flying

SAFETY

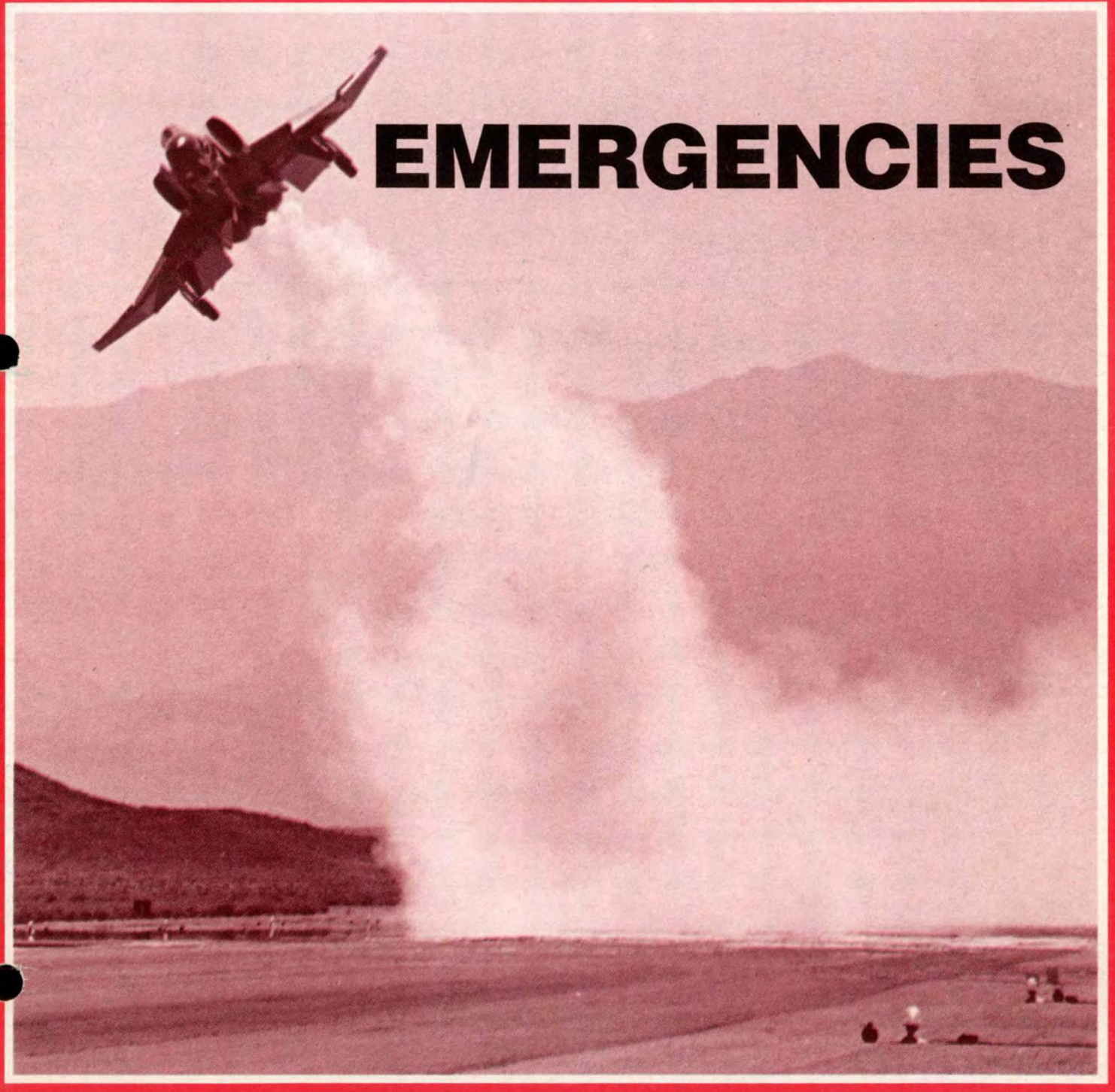
AUGUST 1990

What If?

The Second Fire Warning Light...

Divide and Conquer

Ash 1



EMERGENCIES

THERE I WAS

■ **There we were . . .**

We had flown down to Stuttgart for some transition training in our Lockheed Jet Star (VC-140B). After an hour of approaches and touch and go's, we full stopped for a seat swap. The new initial upgrade pilot strapped in, and I went back for something to drink. It was quite a shock to find the cooler didn't have any Cokes—just 7-Up, Pepsi, and assorted German beverages. I thought to myself that upon our return to the home drome, I would have to inform the chief steward of this grave oversight.

The new student had strapped in, and the IAC was completing the taxi checklist. The flight mechanic was finishing the takeoff data as I climbed into the jumpseat. As we turned onto the runway, I ran the lineup checklist and checked the electrical panel one more time. The pilot pushed up the throttles for the J-60s, and they roared to life.

As we trundled down runway 26, everything was copacetic, and we lifted off right after rotation. A red caution light flickered on the annunciator panel and went out. None of us could tell which light had been flickering.

As we passed Stuttgart West on the Walda Two SID, both ADIs rolled up, the radios went dead, and it looked like a simulator flight on electrical failure day. The pilot announced he was going to use the standby ADI for attitude guidance, even though it was VMC.

A quick glance at the caution panel showed all four generators off line and a no. 3 generator overheat light on. The IP in the copilot's seat turned on the no. 2 inverter and went to transfer, restoring power to the pilot's instruments. As I sat on the jump seat, I checked voltage on all the generators, turned no. 3 to off, reset no. 1 generator, and selected it for emergency power. I reset the nos. 1 and 4 generators, restoring full power to the aircraft. Our IP then called for the appropriate electrical system checklist to confirm all the actions taken during the electrical failure.

Good crew coordination, a very experienced student fresh from simulator training at Flight Safety Int'l, and day VMC made recovery from total electrical failure easy. ■

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flying

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page 2

page 12

page 21

SPECIAL FEATURES

REGULAR FEATURES

CONTRIBUTIONS

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WHAT IF?

What if it doesn't go smoothly on a shuttle flight and an abort is called for?

There's trained experts standing ready for any eventuality worldwide.

CMSGT ROBERT T. HOLRITZ
Technical Editor

■ During every landing of the space shuttle, with the exception of classified missions, thousands of people gather at Edwards AFB, California, to watch the orbiter's pilot grease on a landing that would make even the most experienced aviator envious. But this time was different.

This landing was not at Edwards, and there was no crowd. Instead, only fire and crash vehicles were waiting for the orbiter to touch down on the island's 11,500-foot runway. It seems after a collision with a small piece of space debris, the spacecraft lost cabin pressure at such a rate mission control and the crew decided to immediately abort the mission and bring the shuttle in for an emergency landing at the nearest alternate landing site.

Minutes after being notified, the alternate site's rescue crews were ready to meet the crippled orbiter. At first, the approach and rollout seemed normal, but shortly after touchdown, the left main tire blew. However, the pilot managed to keep the craft on the runway, and it finally came to a stop after engaging the departure barrier. In a matter of seconds, crash and rescue crews arrived, and within minutes, they safely removed the crew from the spacecraft.

This was, of course, purely fictional. But **what if** this incident actually happened? Would the rescue team be prepared to deal with the situation?

This scenario is not as farfetched as one may think. In spite of the shuttle's incredible landing record, even the most optimistic engineer would not rule out some kind of landing problems in future missions either as a result of mechanical failure, human error, or through an act of God. Further, the shuttle is not restricted to landing on Edwards' 7-mile-long dry lake runway. It can also land at the Kennedy Space Center and, in an extreme emergency, the orbiter can land on any runway measuring more than 10,000 feet in length with a TACAN for navigation!

While many runways fit this category, NASA has chosen about 20 of these as emergency sites. Andersen AFB on Guam, Diego Garcia in the Indian Ocean, and Zaragoza AB, Spain, are among the many alternate and emergency landing sites for the shuttle.

The Program

The Air Force, in cooperation with NASA, has developed an extensive program to provide training for rescue personnel for extracting shuttle crews should a landing mishap occur just about anywhere on the globe. While there have been procedures for extracting astronauts since the shuttle's inception, as the program matured, the need for expanded rescue training became obvious. Because emergency landing sites are widely dispersed, a program was needed to provide training at these locations to familiarize personnel with towing and handling the orbiter and to train firefighting and crew rescue teams.

In 1985, the Air Force created two positions at Edwards AFB to support the development of a program to supply this training. MSgt Anthony C. Rush, a missile system specialist, was selected to provide orbiter familiarization training while MSgt Cornelius Hughes, Jr., was to conduct firefighting and orbiter crew rescue training. Both are experienced, master instructors, who worked many months with NASA to develop the curriculum for the courses. To provide the necessary coverage, they both became qualified to teach each other's courses.

"A missile specialist and firefighter are a strange combination, but we had no problem learning each other's jobs," said MSgt Hughes. But, in spite of cross utilization, they both still spend more than 7 months each year traveling to alternate and emergency landing locations. At each site, two nine-member rescue teams receive 10 hours of training on shuttle orbiter crew ex-

continued

The Air Force's Orbiter Trainer is a full scale mockup of the crew and avionics area of the space shuttle. Although constructed mostly of plywood, even astronauts agree except for the simulated instruments, it looks remarkably like the real thing.

What If? continued

traction. Firefighters also learn the peculiarities of combating a shuttle orbiter fire. In addition, support people, such as base flight and EOD, attend a 4-hour orbiter familiarization course. In all, the training package consists of about 17 hours of instruction over a 4-day period. This training is an annual requirement for all alternate-site support teams, but the Holloman and Edwards folks, who are considered primary teams, receive refresher training every 6 months.

Dressed in full protective gear, the team critiques the egress exercise. Every member gets to train and qualify in each team position.

Spruce Trainer

Training aids at the emergency site are limited to videotapes, films, an astronaut ensemble, and whatever else the instructor can travel with. But at Edwards AFB, MSgts Hughes and Rush use a shuttle orbiter trainer to provide an extremely realistic training environment. The trainer, which is a full-scale mockup of the crew area of the orbiter, was built at Chanute AFB, Illinois, disassembled, and shipped by truck to Edwards AFB, where the Chanute building contractors reassembled it and set it up for training.

Although the trainer is constructed mostly of plywood, it looks remarkably like the real thing. There is an operational crew entry hatch on the left side and an emergency escape hatch on the top, located just over the flight deck. Inside, except for the simulated instruments and avionics, the crew area and flight deck are almost exact replicas of the orbiter. What amazes most people is how incredibly small these areas are. The illusion of a roomy cabin and flight deck during actual missions is created by the wide angle lenses on the orbiter's video cameras.

The Rescue

There are two basic rescue scenarios. The preferred method of crew extraction is through the crew entry hatch. After gaining entry into the orbiter's crew area, the first thing rescuers do is close the astronaut's faceplates and turn on the 10-minute emergency air source supplied by each crewmember's bailout bottle. This is important because even after a normal landing, the shuttle emits extremely hazardous fumes, such as hydrazine and nitrogen tetroxide, and once the hatch is opened, these fumes can be expected to enter the cabin. To ensure a fire does not occur during the rescue operation, the rescuers discharge three Halon fire extinguishers located in the orbiter's avionics bays. The final step prior to extraction is to power down the spacecraft's systems. This is also done to preclude any post-crash fire. With all systems safe, the rescue team disconnects and removes the crew.

During a hard landing, however, structural deformity of the fuselage may prevent the crew hatch from opening. In this case, the crew must be removed through the emergency escape hatch on the top of the orbiter's flight deck. This requires two rescuers, using ropes, to hoist each fully suited astronaut through the escape hatch. The crew is then lowered 25 feet to the ground. Considering a fully suited crewmember may weigh as much as 250 pounds, this is definitely not a task for the physically unfit! During training, live victims are pulled through the escape hatch, but for safety reasons, fully outfitted and weighted mannequins are lowered to the ground.

MSgt Cornelius Hughes briefs a rescue team from Holloman AFB, New Mexico, on the practice rescue scenario. Each nine-member team is required 8 hours annual refresher training.

Final Preparation

The semiannual training for the Holloman and Edwards teams takes 3 days. Several days prior to each scheduled orbiter landing, the Edwards rescue folks tow the orbiter trainer onto the dry lakebed for one final practice. This training is even more realistic because it is often conducted in extreme temperatures and during high winds which are so prevalent on the lakebed.

Hopefully, there will never be an orbiter landing mishap. But, in the words of MSgt Hughes, "If there ever is a mishap, the rescue teams at the primary and alternate sites are capable and ready." After spending a day with these dedicated people, there is no doubt in my mind they are absolutely ready! ■

Once Again, Thanks For Your Support!

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

MSgt Chuck Mackey*
35 AGS/MAASS
George AFB, California

It's really amazing to be here month after month and see how you keep coming up with these Dumb Captions. Judging them isn't easy. In fact, it is an inherently risky endeavor from a medical standpoint. There are the distinct dangers of side-splitting laughter, frown crackers, gut busting, knee slappers, the galloping giggle fits, and silly spasms. But our dedicated panel of dumb humor experts have once again survived the many rigors of the judging process and selected MSgt Chuck Mackey as the winner. Your fabulous and most revered CHEAP LITTLE PRIZE is in the mail (just like the legendary check), but you can begin your full-fledged bragging immediately. The honorable mentions below can boast, too, because their captions were close on the winner's heels. If you want to try to win a CHEAP LITTLE PRIZE of your own, see this month's contest on page 14.

Honorable Mentions

1. I knew things were going downhill when I heard Disney enterprises got the simulator contract!
MSgt Chuck Mackey, 35 AGS/MAASS, George AFB, California

2. (2L) So this is the "cheap little prize!" (Lead) The next time some contest says, "Winner will receive a free plane trip," I'll know better!
Lyn Jensen, TM/Det 47/DAC, Long Beach, California

3. Says here to add water and this little plane will grow up to be a B-2A!
Lewis L. Godfrey, Jr., WG-10, 944 CAMS/MAECA, Luke AFB, Arizona

4. "You put your left wing in, you put your left wing out, you put your left wing in, and you shake it all about . . ."
Jeff Putman, WRDC/SED, Wright-Patterson AFB, Ohio

5. It's compact, highly maneuverable, cost-effective, never needs refueling—but a 200-mile extension cord!??
Jim Burt, Training Instructor, NAS Corpus Christi, Texas

6. A little to the left, a little to the right, and pull up on the stick, and you fly out of sight! That's enough singing lessons for today. Tomorrow we will take the train ride and learn a new tune.
SSgt Roy E. Maness, 47 FTW/DOEA, Laughlin AFB, Texas

7. First Gramm-Rudman, then the "Peace Dividend." I tell ya' being' a Thunderbird just ain't the same anymore.
MSgt Chuck Mackey, 35 AGS/MAASS, George AFB, California

8. Split-S, vertical scissors, Immelman—I've tried every maneuver in the book, but I just can't shake these guys off my tail.
MSgt Chuck Mackey, 35 AGS/MAASS, George AFB, California

9. Okay, we are approaching the target. Johnny, you take out the saucer cups; Chuck take the bumper cars; Al gets the merry-go-round; Eddie, take the funhouse . . . I'm going after the Ferris wheel!
SSgt Ray Kayl, 185 TFG, ECM Shop, Sioux City, Iowa

10. Eat your heart out, Robert Conrad.
Sgt Michael A. Aguilar, 93 BMW/DOX, Castle AFB, California

*Because of MSgt Mackay's dumb caption expertise (notice he is not only the winner but also wrote three of the honorable mentions—WOW), we are sending him the CHEAP LITTLE PRIZE with **no postage due!!!**

The Second Fire Warning Light...OR...

WHAT DO I DO NOW?

BOB JENSEN
Senior Engineer
Flight Safety Department
McDonnell Aircraft Company

■ Faced with a high number of fire lights, the F-4 community may also be faced with the question, "What do I do now?" when encountering the second fire light. Recently, an F-4 crew from another nation was faced with this very problem. These events have prompted the resurrection of a meaningful (updated) article from the McDonnell Douglas book "Phantoms Phorever."

The following F-4 crew experienced a situation requiring more data than they had available concerning the treatment of two fire lights. During an A/B pullup off target,

the right engine overheat light illuminated, and a flight member reported a 120-foot flame coming from the aircraft. The crew shut down the right engine and jettisoned the stores. The overheat light went out. The left fire and overheat light then illuminated. The pilot shut the left engine down and restarted the right engine. The right fire light illuminated, joining the already illuminated left fire light and the blinking left and right overheat lights. The aircraft finally pitched up, and the crew ejected safely.

If the crew had just read the following article by Bob Jensen and recently updated by ALC engineers, they might have been able to save the jet.

In twin-engine fighters like the Phantom, a single fire warning light isn't the heart thumper it is in a single-engine machine. Not that it doesn't attract a lot of attention and demand rapid action, but there are ways to cope with the problem and bring the airplane home. Phantom Phlyers have seen their share of fire warning lights, both false warnings and the real. They . . .

"Idle the affected engine, then proceed to cut off if the light continues or a fire is confirmed."

This should take care of the problem, requiring only a no-sweat single-engine landing if there are no additional complications. However, one of the rarer added thrills for the pilot is a *second* fire warning light from the other engine bay. Here we have a hopeless situation—fire in both engines and nothing to do but eject, right? Perhaps, but not necessarily, and certainly not before you know for sure what is really going on down there in the engine room.

Fire Warning Indications

First, let's consider what the fire warning light is saying. The fire detection loops consist of a housing assembly connected to a stainless steel tube. The tube is filled with helium gas and has a titanium purged hydrogen core running through the center of the tube. The housing assembly contains a resistor assembly with an alarm switch wired in parallel with the resistor and an integrity switch wired in series with the resistor.

If the entire fire detector is heated above 525 ^{o}F to 550 ^{o}F, the

continued

helium gas expands causing the alarm switch to close indicating a fire to the fire/overheat control box. If any 12-inch portion of the tube is heated above 1,050 °F, the hydrogen gas leaves the titanium core, increasing the gas pressure, causing the alarm switch to close indicating a fire to the fire/overheat control box. If the fire loop is burned through by an intense "blow torch" type fire, i.e., above 2,000 °F, the tube will open and lose its hydrogen gas pressure.

Loss of hydrogen gas pressure causes the integrity switch to open and signals a burnthrough condition to the control box. About 525 °F to 550 °F is a high enough temperature band that normal engine heat will not cause a warning light and low enough that a warning comes before major fire damage has occurred. The 1,050 °F temperature setting provides indication of a localized high temperature condition. A temperature of 550 °F will not cause immediate serious structural damage in the engine cavities. Like the pain in your hand when you touch a hot stove, the fire warning usually comes before serious damage is sustained. So the second fire warning light is not a cause for instant despair.

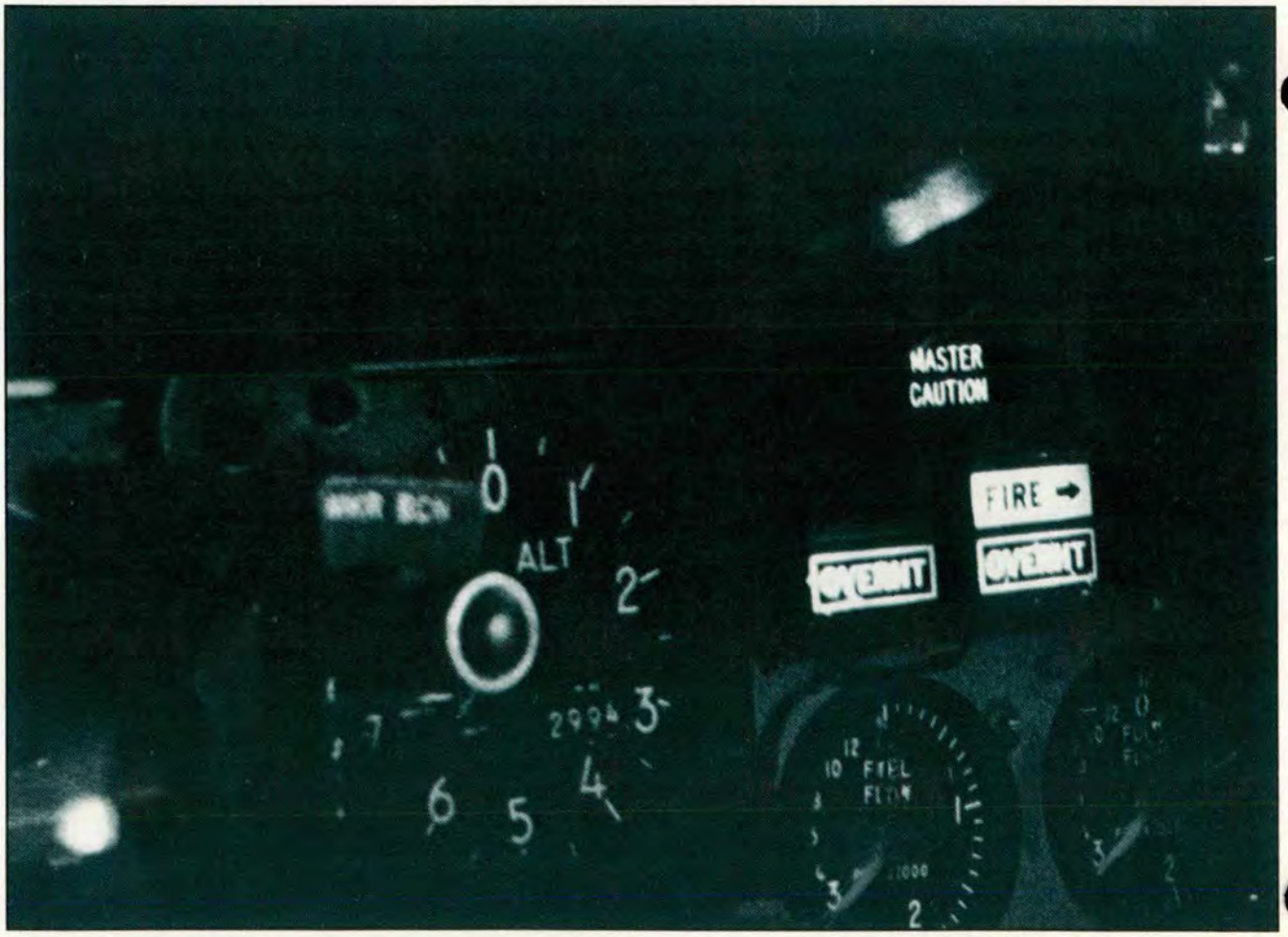
Fire Warning Implications

Let's examine the history of F-4 mishaps where a second fire warning has occurred. In this part of the discussion, only *fire* warning lights, as distinguished from *overheat* warning lights, are considered. There is a very good reason for this distinction because a fire warning light reports a 525 °F to 550 °F temperature condition inside the forward and midengine cavity.

There are some variations in the double fire light mishap patterns, mostly in the time interval between the first and second fire lights. The cases on record where nearly simultaneous fire lights occurred immediately after takeoff almost invariably involved F-4s with centerline external fuel tanks installed.

On liftoff, or initial climb after takeoff, a double fire warning, with a full centerline tank installed, calls for centerline tank jettison, or depressurization by extending the IFR receptacle door/probe. If accomplished promptly, centerline tank depressurization/jettison may eliminate the fire.

An understanding of how the F-4 fire overheat warning system operates can help a pilot make the right decision when the light comes on.



Sequential Warning Lights

A different situation exists where first one engine fire light comes on, and following throttle reduction to idle or cutoff, the other light then comes on. Here we have a definite fire origin within one engine cavity transmitting enough heat to the other engine bay to trigger that fire light as well. Does this mean the fire has spread so both engine bays are involved in the fire? Not always. Perhaps we can even say not usually.

The reason for the second light is sufficient heat from the primary fire was transmitted through the center keel web to heat the fire detection element in the other cavity beyond 525 °F to 550 °F.

In one or two cases, it has been theorized that because right engine bay fire elements are mounted directly to the single titanium keel web above the 83R door, a fire properly positioned in the left engine bay could direct enough heat on the web to cause a right engine fire warning as well.

The J-79 engine installation uses a large-volume, high-velocity flow of secondary cooling air outside the engine and inside the engine bay. This is provided by the jet pump action of the engine exhaust nozzle during engine operation. Inside the engine bay of an operating engine, and especially during engine acceleration, air pressure is less than in the air outside the cavity. This is how a leaking external centerline tank can trigger one or both engine bay fire warning lights. The leaking fuel is drawn into engine bays, ignited in the A/B flame at the nozzle, and fire flashes back into the engine bay.

If, however, the pumping action of the engine exhaust nozzle is stopped in flight by engine cutoff, the normally negative relative pressure inside that engine bay becomes positive. Ram air, entering the engine intake, spills through the opened bellmouth into the engine bay. Due to the termination of nozzle pumping and a restricted exit area, a pressure increase occurs in the engine bay. If one engine is idled, a similar, but lesser, pressure rise occurs in the engine bay of the idled engine. Thus, when one engine is idled or shut down in response to a fire warning light, any opening between the engine bays becomes a "pneumatic tube" to draw the fire into the other side. As engine shutdown cuts off all but residual fuel and a few gallons of hydraulic fluid and engine oil, the fire has little chance to seriously involve the second engine bay. However, it will cause the second fire warning.

Overheat Warnings

To complete the picture, let's examine the mishaps where *overheat* lights were involved. These are indications of high temperature outside the engine exhaust nozzle, where sensors were added to the F-4 to warn of a nozzle flap failure. A single *overheat* light, with no other fire indication, is usually just that, a nozzle flap failure.

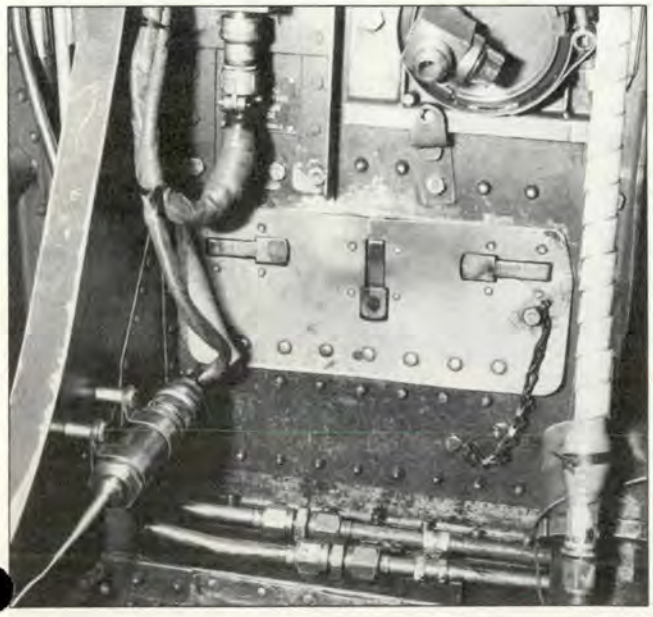
Two overheat lights alone (no fire warning) are a different story—this usually means fuel is burning at the tail in such quantity as to light both lights. An upper fuselage fuel system leak, as from a fuselage fuel transfer line failure or a fuel cell rupture, normally does not enter the engine bays.

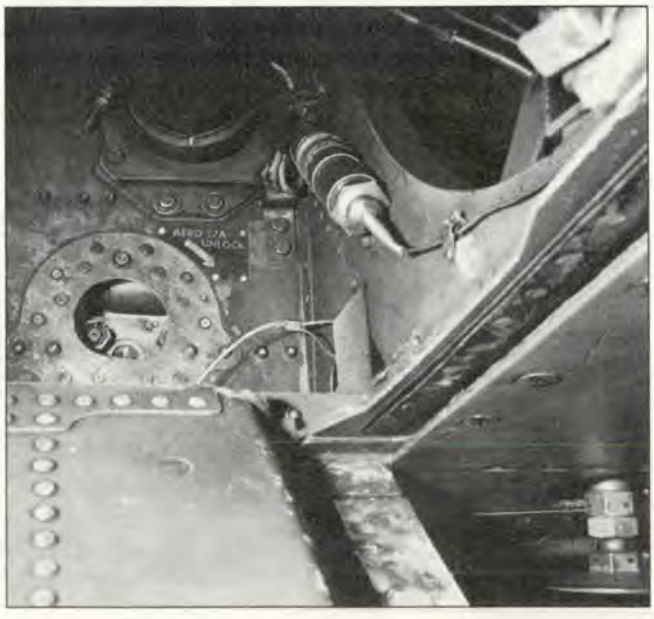
Fuel streaming aft, from an airframe fuel system leak outside the engine cavity, will not ignite until an ignition source is encountered. Historically, engagement of afterburner has been the most frequent and most positive method of igniting leaking fuel. So, if two overheat lights come on shortly after A/B selection, probably a major fuel leak exists.

If one *fire* light follows, or precedes the two *overheat* lights, there is a likelihood the fuel is originating in the engine bay that has the fire warning, and immediate shutdown of that engine may control the fire.

continued

Securing the centerline rack access cover inside the left aux air door is good insurance against a double engine bay fire. An open panel provides a path for fire and leaking fuel through the right centerline rack unlock access panel (below).





After TO 1F-4-1503

TO 1F-4-1503 installed a new fire/overheat control box. The new control box provides additional information to the pilot. The pilot can monitor the integrity of the fire and overheat detectors, connectors, and system wiring via the FIRE SYS light and FIRE TEST switch. During a double fire warning scenario, if one or both of the fire or overheat lights goes out and the FIRE SYS light comes on and associated FIRE or OVRHT light illuminates for 4 seconds, the situation has probably deteriorated. Since all of the fire/overheat system components in the engine bays, i.e., wiring, detectors, and connectors, are rated to 2,000 °F, the pilot should suspect a fire of this magnitude is present in the affected engine bay. In other words, if the fire/overheat system indicates a burnthrough condition after initial indication of a fire in one of the engine bays, the temperature in the affected engine bay has most likely risen above 2,000 °F.

Using What We Now Know

The nature of F-4 fire mishaps is well worth examining for the purpose of learning whether cockpit indications can be used to discriminate between types of fires. This summary is an effort to pass on the available knowledge; however, none of these typical indications can be considered absolute indicators of the fire source.

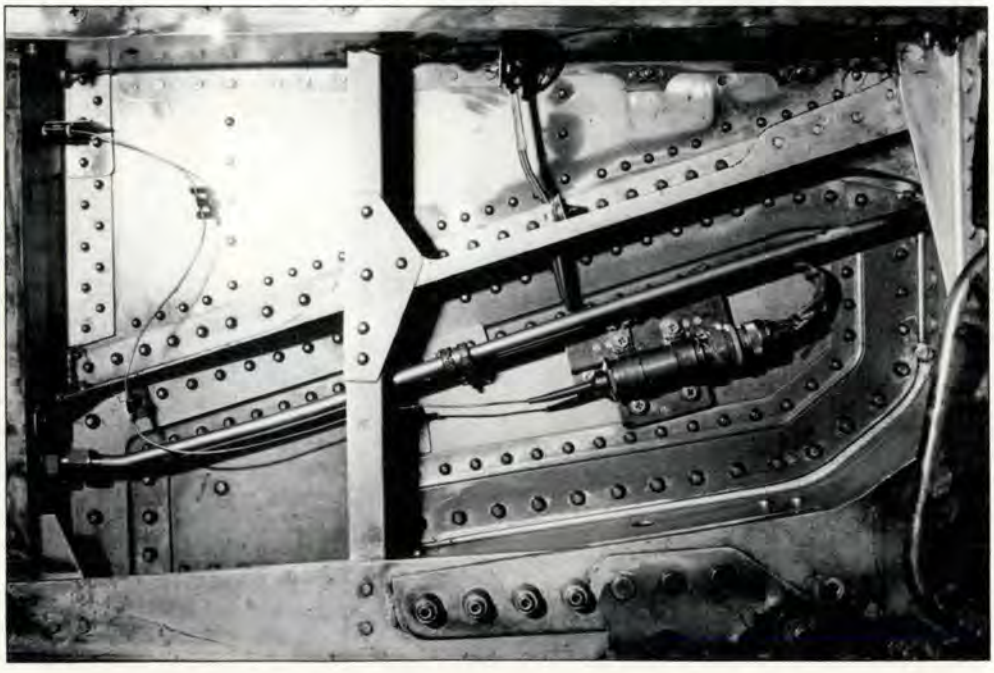
Even though analysis of fire and overheat warning light sequencing is not an exact science, the record shows a particular warning light sequence can be meaningful.

As a pilot, I would make a mental note that with a centerline tank installed, a double fire light just after breaking ground might be cured by tank jettison. Even a single fire light at this point would make me think—centerline tank. I would also make certain, on preflight, the AERO-27 (centerline) rack access doors are installed and secure.

Without becoming complacent about engine bay fires, I might also remember, statistically, the record shows a single fire light followed by a second fire light after cutting the throttle on the first engine, probably means heat transfer from the initial warning area. Completion of engine shutdown as dictated by the first fire light might eliminate both problems. If both lights persist, or the second one goes out and the first remains on after engine cutoff, the odds are good a utility hydraulic line is the fire source.

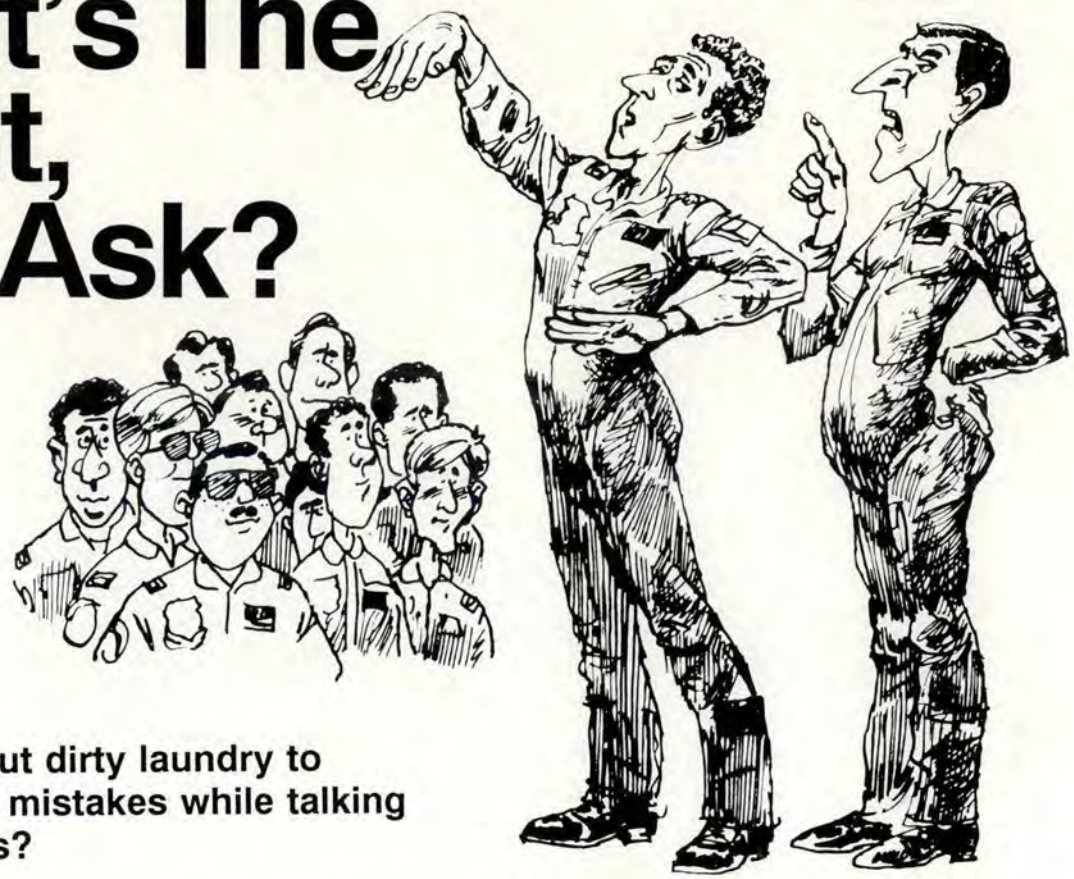
In the aircraft maintenance group, keeping the keel web airtight can save an airplane and crew and may improve the incentive to watch centerline rack access doors more carefully. Other keel openings may also be detected which require resealing. Meticulous leak-checking of centerline fuel tanks after installation may also save a crew and airplane. The fact these tanks only pressurize for transfer after takeoff is the reason a careful leak-check is required *with the tank pressurized.*

Engine bay fires are serious problems in the F-4, and our twin-engine redundancy needs to be protected so a fire in one engine can be contained and possibly eliminated. A better understanding of the causes and progression of fires may result in saving some aircrews and aircraft. ■



Because fire loops and detectors are mounted directly to the titanium keel, a fire in one engine bay could generate enough heat to cause an erroneous fire indication in the other bay.

What's The Point, You Ask?



Is it hanging out dirty laundry to tell about past mistakes while talking to young pilots?

CAPTAIN JEFF THOMAS
82 FTW/SEF
Williams AFB, Arizona

■ There's an old saying that "Experience is the best teacher." But where does that experience come from, and what does it entail? In the aviation community, it's usually a lesson learned firsthand. To name a few, pushing marginal weather, get-home-itis, exceeding personal limits, or flying with a hangover are things most aviators have done "just this once." Those of us who have survived those experiences, "that make the hair on the back of your neck stand up," swear we'll never put ourselves in that position again, chalk it up to experience, and press on. Lesson learned, bullet dodged. We internalize the experience and lock it away.

Unfortunately, most of us throw away the key. We tend to treat the experience as a "skeleton in our closet." We prefer not to share it with our peers in an open forum (i.e., safety meeting) lest our airmanship come into question. We may share it one-on-one in a casual setting (i.e., O' Club bar) as if it's a deep, dark secret, or a "just between you and me" type experience. What's the point, you ask?

When discussing mishaps, there's another old saying, "There are no new causes, just new pilots." During a recent flight safety meeting, I related a personal, dodged bullet whose lessons, in my opinion, bore repeating lest they be duplicated by the naive or uninformed. Afterwards, I was approached by a squadron pilot who made a comment along the lines of "hanging out my dirty laundry for all to see."

Reflecting on his comment and its implications, I realized being an "older head" in the squadron gave me certain practical experience and wisdom to pass along, a feeling he obviously didn't share. Reflecting on this further, I realized his comment reflected not only his attitude, but probably the attitude of most aviators in general—the old "better to die than to look bad" way of thinking.

There's yet another old saying, "We should all bear one thing in mind when we talk about a troop who rode one in. He called upon the sum of all his knowledge and made a judgment. He believed in it so strongly that he knowingly bet his life on it. The fact he was mistaken in his judgment is tragedy, not stupidity. Every supervisor and contemporary who ever spoke to him had an opportunity to influence his judgment. So a little of all of us goes in with every troop we lose." (Author unknown.)

That's the point! Experience and judgment can not only be gained firsthand, but through the maturity of others who have been there before. Your shared war stories may help keep others from being snared by the same traps that almost got you. Pushing your aviator pride aside may save a life! There's another old saying, "Those who don't learn from the past are destined to repeat it." ■

Documentation is a vital part of aircraft maintenance. The fact is, improper documentation is a factor in 90 percent of all maintenance-related aircraft mishaps!

DOCUMENTATION

CMSGT ROBERT T. HOLRITZ
Technical Editor

■ Looking through Webster's, I was surprised none of the definitions of "documentation" fit the connotations of the term as we use it in aircraft maintenance. So, in writing this article, I had to come up with a definition as it applies to aircraft maintenance. Here it is: The certification of actions that have been, or must be, performed to make an aircraft combat ready or safe for flight.

That's a pretty short definition for such an important term. The fact is, each year, improper documentation costs the Air Force millions of dollars in man-hours (yours) and parts. Occasionally, it costs lives.

Aircraft Destroyed

Here is a prime example of what can happen as a result of a failure to document a maintenance action.

At 0600, after an 8-hour shift in below freezing temperatures and high winds, the assistant crew chief was told the centerline tank had to be lowered for a specialist to repair a hydraulic leak. With the help of the specialist and another crew chief, the tank was lowered. Within a few minutes, the leak was fixed, and the tank was reinstalled. After the hydraulic specialist cleared the writeup, the aircraft was returned to fully mission capable status.

Later that day, the forms were reviewed by the flight crew and the production supervisor who determined the Phantom was ready for the mission. The flight crew strapped on the jet, and all went well—that is, until takeoff roll. When the pilot selected afterburner, a long plume of flame spewed from the centerline tank. By the time the tower and the SOF could notify the crew, the F-4 was airborne.

Following BOLD FACE emergency procedures, the pilot jettisoned the tank, and the fire appeared to be out. At about 300 AGL, the pilot realized the engines would no longer respond to the throttles. After narrowly missing a row of power lines, the pilot steered the jet toward an unpopulated desert area and, only seconds before impact, the crew safely ejected.

The fuselage fire was the result of a fuel leak in the centerline stand pipe. After the centerline tank was reinstalled, the crew chief failed to document a leak and transfer check were required. If either the crew chief or the supervisor had noted the omission and added the five-word documentation to the forms, a multimillion-dollar jet would not have become a smoking hole in the desert!

In Shop, Too

It is interesting to note fatigue was a factor in this mishap. The crew chief spent all night in the cold assisting avionics specialists with the aircraft. Troubleshooting was delayed for hours because of a defective LRU received from supply. The LRU was turned in to the shop by the flight line tagged with the ambiguous writeup "failed in flight." After several hours of troubleshooting, the shop could not find any defect in the LRU, so they signed it off CND and turned it in to supply as serviceable. Had the flight line folks taken the time to explain, in detail, the problem with the LRU, the in-shop folks probably would have repaired it and saved everyone hours of work.

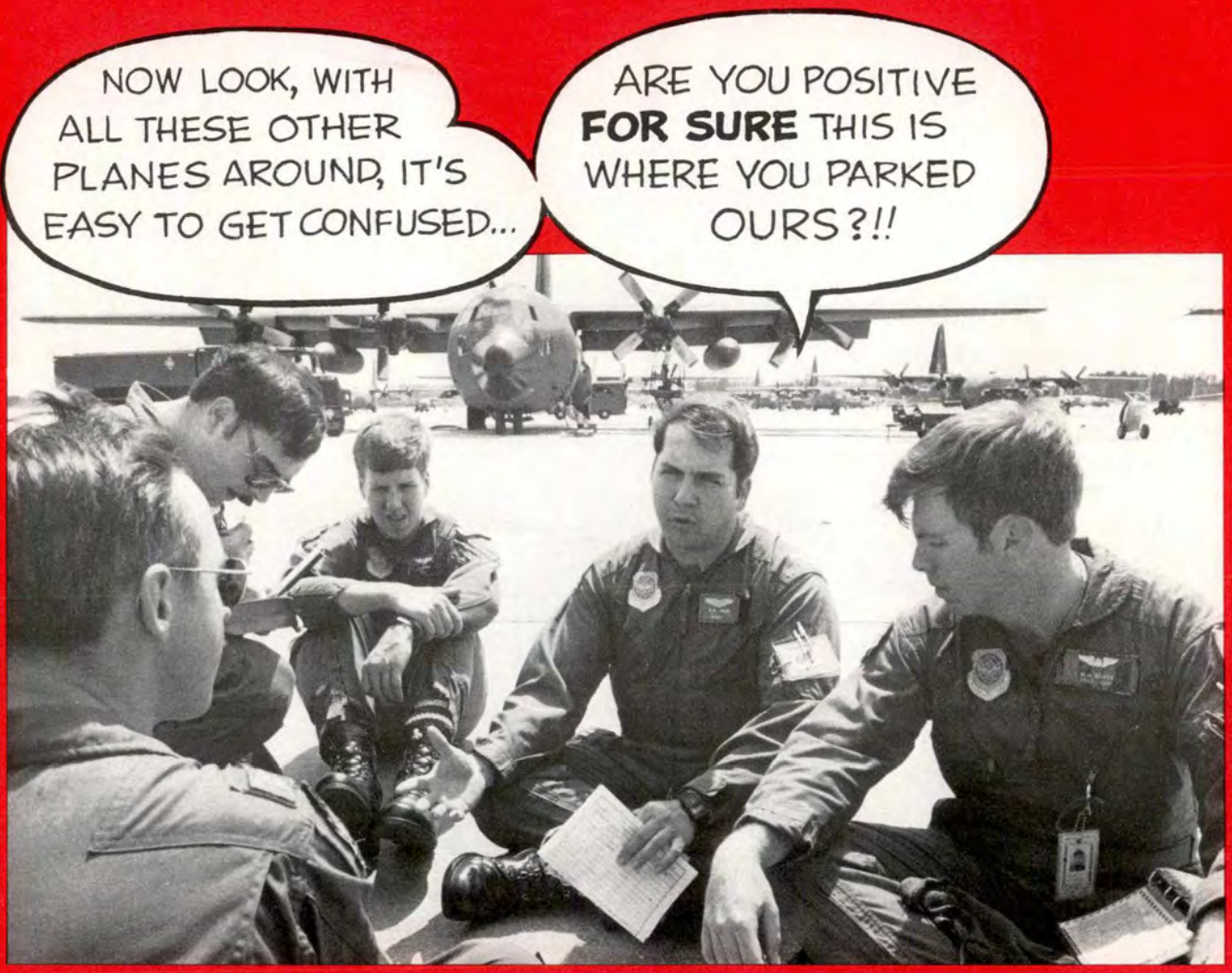
Flight Crew Responsibility

Good documentation of an in-flight discrepancy starts with the flight crew during maintenance debriefing. The extra time it takes for the flight crew to provide the specialists with detailed documentation of an in-flight writeup can save hours of maintenance time. Face-to-face dialogue between the flight crew and the technician is an important part of troubleshooting a particularly complicated or chronic problem. However, putting it in writing will ensure the details will be a matter of record and will be available for reference in case the discrepancy should recur.

The Bottom Line

Proper documentation is essential to quality maintenance. It takes the coordinated efforts of technicians, supervisors, and flight crews to make it happen. ■

Write A Dumb Caption Contest Thing



Our professional dumb caption writers have ganged up on us. They now insist they've been subjected to regular public humiliation by your entries beating their captions each month, and they are thoroughly miffed. Therefore, in a snit of temper, they have brought out their "super dooper" ultimate dumb caption. This caption is supposed to render all other dumb captions obsolete and become the latest state of the art. In all fairness, we have promised to run it (mainly because these clowns are getting impossible to work with, and we hate it when they whine). Maybe if we give 'em a little more rope . . . well, let's see what happens.

Anyway, if you think you can beat this so called A-Bomb of Dumb Captions, then have at it. We figure you might possibly do so and have a chance to win the colossal and "super dooper" ultimate legendary CHEAP LITTLE PRIZE!!! So do it already.

Write your captions on a slip of paper and tape it on a photocopy of this page. DO NOT SEND US THE MAGAZINE. Use balloon captions for any person in the photo or use a caption under the entire page. Entries will be judged by a panel of dumb humor experts in November 1990 (the humor is dumb, not the experts!). All decisions are relatively final. Also, please remember to put your name and address on your entry. As always, tax-deductible bribes over $100,000 will be warmly received.

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

MAJOR HARRY V. DUTCHYSHYN
Directorate of Aerospace Safety

YOU CAN MAKE A DIFFERENCE

■ Safety's biggest challenge is preventing the mishap before it happens. Too often blood on the ramp becomes the motivation that forces our lumbering procurement machinery to invest resources in hazard control. Yet, if the acquisition machine isn't aware of the hazard, it can't be expected to control it and so mishaps occur.

Identify the Problem

This is where you can make a difference. You need to identify the problem. Letting the right people know what is wrong is the ignition key to the corrective machinery. Whether it was your idea, your experience, or someone just put the project on your desk one morning, you need to know how to pass the word on to someone who can "make it happen." This article describes some of the ways you can spread the word and identify system deficiencies that can result in death, injury, or major system damage.

Once you have identified the hazard, someone is going to have to write it down. Then someone is going to have to pass it on. Knowing what your options are is the first step in bringing the problem to the surface—quickly. The following are some of your options for expediting hazard control and mishap prevention.

Hazard Reports

The Hazard Report, AF Form 457, is a vehicle used to identify and correct hazards of all levels of USAF operations. AFR 127-2, The US Air Force Mishap Prevention Program, prescribes the methods and supervisory involvement required to control the identified hazards. The implementation of this mishap prevention program is generally used at the base level but can be applied to other bases through direct communication between safety offices at different bases.

Deficiency Reports

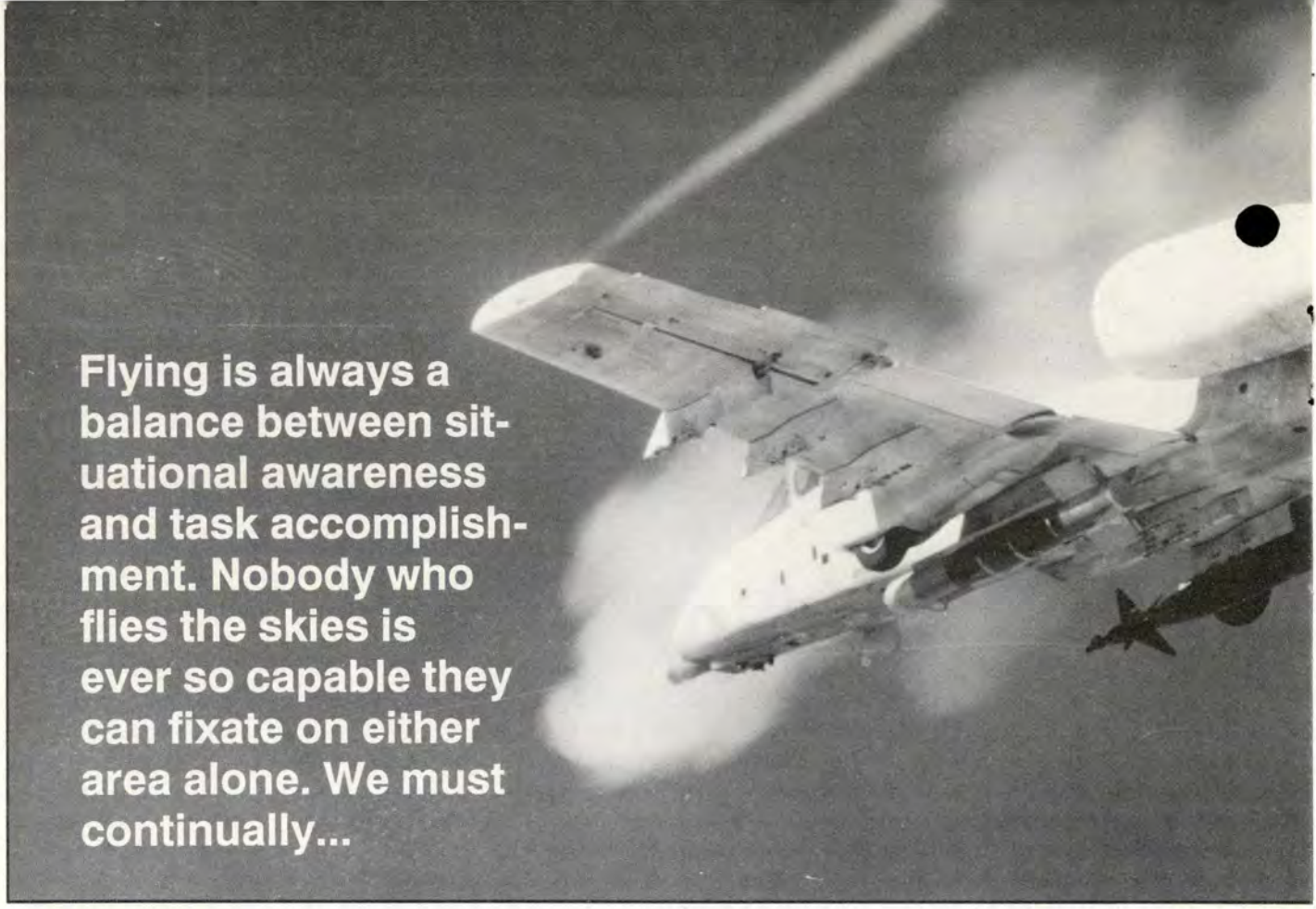
The Material Deficiency Report (MDR), or Service Report (SR), is another method of hazard reporting. TO 00-35D-54 describes the process and identifies the responsible offices for reacting to many deficiency reports. These deficiency reports—MDR, SR, Software Deficiency Report (SDR), and Quality Deficiency Report (QDR) are some of the ways to forward feedback from the user to the program offices responsible for meeting the user's needs. A standard message format or Standard Form 368 is used to forward the necessary information.

■ The SR is primarily used to identify and track system deficiencies for systems in advanced development, test and evaluation, or operational transition. The OPRs for SRs will be the AFSC program office responsible for the system. A safety deficiency is a category I SR. A CAT I SR requires immediate corrective action because the hazard may result in death, major injury or illness, or major system damage or loss.

■ The MDR is very similar to the SR except it applies to systems where program management has been passed from AFSC to an Air Logistics Center (ALC) in AFLC. The term MDR applies specifically to those hazards or deficiencies that could result in death, injury, or major system damage. The OPRs for MDRs are generally the ALC Quality Assurance Office (XXALC/MMQA) with information copies provided to safety (XXALC/SE).

Make It Happen

These reporting procedures are well-established methods for surfacing the hazard to the people who have the resources to fix your problem. You don't have to be a safety officer, a test pilot, or a QA inspector to use this system. Anyone can put the wheels in motion. Yes, it takes some initiative. Yes, it takes some followthrough. But, YOU can make a difference. ■



Flying is always a balance between situational awareness and task accomplishment. Nobody who flies the skies is ever so capable they can fixate on either area alone. We must continually...

Divide and Conquer

LT COL JAMES M. TOTHACER
Directorate of Aerospace Safety

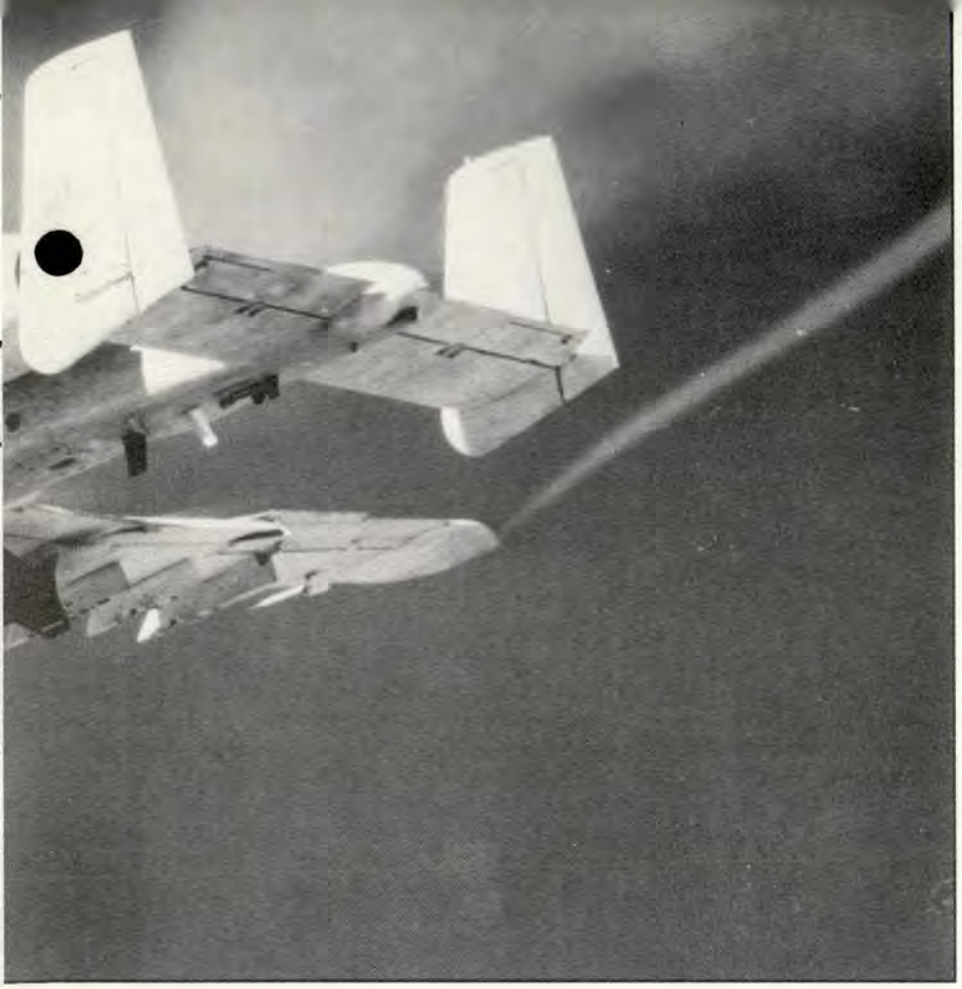
■ Spell the word "joke"—J-O-K-E. Say the word "joke" three times out loud: "Joke, joke, joke." Now quick, what's the white of an egg called? If you answered yolk, you have just fallen prey to attention fixation. Not serious? Well, in flying, attention fixation is one of those insidious little creatures that can sneak up and leave you dead.

The importance of "paying attention" is something drummed into our heads from practically our first day of schooling. Do you remember having one of your elementary school teachers warn you to pay attention? What effect did this have on you? Did you pay attention so intently you failed to notice when lunchtime came? Did you miss going home that afternoon because of your intense concentration and eventually die from starvation while peering at the chalkboard? Of course not, or else you wouldn't be reading this right now. But, it is a horrible truth—channelized attention kills pilots every year.

Not too long ago, two F-16 aircraft collided while on a 2V1 DACT mission against an F-15. During the intercept phase of the fourth engagement, the F-16 wingman lost sight of his flight lead. Lead gave his wingman a vector to the fight, merged with the F-15, and entered an anchored, turning fight. The wingman called "tally," but never called visual or acquired his leader.

Channelized on shooting the bandit, the wingman entered the engagement without both aircraft in sight and struck his lead's left wing with his own aircraft's left wing. The two aircraft became unflyable, and both pilots ejected. Unfortunately, the wingman's parachute tangled with the seat—resulting in a streamer and fatal injury on ground impact.

Another case in point is the A-10 instructor pilot who became so involved with monitoring his wingman's strafe pass, he flew into the ground. His attention was so fixated, so riveted, the rest of the



world was oblivion until that oblivion smacked the unfortunate pilot right in the face.

In the complex arena of aviation, we must be able to divide our attention to accomplish multifaceted flying tasks. No matter how sophisticated or simple the aircraft is you fly, you must divide your attention properly to ensure safe aircraft control.

When a function inside the cockpit becomes the focal point of your attention for an extended period of time, you are courting disaster. The high speed, low-level missions flown in many aircraft today increase the dangers of channelized attention. Pilots of "slow-movers" are equally susceptible to the perils, also. It'll get you, too—it just might take a little longer.

So what can we do to protect ourselves from the dangers of fixation? There is no one answer, no secret salve, no magic potion or pill we can take to make us immune; but there are steps we can take to minimize the problem.

One thing to do is to recognize channelized attention is a phenomenon with the potential to occur at any time. Next, admit it doesn't always happen to some other pilot—it can happen to *you*. Once you have accepted these premises, it's time to consider the seriousness of the problem. No gentle hint, just the bottom line: It can kill you—dead!

So let's say now you believe there is such a thing as attention fixation and you know it can alter your lifestyle, big time. What you may not realize is you already have learned not to fixate, you just don't consciously think about it (after all, you haven't died yet, have you?).

Back when you were first learning how to fly instruments, I'll bet you remember your instructor hounding you to "keep your cross-check going" or "keep your eyes moving." Although you may have thought you were only learning how to maintain heading, altitude, and airspeed, you were also learning to divide your attention and not to fixate. Your instructor was forcing you to do something you should think about when evaluating your cross-check. That is, the development of timing patterns for knowing how long you need to look at the instrument(s) and when it is time to recheck parameters. Practice building a cross-check where you consciously break your focus every few seconds or so, even if you don't need to. In other words, and it may sound strange, practice being as alert as you can possibly be during your cross-check.

Please don't get the idea instrument flying is the only place where channelized attention will bite you. This is far from true. You can fixate on a target, a runway, emergency warning light, or anything else inside or outside the cockpit. To prevent doing so, you must practice what I call "big-picture flying." Have it squarely in your mind what your priorities have to be for your particular mission and think how you would handle any distractions which might occur.

I know, I know, you can never think of every situation, but just "getting your mind right" helps. Fly your aircraft such that if you saw Godzilla doing the Lambada on the rim of the Grand Canyon, you could tell your children all about what you saw and still be "qual-level one" on your flight parameters.

If all this sounds so basic you are sorry you ever started reading this article, then I'm glad. I'm glad because fixating or channelizing your attention is all too often a result of overlooking the basics. Once upon a time, we all learned something about maintaining aircraft control, analyzing the situation, and landing as soon as conditions permit. *Fly-Think-Land*. You just can't afford to do any of these steps to the exclusion of the others, and you certainly can't afford to exclude these steps completely.

Perhaps you have given this article such close attention you haven't thought of albumen as the answer to the earlier egg question. You probably knew it all along but got fixated on the reading. It's okay here, but don't forget, flying demands your attention, not your undivided attention, but your intelligently divided attention. ■

IFC APPROACH

My Instrument Question Is:

THE INSTRUMENT FLIGHT CENTER STAFF
The Instrument Flight Center
Randolph AFB, Texas

■ As the focal point for Air Force instrument flight procedures, the Instrument Flight Center has received numerous inquiries on instrument-related topics. We have published the most frequently asked questions in hopes this information will increase your understanding of instrument procedures and techniques.

QUESTION: *What instrument approach procedures (IAP) book does the controller use when you are in the radar pattern?*

ANSWER: Unless you specifically request a high altitude approach or a portion of a high altitude approach, the approach provided you will be out of the low altitude IAPs. The majority of low altitude IAPs are only designed with A-D minimums published. In certain cases, users request E category minima be included on the low altitude IAP. High altitude IAPs are designed at the request of the military and include E category minima. If you operate into an airfield whose low IAPs only have D minima and you fly an E category aircraft, you will have to request vectors to the final portion of the high altitude approach (assuming the field has one) and use the published E minima. Often, the routings and altitudes between the high and low altitude approach will be different. Flying the high IAP when cleared for the low IAP may put you somewhere the controller does not expect you to be.

QUESTION: *If the weather goes below minimums when you are established on an enroute descent, are you legal to continue the enroute descent? Are you legal to start an approach IAW AFR 60-16, General Flight Rules?*

ANSWER: AFR 60-16, para 8-14, says you may start a published straight-in, or side-step, or enroute descent only if the visibility is at or above published minimums. Even if the weather goes below minimums during an enroute descent, you can continue the enroute descent. However, after the enroute descent, you can't start the approach if the weather is below minimums. Radar approaches (ASR, PAR) start when the aircraft is established on final. As a reminder, straight-in and side-step approaches require visibility only, and circling approaches require ceiling and visibility.

QUESTION: *When a controller gives me a speed to maintain, is this a minimum or maximum speed?*

ANSWER: The answer to this question is found in the TERMS section of FLIP General Planning, under "speed adjustments." ATC requests pilots to adjust aircraft speed to a specific value for the purpose of providing desired spacing. Pilots are expected to maintain a speed of plus or minus 10 knots or 0.02 mach number of the specified speed.

QUESTION: *In reference to a procedure turn, I have proceeded outbound and made my turn back inbound. Do I have to intercept the inbound course, or can I proceed direct to the FAF?*

ANSWER: While no procedure prevents you from proceeding direct to the FAF, it is not a technique recommended by the IFC. We feel it is better to be established on centerline with the drift "killed" by the time you cross the FAF, rather than cross the FAF at an angle, then work to establish yourself on centerline inside the FAF. The only time it would be advisable to proceed direct is when you are unable to intercept the published course.

QUESTION: *On a low-altitude IAP, what is the difference between an enroute facility and a feeder facility?*

ANSWER: Both are considered published routing.

The outer enroute facilities ring indicates NAVAIDS, fixes, and intersections along the Low Altitude Airway structure. From this point, terminal routings are shown. The routing will show bearing, distance, and MEA, and whether it is direct or via feeder facilities to the IAF. The fixes and intersections on the enroute facilities ring are not defined by radials or bearings since they are found on the low-altitude charts along the Low Altitude Airway structure.

The middle feeder facilities ring has NAVAIDS used by ATC to direct aircraft to intervening facili-

ties/fixes between the enroute structure and the IAF. These NAVAIDS normally are not part of the enroute structure. Intersections shown on the feeder facilities ring are shown by the intersection of the radials or bearings from the NAVAIDS that define them.

QUESTION: *On a civil standard instrument departure (SID), if the depicted climb gradient does not say it is for obstacles, can it be deleted?*

ANSWER: No! Civil SIDs only depict obstacle climb gradients, and although they depict see-and-avoid weather minima to be used in lieu of the gradient, USAF aircraft must fly by AFR 60-16 which does not allow the use of see-and-avoid minima. ATC climb gradients are not depicted on a civil SID. You must calculate these on your own using the depicted altitudes and distances. Simply assuming the absence of a climb gradient means you must maintain 200 feet per nm could get you into trouble. For an example, take a look at the Silent Seven Departure out of Oakland, California (figure 1). The depicted obstacle climb gradient is 230 feet per nm to 2,000 feet. However, the climb gradient to 6,000 feet is 352 feet per nm (based on 6,000 feet in 17 nm).

QUESTION: *Do I have to call when departing the IAF altitude?*

ANSWER: No. You are not required to unless specifically requested to do so by the controller. Also, when being radar vectored in the pattern and the controller tells you to maintain "X" altitude until established on a segment of the approach, you do not have to call departing this altitude for an altitude depicted on the approach. The controller is expecting you to comply with altitudes depicted on the approach plate. Making these calls would unnecessarily tie up the radio frequency.

QUESTION: *I fly the T-38 and was told that while operating in the PCA, I can plan to file outside of the Service Volumes of the NAVAIDS because ARTCC will give me radar vectors. Is this true?*

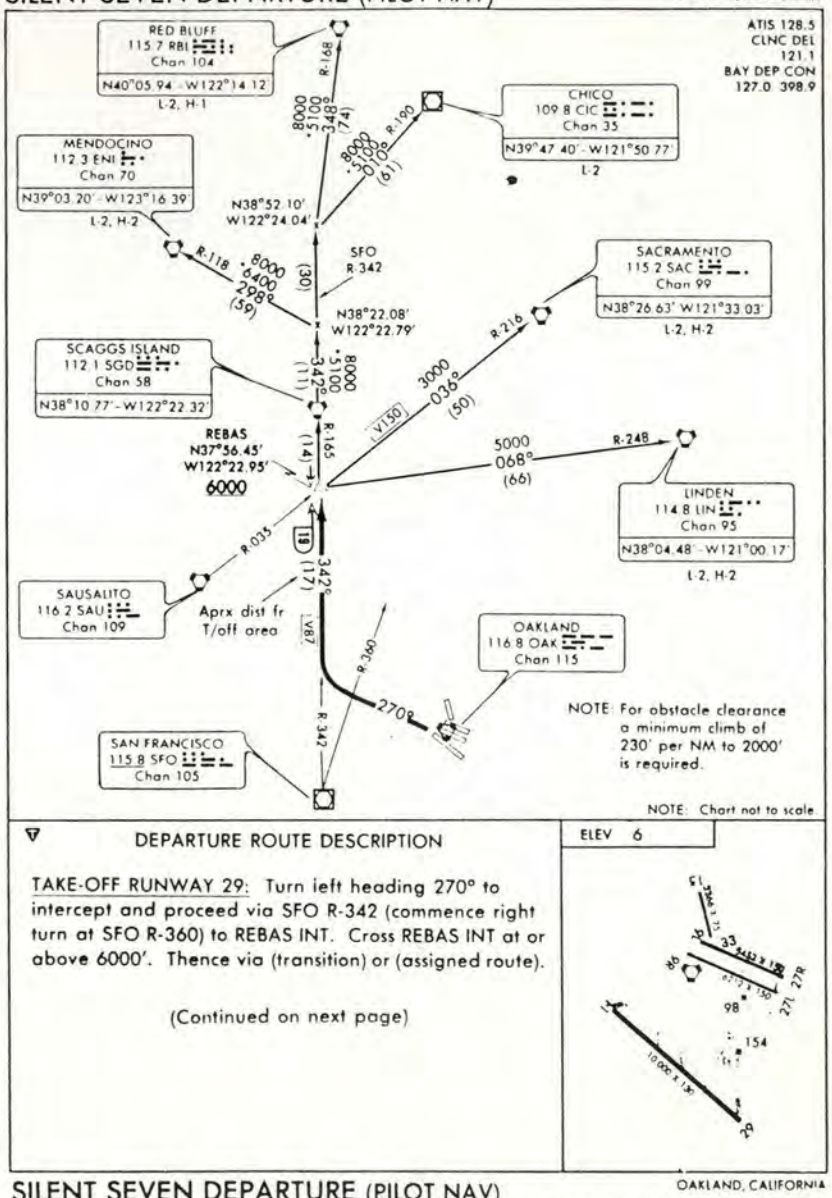


Figure 1.

ANSWER: It is most definitely false! All USAF aircraft must file their fixes inside the appropriate Service Volume of the NAVAIDS they use to define their fixes. Aircraft which are not capable of degree/distance or RNAV navigation must file so they will remain within the Service Volume (signal coverage) of the selected NAVAIDS. Once airborne, you may be cleared routing which will take you outside of the NAVAID Service Volume. However, you must *file* your flight plan so you can fly your routing in case of ATC radar failure, communications failure, etc. ■

The Major Has a Message...

"Preflight of an aircraft is not enough. You must preflight yourself."

USAF Photo by SSgt Marvin Krause, Homestead AFB, Florida

DOROTHY SCHUL
Editorial Assistant

■ In 1988, Major (Dr) Joyce Teters, Chief Air Force Aviation Psychologist, came to the Air Force Inspection and Safety Center at Norton AFB, California. Since then, she has spent very little time at her desk. Because of her experience, knowledge, and down-to-earth approach to human factors as they relate to the greater Air Force family, she is constantly on the road speaking to flight commanders, pilots, aircrews, and spouses.

In 1984, Dr Teters was attached to the F-15 "Fighting Tigers" at Bitburg AB, Germany. While stationed there, she developed a training program for flight commanders. This program was designed to help them identify a pilot who may be having problems and, therefore, could be potentially dangerous in the cockpit. Eventually, the briefings were expanded to include the wives of fighter pilots. She was subsequently invited to other bases in USAFE and has been on the road ever since.

These briefings are not lectures on theory. They are practical, compassionate talks in everyday language about subjects applying to the pilot's world. People share skills, goals, and personality traits with others in their field, whatever their specialty. And whether they are aware of it or not, these characteristics strongly determine everything they do, think, and feel.

At squadrons from Texas to Korea, Dr Teters talks about how to determine the emotional stability of a pilot. There are types of recognizable (to others) behavior which indicate the pilot is not operating at 100 percent—indications the pilots do not notice, oblivious to the possibility they may be in trouble. Their duties and personality traits affect the family. The spouse, being so close, frequently recognizes these behavioral signs and knows there is a problem. Many times the personality traits which make pilots safe in the air will make them difficult to live with at home. Through the give and take with the spouses, her insights and suggestions continue to benefit aviators' families.

Dr Teters says, "People learn to handle stress at different levels, in different ways. Their behavior will tell us when they have reached a point where they are no longer handling their problems—their problems are handling them. It is important for spouses to realize they are not alone."

Dr Teters also discusses the effects of an aircraft loss on the base community. She recognizes the entire base family feels the ramifications of the tragedy. For example, maintenance troops may blame themselves for what went wrong with the aircraft. "Their unjustified guilt and nervousness only introduce the potential for another mishap," the major says. This subject will be addressed in a future article. She will also discuss human factors and how they affect aviators in subsequent issues of *Flying Safety.*

The hard work and many, many miles covered the last 6 years have been recognized. Dr Teters and her program have been nominated for the prestigious Flight Safety Foundation's Admiral D. Florez International Safety Award. No person in the USAF has ever been nominated before. Nominees from all over the world will meet in Naples, Italy, at the Flight Safety Foundation International Safety Seminar in the fall. ■

USAF Photo by SSgt Marvin Krause.

The lively, spirited Major (Dr) Teters constantly travels, presenting her commonsense approach and message to flightcrews and their families around the world. She identifies serious human factors problems which could erode flying capabilities, tells how to recognize symptoms, then gives methods for handling the situation before trouble occurs.

Safety Warrior

ASH 1

CMSGT ROBERT T. HOLRITZ
Technical Editor

■ On 18 December 1972, the United States began Linebacker II, a saturation bombing campaign against the military and industrial complexes in and around Hanoi, the capital of North Vietnam. The bombings continued nightly until the morning of the 25th of December when the Americans took a Christmas respite.

On the night of the 26th, the raids resumed. The North Vietnamese took full advantage of the temporary cease fire by beefing up their air defenses, rebuilding and restocking their missile sites with surface-to-air missiles (SAM), and replacing antiaircraft gun emplacements.

Ash 1 was the lead B-52 of a 3-ship cell whose mission that night was to bomb an industrial complex and a railroad yard. As they entered the Hanoi area, the aircraft encountered heavy SAM activity and had to maneuver continuously to avoid being hit. Now, with less than a minute before bomb release, Captain Jim Turner set the aircraft on a straight and level course toward the target. They were now committed and would not alter course even to evade a missile.

After what seemed like an eternity, the B-52 leaped skyward as its load of 108 bombs released precisely on the target. Turner and his copilot, First Lieutenant Bob Hymal, steered the big bomber toward the Gulf of Tonkin. Only a few minutes before they reached the safety of the coast, Ash 1 was hit by a SAM. Assessing the damage, Turner noted one engine out, another engine on the same pod not advancing above idle, one 19,000-pound drop tank leaking fuel, and an injured tail gunner. He was also having some difficulty with the flight controls.

Capt Turner reported his situation to Red Crown, which was the code word for the USS Long Beach. Red Crown was stationed in the gulf to call out MiGs and coordinate rescue for downed airmen. Red Crown gave Ash 1 the locations of several friendly ships in case the crew decided to ditch. But Capt Turner notified Red Crown that although he was having some control problems, he was confident the aircraft could make it back to their base at U Tapao, Thailand.

Throughout the return flight, the aircraft remained controllable, and Capt Turner even managed to take on fuel from a tanker. It seemed that all would end well as Capt Turner lined up his B-52 for the approach and landing at U Tapao AB, Thailand. But during the landing flare, the aircraft began to drift toward a row of tankers and bombers, many of which were loaded for the next mission. The crew corrected the drift but could not get the jet to land. At the last minute, Capt Turner applied full power, pulled up the nose, and as the aircraft passed over the departure end of the field, its silhouette disappeared against the darkness. Seconds later, a muffled explosion and fireball announced Ash 1 had crashed.

Capt Brent Diefenbach, who had himself just returned from piloting another B-52 over Hanoi, was riding in a crew bus on the east side of the base waiting to cross the runway when he witnessed the crash. Running out of the bus, he jumped over the chain gate which was across the road. It was obvious to the sentry the captain was going to the crash site, and he gave him a nod of approval.

Once outside the base, Capt Diefenbach hailed a passing motorcycle. After a brief and futile effort to communicate with the driver and his two passengers, he gave up and hailed a baht bus (Thai pickup truck with seats in the rear for carrying passengers). The driver understood what the American wanted, and he drove Capt Diefenbach to about

SAFETY WARRIOR: ASH 1 continued

1/4 mile from the burning aircraft but refused to go any further. The aviator would have to go the rest of the way on foot.

The wreckage lay in a field of elephant grass about 1 kilometer north of the base. As Capt Diefenbach made his way through the tall, snake-infested grass, he could see the tail and most of the fuselage were engulfed in flames. He knew if there were any of the 500-pound bombs left in the bomb bay, they could detonate at any time. As it was, the ECM flares were burning fiercely, lighting the area with an eerie hue. The 50-caliber ammunition in the tail was cooking off like a pack of giant firecrackers.

Approaching the aircraft, he could see the cockpit area, although severely damaged, was not yet on fire. Still, given the tremendous impact and explosion, he was almost certain there could be no survivors. Nevertheless, he called out in the dark to make sure. To his surprise, he heard a faint response from the copilot's station. The copilot was alive!

Capt Diefenbach climbed through the hatch into the cockpit. He found the copilot strapped tightly in his harness slipping in and out of consciousness. Capt Diefenbach pulled the sleeves of his flight suit over his hands to protect them from the intense heat. He regretted leaving his Nomex gloves in the crew bus, but this was one mission he had no time to plan. Using a folding hunting knife, he tried, without success, to cut the copilot's harness. Finally, he managed to free the aviator and pull him from the wreckage.

Capt Diefenbach discovered the copilot had initiated the ejection sequence, but it was interrupted by the impact of the crash, leaving the seat armed. As a consequence, any wrong move could fire the seat and probably kill both of them. The flames were now so close to the cockpit that metal surfaces were hot to the touch, and explosions were getting louder and more frequent.

At first, Capt Diefenbach merely carried the copilot to get away from the fire. Then he used a fireman's carry and fell several times in the wet grass. When they were a safe distance from the aircraft, the exhausted captain stopped to rest. Looking back at the aircraft, he could see it was now entirely engulfed in the fire. He could now hear the fire and rescue vehicles responding. Ironically, after one of the boldest rescues of the Vietnam war, they were both almost killed by a firetruck. It came plowing through the tall grass and missed running them down by only a few feet.

Capt Diefenbach caught a hop back to the base in a helicopter. Dirty, sweaty, bleeding, and exhausted, he walked from the flight line to ops. He stopped in at the command post, explained to the assembled battle staff the evening's events, and then, as if nothing had happened, departed to attend that night's mission debriefing. He had had a very busy night.

Epilog

Lt Hymal recovered from his injuries, and as of this writing, he is still on active duty. The gunner, TSgt Spencer Grippen, also survived. After a search of the area, he was found walking on the side of a road on his way back to the base. Miraculously, he was thrown from the aircraft on impact and received only minor injuries.

The bombing continued for three more nights, leaving Hanoi, the most heavily defended city in the history of air warfare, defenseless. Its industry and war-making capability were completely destroyed. As a result, the North Vietnamese began meaningful negotiations with the United States, bringing the eventual end to the US involvement in the war. The story of Ash 1 is only one of many stories of the courageous men who flew the treacherous skies over North Vietnam during the "Eleven-Day War." ■

X-COUNTRY NOTES

REX RILEY
Directorate of Aerospace Safety

■ Those of you who have followed my **Cross-Country Notes** may have noticed my absence from these pages for over a year. I was given a short-notice opportunity to work on some special projects related to present and future flight safety issues. Unfortunately, these projects demanded most of my attention, and I could not devote the time I really wanted to tracking the welfare of the transient aircrew.

As you can see, I'm back, with renewed vigor, ready to resume my quest for quality transient aircrew services. My goal with the Rex Riley Transient Services Award Program has always been mishap prevention through the recognition and improvement of USAF transient aircrew services. I evaluate not only the obvious flight line hazards and operations, but also attempt to evaluate (and hopefully improve) facilities. These include flight planning, messing, transportation, billeting, and other areas which could directly or indirectly affect aircrew frame of mind or fatigue level. My purpose is twofold:

- Seek out and bring attention to any condition which could increase the probability of a mishap.
- Recognize publicly those installations which are providing outstanding quality service to transient aircrews.

I am not alone in my efforts. The office of the Chief of Staff of the Air Force recently initiated a program called "Project Prime Knight." It is being tested at 11 Air Force bases worldwide to improve transient aircrew services by providing "meals, wheels, and room keys" within 10 minutes of the transient aircrew's arrival. I heartily endorse this program and anticipate it will be implemented Air Force-wide at the completion of the test phase.

The success of the Rex Riley Program depends on timely, standardized evaluations carried out on a no-notice basis at every eligible Air Force installation worldwide. My goal has been to try to evaluate all bases at least once every 2 years. However, I am becoming more and more limited in the number of evaluations I can perform and the ability to visit bases located out of the mainstream.

To maintain the quality and number of evaluations needed, I have recruited, and personally trained, a select number of safety professionals to help me conduct evaluations. These additional-duty evaluators are selected flying safety officers who fly the line as basic crewmembers. They have the potential to visit every eligible base in the world.

We want to conduct at least 100 evaluations per year. So a friendly tip to those of you who work in a transient aircrew-related area—expect a Rex Riley evaluator to drop in unannounced as a crewmember in an F-15, F-16, C-5, C-141, C-21, KC-135, or any other aircraft that routinely transits your base within the next year.

As always, I look forward to get-

ting feedback from those of you operating in the transient crew environment. If you are a crewmember, let me know when you have transited a base which has some problems (maybe I can help correct them); or exceptionally good service (so I can recognize them). If you are proud of the services your base provides and would like a Rex Riley evaluation, or you notice trends or negative attitudes developing in aircrews and the procedures they use, let me know. Your active participation and interest greatly enhance this program. You can reach me at AFISC/SEFB, ATTN: Rex Riley, Norton AFB CA 92409-7001, or call me at DSN 876-2226, Commercial (714) 382-2226.

Cross-Country Notes

While I was otherwise preoccupied over the past year, I didn't entirely forget about the plight of the transient crewmember. I still managed to conduct over 30 evaluations. These evaluations resulted in eight new additions to the Rex Riley base list. At the same time, there were six bases who had deficiencies in one or more areas. Three bases were removed from the list, and three failed to qualify for the first time. The highlights (and lowlights) are summarized below.

Loring AFB ME Loring AFB has the honor of holding the Rex Riley Award the longest. They initially received the award January 1958 and have successfully passed every interim evaluation with flying colors. Their latest evaluation proved again they continue to place high emphasis on transient crews. Base ops, crew transport, and billeting were rated outstanding. If you get a chance, stop in and experience this legend.

Eglin AFB FL Eglin AFB continues to provide the little things that make a big impression on transient crews. In addition to superb accommodations, billeting provides express checkout, a locally assembled information booklet, and even same-day dry-cleaning service. All are ideally suited to travelers and especially aircrews. I appreciated the extra effort of the maintenance and TA folks who quickly serviced my aircraft which allowed me to depart ahead of inclement weather which closed the base.

McChord AFB WA This was the most aircrew-friendly base I have visited in some time. Base ops, billeting, and MAC maintenance were all outstanding. What sets McChord apart from most other bases is the positive, enthusiastic attitude displayed by everyone I met—no exceptions. From the crew bus operator to the billeting clerk to the maintenance crew chief, they were anxious to please and went out of their way to prove it. If you find yourself transiting the beautiful northwest, McChord will take good care of you.

Base Y A poor attitude on the part of the billeting clerk resulted in an unsatisfactory rating. The enlisted crew quarters were noisy. Initially, one crewmember was assigned to share a room with a nonrated maintenance technician. When the decision to stay off base was made, the clerk provided no assistance in finding a motel or dining facility for the crew. His basic attitude was "If you don't like what we have, you are on your own."

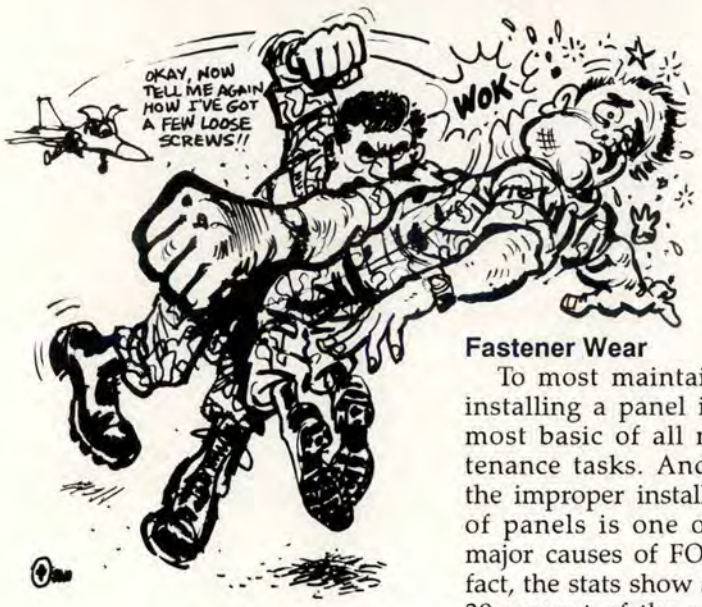
Base Z This base was removed from the Rex Riley list because its base ops flight planning room was a shambles. When the room was moved into the crew lounge to make space for another office, it was totally ignored. Flight publications were scattered, missing, or badly damaged. NOTAMs were hung haphazardly. Pictures were left on the floor or leaning up against the wall. Routine flight planning was a real chore. Hopefully, they will clean up their act before my next visit. ■

LIST OF BASES*

Loring AFB	ME	Kirtland AFB	NM	Williams AFB	AZ	Torrejon AB	SP
McClellan AFB	CA	Buckley ANG Base	CO	Westover AFB	MA	Luke AFB	AZ
Maxwell AFB	AL	RAF Mildenhall	UK	Eglin AFB	FL	Eaker AFB	AR
Scott AFB	IL	Wright-Patterson AFB	OH	RAF Bentwaters	UK	Bergstrom AFB	TX
McChord AFB	WA	Pope AFB	NC	RAF Upper Heyford	UK	Davis-Monthan AFB	AZ
Myrtle Beach AFB	SC	Dover AFB	DE	Andersen AFB	Guam	Zweibrucken AB	GE
Mather AFB	CA	Griffiss AFB	NY	Holloman AFB	NM	Hahn AB	GE
Lajes Field	AZ	KI Sawyer AFB	MI	Dyess AFB	TX	Kunsan AB	KS
Sheppard AFB	TX	Reese AFB	TX	Aviano AB	IT	Ramstein AB	GE
March AFB	CA	Vance AFB	OK	Bitburg AB	GE	Johnston Atoll	JQ
Grissom AFB	IN	Laughlin AFB	TX	Keesler AFB	MS	Wake Island	WQ
Cannon AFB	NM	Minot AFB	ND	Howard AFB	PM	RAF Alconbury	UK
Randolph AFB	TX	Vandenberg AFB	CA	George AFB	CA	Hurlburt Fld	FL
Robins AFB	GA	Andrews AFB	MD	Peterson AFB	CO	Carswell AFB	TX
Seymour Johnson AFB	NC	Plattsburgh AFB	NY	Clark AB	RP	Altus AFB	OK
Elmendorf AFB	AK	McDill AFB	FL	Moody AFB	GA	Grand Forks AFB	ND
Shaw AFB	SC	Columbus AFB	MS	Rhein-Main AB	GE	Fairchild AFB	WA
Little Rock AFB	AR	Patrick AFB	FL	RAF Lakenheath	UK	Mountain Home AFB	ID
Offutt AFB	NE	Wurtsmith AFB	MI	Zaragoza AB	SP	Barksdale AFB	LA

*Rex Riley list arranged in order of award date.

MAINTENANCE MATTERS



Fastener Wear

To most maintainers, installing a panel is the most basic of all maintenance tasks. And yet, the improper installation of panels is one of the major causes of FOD. In fact, the stats show about 39 percent of the screws and fasteners which caused damage to aircraft engines came from access panels forward of the engine's intake. And interestingly enough, in almost every case, these panels were inspected for security during a required supervisory inspection. Here are a couple of costly examples:

- Upon return from a cross-country mission, severe damage was found in the no. 1 engine of a B-1. The damage occurred when a screw vibrated loose from a maintenance access panel located forward of the intake. Half of the remaining screws were also loose.
- In a similar incident, a screw vibrated loose from an access panel just forward of the F-111's left intake and was ingested by the no. 1 engine, resulting in severe damage. The total cost of both these mishaps was more than $200,000.

Again, looking at the stats, in the past 16 months, these scenarios have been repeated no less than three times on the B-1 and twice on the F-111. On a fast horse, it would appear either the wrong screws were installed or the screws were installed improperly. But there is another more probable reason for these fasteners coming loose.

Many maintainers fail to consider fasteners, just like anything else, wear after a period of time. Both these panels are frequently removed by maintenance personnel to gain access to various components. After a number of installations, a screw begins to lose its ability to engage the self-locking mechanism of the nutplate. When this happens, no amount of torque will prevent the screw from backing out due to vibration. This situation is insidious, because to a supervisor performing an inspection, the panel appears to be installed properly.

Fortunately, there are some commonsense steps that can prevent access panel screws from becoming an expensive FOD problem:

First, when installing a screw into a panel, be sure there is resistance (engineers call this the prevailing torque) to wrenching after the first two turns. If there isn't, replace the screw. Of course, it is best to use new screws any time panels are installed forward of the intake. In some instances, even a new screw will spin freely after engaging the nutplate. In this case, the nutplate is probably worn and must be replaced.

This may be a little expensive and time-consuming, but it is a worthwhile effort considering it could have saved the Air Force nearly $500,000 in just the past 16 months.

SEAWARS Activation

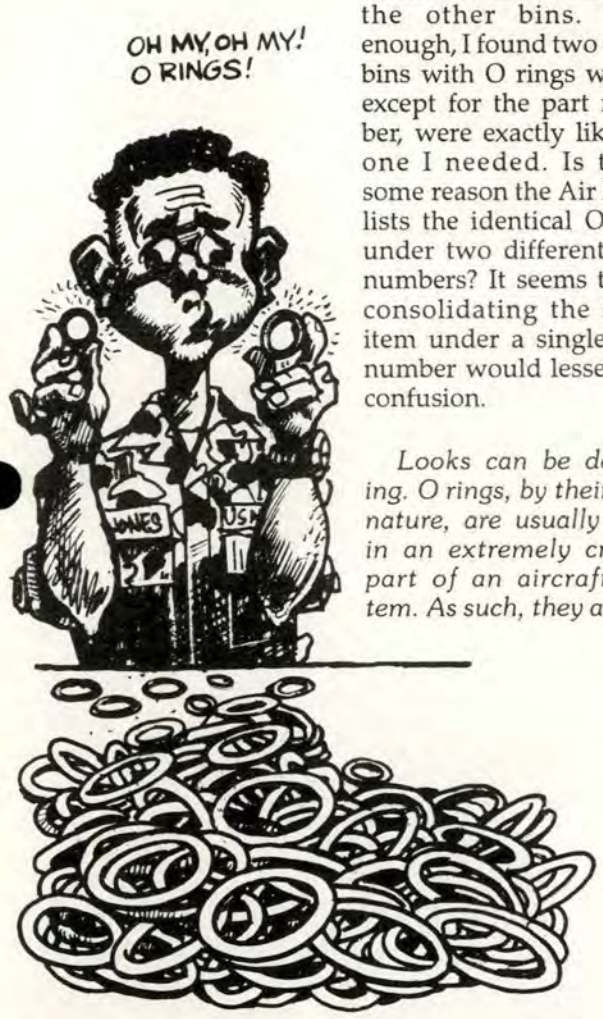
A curious pilot asked a life support technician if the seawater activated release system (SEAWARS) could be activated by coming in contact with the metal tip of a mechanical pencil. The specialists knew SEAWARS was designed not to activate by electromagnetic conditions, fresh water, sweat, salt spray, or even acid rain.

To demonstrate only seawater would activate the SEAWARS cartridge, he inserted the tips of a pair of scissors in the sensors. It wouldn't take Mr Wizard to predict what happened next. The scissors completed the circuit to the bridge wire and activated the cartridge. The technician's experiment proved that in addition to seawater, a metal object coming in contact with the SEAWARS sensor can activate the device. The lesson to be learned? All explosive devices should be handled with care. Experimenting with them is asking for a mishap.

MAINTENANCE MATTERS

FROM THE FIELD

"O" Ring Ringer



Looking through our bench stock, I discovered a bin marked with the part number of the particular O ring I needed. Of course, it was empty. Since I needed a replacement to fix my aircraft, I looked at the O rings in the other bins. Sure enough, I found two other bins with O rings which, except for the part number, were exactly like the one I needed. Is there some reason the Air Force lists the identical O ring under two different part numbers? It seems to me consolidating the same item under a single part number would lessen the confusion.

Looks can be deceiving. O rings, by their very nature, are usually used in an extremely critical part of an aircraft system. As such, they are designed to operate in many different parameters. Although they may look alike, chances are the replacement you chose was not a suitable substitute and was not designed to operate in the environment in which you used it.

In spite of the fact they all appear to be made of the same kind of common rubber, there are at least six different materials which can be used to manufacture O rings. The type of material used depends on the environment in which the O ring is intended to be used. For example, some O rings are composed of materials which are extremely resistant to fuels and lubricants. These are used in fuel systems. Those used in aircraft hydraulic systems are made of materials such as ethylene propylene which is resistant to hydraulic fluids and can withstand fairly high operating temperatures.

An O ring which cannot withstand the heat, or is incompatible with the fluid in the system, will eventually deteriorate, resulting in system leaks or failure. In fact, using the wrong O ring is a major contributor to hydraulic and fuel leaks.

Here are some things to remember when looking for a replacement O ring:

- *Always replace an O ring with one of the same part number. If the bench stock bin is empty, order it through your base supply. The chances are, if it's a bench stock item, base supply maintains a minimum level in the warehouse.*
- *Never use an O ring not issued in a manufacturer's properly sealed and marked package. This is because, like other seals, O rings tend to deteriorate in storage if not properly packaged. The sealed package will also help prevent mixing of different kinds of O rings. These packages should at least have the part number, lot number, and manufacturer printed on them.*
- *Always check the part number with the TO. It could be you are replacing the O ring because it was the wrong one to begin with.*

The bottom line is, O rings are critical to systems operation, and using the correct one is critical to system operation and safety.

FROM THE FIELD

Sporadic Sparrow

I just read the September 1989 *Flying Safety* magazine. In it there was an article entitled "Sparrow Alert" concerning a problem with an AIM-7 F/M MPU which can activate 15 minutes to an hour after a misfire venting pressurized fluid. I just wanted to let you know we had an AIM-7 F/M MPU fire 3 hours after a misfire.

We contacted the AIM-7 F/M manager at Robins AFB, Georgia. They concur. The MPU can activate up to several hours after an AIM-7 F/M misfire. TO 21M-AIM-7M-2 has a warning to that effect. The bottom line is to be careful as the timing of this event is not predictable.

FIRST LIEUTENANT
John D. Noah

CAPTAIN
Patrick J. Moisio

162d Tactical Fighter Group (ANG)
Tucson, Arizona

■ First Lieutenant John D. Noah, student pilot, and Capt Patrick J. Moisio, an instructor pilot (IP), were flying their F-16As on a solo conversion mission. During close formation, Lt Noah's airplane entered an uncommanded pitch-up. Lt Noah radioed Capt Moisio he felt he had no pitch authority. Twenty seconds after the uncommanded pitchup began, Lt Noah was able to regain control and radioed he had normal pitch control authority. Capt Moisio maintained a chase position and coordinated an emergency recovery.

The approach was planned without speedbrakes and with the trim/autopilot switch in the disconnected position. At about 6,000 feet AGL on the approach, the aircraft pitched up again. Lt Noah rolled the aircraft resulting in a barrel roll, selected afterburner, then transitioned to a climbing spiral. About 22 seconds later, Lt Noah once again regained normal control. The flight then climbed to a safe altitude.

The SOF contacted the aircraft contractor to discuss possible causes of the problem. Lt Noah and Capt Moisio discussed the best recovery maneuver should the aircraft pitch up again, and also ejection procedures.

On final approach at approximately 200 feet AGL, the aircraft pitched up again. Lt Noah executed the recovery maneuver previously discussed and regained control after 630 degrees of climbing spiral. A decision was made not to land at Tucson International Airport due to adjacent populated areas. The flight proceeded to a remote auxiliary field to attempt a safe recovery. As a possible solution, the MPO switch was held in the override position with a pen for the remainder of the flight. The center line tank was jettisoned enroute to the auxiliary field.

The final approach continued to a safe landing and approach end barrier engagement with no damage to the aircraft. The teamwork and superior airmanship of Lt Noah and Capt Moisio saved a valuable aircraft.

WELL DONE! ■

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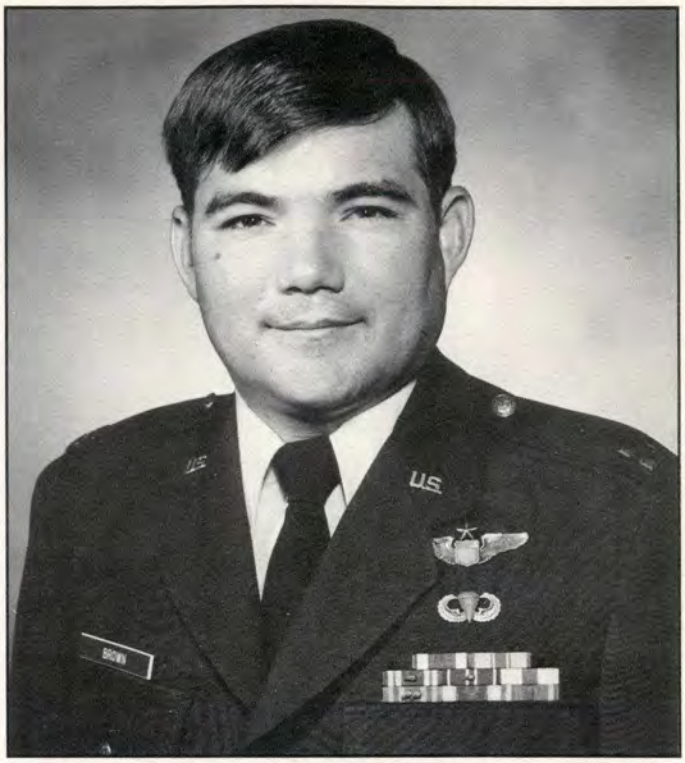
UNITED STATES AIR FORCE

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.



CAPTAIN

Kenneth A. Brown

HQ Contract Management Division (AFSC)
Kirtland AFB, New Mexico

■ Capt Brown was performing an initial acceptance check flight of a new F-16C at Carswell AFB, Texas. Eighteen minutes into the flight, while at FL 400 and 1.6 Mach, Capt Brown pulled the throttle to idle to check the Mach/idle lockout. The rpm immediately went to 80 percent instead of the expected 100-105 percent.

Sensing a serious engine malfunction, he advanced the throttle, but the engine failed to respond. Instead, the rpm continued to decay. His position was 75 nm north of Carswell AFB, heading north. He immediately started a climbing turn back toward the Fort Worth area to preserve his emergency airfield options. The engine compressor stalled when he was at FL 430 and 1.3 Mach, halfway through the turn.

He declared an emergency with ATC and was advised a B-52 had closed the Carswell runway with a hydraulic emergency. Now at FL 370, he attempted to put the throttle in cutoff, but it resisted positioning below idle. Using two hands, he finally forced the throttle into cutoff. By maintaining his current glide angle and airspeed, he could make Carswell AFB. However, the runway was still closed by the B-52, and if not opened, he would have to land on the taxiway. He also realized he might run out of hydrazine for the EPU, lose the flight controls, and have to eject over a populated area unless he flew toward two lakes north of Carswell.

Passing FL 190, he made a last attempt to start the engine. It accelerated to 60 percent, but decayed back down to 40 percent. Considering his options, he decided 40 percent rpm would help maintain enough hydraulic pressure to land should the EPU run out of hydrazine. By the time Capt Brown reached high key, the B-52 cleared the runway, and the F-16 was skillfully glided to a safe landing. Capt Brown's exceptional flying skill and knowledge of F-16 systems allowed him to save a valuable aircraft and prevented the possible loss of life and destruction of property.

WELL DONE! ■

Just "Dropping In" Doesn't Always Mean You'll Be Welcome ...

3-249

Review Your Emergency Procedures!