Flying SAFETY

Flying South — Operation Deep Freeze

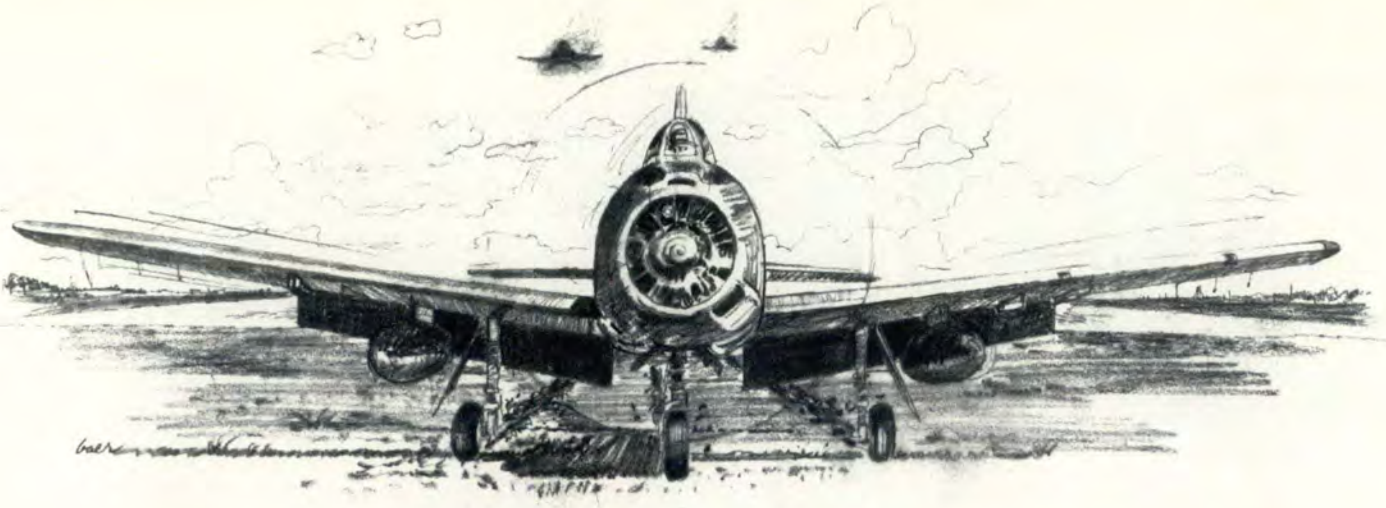
The Race Goes to the Most Aware

Fly-By-Light Aircraft Flight Control

The Black Jet!

APRIL 1992

DISTINCTIVE MISSIONS



THERE I WAS

■ I was flying the T-28 "Trojan" out of Udorn Royal Thai Air Force Base during the war in Southeast Asia. Udorn was a single runway with about eight squadrons of F-4s, 40-some T-28s, and a lot of miscellaneous aircraft operating out of the Air America compound. It was a **very busy place!** With that in mind, there was a continuing emphasis on minimizing time on and around the runway. It got real busy about the time we recovered a Linebacker strike from over the North.

The T-28 was a real cute little aircraft with a 1425-horse, 9-cylinder radial engine (that's those engines we had before jets). We used it to go up north somewhere and drop MK-81s and MK-82s — kind of fun, but it didn't impress the Phantom Phlyers too much.

Well, anyway, one day I turned base to land, and as luck would have it, there was a bunch of double-uglies — excuse me, I mean Phantoms — rolling out on final close behind me. The tower, as usual, started his chatter to use the next available turnoff and expedite my taxi (I was still going about 100 knots).

Being a conscientious sort of a guy, I did my best and got on the binders as hard as I could and attempted to make the next turnoff, which was quite close. I almost made it, but didn't. Turning around was not an option, so it was on to the next turnoff which was a few thousand feet down the runway. The tower, naturally, was offering their encouragement . . . I jammed in the power to get a little more taxi speed and hurried down to the next turnoff at the departure end of the runway.

The problem was the T-28 had some idiosyncrasies. One of them was that it had good brakes — but only if you used them just once. They faded rapidly during that initial use and then just kind of disappeared. I had already used them once during my initial hard braking. Thus, I was in for a big surprise. As I stepped on the brakes while expeditiously approaching the end of the runway, I got not even so much as a little slowdown — nothing. I had absolutely no brakes.

I went off the end of the runway, through the overrun, and off into the tules. The F-4 dearmers watched casually from their shack which was over near the parallel taxiway. Surprisingly enough, the gear didn't collapse. I just kept on bouncing along through the rough. I eased in a little rudders/NGS and started a gentle turn back towards the parallel taxiway. The dearmers bailed out of there with **great** haste.

Surprisingly enough, I bounded back onto the parallel taxiway, now at a much more controlled rate of speed. Tower/ground control had not uttered a peep. I don't know whether they hadn't seen me or were just rendered speechless. They never did call — it was wartime, after all. I strolled on down the taxiway and soon my faded brakes returned. Postflight inspection revealed no damage to my aircraft, although I did cause my flight suit to be temporarily unserviceable.

In retrospect, I did learn/relearn a few lessons.

- Once cleared to land, the runway is yours, and it's yours until you clear it, regardless of who's next.
- Be careful about expediting on the runway or trying to make an early/rapid turnoff. You can't help the guy behind you if you close the runway.
- Cross-countries aren't all they're cracked up to be. ■

UNITED STATES AIR FORCE

Flying Safety

APRIL 1992

AIR FORCE SPECIAL PUBLICATION 127-2

VOLUME 48, NUMBER 4

Cover photos by
CMSgt Bob Holritz

CONTRIBUTIONS

Contributions are welcome as are comments and criticism. No payments can be made for manuscripts submitted for publication. Address all correspondence to Editor, *Flying Safety* magazine, Air Force Safety Agency, Norton Air Force Base, California 92409-7001. The Editor reserves the right to make any editorial changes in manuscripts which he believes will improve the material without altering the intended meaning.

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SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE CHIEF OF SAFETY, USAF

PURPOSE — *Flying Safety* (ISSN 0279-9308) is published monthly by the USAF, Norton AFB CA 92409-7001, to promote aircraft mishap prevention. Use of funds for printing the publication has been approved by Headquarters, United States Air Force, Department of Defense, Washington, D.C. Facts, testimony, and conclusions of aircraft mishaps printed herein may not be construed as incriminating under Article 31 of the Uniform Code of Military Justice. All names used in mishap stories are fictitious. The contents of this magazine are non-directive and should not be construed as regulations, technical orders, or directives unless so stated. **SUBSCRIPTIONS** — For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Changes in subscription mailings should be sent to the above address. No back copies of the magazine can be furnished. **REPRINTS** — Air Force organizations may reprint articles from *Flying Safety* without further authorization. Non-Air Force organizations must advise the Editor of the intended use of the material prior to reprinting. Such action will ensure complete accuracy of material amended in light of most recent developments. **DISTRIBUTION** — One copy for each six aircrew members. One copy for each 12 aircrew support and maintenance personnel. Air Force units must contact their base PDO to establish or change requirements. AFSP 127-2 is entered as a publication at the Second-Class rate at San Bernardino Postal Service, 1900 W. Redlands Boulevard, Redlands, CA 92373 and additional entries. **POSTMASTER:** Send address changes to *Flying Safety*.

FLYING SOUTH
Operation Deep Freeze '92

CMSGT ROBERT T. HOLRITZ
Technical Editor


The author on his way to Operation Deep Freeze with the 63 MAW.

Cargo for Operation Deep Freeze being loaded at Christchurch, New Zealand.

■ The continent of Antarctica covers 5.4 million square miles, an area about the size of the United States and Mexico combined. With temperatures as low as -120 degrees Fahrenheit, it is, by far, the coldest place on earth. Ironically, in spite of the fact it is almost entirely covered by ice and snow, with an annual accumulation of approximately only 1 to 2 inches of precipitation, the interior region of Antarctica is one of the world's largest deserts. The icecap, which is nearly 16,000 feet thick in places, is the result of millions of years of accumulation of precipitation.

Because of its extremely hostile environment, Antarctica was the last of the continents to be explored. And, although explorers have been visiting Antarctica since 1899, by 1956, half of the continent had still not been traversed. In 1957, 12 nations joined in a scientific program, OPERATION DEEP FREEZE, to conduct research in Antarctica as part of the "International Geophysical Year."

Since then, the National Science Foundation, funded by the United States Government, has maintained six research stations on the continent, including the Admundsen-Scott Station at the geographic South Pole. These stations comprise the United States Antarctic Program. Research at these stations covers a variety of fields including earth sciences, biology, glaciology, oceanography, geology, the study of cosmic radiation, and even satellite movements.

While ships have access to the continent much of the year, airlift plays a major roll in the logistical support of the research facilities, and it is the only means to supply the South Pole Station. Most airlift is supplied by Navy LC-130s equipped with skis. However, for


It takes a joint effort by aircrew and ground personnel to muscle the 13,000-pound platforms into the aircraft.

Beautiful downtown McMurdo Station, summer home for about 2,000 scientists and technicians.

Loadmasters TSgt Dave Birchman and TSgt Randy Geisen check weight and balance calculations.

the past 11 years, Air Force C-141Bs, operating out of Christchurch, New Zealand, have provided heavy airlift support for the Antarctic stations. And on 4 October 1989, a C-5 from the 60 MAW, Travis AFB, California, made history as the largest aircraft to land on the continent.

During OPERATION DEEP FREEZE '92, C-141s from the 63 MAW, Norton AFB, California, and 62 MAW, McChord AFB, Washington, flew 11 airdrop missions to the South Pole, dropping more than 200 tons of supplies.

Air dropping of any kind requires precise flying and proper planning. But a sequential drop of a 39,000-pound load 1,200 feet over the South Pole exacts the best planning and skill from both air and ground crews.

The Rigors of Rigging

The preparation of the cargo on the 16-foot-long platforms is absolutely critical. Rigging teams composed of US Army, Air Force, and Kiwis (New Zealanders) spend hours packing chutes and preparing the cargo platforms. Their honcho, US Army WO-4 Bennie Manning, describes his riggers as the hardest working and most dedicated experts he has worked with in his 29 years in the airlift business. He has been involved in OPERATION DEEP FREEZE since he was assigned as a liaison to MAC in 1984.

Mr Manning talked about the unique problems with the South Pole airdrop. "Organizing the maze of equipment we found in the staging area when we arrived here at Christchurch was no easy job. The original plan was to drop loads which consisted mainly of metal structural components. But when we arrived, we found tools, cardboard panels, sheetrock — you name it. It all had to be dropped on 11 missions, and loads had to be planned so they would not exceed the capability of the C-141. "And," he added, "they had to be packed right. You can't afford to have a load

continued

Before landing on the ice runway, the aircrews don arctic flight gear.

Scientists and technicians from the National Science Foundation journey to Antarctica. Some will spend the winter (June through September) at the South Pole Station.

Capt Mark Murray, 15 MAS, makes a perfect landing on the ice runway at McMurdo Sound after the flight from Christchurch, NZ.

FLYING SOUTH continued

come apart when it gets yanked from the aircraft at 150-plus knots. On average, the platforms weighed about 12,000 pounds, but one weighed more than 17,000 pounds. Our folks are professionals, and when a load arrives at the back of the aircraft, it is ready."

Aircraft Preparation

According to Major Harrison Freer, the mission commander, "If the doors stick open or the flaps don't retract during the drop, our fuel situation would be critical."

Aircraft systems such as these are not designed to be operated in the extreme cold of Antarctica. At -45 degrees Fahrenheit, the grease used to lubricate the screw jacks of the doors and flaps freezes solid. During preflight for these missions, the crew chief removed all the grease from the screw jacks and replaced it with a lubricant about the same viscosity as machine oil.

Just like the bindings on a pair of skis, the tension on the rails on which the platforms will ride during the drop sequence must be adjusted correctly. As the 63 MAW's chief loadmaster, CMSgt Cecil Clark explained, "Too loose, and the platform could move uncontrollably in flight — too tight, and the platform could fail to release during the extraction phase of the drop. Either occurrence during this unique operation would cause some serious problems."

Loads

For the loadmasters, the South Pole drop is one of the most complex and challenging airlift scenarios. Chief Clark explained, "This is no mission for OJT. We leave nothing to chance. Each of the six loadmasters is either an instructor or flight examiner. They were all handpicked for this mission."

After the platforms were loaded on the aircraft and inspected by a joint service team, the loadmasters rehearsed the drop procedures. They discussed every possible

During the winter, the ice of McMurdo Sound is nearly 7 feet thick, but during the Antarctic summer, supply ships are moored where these airmen are standing. Constant monitoring of the conditions of the ice is a routine part of the job.

A fleet of LC-130s equipped with skis is operated and maintained by the Navy under contract with the National Science Foundation.

The LC-130s are the only means of transporting personnel to and from the South Pole Station.

emergency. This was important because once the cargo doors are opened at the drop zone, communication between loadmasters will be limited to hand signals.

Heading South

The mission for the South Pole airdrop included a 2,400-mile flight to McMurdo Station, the largest of the Antarctic stations, where we refueled. During the flight to McMurdo, the loadmasters again made several dry runs covering drop and emergency procedures.

The landing strip at McMurdo is actually a frozen stretch of the Ross Sea. Although the ice was more than 7 feet thick, there was some concern about the condition of the runway. The temperature at McMurdo had risen to a balmy 27 degrees, and there was a good possibility the surface had become soft. Within 2 weeks, it would become unusable. And in a month, it would again become the hunting grounds for killer whales and an anchorage for supply and research vessels.

Because of the lack of visual cues and unpredictable winds, landing on the ice can be tricky. But in spite of the fact this was Capt Mark Murray's first ice landing in the left seat, he set the heavy Starlifter gently on the frozen surface.

McMurdo Station

McMurdo Station is the hub of all air transportation for Antarctic operations. Its ice runway is the only one on the continent which can support heavy transports such as the C-141 and C-5. Using their fleet of ski-equipped LC-130s, the Navy and the National Science Foundation fly shuttle flights from McMurdo to other research stations including the South Pole Station. The aircrews and maintenance folks at McMurdo have learned to deal with the cold and wind. Without warning, blowing ice particles and snow can bring visibility on the ice to zero. At temperatures that drop to as low as -30, and with winds often exceeding 100 knots, even basic aircraft servicing operations are a challenge. Hydraulic systems become sluggish and often inoperative, and the extremely dry air increases the hazard of static buildup during refueling.

Polar Drop

As we climbed to altitude on the 2-hour flight, we contacted the pole

continued

Each year MAC provides airlift for the South Pole Station. Below, a C-141 from the 63 MAW takes off from the McMurdo ice runway to airdrop heavy construction material at the Pole.

The copilot's view of the South Pole Station seconds before drop time.

The loadmasters go over the drop procedures one last time.

FLYING SOUTH continued

station. Since the weather at the pole can, and usually does, change without warning, we received updates about every 20 minutes. For the drop, the wind could not exceed 17 knots. The temperature at the drop zone was -41° Fahrenheit.

Aside from the weather, this flight posed some other problems unique to polar aviation. For nearly 10 years, navigators have not been used on C-141s. But, because the inertial navigation system is unreliable at latitudes below 60 degrees south, and useless near the poles, this mission required a skilled navigator. Our navigator, Major Walt "Hawkeye" Lindsey, maintained our course using a grid system with coordinates relative to McMurdo.

Radar altimeters were also unreliable over the deep ice of the polar cap. "Whiteouts" were common and for some time during the mission, made it impossible for the pilots to define a horizon. In 1979, a civilian aircraft crew's inability to define a horizon was blamed, in part, for a mishap near McMurdo which claimed 257 lives.

An hour before drop time, the crew made final preparations. The loadmasters performed predrop checks on the platforms. The engineer, MSgt Pat Cain, turned on the ramp and door hydraulic system to warm the fluid and turned off the heat in the cargo compartment to prevent the crew from becoming overheated in their thermal gear.

Thirty minutes before the drop, Hawkeye made contact with the TACAN signal from the South Pole Station, and we began to descend. Although the drop would be at an altitude of 1,200 feet, the polar icecap itself is 9,300 feet thick. This means the drop would actually be at an altitude of 10,500 feet above sea level, and the crew would have to be on oxygen during the drop. As an extra precaution against hypoxia, Maj Freer directed the crew to

One of the two Kiwi riggers makes one last check of the platforms just before the descent.

READY . . .

prebreathe oxygen 30 minutes prior to the drop.

With just 10 minutes to go before the drop, only ice and a faint horizon were visible from the cockpit, but the navigator assured Capt Murray they were on course. Capt Murray lowered the flaps to 86 percent and slowed the aircraft to 156 knots. In this configuration, airspeed was critical with a tolerance of only 10 knots. Any problems with the drop could easily eat up that margin. In spite of the warmup, the cargo door opened hesitantly.

Three minutes before the drop, the polar station appeared in the right window just as Hawkeye predicted. Although the drop zone was 300 feet wide and a mile long, when Capt Murray lined up with it, it looked no larger than a postage stamp. With 30 seconds left, Hawkeye began the countdown.

In the cargo compartment, the loadmasters, although confident, were ready to react to any problems. At the end of the countdown, Hawkeye directed the cargo release sequence, and in less than 5 seconds, the 39,000 pounds of cargo were swinging from their parachutes. The loadmasters watched as the platforms landed dead center in the drop zone.

Until now, the mission was flawless. But as Capt Murray began to climb to altitude, Chief Clark notified him the cargo ramp would *not* move. (After landing back at Christchurch, New Zealand, it was discovered the jack screw on the right petal door had sheared, causing the petal doors to slam shut, damaging the micro switch that initiates the cargo ramp closing sequence.) Using the manual override system, Chief Clark and the other loadmasters took turns pushing the system's buttons until their fingers became numb. Finally, the cargo ramp reluctantly was raised, closed, and locked, allowing the cargo ramp and doors closure procedures to be completed and the aircraft sealed and pressurized for the long flight back to Christchurch.

MSgt Patrick Cain, the flight engineer, doublechecks his fuel calculations just prior to the South Pole drop.

Since the inertial navigation system was useless, Navigator Major Walt "Hawkeye" Lindsay uses grid navigation to find the Pole.

A Global Resource

Few airlifters would argue Antarctic airlift operations present a certain amount of additonal risk. But, as Maj Freer put it, "We are writing the book on Antarctic airlift for the C-141." Loadmaster MSgt Brandon McKey added, "We learn something new every mission."

Success relies on thorough planning. For the airlift crewmembers, cockpit resource management is vital and extends from the flightdeck to the loadmasters and crew chiefs in the cargo compartment.

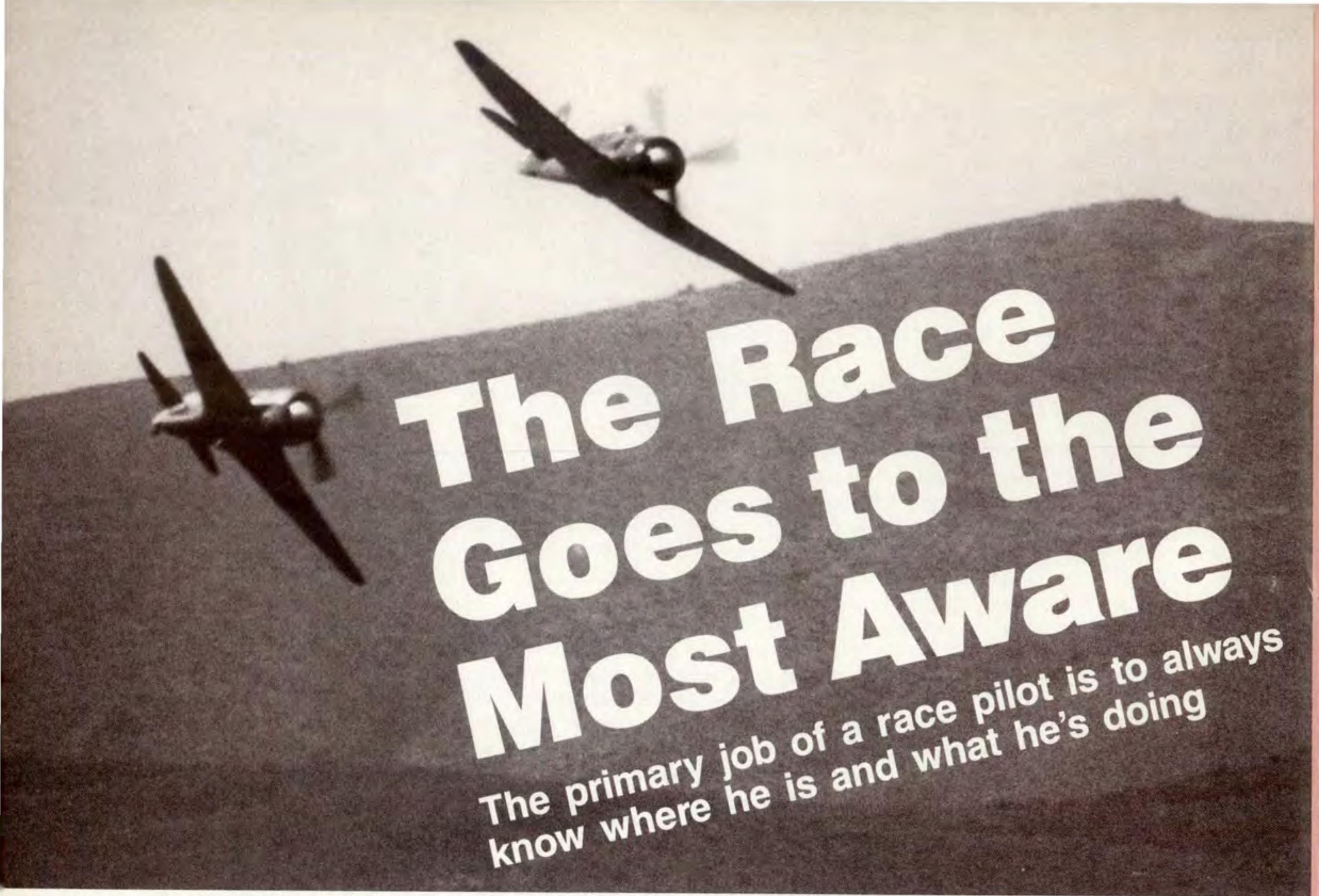
The international research programs conducted in Antarctica stand to benefit all mankind. Studies of the ozone layer and global warming are only two of many studies which will provide a better understanding of the planet and universe in which we live. Antarctica is truly a global resource.

As the famous explorer, Admiral Richard Byrd, wrote in a 1956 article for National Geographic Magazine: "I am hopeful that Antarctica, in its symbolic robe of white, will shine forth as a continent of peace as nations working together in the course of science set an example of international cooperation." Certainly, Antarctica will provide a realization for his hopes, and airlift will make it happen! ■

GOING . . .

GOING . . .

GONE!



The Race Goes to the Most Aware

The primary job of a race pilot is to always know where he is and what he's doing

MAJOR ROY A. POOLE
Editor

When flying low level, "Rule no. 1 is 'Remember where the ground is.' " (John Penney)

■ Standing amidst sagebrush in the high desert sand, I was buffeted by the propwash from 4,000-horsepower radial engines roaring 100 feet overhead. Eight restored fighter aircraft from World War II were racing one another around the closed course of the 1991 Reno National Air Races.

Top speed was averaging more than 470 mph after 6 laps of the 9-mile course. During the race, none of the planes were over 500 feet above the ground since the rules give the advantage to the lowest flier. Earlier in the week, during a practice lap, a T-6 "Texan" had scraped a wingtip on the ground. The pilot barely righted the aircraft before it pancaked into the desert landscape.

As the planes streaked by during this "Unlimited" race, the danger of low-level flying seemed very real — for pilots *and* photographers. Was there any similarity between this kind of racing and military low-level flight operations? The pilot of the winning aircraft, *Rare Bear,* turned out to be the perfect person to answer the question.

John Penney is a Major in the Nevada Air National Guard's 192d Tactical Reconnaissance Squadron. When he's not racing the F-8F-2 "Bearcat," known as *Rare Bear,* around the racecourse, he's flying RF-4s at nearly identical altitudes. Before climbing into RF-4s 12 years ago, John flew A-7Ds with the Air Force for 9 years. It's safe to say the better part of his high-performance flying time has been logged below 1,000 feet AGL.

When asked about the similarities between air racing at Reno and tactical recce missions, John's answer was simple, "They both have the same rules. Rule number one is, 'Remember where the ground is.'" The look on his face showed he was deadly serious about his answer.

Any kind of flying, but especially low-level flying, requires an understanding of the criticality of the maneuvers and the overall task. To understand how critical the flight will be, the pilot must consider first the safety aspects. For John, this means understanding the consequences of any errors. In the most basic terms, this means, "If I make a mistake, could I die?"

When considering the safety aspect of the planned flight, John will look at the task difficulty. He will consider the multiplicity of tasks which are required, the time compression of the related tasks, and the cognitive versus motor skills which are needed. The most difficult tasks are those needing a number of individual steps accomplished over a short period of time. And if all of these steps require you to think rather than react, you've got your hands full.

Matching the typical requirements of a low-level recce flight to the previous measurements, it's fairly easy to see low-level flying is going to have a high task demand with corresponding high consequence of error. (Yes. You *will* die, if you don't do this right.)

But John wants to make sure each low-level flight is not lumped into a simple category and forgotten. Every flight is evaluated. Some are less difficult because they're routine training flights. Some are more complex because there are other aircraft beside you. And some are very difficult because you are entering a combat environment.

For example, the closer you fly to the ground, the more difficult the flight will be. Returning to rule number one, you must pay *more* attention to the rocks, despite the enemy threat. There's another thing to consider as well. How comfortable are you with the flight? Sure, you may have flown this route or this altitude many times before, but if you haven't done it recently, you may not feel as comfortable.

On Friday's race in *Rare Bear,* John was flying a competitive race in the Bearcat for the first time in 5 years. His comfort level was not very high. Therefore, he flew the race higher than normal and kept a wider distance from the other aircraft. John uses his situational awareness, or SA, as the yardstick for his comfort level.

In addition to flying "Unlimited" class racers, John Penney flies a MiG-15 on the airshow circuit.

"If you're constantly monitoring your SA, and if you are able to maintain your SA, then you are at a good comfort level," says John. Things like constant radio changes, low-altitude turns, and altitude control might cause you to lose a portion of your SA. When these things begin to pile up, your comfort level will begin to fall. In order to regain all of your SA and your comfort level, make some changes. Climb to a higher altitude. Let the radios go for a while. Fly your airplane first.

The same steps should be followed in the event of an emergency. That is, get out of the flight regime where the consequence of error is extremely high. In a race, or on a low level, this means abort and climb.

"In a typical air race," says John, "you're flying over 400 miles per hour, 100 feet off the ground, a few yards behind another plane creating tremendous propwash, and surrounded by other planes which want to pass you at the next pylon." This is not the place or the time to be trouble-shooting the falling oil pressure indication. There is already a high degree of task demand and even higher consequence of error. It only takes a minor distraction to push both difficulty and consequence over the brink.

Often, it's the littlest thing which causes a loss of SA. And just as often, the first awareness to go is remembering where the rocks are. The race, or the fight, will always go to the most aware. ■

After more than 10 years of flight tests, fiber optic flight controls have proven to be lighter, less expensive, and more reliable than today's fly-by-wire controls.

FLY-BY-LIGHT Aircraft Flight Controls

A. J. ENGLISH
Air Force Safety Agency

BOB LEMBLE
Wright Laboratory
Wright-Patterson AFB, Ohio

■ On 24 March 1982, the Air Force flight-tested fiber optic busses on a digital flight control system-equipped YA-7D research aircraft at the Air Force Flight Test Center, Edwards AFB, California. This was the first flight of a fiber optic flight safety-critical link in a high-performance airplane. Over 1,000 fly-by-light flights were made by Air Force Test Pilot School students in the unique DIGITAC YA-7D demonstrating use of specially programmed computers for precisely maneuvering the aircraft in air-to-surface and air-to-air weapon and gunnery missions.

The tests were part of a joint program, starting in 1972, between the AF Test Pilot School and the Flight Control Division at Wright Laboratory, Wright-Patterson AFB, Ohio. During the flights, there were no fly-by-light failures. The program ended in July 1991 (after a series of DIGITAC fault detection and correction tests on a new generation fly-by-light digital control system) when the test center's A-7D's were retired.

The Advantages

Nearly a decade of flight experience demonstrated the four major advantages of fly-by-light: The weight of connecting cable is much less than wire bundles or even coaxial cable busses. The high band width capability of fiber optic busses provides an increase in data handling capability. Fiber optics are nearly immune to electromagnetic interference (EMI) and the electromagnetic pulses of nuclear weapons. Fiber optics also eliminate ground path loops, reducing the risk of electrical noise pickup and self-generated noise.

With DIGITAC and other flight tests, military and commercial aircraft designers can use fly-by-light with confidence. The X-30 and new commercial airliners will use fiber optics to save hundreds of pounds of weight for multiplexed data busses and for point-to-point data paths.

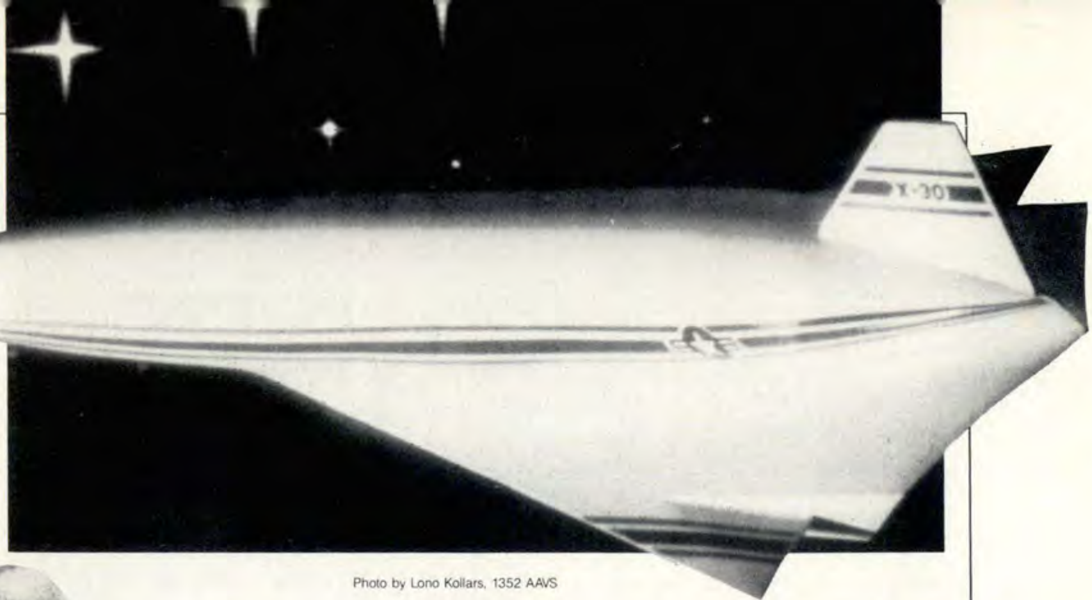


Photo by Lono Kollars, 1352 AAVS

Fiber optic cables are designed to carry a light signal many miles with negligible optical loss.

Fiber optic lines do require special installation procedures to avoid sharp bends which do not pose problems with wire bundles.

All About Optic Fibers

Optic fibers are fine strands drawn from liquid silicon and germanium tetrachloride. Commercial fibers must transmit signals over many miles, hence they must be very transparent along their length. (Half of light's intensity is lost in a foot of ordinary window glass.) High quality optical glass used for eyeglasses and microscopes is 10 times better.

For fiber optic cables, the comparable distance is 2½ miles for multimode signals and 12 miles for single-mode. Single-mode fibers, operating in regions of minimum optical loss (1,300 or 1,550 nanometer wavelengths), use a small optical core to carry a single ray of light which greatly reduces the distortion in digital or analog signals.

Single-mode fibers are also more radiation resistant than multimode fibers. They require less chemical treatment (dopant) for the silica core matrix. At high radiation dosages, the dopant darkens the fiber, reducing the transparency. The optic fiber tends to recover its transmissibility within minutes after exposure to high radiation bursts. In addition, in fiber optic links, no destructive high energy voltage or current pulses can be generated to couple into and destroy functionality of the system receivers and transmitters.

Signals can be transmitted by fiber optic fibers through electrically noisy (high EMI) areas with extremely low bit-error rates and no possibility for electronic jamming, an important feature for tactical aircraft. This feature also enables systems to operate error-free in thunderstorms, which is important for any composite skinned airplane lacking the Faraday shield provided by metal structural skins.

The high data rate fiber optic busses provide high throughput flight control system design options particularly useful for the highly redundant, fault-tolerant design architectures being tested on the DIGITAC YA-7D. This work will continue in the future at the test center when the YF-16D VISTA becomes available.

More Advantages

As fiber optic applications become common in both military and commercial aircraft, the costs will decline, off-the-shelf products will become available, and alternative supply sources will be available. Fly-by-light control systems will be lighter, have better performance, be safer and even cheaper than the fly-by-wire systems they replace.

More information can be obtained from Wright Laboratory (AFSC), WL/FIGL, Bob Lemble, who is already planning some future test programs. ■

When your safety focus begins to blur, little things start to slip through the cracks, and you have those vague uneasy feelings... WHAT CAN YOU DO?

MAJOR DAVID WILLIAMSON

■ Whatever our aircraft or mission, most of us have been in squadrons when things are not going well. On paper, it all looks good, but something is just not right.

Your squadron has just experienced another in a recent series of "close calls." The latest involved a wingman who pressed release altitude on the range and would have shacked the target with his aircraft if not for the flight lead's "pull up" call.

Or, when you reviewed your wingman's video after an air-to-air mission, there were two aircraft in the picture — the one he was gunning and another one he didn't even see.

Or, after several assault landings, you think you need to get your teeth checked right after inspecting the aircraft.

Or, when monitoring an instrument approach, you're suddenly looking up at the trees on short final. You find yourself shaking your head as you walk back to the squadron, wondering what's wrong.

You get the picture. Pick your own example. Your squadron training program looks okay, but the hair on the back of your commander's neck is beginning to stand up. What can you do as a commander, flight lead, or safety officer to turn things around before a bad trend sets in, before aircraft are bent, and before the missing man formation becomes the squadron standard?

How to Fix a Shaky Safety Program

- Don't mistake good briefings or debriefings for tight control.
- Bring back the tough ops officer — backed up by tough flight commanders.
- Put lots of people in a position to say NO!!
- Know who is in charge at all times.
- Maintain maximum supervision while flying is going on.
- Make sure everyone has a tough, no-nonsense boss.
- Identify weak pilots/crewmembers and stop them from flying.
- Install mentorship.
- Stop trying to do too much.
- Develop goals, objectives, and a plan to get there.
- Don't allow excuses — be in control of your own destiny.
- Don't protect nonperformers.
- Be brutal with anyone who intentionally violates regulations.
- Have the courage to make the tough decisions.

Get back to basics, right? Well, what exactly does that mean — stick and rudder skills, procedures, techniques, rules, common sense? Yes, all that, but lots more.

Major General Philip G. Killey, Director, Air National Guard, recently provided his commanders some of his ideas (see box copy). He made some concrete suggestions and asked some tough questions. Run through his list — you will discover some very effective ideas to put in your "clue bag" and help your unit get back on track.

Some of these may not apply to you or your unit, but they should generate some thought. These are positive steps you can take to apply leadership and reverse a bad trend. Don't wait for your commander to come up with the solutions — help him out. Sit down and take a hard look at how your squadron or flight is doing business. If you don't like what you find, take action. Have the courage to make changes before a mishap, rather than in the wake of one.

The goal is an effective training program with strong leadership and "follower-ship" at all levels of the organization. The final product will be real combat readiness and a safe operation. ■

The Black Jet!

■ THIS JET WAS CLASSIFIED FOR 10 YEARS!

PEGGY E. HODGE
Assistant Editor

■ We probably all saw the "awesome" precision and accuracy of the F-117A that dropped the bomb down an air-conditioning shaft in Iraq. This aircraft, known as "The Black Jet" to those who operate and maintain it, is the U.S. Air Force's premier stealth fighter.

It takes an exceptional aircraft to perform such a mission. The F-117A is "one-of-a-kind"! It is the world's first operational aircraft designed to exploit low observable stealth technology and is the *only* operational stealth aircraft in the U.S. inventory. It is operated and maintained by the Tactical Air Command's 37th Fighter Wing (FW) at the Tonopah Test Range Airfield, Nevada.

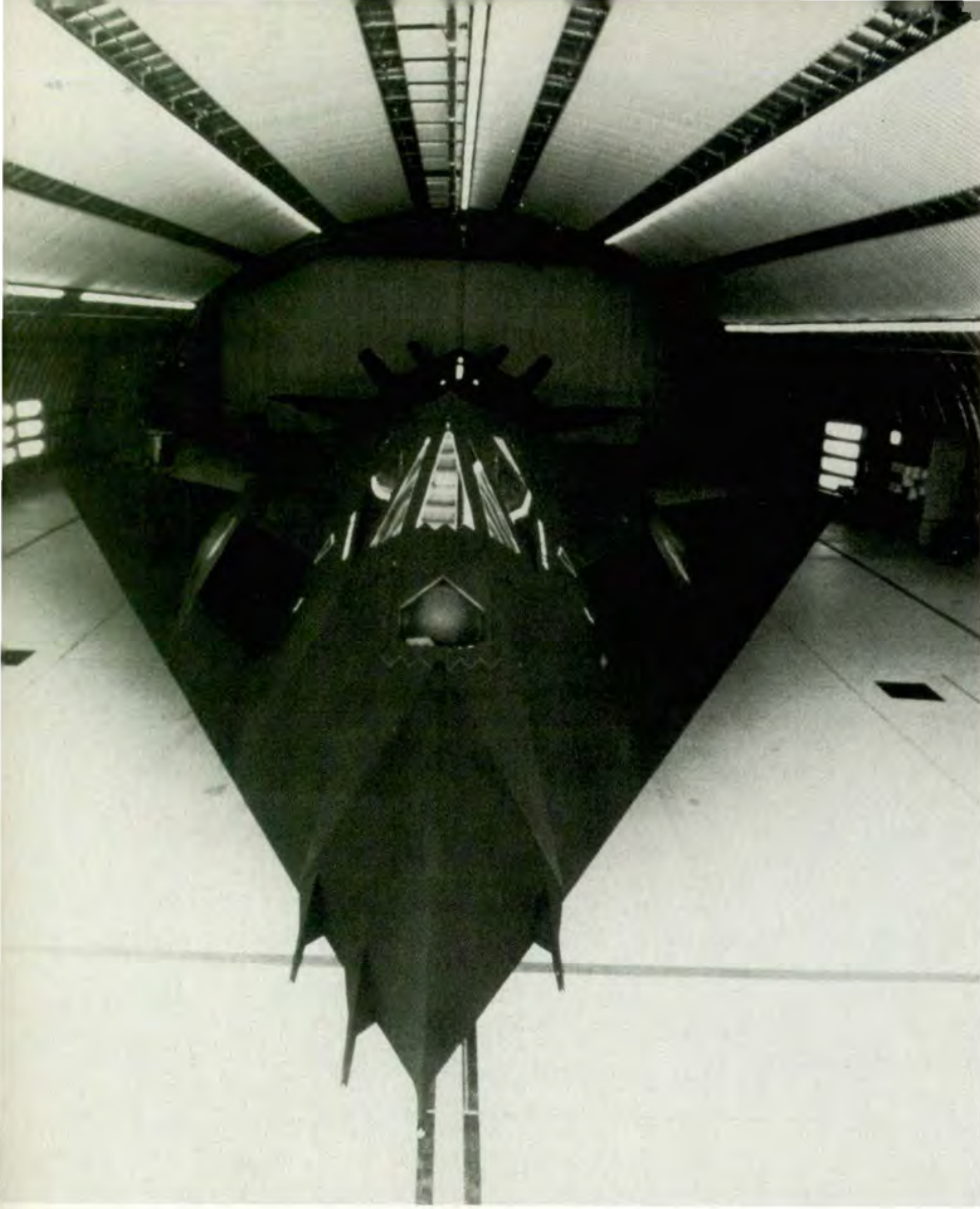
As we saw demonstrated in Iraq, the single-seat F-117A is designed to penetrate dense threat environments as well as attack high value targets with pinpoint accuracy. This jet's unique mission profile and engineering design offer great opportunities and safety challenges to those who operate and maintain a fighter unlike any other in the Air Force inventory.

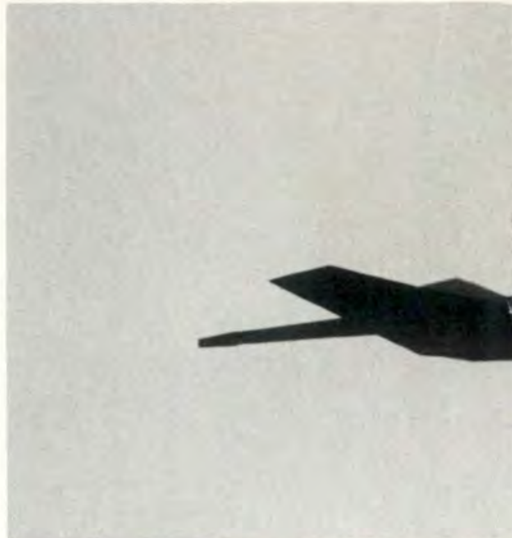
Its Mission

The Operators' View "What sets us apart from other fighters is not the stealth technology or the avionics — it is our mission. It is unlike any other in the Air Force. **It's exclusively at night,**" explained Lt Col Don Higgins, Chief of Safety at the 37 FW, Tonopah Range, Nevada. "Everything we do must be geared towards that night mission.

"Due to the nature of our training, for example, we have *complete control* of the pilots' schedules. To do this, we send everyone up to the

continued





THE BLACK JET! continued

Tonopah Range where we have *total control* of their environment. We must be able to sleep during the day, with no interruptions, to fly our mission at night."

The unique design of the aircraft supports the exclusively night mission and provides exceptional combat capabilities. About the size of an F-15 Eagle, the twin-engine aircraft is powered by two General Electric F404 turbofan engines and has quadruple redundant fly-by-wire flight controls for added safety.

With an air refueling capability, the F-117A supports worldwide commitments and adds to the deterrent strength of the U.S. military forces. It can employ a variety of weapons and is equipped with sophisticated navigation and attack systems integrated into a state-of-the-art digital avionics suite which increases mission effectiveness and reduces pilot workload.

When one watches the F-117A fly, it's almost as if it is gliding! "What you're seeing is attributed to digital computer technology," said Lt Col Higgins. "The thing to remember is the F-117A is unstable in all three axes. Some aircraft are unstable in pitch and roll, but not unstable longitudinally. The F-117A is inherently unstable, and what makes it fly is a quadredundant digital flight control system (like the F-16).

"As far as the stability of the aircraft goes," says Lt Col Higgins, "it is as stable as any can be. It is fly-by-wire, so the stability is taken care of by the computer."

"With its aerodynamic characteristics, the aircraft could not be flown without its flight control computer. Fortunately, it's incredibly reliable. We have never experienced serious flight control computer malfunctions in the jet at all!"

The F-117A is classed as a high subsonic fighter. This further serves to add to its effectiveness. Supersonic aircraft provide a definite acoustic and infrared signature that a subsonic weapon system does not have.

"When people think of stealth technology, they think of only radar," explained Captain Drew Nichols, the Flight Safety Officer at the 37th. "That's only one aspect of stealth technology. If there is any

The value of stealth technology, combined with precision weapons delivery, was realized during Operation Desert Storm. The jet destroyed almost 40 percent of strategic targets.

way for an enemy to detect and track an aircraft, the F-117A stealth technology is designed to counteract it. So, radar is one aspect of stealth and visual is another. It's harder to see low-observable aircraft in flight, and the F-117A's black coating makes the aircraft even more difficult to see at night.

IT WAS THE FIRST AIRCRAFT INTO THE GULF WAR DELIVERING THE FIRST BOMB OF THE CAMPAIGN JUST PRIOR TO 0300!

"The third aspect of the aircraft's stealth technology is sound and acoustics. The F-117A has GE F404 engines right off the shelf, like the F-18 has. However, in our version, some special things are done to the exhaust. It is ducted in various ways to cool it down. Also, we do not have the afterburners.

"So — the bottom line — there are numerous things done to make the aircraft hard to hear, hard to see, and hard to find on radar! What this stealth technology does is allow us to fly over our targets at much safer altitudes . . . to accomplish our mission at night and hit the target 80-90 percent of the time."

It is impressive to note that if it had not been for the weapons' system malfunctions and various weather conditions which plagued Iraq that time of year, the F-117A's hit-rate percentage during Operation Desert Storm would have been even more spectacular! continued

Lockheed constructed the F-117A using proven technologies from other aircraft. For example, the INS is adapted from the B-52, and the flight controls are those of the F-16.

THE JET'S HISTORY

- **In 1978,** the F-117A production decision was made with a contract awarded to the Lockheed Advanced Development Projects, nicknamed "Skunk Works," in Burbank CA.
- **In 1979,** the F-117A unit was activated as the 4450th Tactical Group (TG), and was initially equipped with A-7D Corsair IIs as trainers, while preparing for delivery of the first F-117A.
- **In 1981,** the F-117A flew its first flight, only 31 months after the full scale development decision.
- **In 1982,** the first stealth fighter was delivered to the Tactical Air Command (TAC).
- **In 1983,** TAC's first F-117A unit, the 4450 TG, achieved initial operational capability.
- **Until 1985,** the unit was a direct reporting unit to Headquarters TAC at Langley AFB, Virginia. In 1985, operational command was transferred to the Tactical Fighter Weapons Center (now the USAF Fighter Weapons Center), Nellis AFB, Nevada.
- **Until 1988,** the F-117A program operated under strict security measures to protect "stealth" technology development. In November 1988, the necessity to expand operations required a public announcement acknowledging the existence of the F-117A.
- **In October 1989,** the 4450 TG was deactivated. The unit was reactivated as the 37th Tactical Fighter Wing under the operational command of the 12th Air Force, headquartered at Bergstrom AFB, Texas. Concurrently, the A-7Ds completed their active training role with the unit and were replaced by T/AT-38s.
- **In July 1990,** the last F-117A delivery was made.
- **As of 30 September 1991,** the F-117A fleet had experienced three mishaps: One occurred in the early testing stage of the aircraft, and two others were suspected to be ops-related in 1984 and 1987.
- **On 1 October 1991,** the 37 TFW was redesignated the 37th Fighter Wing.
- **A total of 59 F-117A aircraft have been procured.**

The jet is 10 years old, and although we are not experiencing any major difficulties, we are facing some landing gear problems.

THE BLACK JET! continued

The edges are sharp, the aircraft is black, and all operation and maintenance are completed at night — both operators and maintainers must really watch themselves!

The Maintainers' View TSgt Christian Pelletier, a maintenance hydraulics specialist, says "the aircraft is awesome to work on. From my point of view, the hourly rate to keep it in the air is really minimal.

"Our training must also be accomplished at night," he said. "I was astonished at our training — we were *always* working in the dark. Everyone works with flashlights. The edges of the aircraft are sharp so you have to really watch yourself so as not to bump into it."

The engineering of the F-117A affords some interesting challenges and opportunities for the maintenance people, also. "An airframe is an airframe is an airframe until we got here," said TSgt Wayne A. Paddock, a maintenance avionics specialist. He refers to the maintenance on the F-117A as "slightly" more difficult than on the F-16 or F-15 basically because of the way things are placed *inside* the aircraft.

"There's not too much of a problem with FOD. It's not really too much of a player the way the engines are situated in the aircraft. They sit up above the bottom — what they call the waterline. On the Black Jet, you don't have to worry about getting sucked into the intake.

IT WAS THE *ONLY* MANNED WEAPON SYSTEM THAT REGULARLY WENT INTO THE HEART OF BAGHDAD!

"The F-117A's airframe itself is a challenge for us. It's covered with a coating so you don't just take a panel off — you have to decoat it first and find out where the problem is. You must take the diagram of the aircraft and physically look at it and

"If we have any discrepancies or we are not sure the aircraft is ready to go, we keep it on the ground," said TSgt Pelletier.

TSgt Paddock explains F-117A maintenance as "slightly more difficult than on the F-15 and F-16 because all parts are located *up inside* the aircraft."

measure the fuselage stations to find the panel you need to work with.

"The coating is part of the stealth technology. To ensure the aircraft is capable of performing its mission — this coating must be placed on the aircraft 'to a T' — all the lines and all the angles have to be *just right!* Sometimes it takes more time getting in and covering up than actually doing the repair."

IN ITS YEARS OF SERVICE, THIS JET HAS COMPILED ONE OF THE AIR FORCE'S BEST SAFETY RECORDS.

Its Reliability

The Operators' View "Operation and maintenance reliability are both excellent," says Lt Col Higgins. "I will go five or six missions without having anything wrong with the jet. That's not to say we don't have problems, but by and large, the reliability on the Black Jet is very good.

"The weapons delivery is very accurate. In a single-seater, we have a computer to do everything," says Lt Col Higgins. "It's absolutely incredibly accurate — the amount of things one person can do with that technology.

"For example, in the F-111, if you went out bombing and hit consistently within 100 feet, you were considered one of the best. In the F-117A, if you don't get a "bull's-eye" *every time,* you have really, really messed up."

The Maintainers' View "The aircraft is really reliable! There are very few things that can't be fixed in a very short period of time," said TSgt Paddock.

"The airplane is being flown much more rigorously now than when it first started to fly. Our flying schedule wasn't anywhere near the levels we reach now. As the airframe gets a little older, through torquing and the effects of G maneuvers, there will be problems. Also, as one opens and closes the aircraft for maintenance, some new problems can be created. But generally, they're identified quickly and taken care of," explained TSgt Paddock.

The Concern

As the operators and maintainers tell us, the Black Jet is very effective and very reliable. However, both express a concern.

"Currently in the F-117A, the pilot is kept fairly busy calculating time and fuel computations and airspeed and altitude changes. With future modifications, a lot of this activity will become automated. As supervisors and safety professionals, we have to be careful that *complacency* doesn't set in," explains Lt Col Higgins.

"Complacency is a threat in any fighter. When a pilot gets too comfortable in his job, for whatever reason, complacency can be a serious problem.

"Technology can provide relief from various activities necessary in an aircraft. If we eventually reach the point when pilots are systems monitors instead of hands-on fliers — we may suffer even more from the effects of complacency. If something should go wrong, the pilot may be so complacent he is not focusing his attention where it needs to be focused," he said.

Lt Col Higgins offers some advice to us all. "What we can do as safety professionals and supervisors, *at all levels,* is to make sure we keep our pilots, WSOs, maintainers, and whoever else, **absolutely committed** and **absolutely focused** on their job of employing the aircraft!"

THE F-117 IS CERTAINLY THE PRECURSOR OF A NEW AGE IN AERIAL WARFARE.

The Black Jet

The Gulf War reinforced the perception that high-technology weapons are now more crucial to this country's defense. It is this type of jet, these types of concerned operators and maintainers, and this type of safety and reliability that allow our U.S. forces to maintain the leading edge. ■

Rex Riley CROSS-COUNTR

■ Almost everyone has been affected by the force reductions and restructuring now under way within the Air Force. The Rex Riley Award Program is no exception. Due to several scheduled base closures and realignments and one unexpected natural disaster, I will be officially retiring several bases from the list of Rex Riley award recipients this month. As more bases close or discontinue airfield operations, they will also be honorably retired from the list.

Honorably Retired

Clark AB, Philippines The eruption of Mount Pinatubo forced the early closure of a base which has played a key role in Air Force operations in the Pacific. Clark provided excellent service to countless crews who flew strategic and tactical airlift throughout the Pacific, as well as numerous Cope Thunder exercises on the Crow Valley range.

Sembach AB and **Zweibrucken AB, Germany,** are the first two bases in USAFE to cease or limit airfield operations as part of the European drawdown. Both bases provided excellent services to transient aircrews and can be proud of their tenure on the Rex Riley bases list.

New Award Recipients

Fairchild AFB, Washington Rex was extremely pleased with the flight planning facility in base ops. It was very clean and well organized. The people working in transient alert provided him with a fast, friendly "gas 'n go" stopover.

Hill AFB, Utah All of the services received by Rex during this quick turn were great. The weather forecaster provided a very detailed briefing on changing weather trends along the route of flight. Crew transportation to and from the aircraft and messing facilities was very fast.

Osan AB, Korea ATC services provided by approach control were excellent. When the radar went down in marginal weather, they did a great job sequencing recovering fighter aircraft with arriving heavy aircraft using nonradar procedures. Transient alert provided excellent service in pouring rain, and base ops and weather personnel were very helpful.

Retaining the Award

Elmendorf AFB, Alaska Rex was

Y NOTES

so impressed with the service at Elmendorf he rated three areas outstanding and the others excellent. The flight planning room in base ops is well laid out with plenty of room to work. The dispatchers are some of the best in the business. Prime Knight worked perfectly. The crewbus driver had a contract for a hotel downtown when he picked up the crew at the aircraft. The hotel graciously agreed to keep their restaurant open for an extra hour to allow the crew to eat. The crew transportation was exceptional. It was fast, and the drivers were very helpful, pointing out places to eat and visit near the hotel and even helping to load and unload crew bags.

As Rex said, "The facilities at Elmendorf are nice, but it is the people in the various areas that stand out, without exception, during this stop. Their positive attitude, enthusiasm, and professionalism are contagious."

Vandenberg AFB, California Rex found excellent service everywhere he went. Base ops is a small, but complete, user-friendly facility. There is a comfortable crew lounge with a television. Although there were no vending machines, dispatch personnel keep a well-stocked refrigerator available for transient aircrews. The transient alert folks provided fast, efficient service for Rex's T-38 aircraft. Base ops maintains a U-Drive vehicle for aircrew use on base.

Congratulations also to **Andersen AB, Guam, Hickam AFB, Hawaii, McChord AFB, Washington,** and **Travis AFB, California,** for retaining the Rex Riley Award during recent surveys. ■

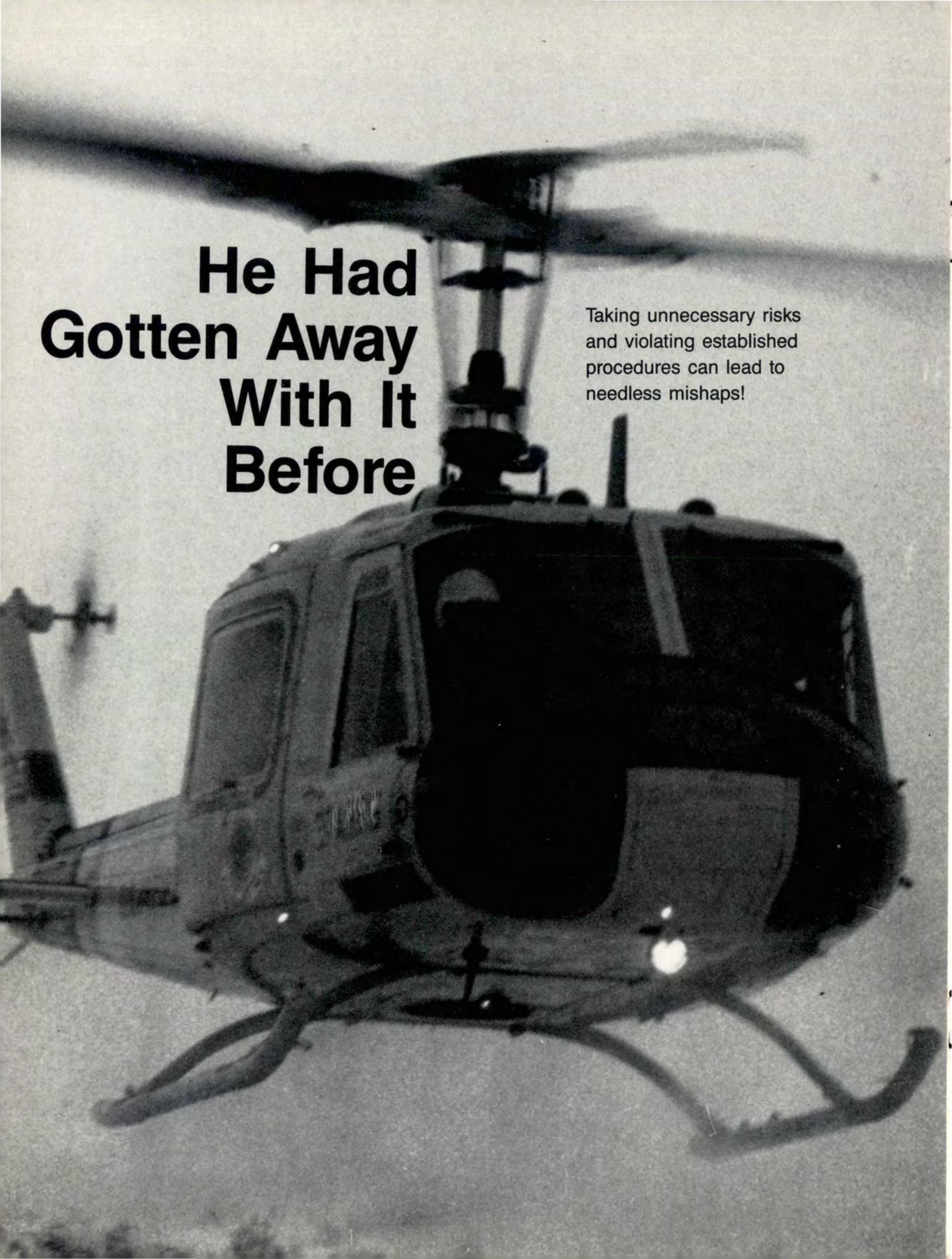
Feedback

In the past year, I have received some feedback and questions from the field that relate to the Rex Riley Program. Since some of this information might be of interest to others, I would like to devote an upcoming column to publishing questions and feedback I receive. If you have a question or an opinion on something relating to transient aircrew services, a complaint, constructive criticism, ways to improve, a gripe against aircrews or services received, or anything else that comes to mind, I would like to hear from you. Send all correspondence to AFSA/SEFB, Norton AFB CA 92409-7001, Attn: Rex Riley, or call Rex at DSN 876-2226. Any feedback would be published anonymously and considered confidential. However, if you want a reply from Rex, please include your name, rank, job title, organizational address, and DSN.

Loring AFB	ME	Wright-Patterson AFB	OH	Holloman AFB	NM	RAF Alconbury	UK
McClellan AFB	CA	Pope AFB	NC	Dyess AFB	TX	Hurlburt Field	FL
Maxwell AFB	AL	Dover AFB	DE	Aviano AB	IT	Carswell AFB	TX
Scott AFB	IL	Griffiss AFB	NY	Bitburg AB	GE	Altus AFB	OK
McChord AFB	WA	KI Sawyer AFB	MI	Keesler AFB	MS	Grand Forks AFB	ND
Myrtle Beach AFB	SC	Reese AFB	TX	Howard AFB	PM	Fairchild AFB	WA
Mather AFB	CA	Vance AFB	OK	George AFB	CA	Mountain Home AFB	ID
Lajes Field	PO	Laughlin AFB	TX	Peterson AFB	CO	Barksdale AFB	LA
Sheppard AFB	TX	Minot AFB	ND	Moody AFB	GA	Hickam AFB	HI
March AFB	CA	Vandenberg AFB	CA	RAF Lakenheath	UK	Kelly AFB	TX
Grissom AFB	IN	Andrews AFB	MD	Zaragoza AB	SP	Travis AFB	CA
Cannon AFB	NM	Plattsburgh AFB	NY	Torrejon AB	SP	Norton AFB	CA
Randolph AFB	TX	MacDill AFB	FL	Luke AFB	AZ	Tinker AFB	OK
Robins AFB	GA	Columbus AFB	MS	Eaker AFB	AR	Charleston AFB	SC
Seymour Johnson AFB	NC	Patrick AFB	FL	Bergstrom AFB	TX	McGuire AFB	NJ
Elmendorf AFB	AK	Wurtsmith AFB	MI	Davis-Monthan AFB	AZ	Incirlik AB	TK
Shaw AFB	SC	Williams AFB	AZ	Hahn AB	GE	Selfridge ANGB	MI
Little Rock AFB	AR	Westover AFB	MA	Kunsan AB	KOR	Nellis AFB	NV
Offutt AFB	NE	Eglin AFB	FL	Ramstein AB	GE	Fairchild AFB	WA
Kirtland AFB	NM	RAF Bentwaters	UK	Johnston Atoll	JQ	Hill AFB	UT
Buckley ANGB	CO	RAF Upper Heyford	UK	Wake Island	WQ	Osan AB	KOR
RAF Mildenhall	UK	Andersen AB	GU				

He Had Gotten Away With It Before

Taking unnecessary risks and violating established procedures can lead to needless mishaps!



■ The stage was set for a mishap long before the pilot got into the cockpit that night. On other missions, the pilot had gotten weather reports forecasting IFR and marginal conditions. There were lots of reports like that. But the pilot had continued into the deteriorating weather and had always made it. The pilot had chanced it, and the weather had not been as bad as forecast.

The night before the mishap, the pilot had flown a similar mission and landed at the same airfield with the tower reporting IFR conditions. The helicopter had broken through a fog layer at 150 feet, 50 feet below decision height, and landed. The pilot had made it again.

On the night of the mishap, the pilot, with a copilot and aidman (comparable to an Air Force medical technician), flew the UH-1 to a nearby hospital, picked up a heart patient and nurse, and transported them to a medical center about 200 miles away. On the return flight, the pilot started seeing some low, scattered clouds. He got a weather report saying his intermediate stop (the hospital) was clear with 7 miles visibility. He wasn't really concerned. The clouds appeared to be thin. He could see lights through the layer.

The intermediate stop was still clear when the helicopter arrived at 0300. The pilot hadn't used half his fuel when he landed at the hospital and dropped off the nurse. Before he landed, he was told his destination was partially obscured to obscured — 100-foot ceiling to partial overcast.

After dropping the nurse and her equipment off, the pilot took off for the home field a few miles away. The plan was to check the weather and then try an approach. If unable to land, it would be simple to return to the hospital. The weather was "partial obscuration, 100-foot ceiling, and RVR at 1,000," which is below minimums. The forecast for the intermediate stop was okay, and the pilot thought it was ridiculous not to try an approach and, if necessary, a missed approach. The ground could be seen all the time until the pilot got closer to the final destination.

The pilot elected to try to shoot an approach, seeing no harm in doing so. The auxiliary fuel tanks had run out on the way to destination, and there was now about 1,200 pounds remaining in the fuel tank. The pilot received vectors for an approach. The controller made it very clear the pilot was going below minimums. Still, he thought it was worth a try because there was so much doubt about the actual weather during the briefing.

The pilot could see the "rabbit" lights at the missed approach point. The threshold lights weren't in sight, so a missed approach was begun. During the missed approach, the copilot looked to the left, saw the runway lights, and told the pilot the lights were visible. The pilot decided to go around and try again. While being vectored for downwind, the pilot was told the intermediate stop had gone to 200 and a quarter and would probably go to zero/zero before they could get back there.

The crew got a report from maintenance at one of the hangars on the airfield that they couldn't see the helicopters from where they were. The pilot decided to try one more approach and do it at a slower airspeed. There was 800 pounds of fuel left as they lined up for final. Following another approach, the same thing happened again. The runway lights were out to the left.

As the pilot started to do a missed approach, the copilot saw the runway lights. The pilot told the copilot to keep the lights in sight. The pilot slowed down to try to get some visual references outside, but he couldn't see anything.

Power was added, but the pilot did not compensate correctly with anti-torque pedals. A glance at the airspeed showed it dropping below 40 knots. The next thing the crew knew, the helicopter had hit the ground and rolled onto its right side.

After the crash, the pilot tried to call the tower on a survival radio. After two unsuccessful attempts, the pilot discarded the radio and tried to use a strobe light, which was inoperative. The pilot then tried to use the radio in the helicopter, but was unable to connect helmet and cord jack in the darkness without a flashlight.

The tower operator heard an emergency transmission on Guard from the aircraft, but received no response. The operator heard a short sweep on an emergency locator transmitter and dispatched a crash truck to the approach end of the runway.

The crew could hear the crash truck driving up and down the runway. Because of the heavy fog and near-zero visibility, rescue personnel could not find the helicopter or see its landing light which was shining up at an angle toward the tower. Because the crash truck was not able to find them, the pilot ran about ½ mile to a hangar. The tower was called, and the crash truck picked up the pilot at the hangar. The pilot directed the truck to the mishap site. They arrived at the site 23 minutes after the crash.

Mishap Behavior Pattern

This mishap is a classic example of a pilot who developed a behavior pattern in flying which led to repeated and unnecessary risks, while willingly and knowingly violating established procedures.

Following cancellation of the IFR clearance, the pilot left the hospital VFR when the destination was below IFR filing minima and forecast to remain so for the next 2 hours. There was no urgency to return to home station. The pilot could have remained at the hospital.

After arriving at the destination, the pilot did two approaches and missed approaches when weather was below that required for the requested procedure. During the second approach, the pilot descended below decision height when neither the landing area nor the approach lights were clearly visible.

The mishap was caused by a violation of procedures. Pilots who lack the self-discipline to follow the rules must change their behavior or be taken out of the cockpit. ■

Adapted from *Flightfax*, Vol 13, No 47

Maintenance Trauma

CAPT DAVID M. HUYCK
314 AMU OIC

■ A maintainer's worst nightmare had just begun! One of our aircraft was down!

This day started out as most others — reviewing last night's fixes, discussing the daily flying schedule, and formatting the plan for today's maintenance actions, but circumstances quickly changed with this radio call.

As the aircraft maintenance unit (AMU) OIC, I can now speak from experience — losing an aircraft is an emotional issue. It causes organizations to rethink and question a lot of programs, like your emphasis on quality maintenance, putting forth the extra effort, and stressing pride and professionalism as an ingredient to overcome adversity, etc.

This aircraft's loss delivered a sobering blow to our AMU. Based upon our experience, and recent observations as the maintenance member investigating the loss of another F-16, I decided to share these experiences with other maintainers.

When that dreadful "SQUAWK" came over the radio, I was at my desk reviewing paperwork, stopping only briefly to answer the phone or to address one of many visitors to the OIC's office. A lull occurred when all the morning fliers were airborne. The "Chief," our AMU NCOIC, along with the assistant OIC, were at the fuel barn checking on one of our jets with a fuel transfer problem. The production superintendent was mobile, and most of our other NCOs were "jobbing away," working to support the day's activities. Like most OICs, I kept a radio nearby to monitor the daily activity, subconsciously listening to radio chatter as I labored over paperwork.

Despite hearing the SQUAWK, I refused to believe it was one of our aircraft. Those chilling words "AIRCRAFT DOWN WITH TWO . . ." were too distinct and clear. My mind raced. Where was the Chief? Remembering he was at the fuel barn, I sprinted from my office and past several AMU members. Everyone already seemed to be in a daze, struck by this tragic news. At the dispatch counter, a young airman asked me if I'd heard. "Yes, yes, unfortunately, yes," I replied, as I was beginning to focus on what must be done next.

Fortunately, the initial shock was short lived. We were professionals and began reacting. We gathered up training records, impounded the aircraft's forms and the jacket file, and isolated the equipment and tools used to launch the aircraft long before the Quality Assurance (QA) representative arrived to retrieve them.

On a followup visit to the AMU, the QA representative was amazed we had anticipated his requests and had everything ready before he asked for them. Even though we'd just lost an aircraft, I was proud of our professional reaction to this traumatic event.

Based on the training I received at the Aircraft Mishap Investigation Course, I requested the load crew, the dispatcher, the crew chief, the expediter, and the flight chief to make written statements. Each person captured their part on paper,

"Attention all radios this net. Attention all radios this net. AIRCRAFT DOWN with two good chutes; aircraft tail number is 3333. (Repeat) AIRCRAFT DOWN . . . "

This announcement was the opening of a new experience that took our entire maintenance unit on a roller coaster ride of emotions.

helping to recreate the events leading up to the launch.

The initial disbelief began to pass. Just as ground troops in combat must keep fighting when one of their comrades fall, we had "jets" to recover and the next day's fliers to make ready. Each of us knew we could not accept the "cost" of letting this tragedy settle upon the AMU.

When things settled down and I had a moment to reflect upon this loss, the shock hit me again. It is hard to accurately explain the impact. My goals, and those of our organization, to perform quality maintenance with fixes and not temporary repairs, and to accept nothing but the best from our people, all seemed compromised.

Looking around the AMU, the atmosphere was amazingly still. The normal spontaneous conversations were subdued. Noting this, the Chief and I seized the opportunity to interact and "reglue" our folks' spirits. Shift change came and went. Even though our swings weren't on duty when the initial "AIRCRAFT DOWN" squawk came, they, too, seemed depressed! Again, the Chief and myself, along with the evening flight line supervisor, interacted with the people to help them remain focused on their evening's workload.

The one most affected by this loss was the crew chief who launched the aircraft on its last mission. The Chief had seen this type of depression before. Using his savvy, he took this young NCO aside to lessen the impact and to help him put this into a clearer perspective. The guilt the crew chief was feeling was obvious. By going through the prelaunch preparations over and over, and the launch sequence again and again, we helped him realize there was nothing possible he could have, or should have, done differently.

The burden of this loss and its impact on the crew chief moved me. Before that tragic day, I had observed this young maintainer going about his daily business — preflighting, launching, recovering, refueling, and preparing aircraft for their next sortie. Whether working the mundane, the complex, or assisting others, he always pitched in and did his part. Now this airman had the "weight of the world" on his shoulders.

For dedicated maintainers, the loss of an aircraft is a traumatic experience. Unless prevented by supervisors, post-mishap depression can cripple a unit's maintenance effort.

As I talked to the crew chief, it was easy to see care and deep concern. I was moved when he told the story about the pilot's 7-year-old daughter running up to hug her dad at the hospital. The crew chief told me, "Captain, I realize now, lives depend upon my checks. Looking at fluids, the airframe, and all . . . pilots depend on me."

As the maintenance member investigating another aircraft loss, I had a similar moving experience. The crew chief for that aircraft cornered me, demanding information about his jet and the pilot's well being. "Captain," he stated, "I'm the dedicated crew chief. You have to tell me, you just have to! That's my jet . . . you just have to . . .!"

It's a fact — there was nothing either of these crew chiefs could have, or should have, done differently. However, because they cared so much, each, in their own way, tried to convince themselves there was something missed or overlooked. I'm sure we helped them through this trying time with our talks and support. The decision to place our crew chief on another jet the following day further helped and also reaffirmed our confidence in him.

In retrospect, these experiences gave me a better understanding of why we place so much importance on training, and why we maintainers are adamant about compliance with technical data. Within our AMU, the constant emphasis and daily maintenance discipline helped us to remain focused on the mission despite suffering the loss of one of our aircraft. During this critical time, training took over and kept emotional experiences from detracting from the important tasks at hand. This experience confirmed teamwork, training, and maintenance discipline are an unbeatable combination. ■

Write a Dumb Caption Contest Thing ...

Just when you were hoping (Oops!), we mean afraid, the internationally famous Dumb Caption Contest Thing was missing, we have discovered this new picture awaiting your captioning brilliance. All it takes to enter is a copier, a bottle of white correction fluid, a crayon, and sick, but safe, sense of humor. Send your entry(ies) to:

Dumb Caption Contest Thing
***Flying Safety* Magazine**
AFSA/SEDP
Norton AFB, CA 92409-7001

... And thanks for your continued support

AND THE WINNER FOR THE OCTOBER 1991 DUMB CAPTION CONTEST IS . . .

Jim Burt
Academic Training
Corpus Christi, Texas

Congratulations to an old captioneer, Jim Burt, for winning this month's contest. We are shipping his reward to the Cheap Little Prize discount store in Corpus Christi, Texas. We would also like to thank this month's Honorable Mention winners as well, but the names were smudged beyond recognition. Does anyone out there recognize them?

HONORABLE MENTIONS

1. **Gentlemen —— ... they said the heat or the boredom could get to you ...**
   Sent by an undecipherable captioneer.

2. **"You'd be bug-eyed, too, if your flight gear fit like this ". . .**
   Sent by another undecipherable captioneer.

MAINTENANCE MATTERS

Spare FOD

■ Already 20 minutes late for takeoff, the Eagle pilot aborted the primary aircraft and went to a spare. The crew chief had just returned to the spare aircraft as the pilot arrived. He and an assistant hurriedly prepared the aircraft for flight. After reviewing the forms and a quick walkaround, the pilot climbed into the cockpit and proceeded with the launch.

Except for the sense of expediency, engine start and taxi preparation seemed normal. But when the pilot applied power coming out of the chocks, the ground crew heard a loud bang and noticed sparks coming from the augmentor of the right engine. They notified the expediter who, in turn, notified the EOR crew.

At the end of the runway, the aircrew was told to shut the engines down. Shining a 6-volt lantern down the intake, they found the intake plug lodged against the first stage of the right engine compressor. The aircraft was towed back to the ramp where further inspection revealed the pip pin, the remove-before-flight streamer, and the cable had been ingested into the right engine causing extensive damage.

An investigation by QA revealed that in the rush to make the mission range time, the ground crew failed to remove the intake plug from the right engine prior to engine start. The pilot also missed the plug during his hasty walkaround. As a result, not only was the mission scrubbed, but the right engine received $18,000 in damage. ■

Document Disconnect

■ The T-38 pilot noted no problems during takeoff roll as the aircraft accelerated through minimum acceleration check speed. But, shortly after rotation, the indicated air speed dropped instantly to 70 KIAS.

The pilot immediately checked the engine indications. They were all good. He also sensed the aircraft was accelerating normally. Since he was unable to determine if he was above the adjusted refusal speed, he elected to continue the takeoff. Once airborne, he noticed the altimeter was also reading incorrectly. A chase aircraft verified the instrument error and led the ailing aircraft to a safe landing.

An investigation by maintenance personnel showed an instrument specialist had disconnected a static air line while working an engine indication problem. The specialist not only failed to document this action, but also forgot to reinstall the line. Had it been documented as required, the aircraft would not have been released for flight until the line was properly reinstalled and inspected. ■

Beyond Limits

■ On a routine training flight, the crew of a B-1B noticed the RPM, EGT, and fuel flow readings of the no. 2 engine were slightly higher than the other three engines. During postflight inspection, the crew chief discovered foreign object damage (FOD) to the no. 2 engine.

The engine was removed and sent to the engine shop where specialists found 5 IGV flaps and 28 first-stage blades damaged beyond limits. A detailed inspection of the fuselage revealed a missing screw from a panel forward of the no. 2 intake. Records did not in-

continued

MAINTENANCE MATTERS

Beyond Limits continued

dicate when the panel was last installed, but an inspection of the remaining panel's fasteners indicated they were properly installed.

A maintenance team determined the missing fastener had vibrated loose during flight and was ingested either because the screw was the wrong length or its threads were excessively worn. B-1B aircraft are notoriously susceptible to FOD, and even slight damage to an F101 engine is extremely costly. In 1990 alone, missing fasteners resulted in hundreds of thousands of dollars in damage to F101s. Just a reminder — TO 1-1A-8 requires a new screw be installed any time a panel is installed forward of the intake or any place it may be ingested in the intake. Expensive and time-consuming, yes, but not when you consider the time required to replace the engine and the cost of this mishap, which was $80,000. ■

An Unexpected Turn

■ During the preflight portion of a combat turn operation, the F-15's pilot noticed one of the AIM-7s had gold showing between the umbilical and the shear wafer. The Eagle driver brought the discrepancy to the attention of the senior APG team member. He told the pilot the weapons specialists had already left the area, but he was sure the missile was properly secured to the aircraft.

To remove any doubt from the pilot's mind, the APG specialist removed the safety pin from the LAU 106 launcher. Fortunately, the missile was properly secured, and it did not fall when the pin was removed.

But there are times when, in spite of incredible luck, a mishap seems inevitable. While the APG supervisor still had the pin removed, his assistant, without any warning or provocation, inserted a speed handle into the launcher's lock/unlock mechanism and gave it a counterclockwise turn. The launcher functioned as designed, and the missile fell onto the concrete ramp.

The missile laying at his feet, two questions ran through the mind of the somewhat perturbed pilot. What did the APG supervisor expect to happen when he pulled the safety pin if the missile was not properly installed? And what possessed the other APG member to crank the launcher to the unlocked position?

Hopefully, both erring technicians can cop a temporary insanity plea. Whatever the reasoning, their actions resulted in $16,000 damage to the missile and put a vital combat resource temporarily out of commission. ■

F-16 Missing Axle Spacer

■ The F-16 pilot aborted at end of runway for an equipment hot light. While taxiing back to his parking spot, he felt a thump followed by a severe nosewheel vibration. He stopped the aircraft and shut down the aircraft on the taxiway.

Examination of the nosewheel revealed the axle nut had backed off, allowing the nosewheel to come loose. Prior to the attempted flight, a crew chief removed and replaced the nosewheel assembly, and a 7-level technician signed off the red X. Not only was the spacer installation step in the TO skipped, but a local in-progress inspection (IPI) had also been overlooked. Once the wheel assembly is installed, there is no way to determine if the spacer is in place — until the pilot feels a thump followed by a vibration during taxi!

Last year, another Falcon pilot heard a thump, only his unusual sound happened during gear retraction after takeoff. With a red light in the gear handle, he gave a heads-up to his flight leader. After lowering the gear and seeing three green lights, he was told by the lead that the nosewheel assembly was missing. Through skillful maneuvering, the mishap pilot slid the F-16 along the runway for 6,000 feet, stopped, and got out of the jet safely. Here was another spacer that was left off during a previous nosewheel change, allowing friction to back off the axle nut and the wheel to fall off.

Once again, it's the small things that contribute to mishaps: A missing spacer, a skipped IPI, no last look before leaving the job. When you finish a task, take that extra minute to think: Did I follow the TO? Is everything in place? It'll be one of the most important, profitable minutes you'll spend all day. ■

C-17 Computerized Training

■ One of the biggest problems getting a new type of aircraft operational is training the people who must maintain it. For years, we have had the capability to use computers and simulators to help train a cadre of aircrews on the aircraft. But, until now, only time-consuming hands-on training has been available on new aircraft for maintenance personnel.

Now, however, the folks at the Aeronautical Systems Division at Wright-Patterson AFB, Ohio, have developed a system to train and certify maintainers without on-the-job training. Beginning with the C-17, the Air Force will use "high fidelity training devices to train and certify a cadre of people on an aircraft before it is in production."

Called, appropriately, maintenance training devices, or MTDs, they will allow units to certify maintenance personnel before the aircraft are available in the field. Down the road, this concept will all but eliminate the need to tie up an aircraft for training.

Specialists can be trained on new tasks to a safe and competent level of expertise, and personnel already trained can review the task procedures via a simulator. According to Maj Donald "Bud" Vasquez, a program manager with ASD's Training Systems System Program Office, "Twelve types of training devices will be built to exactly replicate different parts of the C-17 required for training. These include flight control systems, engine cowling maintenance, landing gear maintenance, engine maintenance, a cargo door/rail system trainer, a fuel system trainer, and a consolidated maintenance trainer."

The first C-17 MTDs were delivered to Charleston AFB, South Carolina, in June 1991, 120 days prior to the formation of the squadron. ■

OPS TOPICS

More Low-Level Hazards

■ The list of hazards to pilots flying low-level routes is well known — birds, other airplanes, turbulence, changing weather, and wires. A mining engineer wrote to complain about low-level airplanes and to add two more hazards to the list.

This engineer works with open pit mines and has seen airplanes, civilian and military, flying less than 500 feet over the mines. And while the mine might appear to be abandoned, chances are it is empty because blasting operations are about to begin. The explosion will throw rock fragments more than 500 feet high and more than 1,500 feet horizontally. Ouch!

Lest you think yourself safe because most of your low-level flying is over the ocean, read on. Many of the "supertankers" carrying liquid gas will vent the vapor buildup as they approach the coast for changing cargo, or in an emergency. The gas is vented under high pressure to clear the crew quarters, and it can easily reach 500 feet above the sea.

Now, when plotting out the hazards for your next low-level, you can add open pit mines to your list of traffic patterns, towers, and turkey farms. ■

We're Taking Corrective Action

■ Usually when you read about another engine FOD mishap, the corrective action is targeted toward using the correct nuts and bolts. A while back, however, a base discovered its problems were the result of a deteriorating runway. Rather than simply run a sweeper down the runway one more time, they got serious.

First, they moved flying operations to another base.

Second, they milled off the porous surface which was breaking up and causing the FO.

Third, they continually scraped and swept the runway for *weeks* until it was smooth and clean.

Fourth, a new 3-inch layer of asphalt was laid over the milled portions of the runway.

Fifth, they bought a new and better sweeper for use exclusively on the flight line and runway.

Sixth, every Friday maintenance borescopes one engine on the aircraft that has made the most landings.

Seventh, FOD walks of the runway are routinely conducted.

Finally, a strong, electromagnet was purchased for use on a truck which will make frequent sweeps of the flight line.

Was all this really necessary? Well, before they began to fix the problem, two-thirds of all the engines on the base had FO damage. Today, not a single aircraft is unable to perform its mission due to FOD. Talk about your corrective actions! ■

☆U.S. GOVERNMENT PRINTING OFFICE: 1992-679-016/40016

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.

FIRST LIEUTENANT

Daniel A. O'Connor

178th Tactical Fighter Group
Springfield-Beckley Municipal Airport
Springfield, Ohio

■ First Lieutenant O'Connor departed Springfield-Beckley Airport, Ohio, on a training mission as no. 3 in a flight of three A-7s en route to the entry of a low-level route. Approximately 3 minutes after takeoff, while passing 8,000 feet MSL on climbout, Lt O'Connor moved to tactical formation as directed when he heard a loud banging noise accompanied by intense vibration. Immediately, the engine hot light illuminated. The fuel flow indicator also began fluctuating in the 200 to 300 pound per hour region.

Lt O'Connor immediately retarded the throttle, informed his flight leader, and turned toward Wright-Patterson AFB, Ohio, approximately 5 miles east. Even with the throttle set at idle, the engine noise, vibration, fuel flow fluctuations, and overheat persisted. He called Wright-Patterson Tower on Guard frequency while flight lead notified local approach control of the need to deviate from the flight clearance.

Lt O'Connor continued the descent with power at idle and informed Tower of his intent to land opposite direction on runway O5L. He delayed landing gear extension in order to use the speedbrake to dissipate altitude. Approximately 3 miles from the runway threshold, with the landing assured, he configured the aircraft for landing.

Touchdown occurred approximately 2,500 down the runway, at a slightly higher-than-normal speed, beyond the approach-end cable. However, Lt O'Connor completed the landing, slowed the aircraft without engaging the departure-end cable, and cleared the runway. With the emergency crews on hand, he shut the engine down and exited the aircraft.

Lt O'Connor's early recognition of a serious engine problem, combined with an accurate assessment of his aircraft's glide capability to a suitable landing field, prevented the loss of this aircraft and potential injury to individuals on the ground. WELL DONE! ■