station to the field was.

"In a Sweat"

If I had not been in a sweat when they told me, it would have been no puzzle to me; but when they came back and said the heading from the range station to the field was 140 degrees, I was lost — really lost. I nearly gave up again right there. I was now heading 320 degrees, and I couldn't figure out why they wanted me to turn. I was just about to hit the panic button again when it occurred to me that the field was between me and the station

I drove on in beneath the ragged edge of the overcast until I finally saw the blinking light, the double white with the green on the back, flashing from the beacon at Apple Valley. I called, then switched over to "B" channel and said I had the field in sight.

". . . I sat there for about fifteen minutes before I could get out of the cockpit . . ."

The Little Things

In case you are wondering why I had the flameout, here's the story. When I had reached down to the right for the pitot heat switch, I had hit the checkout switch instead. The sudden surge of fuel had drowned out my flame.

My inability to make an air start, of course, was due to the fact that my battery was not turned on.

I might add here — in case you are wondering about how I flew instruments on this flight — I loosened my shoulder straps so I could lean forward over the stick. I guess I must have been about 3 inches from the instruments. While trying to read them, I was helped quite a bit by constant flashes of lightning. Every now and then a sheet of lightning would come just in time to help me get out of a tight spiral. My windshield plate glass was a solid sheet of "St. Elmo's" fire.

I have always carried a flashlight prior to this trip — I have been carrying one since 1942. This is the only time I have ever forgotten to turn on the battery switch; and it is the first time I have ever had a flameout. It is the first time I have ever hit the checkout switch while in flight; and it is the first time I have ever hit it without being prepared for such a thing. It is not the first time I have made a flight without maps of the complete area — but it is one of those things — you never expect to make better than a 180 and come back to an area that you don't ordinarily hit. All the same, it was a mistake. I should at least have had a jet handbook.

As soon as I discovered my flameout, I should have made an immediate call to ARTC to let them know I was in an emergency. But it was one of those times when pride jumped in and said, "Don't let anyone know you have had a flameout, particularly that you did it yourself. You can get back up before you reach 20,000 feet — no sweat."

As you can see, each of these little details in themselves would not have placed me in serious trouble. It was the accumulation of all these things together that nearly ended my Air Force career. ■

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WILLIAM D. BRADFORD
Directorate of Aerospace Safety

TF34 Engine Modification

■ The USAF has approved engineering change proposal (ECP) 23DG5005A for introduction into TF34 engines used on A-10 aircraft.

In the past, TF34 engine fan blades and their retaining pins with over 3,000 hours were not reusable and were discarded (photo 1). The ECP now permits the blades to be reworked and, when installed with the larger diameter fan blade retaining pins, used again.

To extend the life of the fan blade for a second 3,000-hour interval, its pinhole diameter is enlarged by 0.018 inch, and the pinhole surface is coated with black MOLYDAG. These reworked blades must only be installed with larger diameter retaining pins which are easily identified by their black MOLYDAG coating (photo 2).

The reworked fan blades and their pins will be introduced via attrition of existing parts versus issue of a time compliance technical order (TCTO). The reidentification of fan rotor assemblies will not be required.

The part number changes related to the fan blades and their pins are as follows:

Nomenclature	Original Part No.	Reworked Part No.
*Fan Blade	6018T30PO2	4922T12PO1
	6018T30PO3	4922T12PO2
Matched Fan Blade Set (28)	3901T93GO1	3901T93GO3
Retaining Pin	4029T16PO1	4029T16PO2

*Note: New production blade part numbers will be 6018T30PO4 or 6018T30PO5

Operational Supplement 2J-TF34-4S-12, dated 1 October 1987, has been written to introduce reworked fan blades and pins at the jet engine intermediate maintenance (JEIM) level. This supplement dictates that reworked/reidentified fan blades and pins be used as complete sets only. *They are not to be intermixed in fan rotor assemblies with original configuration fan blades and pins.*

Operational Supplement 1A-10A-3-71JG-5S-60, dated 1 September 1987, has been issued to introduce reworked blades and pins at the organizational level of maintenance. However, this supplement is not as clear as it should be. It only addresses fan blade and retaining pin relationship by part number while failing to include the noninterchangeability of configurations within a rotor assembly.

Key points to remember are:

- Reworked fan blades (P/N 4922T12P01 and 4922T12P02) and retaining pins (P/N 4029T16P02) are only to be used as complete sets (28 each).
- Fan rotor assembly remains the same regardless of type (sets) of blade/pins used.
- Future blade replacement will require use of the same configuration as originally installed.
- These configurations are *not* Murphy-proof. Any combination of blades and pins will assemble into any disk. Therefore part number identification and control are absolutely *mandatory.*
- If original configuration retaining pins (uncoated) are incorrectly used with reworked fan blades, the potential for uncontained fan blade failures is greatly increased.

In summary, it is imperative that all levels of the TF34 engine maintenance community properly adhere to the fan blade and retaining pin configurations discussed in this article. Awareness of the configuration difference is the first step towards maintaining the necessary configuration control. ■

Good News! These original TF34 engine fan blades used to be discarded after 3,000 hours. Now they can be reworked and reused.

Bad News! These new blades are not Murphy proof and can be erroneously intermixed with the old fan blades in a rotor assembly.

Do You Really Know What Controllers Do?

TSGT JAMES M. SMITH
Tower Watch Supervisor
1942d Communications Squadron
Homestead AFB, Florida

■ How many times have you wondered just what in the world an air traffic controller was doing? Ground gives you the wrong clearance or doesn't always hear your radio calls. Radar gives you a 20-mile downwind, a box pattern, or breakout on final. Tower gives you 360s, holds you short of the runway for no apparent reason, or denies a request even though you can't see or hear anyone else in the area.

After experiencing these or other situations, you've probably questioned the controller's ancestry. Or perhaps you were tempted to vent your spleen by politely informing the folks at ATC Operations they need to hire some real controllers.

Well, controllers have the utmost respect for pilots. They know the major share of the burden of flying, fighting, and winning is on your shoulders. Unfortunately, many pilots don't seem to realize a controller's lot in life isn't easy either. The following are some of the situations controllers face, resolve, or contend with daily:

- Controlled takeoffs vs inbound traffic
- Fast vs slow aircraft
- Wake turbulence separation requirements
- Helicopters vs fixed wing
- Paradrops during fighter recoveries
- Radio blind areas
- Late requests for nonstandard departures
- Poor aircraft radios
- ASLAR mixed with non-ASLAR aircraft
- Changing priorities
- Late flight plan and call sign changes
- Alert scrambles
- Conflicts in flight scheduling
- Special operations
- Late calls for visual straight-ins
- Weather conditions
- Equipment limitations and failures
- Airspace limitations
- Less-than-cooperative support agencies
- Fighter needs vs others
- Release delays from Departure or Center
- Computer failures
- Regulations vs real-world needs
- VFR vs IFR priorities
- SFOs through or around clouds
- VIP arrivals and departures
- In-flight and ground emergencies
- Power failures
- Heavy vs nonheavy aircraft
- Micromanagement
- Pilots jumping frequency without notice
- Exercise participation
- The "ATC-is-last-to-know" syndrome
- Politics
- The need to train apprentice controllers
- The "everybody-wants-to-be-first" syndrome
- Wide variations in pattern flying from pilot to pilot
- The "feast or famine" nature of traffic volume
- Erroneous information or lack of information from other agencies
- Pilots who ask for more when the pattern is obviously saturated
- Noncontrollers who dictate questionable ATC procedures and priorities

The list could go on and on. In fact, many of these situations and numerous others can, and do, occur simultaneously.

This is not an "Oh, woe is me," or "My job is harder than yours" sob story. Controllers know all this comes with the job. It's what they get paid to do. But it tends to make a controller bristle when a pilot complains about something minor, even though the sky was full of airplanes at the time. It's also exasperating to have situations aggravated by a pilot's lack of patience or understanding.

Do you have a good idea how the local ATC system works? Have you visited the tower or radar facility lately? If you answered no to either question, please stop by soon. Controllers love to talk shop.

The bottom line is this: We can all function better as a team if we have an understanding of the demands and pressures of the other person's job. ■

FSO'S CORNER

History Lesson

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

■ Once upon a time in the land of Wing, there lived an FSO named Joe. Now Joe FSO worked for many years to develop a flight safety program for the land of Wing. He had many duties and performed them well.

One day, he realized it all just didn't seem good enough. Everywhere he looked there were rough edges. There had to be a better way to do business. Perhaps a more efficient way to conduct spot inspections, a smoother way to transition between FSOs, a smarter way to conduct flight safety meetings, a more timely way to do all the things he found he had to do in less and less time. How could he manage to discover these better ways to do business when he had so little time to do so much?

Joe FSO missed going to the Air Force-wide FSO conferences that were held annually for so many years. The week of discussion with other FSOs always provided a wealth of information he didn't have time to obtain during the rest of the year. He just didn't understand why no one was willing to set up the conferences any more. The cost seemed so little for the value obtained. He attended MAJCOM conferences when they were held, but they were shorter and were conducted less frequently because of funding problems. He would have to muddle through as best he could. It seemed there were no good sources of practical information available for FSOs any more.

One day, as Joe FSO sat in his office pondering his frustration at the state of his flight safety program, an idea came to him. Perhaps he could find a way to get other FSOs to tell him about their good ideas. He had a couple he could share. Maybe other FSOs would be willing to share a couple. But how would this be possible? Were other FSOs experiencing the same plight?

As time passed, he thought about how he could implement his idea, but alas, after considerable time he was still without a plan. Perhaps Marlin the Magnificent Magus would be willing to help.

After Joe FSO explained his plight, Marlin suggested he volunteer to manage an FSO crosstell program for the Air Force. In the program, FSOs from other lands of Wing could send their good ideas to Joe FSO who, in turn, would write articles based on the ideas. The articles could be published in the *Air Force Safety Journal* for all FSOs to read.

What an idea! Offer FSOs the satisfaction of helping other FSOs as well as recognition and OER fodder for sharing their good ideas. They wouldn't have to write the articles — Joe FSO could do that. Perhaps they could find enough time to send a rough outline of one of their ideas. The articles wouldn't have to be long — perhaps the corner of a *Journal* page would do. Joe FSO decided to call the program "The FSO's Corner."

Marlin told Joe FSO to send a letter with an example article to the *Air Force Safety Journal*. The folks at the Air Force Inspection and Safety Center would surely see the value in an Air Force FSO crosstell program managed by a wing FSO. They did.

Soon, Joe FSO had written many FSO's Corner articles. FSOs from around the world shared their ideas with him. Through the articles, they also shared their ideas with all other Air Force FSOs. Joe implemented many of the ideas in his own program and was able to do even more with his time as a result.

In the early days of the FSO's Corner, things did not always work as planned. Air Force FSOs are a busy

lot, and sometimes they didn't send their ideas to Joe FSO as often as needed. When this happened, Joe FSO would call FSOs at random. Most of the time, the FSOs he called had something to share, but either didn't realize it, hadn't taken the time to send it in the mail, or were too modest to allow their name to be seen in print.

Today, the *Air Force Safety Journal* is no longer published, and the FSO's Corner is no longer managed by Joe FSO, but the program serves the same goal — "To enhance flight safety programs Air Force-wide." Toward this goal, some enhancements have been added. The latest enhancement to the FSO's Corner is the addition of a Defense Data Network address for submitting your good ideas to help other FSOs. What could be easier?

The FSO's Corner needs your ideas. If you have something in your program that could help other FSOs if they knew about it, call me (Dale Pierce) at AUTOVON 579-7450; or send your name, AUTOVON number, and a brief description of your program idea to either 919 SOG/SEF, Duke Field, Florida, 32542-6005, or Defense Data Network (DDN) mailbox: AFRES.919SOG-SE@/GUNTER-ADAM.ARPA. ■

MAIL CALL

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

■ Re "Looks Can be Deceiving," March 1988. Isn't it amazing how soon we forget the basics? The table is on our old friend the CPU-26 A/P Computer. See AFM 51-40 for details.

Lt Col Mal Emerson
Aging Single-Seat Fighter Pilot

Thanks for the reminder. You're right, the answers are there, but most people will prefer an easy reference chart. The chart also has some good memory joggers. ■

A. Monitor ATIS. If applicable, ATC will broadcast on ATIS (if available) or upon initial contact, that altitude temperature corrections are in effect.

B. Radar vectoring altitudes assigned by ATC are temperature compensated and require no further correction.

C. For published SID and approach procedure altitudes which are below the MSA, pilots will apply corrections IAW the note below. Advise ATC how much of a correction is to be applied.

NOTE: Whenever the aerodrome air temperature is 0° celsius or less, the values derived from this chart should be added to all altitudes. However, in extremely cold temperatures, the correction values shall be added whenever the error factors equal or exceed:

A. 80 feet for DHs and MDAs (round interpolated value to nearest 10 feet). Lightly shaded area above.

B. 180 feet for all procedure altitudes at or below the highest minimum safe altitude (MSA) published on the procedure (round interpolated value to nearest 100 feet). Darkly shaded area above.

Unless otherwise specified, the destination aerodrome elevation is used as the elevation of the altimeter source.

TEMPERATURE CORRECTION CHART (FEET)

AERODROME TEMP °C	200	300	400	500	600	700	800	900	1000	1300	1500	1800	2000	2300	3000	4000	5000	10000	15000
0	0	20	20	20	40	40	40	40	60	80	90	110	120	140	180	240	300	600	900
- 5	10	20	30	30	50	50	60	60	80	110	120	150	160	180	240	320	400	800	1200
-10	20	20	40	40	60	60	80	80	100	130	150	180	200	230	300	400	500	1000	1500
-15	20	30	50	50	70	80	90	100	120	160	180	220	240	280	360	480	600	1200	1800
-20	20	40	60	60	80	100	100	120	140	180	210	250	280	320	420	560	700	1400	2100
-25	30	50	60	70	90	110	120	140	160	210	240	290	320	370	480	640	800	1600	2400
-30	40	60	60	80	100	120	140	160	180	240	270	330	360	410	540	720	900	1800	2700
-35	40	60	70	90	110	130	150	180	200	260	300	360	400	460	600	800	1000	2000	3000
-40	40	60	80	100	120	140	160	200	220	290	330	400	440	510	660	880	1100	2200	3300
-45	50	70	90	110	140	160	180	210	240	310	360	430	480	550	720	960	1200	2400	3600
-50	60	80	100	120	160	180	200	220	260	340	390	470	520	600	780	1040	1300	2600	3900

HEIGHT ABOVE THE ELEVATION OF THE ALTIMETER SOURCE (FEET)

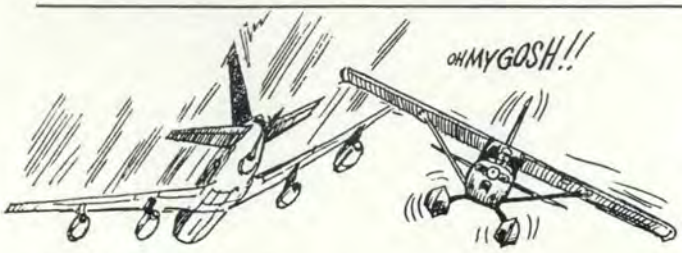
EXAMPLE:
Hi TAC Rwy 11
Minot AFB, ND
Elev. 1668' MSL
Temp: Minus (–)30°C
Highest Minimum
Safe Altitude (MSA) 4200' MSL

	Altitude (MSL)	Height Above Alt. Source	Correction	Corrected Alt. (MSL)
MDA (Straight-In)	1980'	312'	+60'	2040'
MDA (Circling) (D Cat)	2220'	552'	+90'	2310'
FAF Altitude	3300'	1632'	+300'*	3600'

* 290' rounded to nearest 100'

* Editor's Note: These procedures have DOD approval and the FAA is currently investigating them.

OPS TOPICS



Amphibious Attack

■ A KC-135 was being vectored to final approach for a full stop. Shortly after being given a left turn, the pilot was told to climb from 4,000 to 4,300 feet due to VFR traffic at 3,300 feet.

The crew spotted a float-equipped, single-engine Cessna about 500 feet below their altitude. The Cessna then began a climbing turn directly toward the -135 and leveled at the same altitude.

At this time, the -135 pilot made a hard left, full throttle turn. The Cessna also made a last-minute evasive maneuver, and the aircraft missed each other by 300 to 500 feet.

Apparently, the Cessna pilot was intent on finding a hole in the cloud deck below for a VFR descent and wasn't watching his altitude or clearing for other aircraft. Fortunately, the -135 crew was doing both.

Remember, don't relax your vigil because you're on an IFR clearance and receiving radar vectors. Seeing is half the problem — avoiding may be even more difficult. Sometimes it seems they're out to get you.

Close Call

An F-15 pilot was at 5 miles on ILS final, in the weather, when the GCA controller canceled approach clearance due to an emergency. He gave the pilot a missed approach heading, and told him to maintain 7,300 feet. (The vector was toward rapidly rising terrain in excess of 9,000 feet.)

The pilot immediately complied with instructions. After approximately 1 minute, he requested a higher altitude or a different heading. GCA told him to stand by.

Shortly afterward, the pilot again requested a change and was told to stand by. He then initiated IFF Ident to highlight his position but received no response.

After about 3½ minutes at assigned heading and altitude, the pilot saw the ground and a tree through a break in the clouds. He estimated his altitude as 50-feet AGL. He selected afterburner and made a climbing turn to 12,000 feet.

The message is clear. Be aware of your position and know what your minimum safe altitude is at all times. If there is any doubt and you're not getting help, declare an emergency and do what you have to do to avoid the ground or other obstacles. Don't delay.

Quick Stop

The F-16 pilot was completing a full stop landing after an uneventful flight when things suddenly got very eventful. When he applied the brakes, he heard, "Caution, Caution" and noticed the Master Caution and Anti-Skid warning lights were on.

Both main tires blew out immediately with 4,900 feet of runway to go. The aircraft started drifting left, so the pilot engaged nosewheel steering. The electric jet started correcting back to the right when it suddenly went hard right and entered a spin.

After spinning 270 degrees to the right while traveling an additional 1,400 feet down the runway, the aircraft came to a stop. It was facing toward the left side of the runway and 90 degrees to the runway heading.

Maintenance found a bad anti-skid control box was the culprit. They also had to replace both tires, wheels, brakes, and assorted other parts.

Remember, don't get complacent just because you have the jet safely on the ground. Stopping could be the most exciting part of the flight. ■

MAINTENANCE MATTERS

NO PROBLEM

■ All progressed normally during the pilot's functional check flight (FCF) of an F-16 until, climbing through 34,000 feet, the environmental control system (ECS) shut down and the "Equipment Hot" light came on. The cabin altimeter rose from 13,000 to 17,000 before the ECS came back on.

This happened once more in a climb and again after leveling at 40,000 feet, but both times the cabin altimeter stayed below 18,000 feet. Finally, the ECS stabilized, and the pilot performed the required FCF engine checks.

However, once again the ECS shut down momentarily, the "Equipment Hot" light came on, and the cabin altimeter rose to 23,000 feet. A few seconds later, the ECS came back on and the warning light went out.

The pilot terminated the flight and returned to base, where maintenance specialists found a sensor cannon plug disconnected from the ECS transducer in the left wheel well.

Investigation revealed that a maintenance person had serviced the aircraft Halon bottle on the night prior to the FCF. Although the technical order does not call for anything to be done to the ECS transducer or cannon plug during Halon servicing, the individual disconnected the cannon plug anyway. But he failed to reconnect it.

Sometimes, while performing routine tasks such as servicing, we tend to rely on our memory or even worse, do it our own way. If we should miss something or add an extra step — "no problem," as the TV character ALF would say. Someone will catch it.

But there's a flaw in this reasoning. The trust that we place in ourselves and others should not take the place of checklists and other proven methods. Follow the established procedures.

SHOUT IT OUT!

Following an air abort for unrelated reasons, the scanner on a C-5 Galaxy discovered significant damage to the left main landing gear door. The investigation revealed that a two-person maintenance team, both 7-levels, and an assistant shop supervisor had replaced the lower linkage bushings on the main landing gear inboard door aft actuator assembly.

Changing the bushings requires rotating the actuator out of position. Anytime the actuator is rotated in this manner, applicable tech data require the aircraft be jacked and a maintenance operational check performed. But the maintenance trio didn't do this.

When a flight line supervisor reminded the shop supervisor of the jacking and operational check requirements, the shop supervisor informed him that the team had placed marks on the rigging and, therefore, the check was not required.

Consequently, the flight line supervisor did not insist that the aircraft be jacked so the check could be performed. The shop supervisor then signed the work as completed without accomplishing the required operational check.

But unknown to the maintenance team, the actuator was, in fact, installed improperly. Although the marks were lined up, the actuator was out of rig. Therefore, when the gear was cycled in flight, the front and aft actuators opposed each other, damaging the gear door.

It's obvious from the chain of events that a breakdown in supervisory involvement occurred. It continued to the point where neither the shop supervisor nor the flight line supervisor took the responsibility to ensure the work was performed or inspected in accordance with current directives.

Aircrew members are taught that if they see a potential problem, they are to "shout it out" to the rest of the crew. They are taught to be responsible for one another.

Perhaps if we as aircraft maintainers would "shout it out" when we see something wrong, we could prevent mishaps such as this. ■

CAPTAIN

John L. Davis

SECOND LIEUTENANT

Paul M. Thompson

91st Tactical Reconnaissance Squadron
Bergstrom AFB, Texas

CAPTAIN

Norbet Madsen

12th Air Force
Bergstrom AFB, Texas

MAJOR

John A. Brigance

67th Tactical
Reconnaissance Wing
Bergstrom AFB, Texas

■ On 12 June 1987, Captain Davis, pilot, and Lieutenant Thompson, weapon systems officer, struck a large bird while on a low level RF-4C two-ship checkride being given by Captain Madsen and Major Brigance. The bird strike was centered on the forward canopy and destroyed three-quarters of the Plexiglas®. Bird remains and Plexiglas® spread throughout the cockpit.
fragments in his eyes and received painful bruises and cuts around his arms and chest. As briefed, Lieutenant Thompson took control of the jet and started a turn home while climbing, slowing, and notifying the chase aircraft. The chase aircraft rejoined to a route position to assist.

After the initial terminate call, communication between aircraft or intercockpit was impossible for the rest of the flight due to windblast and the loss of Captain Davis' communications cord. Captain Davis, after cleaning his eyes, took control of the aircraft.

He noted the upper ejection handle was flailing in the airstream and positioned himself to reduce the flapping. The chase crew spotted serious damage to the drogue chute container. Knowing an inadvertent deployment could result in an ejection and serious injury, Captain Madsen took the lead, as briefed, and slowed the flight to 200 knots which significantly reduced the windblast.

The chase crew declared an emergency and coordinated an expeditious route home. Major Brigance coordinated with the command post via HF radio. The chase crew led a flawless formation approach and passed the lead to the mishap crew when assured they could land safely. The mishap crew landed uneventfully with a severely damaged aircraft.

Using the abilities of each crewmember, these crews were able to promptly and accurately respond to a serious bird strike. They safely recovered a valuable aircraft while taking every precaution to prevent injury or loss of life. WELL DONE! ■

☆U.S. GOVERNMENT PRINTING OFFICE: 1989 — 579-037/80000

UNITED STATES AIR FORCE

Well Done Award

CAPTAIN
David G. Jowers

CAPTAIN
Robert D. Pietras, Jr.

3d Tactical Fighter Squadron
Clark Air Base, Philippines

■ On 20 May 1987, Captain Jowers, pilot, and Captain Pietras, weapon systems officer, were leading a composite strike force of 29 F-4s as part of an exercise. Just prior to aerial refueling, they lost their left generator and immediately headed toward home base.

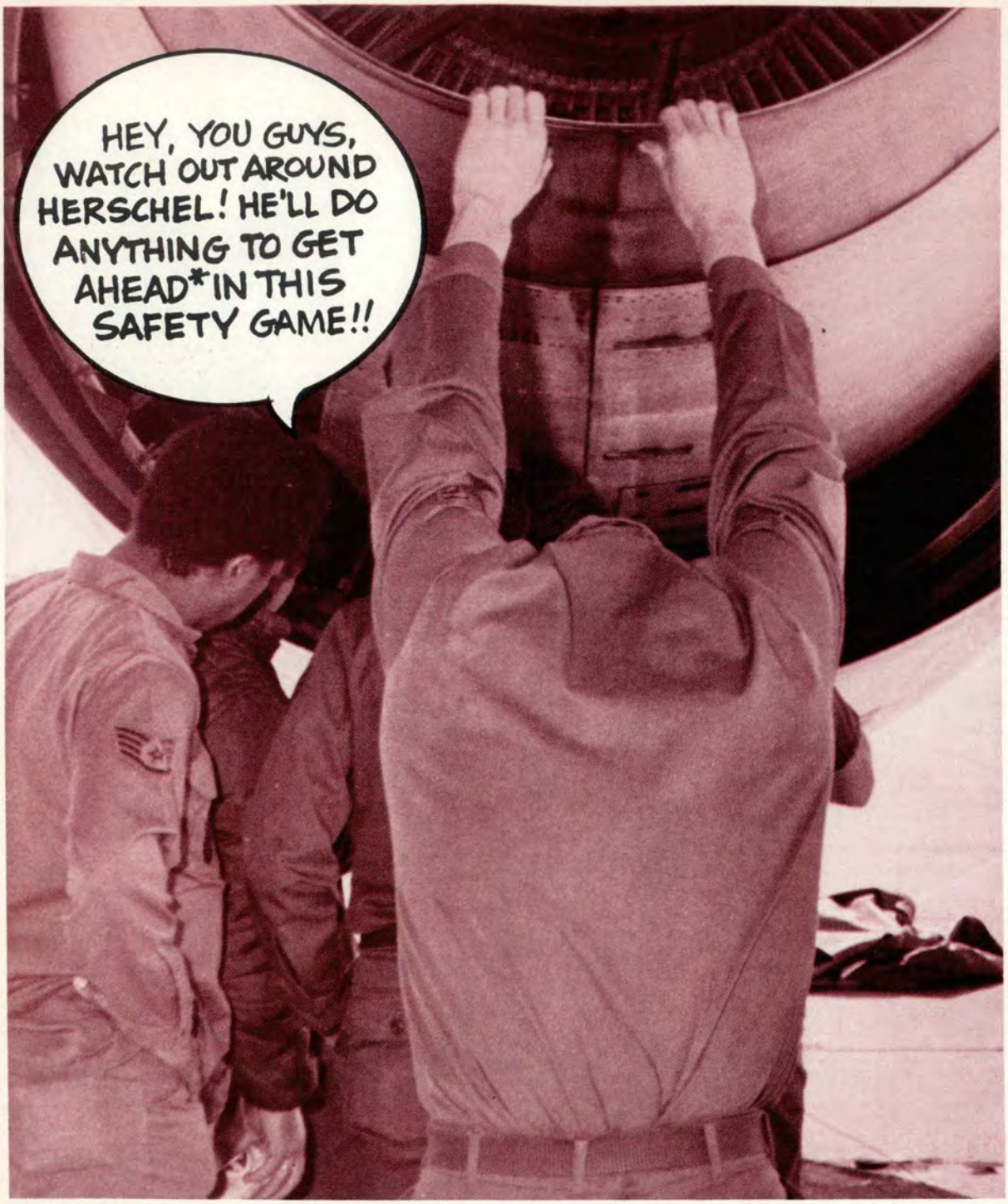
Approximately 70 miles out, the left nozzle failed open, significantly reducing thrust on that engine. Shortly thereafter, the right nozzle failed closed. The asymmetric thrust, compounded by a 2,600-pound GBU-15 training weapon on the left inboard pylon, caused the aircraft to roll left. Captain Jowers immediately applied right aileron and rudder to control the aircraft. Captain Pietras' quick analysis of the situation in keeping ahead of the ever-mounting checklist items and preparing for all contingencies proved invaluable in maintaining control of the rapidly deteriorating situation.

The crew decided not to jettison the weapon since they were flying above an undercast with populated areas below. Also, due to the undercast, limited visibility, and the possibility of engine failure at any time, they decided to proceed directly to the airfield at altitude instead of taking radar vectors for a straight-in approach. This allowed them to descend directly over the airfield using a low power setting which reduced the asymmetric thrust problem.

Approaching the field, the right generator failed, causing the loss of all flight-control stability augmentation. With both generators failed and operating on only battery power, they needed to land immediately and make an approach-end cable engagement. They accomplished all checklist procedures and brought the crippled aircraft to a perfect landing and successful arrestment.

Captain Jowers' and Captain Pietras' quick thinking, outstanding airmanship, exceptional systems knowledge, and crew coordination allowed them to skillfully handle this critical, complex emergency, and resulted in the safe recovery of a valuable Air Force 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.



* Ahead . . . a-head . . . get it?

Write A Dumb Caption Contest Thing

So, you could do better than our dumb caption, huh? Well, OK, here's your chance, smarty. You send us the best caption, and we'll send you our cheap little prize and also plaster your name all over our December magazine. How's that for a big deal?! Wow!!

Write your caption on a slip of paper and tape it on a photocopy of this page. DO NOT SEND US THE MAGAZINE PAGE. Use "balloon" captions pointing to any or all of the people in the picture, or use a caption under the whole thing. You may also submit your caption on a plain piece of paper. Entries will be judged by a panel of experts on dumb humor. All decisions are relatively final. No bribes under $1,000,000 will be accepted.

So, send your entry NOW.

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