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SAFETY JUNE 1976

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REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

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JUNE 1976 AFRP 127-2 VOLUME 32 NUMBER 6

PEOPLE CAUSE ACCIDENTS

LT COL JOSEPH P. CLINE
Directorate of Aerospace Safety

It is people who cause aircraft accidents. The people who design the planes, the people who make the parts, people who put them together, people who maintain them, and the people who fly them. You can take that through as many iterations as you like. The people who provide the specifications, and those who supervise the production, assembly, maintenance, and flying. In fact, you can trace the causes through activities related to flying all the way to commanders, policy makers and authors of various regulations, manuals and technical data.

But the *real* causes are as elusive as the proverbial "they," the regular crew chief or the guy who has the big picture. It depends on your point of view—on how you perceive the accident. That is where the finger pointing game comes in. After investigating some accidents, the only conclusion is that it didn't happen because everyone was clean. The pilot was our best old boy. The entire maintenance complex was the cream of the crop. The aircraft had just come out of overhaul (not on Monday or Friday) with all the latest mods. And the entire chain of command consisted of fair haired boys with the highest intentions. But we have one less aircraft and someone caused the loss.

Keeping accident causes in mind, let's shift our thinking a bit and look at the mission. We say "the mission-safely." To some that may seem like a paradox. We, the Air Force, have a charter to be able to fly and fight. We must be ready to perform many rather difficult missions effectively and efficiently. By necessity, we are always pushing technology and flying to the edge of the flight envelope. Anything else would be wasting resources and accepting second best.

Accidental losses reduce our efficiency and capability. This throws us into a perplexing situation. We must pick a course of action or rather a philosophy of operation somewhere between two extremes. At one end of the spectrum is the "damn the torpedoes, full speed ahead" attitude where we say that flying is inherently dangerous, so press on and accept the losses. At the other end we could avoid all accidents by not flying. In actuality, we have vacillated back and forth. Should we adopt the sink or swim approach to training pilots where we accept the losses early, when they are cheaper? Or do we hand feed a guy through his flying career, hoping that he will pick up enough along the way to do it on his own if he ever needs to?

Why don't we optimize our operational capability through a program of maximizing training effectiveness and minimizing accident potential? It is a "mission-safety" equation that includes a thorough understanding of the requirements and hazards.

As you read through this issue, you will find that many of the articles address people problems. Col Jones in "What Are You Doing for Green 16" and Capt Laird in "Don't Let Your Wingman Down" both discuss the need for pilots and operational supervisors to understand and acknowledge physical problems, and Maj Spey in "No Joy" addresses the cockpit environment. Capt Sweeny illustrates in "Time Bomb" the problem of coping with stress and anxiety. These and other people problems continue to cause accidents. The need to learn from past accidents is emphasized by both Maj Allocca in "Feedback and USAF Accident Board Recommendations" and Capt Bloom in "No New Causes."

So—read on and find your place in the safety equation. We can do better, you know! ★

What are you doing for GREEN 16?

Material things are important in accident prevention; but the human factor demands as much attention.

LT COL MURPHY NEAL JONES
Commander, 357 TFS
Davis-Monthan AFB AZ

Lt Col Jones, eyes glued to the television, sat in his favorite easy chair but his mind was far away recounting the events of the last few weeks. It was more than a month now since he, as squadron commander, had gone to the homes of two of his pilots to break tragic news to their wives.

Just this morning, the accident board finished their final report: Cause — Material Failure. Many dedicated people worked long hours to dig out the clues to the full story. The sequence of events appeared cut and dried, although it wasn't an easy case.

During basic maneuver practice, one aircraft had suffered a loss of one hydraulic system — an emergency, but certainly a common one. While rejoining to return home, the two planes collided almost canopy to canopy, destroying both aircraft. Neither pilot had a chance to eject. Further investigation into the twisted wreckage had added new dimensions to the accident.

Col Jones thought briefly of each new fact as it had been uncovered: The second hydraulic system with a clogged line to one aileron . . . an actuator which leaked out those few precious drops of fluid which would have damped the flutter and prevented the metal fatigue. He could picture the two aircraft closing for rejoin when suddenly one, out of control, rolled up and over into the other.

The picture was so vivid, the sound of tearing metal threw his thoughts to the accident board findings. He and other supervisors had not been listed as a cause factor. The pilots were current in the events to be flown and there had been no crew rest or other violations of regulations. Yes, a group of his peers had found him free of any fault and they had dug deeply into the facts.

Col Jones knew that in another court he had not been vindicated. In the dark recesses of his own mind, he served as both defense and prosecution, pondering not only the facts but the intangibles. On his scales of justice, the intangible could bear a heavy weight.

Jones knew the pilots of his squadron were second to none. They had always accomplished every mission whether it was daily flying, additional duties, meetings, or the mountains of paperwork which never stop flowing. He thought of his own schedule and how rough it could get at times.

There had been no real clues to indicate any imminent problems. Oh, there were always last minute schedule changes to replace a pilot who had a meeting or had to meet a last minute suspense, but there was always another pilot eager to fill the gap. Yes, he could remember a few flight briefings which seemed not quite as smooth as normal and maybe a few small details had not been covered; but, with his experienced group of pilots, it had never affected a mission.

As his mind pulled and tugged, Col Jones wondered if he had spent enough time really understanding the men of his own unit. On that tragic day, could he have spotted some small clue which shouted, "Reaction time is slow! The risk factor is climbing!"? Could it have made a difference? He did know that there was a risk in flying, but had he done everything possible to cut the risk to a minimum? As he fell asleep, the television screen now only a test pattern, he mumbled, "I don't know, I really don't know!"

Fortunately, this story of the midair collision and the death of the two pilots is imaginary, but it could very well be true. How many accidents and how many deaths have been caused by those kinds of circumstances when an alert pilot with fast reactions could have saved the day?

I do believe that the commanders and supervisors of flying units know the regulations and try to follow them to the letter; however, in this day of complex aircraft, this is not sufficient. We have the responsibility of keeping our pilots alive, and with the economic crunch on the military, we must preserve the combat assets of our country. Following regulations to the letter is only the beginning.

When you schedule that young lieutenant or that attached colonel do you only ask yourself, "Is he legal to fly this mission?" or do you propose this question, "Have we provided him enough training to adequately complete the mission, and is he physically and mentally prepared to do so?"

The author briefing squadron pilots.

We all know that we cannot stop every accident, but we can prevent senseless accidents, and we may be able to avert some which would normally be considered unavoidable. We can do this by being aware of the daily capabilities of our people. You, as a squadron commander or supervisor, must be able to communicate with your people. You must know them both professionally and socially.

My experience in TAC has shown me that pilots have several traits (be they real or imaginary) that can be either beneficial or detrimental depending on the situation. A pilot is both aggressive and cocky, and he believes that he is better than his peers. Aggressiveness is good; being cocky by itself, does no harm; and believing that he is the best, promotes confidence and the will to do better. However, when these qualities are mixed, you have a pilot who generally won't say no.

A pilot doesn't like to admit a flaw in his ability. He rarely will ask his supervisor to replace him on a demanding mission, even though he knows he is not up to par. He may have had trouble at home, one to many at the bar, or he may only be having a down day. This is where knowing and communicating with your people is important.

You must persuade the members of your unit to be honest with you and most importantly, with themselves. Your flight commanders can also provide valuable insight. They must be more than mere figureheads. They must act as operations officers and psychologists simultaneously. Since they maintain close touch with individuals in their flights, they can be your link between operational and personal requirements.

In my squadron (the 357th Tactical Fighter Squadron), we attempt to consider all of these factors when designing our schedule. The squadron scheduler initially allocates available sorties and duties to the flights proportional to the flight size and makeup. The normal items considered are phase and continuation training requirements, eligibility, and currency. Then, with inputs from the flight commanders, the operations staff, and the squadron commander, the makeup of each flight is considered in light of the objective of the mission and the events to be accomplished. If a mission is to have especially demanding tasks, the pilots in that flight should have had recent flights preparing them for that mission. Highly capable pilots are placed in those flights which have pilots who are not so strong. These and other similar requirements usually ensure that the original schedule has covered all known conditions.

Further refinements must be made on a daily basis. For example, the mission which was preparatory to the demanding mission may have been weather cancelled or aborted. Individual problems or requirements might now dictate a personnel change within a flight. That new flight lineup might now require a change in the mission objective. The list of possibilities is endless.

There are no easy methods to eliminate accidents; but, it is up to you, the squadron commanders, and supervisors to cut the risks to a minimum. With ample planning, the next flight you schedule will be prepared to fly, to fight, and, *to return.* You are the person who can keep that young wife from looking out the window and seeing that grim scene of the wing commander, the chaplain, the flight surgeon, and yourself walking up to her door. I certainly don't want to inform her that her husband has just been kill[illegible] and I don't think you do either. Think about this when you drive to work—*think about it constantly!* ★

Lt Col Murphy Neal Jones is the Commander of the 357th Tactical Fighter Squadron (TAC), Davis-Monthan AFB, Arizona. He attended Tulane University, New Orleans, LA, where he was the first string center and linebacker for three years, a member of the AFROTC, and commander of the Arnold Air Society. He graduated on May 30, 1960, and was commissioned a Second Lieutenant in the Air Force. After pilot training, he served in several assignments, including two combat TDY tours to Southeast Asia. He again volunteered to return to SEA in 1966. While assigned TDY to the 333rd TFS at Takhli Air Base, Thailand, he was shot down and captured over Hanoi on June 29, 1966. Col Jones was repatriated on February 12, 1973. After his return from Hanoi, he attended the Armed Forces Staff College, graduating in January 1974. He was then assigned to Randolph AFB, Texas for a flying refresher course, and [illegible] assigned to the 355 TFW at Davis-Monthan AFB, Arizona in April 1974.

WIRE ACT

Ask a helicopter pilot what his greatest occupational hazard is and he'll probably answer "wires." Every year some chopper pilots come out second best in an argument with a wire —sometimes permanently.

It has been policy to dismiss such "mishaps" with the assertion that "if the pilot hadn't been flying so low" . . . or "if the pilot had been clearing properly. . . ." Such simplistic answers don't fit the facts. First, not all wires are close to the ground. One collision occurred *over 1700 feet above the ground*. The wire was stretched across a valley and there were no poles visible. When the investigators measured the height they found the wire was 1782 feet AGL.

Wires are often invisible to the aircrew, even if they are clearing properly. A pilot was killed when his helicopter flew into power lines stretched across a Pacific Coast inlet. The wires were obscured by the superstructure of a bridge in the background.

The problem can be solved by making wires more visible. Unfortunately, efforts to do this have not been very successful. The technology is available, e.g., colored plastic balls hung on the wires; lights—even one run by static electricity, something always present around high voltage power lines; however, little has been done.

There is some evidence that this attitude may be changed. In the past the appellate courts generally ruled that when an aircraft struck a power line or transmission line, the liability rested solely with the pilot. But some recent decisions have resulted in judgments against power companies. There are also aviation and citizens groups attempting to sponsor legislation requiring marking of hazardous wires.

Helicopter pilots should take it for granted that at low level there will be wires. But 1782 AGL does stretch the imagination. Aeronautical charts will help; so will NOTAMS, although neither is a 100 percent guarantee.

It would be nice if all wires and cables that could snatch a chopper were adequately marked, but that's not the way it is. Until the wires are all marked, you can't beat good flight planing with due regard for the weather and some very busy, very sharp eyeballs. These may prevent one wire act that doesn't even belong in a circus. ★

Not all wires are close to the ground.....

OPS TOPICS

NEW MATERIAL FOR CHUTES

AFSC's Flight Dynamics Lab has completed testing of a new fiber as a possible successor to nylon for drogue parachutes. The new material called Kevlar® was developed principally for tires but can be woven into parachute material that is twice as strong as nylon. Thus, parachutes of the future may be only half the weight and volume of their nylon counterparts. The ribbon type parachutes were tested in the wind tunnel at AFSC's Arnold Engineering Development Center. Dynamic loads were measured on deployment at speeds of approximately 600 mph and simulated altitudes from 5000 feet to 35,000 feet. The tests also measured steady-state loads from 400 to 900 miles per hour.

IT'S THAT TIME AGAIN

The Herky Bird was IMC at FL 200. Although the preflight briefing had not forecast any thunderstorms, an update from another aircraft indicated activity on track. Since the airborne radar was inop, the crew elected to reverse course and descend to VMC. During the descent the aircraft was struck by lightning which damaged the radome.

LITHIUM BATTERIES REPLACED

The item manager at Hill ALC has directed that all lithium batteries NSN 613-00-204-5702LS be removed from service and replaced with mercury batteries. All major commands have received a message on this subject. Use extreme care with batteries showing signs of deterioration since there are serious hazards from sulfur dioxide to personnel handling defective batteries.

TOO MUCH PULL

An A-7 pilot was performing a preflight of his life support equipment. He was a bit too enthusiastic when he performed the security check of the arming cable swag ball. He exceeded the 10 pound pull tolerance and fired the parachute automatic release cartridge.

GLOBAL HF STATION— NEW PROCEDURE

Instructions for the use of Global HF Aeronautical Station were changed effective with the 24 April 1976 issue of FLIP IFR Supplement. The new procedures require USAF aircrews to maintain radio contact with the Area Control Center responsible for the FIR except when a USAF HF station maintains "Primary Guard" for that FIR. Changes were necessary for DOD aircrews to comply with ICAO procedures. Refer to FLIP for details.

CORRECTION

On Page 8, *Aerospace Safety* magazine for April, a drawing of an aircraft closely resembling a DC-10 was used to illustrate an article. The article did not mention the type of aircraft involved but it was not a DC-10, and we regret that there could be any implication that a DC-10 was involved.

OPS TOPICS

DO YOU LIKE CHALLENGES?

The Safety Education Division at AFISC is looking for a rated major or major selectee to be a safety education staff officer. He will develop and manage new safety education programs and manage existing ones, both audiovisual and instructor oriented. He will also work directly with the chief of the division on other areas of safety education. If you would like a challenging and different job, contact Lt Col Raley, AFISC/SED, Norton AFB, CA 92409, AUTOVON 876-2407.

FLIP REALIGNMENT IN THE PACIFIC

On 15 July 1976, the Pacific and South Asia (PSA) and the Australia, New Zealand and Antarctica (ANZA) FLIP Enroute and Terminal publications will be combined into a single package. The title of the new publication will be the same as Area Planning 3—Pacific, Australasia and Antarctica (PAA). The new PAA FLIPs will also be published on an expanded cycle.

The PSA and ANZA Supplements will be combined into a single PAA Supplement. The Enroute Chart coverage will remain the same, but the current ANZA Charts 1-9 will become PAA Charts 11-19. The charts and supplement will be published every 16 weeks with a Military Aviation Notice (MAN) issued at the intervening 8-week mid-point.

The Instrument Approach Procedures (IAPs) will be combined into three high/low combination volumes. These volumes will also contain the Standard Instrument Departures (SIDs) plus any existing expanded airfield diagrams and Standard Terminal Arrival Routes (STARs). The radar minima for the airfields will be moved from the Supplement to the front of these volumes. The IAP volumes will be published every 24 weeks. Two bound MANs will be published at each of the 8-week intervals between cycles with the second MAN being cumulative.

CLIPBOARDS (FOD)

During cockpit check on a recent T-38 sortie, the crew found a small knob on the left cockpit console and identified it as the light control knob on the MXU-163/P pilot's clipboard. One way to keep this type of foreign object (FO) out of the cockpit is to lock the set screws which hold the knobs to the shaft. This can be accomplished by the application of adhesive sealant, silicone, RTV (MIL-A-46106, Type I, NSN 8040-00-103-9378) or similar material to the threads of the set screws by your protective equipment technician. Crewmembers should check their life support equipment as a possible FOD source, as well as for function, prior to each flight. ★

NO NEW CAUSES

CAPTAIN JAMES P. BLOOM
Alaskan Air Command

One of the instructors at the Flight Safety Officer Course presented our class with the idea that there were no new causes of aircraft accidents. Naturally enough, the point was debated with some people supporting the thesis, and others opposed. This concept could not be resolved to everyone's total satisfaction; however, some aircraft accidents illustrate the idea that there are no new causes of aircraft accidents

Flying safety meetings are usually where aircrews get the opportunity to listen to mishaps that have occurred to others. The theory is to learn from mistakes others have made in order to keep from duplicating those errors. Another reason, albeit, very similar, is to find out how someone was able to save a rapidly deteriorating situation just in case the same thing happens to

your wingman. (It always happens to the other guy. Right?) Thus, you would be able to give him the guidance he needs to get back to the "home drome."

After hearing about all these accidents and incidents that have happened to others, have we really learned anything? After listening to the causes of all these mishaps, have we absorbed this knowledge in order to avoid the same pitfalls that others have stumbled into?

Do we really learn from the mistakes of others and avoid similar accidents? Look at what happened to a T-33 crew, consisting of an instructor pilot and a pilot, who had an accident while they were practicing a simulated flameout approach (SFO). The accident sequence started after the aircraft was established on final. When the aircraft commander lowered the flaps to the full-down position, the T-33 developed an excessive rate of descent. The instructor pilot finally had the pilot reselect 50 percent flaps and add thrust, but it was too late. In a vain attempt to stretch the glide, the aircraft commander raised the flaps completely. The T-Bird was destroyed when it came to rest short of the overrun. The crewmen were not seriously injured.

Most T-Bird jocks probably were briefed at their flying safety meetings on all the causes and findings related to this accident. Some aircrews may have filed the details away in their heads to prevent such a mishap from occurring to them, but obviously not all T-33 pilots learned from this accident. Approximately three months later, another crew consisting of a pilot and an instructor pilot in a T-Bird were shooting an SFO and got low on the glide path. The instructor pilot twice commanded the aircraft commander to increase the thrust, but the throttle was never advanced until the instructor pilot did it himself. Finally, in another futile attempt to reach the runway, the aircraft commander attempted to raise the flaps to the 50 percent position, but mistakenly selected the full-up position. Scratch one more T-33.

Again, the crewmen were not seriously injured. The causes in both accidents were the same: operations factor, direct-operator error; and supervisory factor-direct. The instructor pilots in both cases allowed the pilots to fly into dangerous situations from which they could not recover.

Another example of causes repeating themselves involved F-4s flying AI/ACM. The first accident occurred during tactical intercept from a 2 vs 1 scenario. During the maneuvering, the defender lost sight of one of the attackers, the attackers never saw the defender, and during the ensuing battle, one of the attackers and the defender collided. The point illustrated by this mishap was that the participants lost sight of each other and continued the engagement. They should have broken off the engagement and set upon another one. Fortunately, everyone lived through this accident.

Most fighter crews were probably briefed on this mishap, especially those in the ACM phase of training. The rules of engagement were probably emphatically stressed during briefings because of this accident. Again, some aircrews did not listen to the lessons illustrated by the previous midair, nor did they listen to the rules of engagement. They couldn't have, because less than one month later another pair of fighters lost sight of one another and collided during an ACM engagement. The only difference this time was that two of the attackers ran into each other instead of an attacker and a defender as in the previous accident.

The causes of both ACM accidents were basically the same: not adhering to the rules of engagement that had been established in order to prevent such accidents and ensure safe training.

These accidents were preventable. At least the second accident in each pair should never have occurred, because the first T-Bird accident investigation had already been completed with all the causes published. The aircrews should have been aware of the mistakes the first T-33 crew made and thus avoided the second T-Bird SFO accident. While the F-4 crews did not have the benefit of all the findings from the first midair, they should have been fully aware of the hazards involved in ACM as illustrated by the previous midair, before they flew their mission.

No new causes? Probably true. Once we know the causes of accidents, we should be able to prevent them. This is where accident prevention becomes the responsibility of the individual and not the safety officer. The safety officers make the causes of mishaps known to the aircrews, then it is up to the aircrews to use that information. That means it's all up to you—the aircrew. After all, what have you got to lose? ★

"NO JOY"

MAJOR JACK SPEY
475 ABW

It was 0500, runway 25 and cleared for T/O. On the hack, the first of nine C-123s rolled down the runway, at 15 second intervals. In the last of the "nine shipper," power checked good; and at 110 knots we were airborne. As the wheels hit the well there was a muffled explosion, a slight shudder, and a briliant glow filled the dark cargo compartment.

Outside, flames engulfed nr two engine as the right fire handle glowed red. The pilot called for the fire handle to be pulled and the copilot pulled the illuminated fire handle feathering the propeller. (This step also cuts off the fuel, hydraulic fluid and arms the fire extinguisher.) The next step of this three step shutdown procedure, which normally takes 3-5 seconds to perform, was delayed due to excited interphone transmissions from a crew member in the cargo compartment. After 10-15 seconds, at the pilot's direction, the mixture was placed in the Idle Cut Off Position (Step nr 2) and with the fire now burning ravishingly, he instinctively called for the extinguisher to be activated.

At this point, 20-25 seconds, after all possible indications of fire were evident, (visual, oral, instrument, and the obvious), the copilot began looking for the fire extinguisher switch. He knew the general, if not specific, location but he was unable to locate it! Why? *Cockpit lighting!* Inability to find the extinguisher switch was not due to *lack* of illumination. The lights in the cockpit were so bright that the glow masked the location of the switch. The Fire Panel containing the switch was ablaze with light, as was the rest of the cockpit. The etching in the instrument panel that normally outlines the switch by back lighting was masked out by the brilliance.

This incident, not completely described, contains other lessons. Extinguishing systems contain sufficient agents to put out a fire if the proper procedures are taken quickly. If the whole barn is on fire before we decide to fight it, we may have to come up with another plan!

2000 hours, 14,500 feet, C-130 between Da Nang enroute Saigon RVN, 14 NE Saigon; WX—clear and unrestricted.

"Herky 41, this Paris control, you have traffic one o' clock, two miles east bound.

"Paris, Herky 41, no joy.

"Roger.

"Herky 41, Paris, traffic now twelve o' clock one mile.

"Herky 41, Roger . . . no joy!"

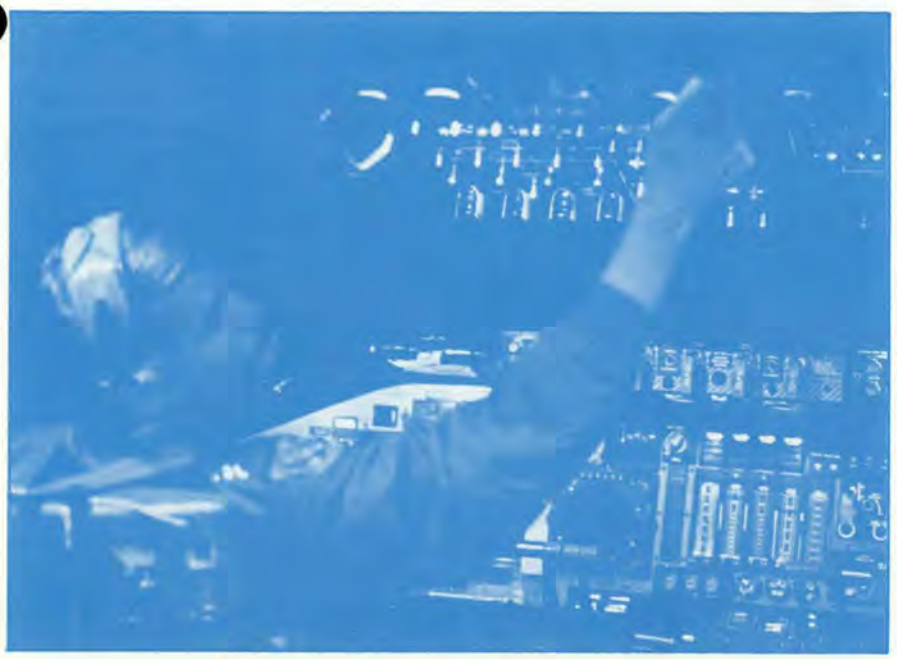
While dead heading from Da Nang to Saigon, I became bored riding in the cargo compartment and decided to join the crew. Not being a C-130 pilot, I was anxious to watch the Lockheed being flown and admire all the gadgets. After I arrived on the flight deck and plugged into the intercom, the pilot and I engaged in the normal chatter that takes place between pilots of different aircraft. He expressed sym-

pathy when I described the equipment on the C-123 and he seemed elated when I showed admiration for his auto-pilot, radar, crew bunk, etc. As the flight progressed toward Saigon, I instinctively monitored the radio chatter.

Paris Control (Saigon GCI) was providing traffic information to the dwindling number of aircraft as the flying day over Vietnam was ending. On seven occasions, Paris Control advised Herky 41 that he had traffic in the forward quadrant at 2-5 miles. In each case, the response was, "No Joy." When traffic was called, I would rubberneck over the flight engineer's shoulder for a better look. Unable to see the traffic, I nervously moved forward to the right of the copilot and pressed my nose against the windshield. In this position, I could see the star-filled sky and was able to see a number of other aircraft.

As we approached Saigon for landing, I nervously returned to the cargo compartment; but as I moved to the rear of the flight deck, it became evident that the brightness of the cockpit lighting was preventing the crew from seeing outside the cockpit. The windscreen and side windows were flat black and little or no light from outside the aircraft was reaching the pilot's eyes. If near miss situations were occurring, we in the cockpit were totally oblivious to the situation, except for those seen by Paris Control.

In both these incidents, the cockpit lighting was excessively bright. Far more illumination was being used than was required to adequately read instruments, see switches, and perform cockpit duties. In the first incident the overbrightness masked the location of critical switches. In the second case, visibility outside the cockpit was nil—preventing sighting of other aircraft.



"SEE and AVOID!"

If this article is being read in such a cockpit, ablaze with light, stop and see how well you can see outside the aircraft. If the stars are faint or not visible at all, gradually lower the intensity of your interior lighting. Each panel rheostat will require different adjustments due to the nature and quality of the lighting design and the importance of individual panels; however, over a period of 30-45 minutes of gradually reducing the intensity of each panel, the excess light can be removed without degrading interior visibility.

This process takes time, as the eye must simultaneously generate the visual purple necessary to improve night vision, but after the eye has reached peak performance and the minimum intensity level is reached, we will find that bright spots in the cockpit are removed, the cockpit is equally as distinct as before and the sky, stars, horizon and other traffic become visible.

While taking off at dusk or flying into the night, the eye naturally begins to generate visual purple and adapts to the growing darkness. As the cockpit grows darker and less distinct, slowly adjust and gradually *maintain* the minimum intensity you require to see those instruments and necessary cockpit controls. (The key word is maintain.) Slowly and selectively adjust the rheostats to *maintain* the minimum intensity required. In this way the eyes, the approach of darkness, and careful adjustments, work in concert to achieve the minimum required interior lighting and without jeopardizing or destroying the capability to see beyond the windscreen.

The careful effective use of cockpit lighting can ensure our ability to perform cockpit duties while night flying and preserve our ability to maintain adequate visual crosscheck outside the aircraft thus permitting us to "see and avoid" and to appreciate our sky. ★

Your Way Out

SSGT ROBERT J. PAETZ
3612 Combat Crew Training Squadron
Fairchild AFB WA

You have just been tossed out of your cozy warm cockpit and find yourself tumbling into a survival situation. That's a brand new mission. Could you hack such a mission, not knowing what it entails? Unfortunately, a lot of aircrew members have forgotten that they have an assigned mission even after they leave their aircraft. Let's look at what Uncle Sam says that mission is, and why.

The moment you depart your aircraft, Sam states you're to "return to friendly control without giving aid or comfort to the enemy, to return early and in good physical and mental condition." On first impressions, "friendly control" seems to relate to a combat situation. However, even in peacetime your environment may be quite hostile. Imagine parachuting into the Arctic when it's −40° F. Would you consider this friendly? I doubt it. If you are forced to crash land in the desert where temperatures may soar past 120° F, would this be agreeable? Hardly. The list is endless. Almost any place you might bail out, you can be confronted with situations difficult to endure. You want to "return to friendly control."

The second segment of the mission, "without giving aid or comfort to the enemy," is of course related to a combat environment. This part of your mission may be most effectively fulfilled by following our moral guide, the Code of Conduct. Remember, however, that it should be followed at all times and in all places. It *does* apply to the peacetime situation.

The final phase of the mission "to return early and in good physical and mental condition," will probably be the most strenuous requirement to accomplish. The most important criterion for successful completion of that part of the mission will be your WILL TO SURVIVE. Although this "will" is inherent in all of us, some will find it difficult to activate. Surely you've read stories or know of incidents where people have eaten their belts for nourishment, boiled water in their boots to drink as broth, or have eaten human flesh—though

this certainly wasn't their cultural instinct.

One incident where the will to survive was the deciding factor between life and death involved a man stranded in the Arizona desert for eight days without food or water. He traveled more than 150 miles during searing daylight temperatures, losing 25% of his body weight due to the lack of water. (Usually a 10% loss is considered fatal.) His blood became so thick that the lacerations he acquired could not bleed until he'd been rescued and had received a large amount of water. When he had started on that journey, something must have clicked in the back of his mind telling him to live, regardless of any obstacle which might confront him. And live he did!—on guts or will alone.

Let's flip the coin and check the other side of "will." Our location is the Canadian wilderness. A pilot ran into engine trouble, and chose to deadstick his plane onto a frozen lake rather than punch out. He did a beautiful job and slid to a stop in the middle of the lake. He left the aircraft and examined it for damage. After surveying the area, he noticed a wooded shoreline only 200 yards away where he could find warmth, food and shelter; he decided to go there. Approximately half way there, he changed his mind and returned to the cockpit of his aircraft where he smoked a cigar, took out his pistol and blew his brains out. Less than 24 hours later, a rescue team found him. Why did he give up? Why was he unable to survive? Why did he kill himself? Why do other people eat their belts or drink broth from their boots or take a bite out of George? No one really knows, but it's all related to the WILL TO SURVIVE.

Like a lot of other things in this world, your will may be improved upon. Let's take a look at some ways. In an emergency outside the cockpit you may have a tendency to panic or fly off the handle. That can usually be handled by sitting down, calming down and analyzing the situation rationally.

After your thoughts are collected and you're thinking clearly, the next step is making decisions. In all walks of life, some people always avoid making decisions by letting others do their planning for them. But in a survival situation that won't work. You're on your own, and every decision may mean life or death. When you make critical decisions, like how and where to build a shelter, how to signal, and where to find water and food, you've got to be flexible and plan ahead. Flexibility is essential because circumstances may not always go according to that plan. For example, you may have started to construct a shelter and hear an aircraft in your vicinity. You would probably want to postpone the shelter and attempt to get out a signal. I don't mean to be as flexible as jelly, but maybe like jam.

If you get in a pinch and find yourself without an item you feel is critical, use a little "Yankee ingenuity"—improvise. Today you might walk outside and see a tree and wonder how tall it is or what good shade it could provide. But in a survival situation, you have to look at that same tree in a totally different light. It may supply you with shelter, food, signalling, warmth and medicine.

Tolerance is the next topic of concern. You will have to deal with many physical and psychological discomforts, such as creepy crawlers, flying insects, loneliness, and maybe even "Sasquatch." Just by being in the military you've had a chance to learn to tolerate uncomfortable situations. Fine. Apply that to your new environment. You'll probably find it's not so bad.

Facing and overcoming childhood fears is another threshold you may have to cross. Realistically speaking, everyone has acquired childhood fears. For instance, why do you usually turn on the bedroom light when it's dark even though you've been there hundreds of times before and already know where every stick of furniture and every knick-knack is located? Is it a habit, or a reflex? Or could it be that when you were very young someone jokingly scared you in the dark? Maybe as a small child someone told you not to leave the yard because wild animals in the nearby woods might get you. And now you may find yourself in a strange dark woods which is the playground of these wild and ferocious animals. Old fears can be detrimental to your survival unless you learn to overcome them.

Perhaps one of the most important psychological factors to remember is optimism. With today's modern technology, it's likely someone already knows you are missing and a rescue team is being organized to find you. Like the old saying goes, "Keep the Faith, Baby!"

As you can see, the survival mission Uncle Sam has assigned you is not an easy one. This is just a peek at some of the ways you can succeed in that mission if you're ever "fragged" for it. If you find yourself in this predicament, I hope you'll remember that your WILL TO SURVIVE is Your Way Out. ★

FROM WHENCE WE CAME

THE RAID ON PLOESTI

MSGT DAVE SYLVA
63 MAW
Norton AFB CA

The Ploesti Raid was a costly fiasco marred by misinformation, mistiming, mistakes and outright confusion. Only determination and personal initiative saw it through despite all the odds against it.

"The defenses here are nothing as strong as they are on the western front. The majority of the fighters will be flown by second-rate Rumanian pilots who are thoroughly bored with the war. The anti-aircraft defenses are estimated to be 80 heavy and 160 light AA guns largely disposed for a night attack from the south along the railroad. The heavy AA guns should not trouble you at low altitude. Equipment has been installed for making smoke but has not proven to be effective. Now the defenses at Ploesti may look formidable on paper but remember . . . they are manned by Rumanians."

That was what the crews were briefed before they flew against one of the worst targets in the history of air war.

Even if the briefing were correct —and it wasn't—the mission would be a nightmare. If all went as planned—and it didn't—the strike force would have to fly nearly a thousand miles into enemy controlled territory, without fighter escort, and a thousand more miles

home. To avoid detection, the ops order called for a low level run across the Mediterranean and on into the target area. "Low level" was spelled out as thirty feet. The plane, Consolidated's B-24 Liberator, was a four engine, flying gas tank that handled like a truck.

If all went as planned, it would be rough. Fate, however, put her hand in and busted the plan. The rough mission turned into a nightmare of confusion, terror and hideous losses.

That confident briefing was not the product of a hyperactive information officer. It was the honest opinion of S-2, an error in judgment by Intelligence based on past experience with the target.

After the disaster at Pearl Harbor in December 1941, President Roosevelt requested plans be drawn up for the early bombing of Japan. Doolittle's raid was one result. A second, less known, was a B-24 mission designated HALPRO that was to fly from Florida to Brazil, span the Atlantic, cross Africa, on to India, Burma and China. Then in May of 42, to bomb Tokyo from the base at Chekiang. Before the job could be pulled off, the Japanese took the base at Chekiang and the mission was scrubbed.

Stranded in the Sudan, in eastern Africa, HALPRO was turned around and brought up to Egypt for a long haul strike into the heart of German oil production.

The forty refineries at Ploesti gave Hitler one-third of all his petroleum products and the highest octane aviation fuel anywhere. It was a strategic target in the truest sense of the word—probably the most valuable target in all Europe.

At dawn of June 12, 1942, the first American bombing raid against Europe in World War II began. The thirteen Liberators came in, unopposed, dropped their bombs and streaked for home before the enemy's fighters and flak batteries could be organized. We suffered no combat losses to speak of and the bombing results were no worse for the Germans. In fact, they wrote the raid off as an "Intruder" mission. The actual results though, would not be felt for another year and when they were, they would be deadly.

Our first taste of blood at Ploesti had not been as bad as we had expected and it lulled our Intelligence into a false sense of security. The Rumanian defenders would not seriously threaten a determined force. A low level attack would give us the element of surprise. There was a good chance that a single lightning strike with a force of nearly 200 heavy bombers would take out Ploesti. All this optimism was based on the premise that the defenses at Ploesti had not changed. This faulty judgment gave small credit to a brilliant air tactician, Luftwaffe General Alfred Gerstenberg.

HALPRO had shown that the Americans had a serious interest in the Rumanian oil refineries. In answer to this interest, Gerstenberg had some of the finest pilots of the Luftwaffe brought into the Ploesti area. Crack anti-aircraft gun crews bolstered the defenses. The "second-rate" Rumanian flyers, over half of the interceptor force, were as good as any of their German allies.

And so, in July 1943, as the 9th Air Force prepared for Operation "Tidal Wave," the opposing sides held totally different views. The Germans, anticipating the flight, had beefed up for the battle that had to come. The Americans, remembering the first raid, HALPRO, thought they would be flying against a lightly defended target. On the first of August, 1943, one of the most terrible battles in the history of airwar was joined.

The five bomb groups of the strike force took off from fields in Libya. The lead group, the 376th totalling 29 heavy bombers, carried the mission commander, Brigadier General Uzel G. Ent and the lead

Model of Ploesti, scale 1: 5,000, was built in England in one week by the RAF, shipped to North Africa along with other models and carried from field to field by truck so that crews could familiarize themselves with it.

Photo of same area covered by model above. For orientation, key on the river in upper left of model photo and middle left in lower photo.

We wish to gratefully acknowledge the Air Force Museum at Wright-Patterson AFB, Ohio, for providing the photographs accompanying this article.

PLOESTI continued

navigator, 1st Lieutenant Robert Wilson. With the "Liberandos" airborne, the 39 ships of the "Traveling Circus" followed. Behind the 93rd Group came the 47 "Pyramiders" of Killer Kane's 98th Bomb Group, Johnson's 37 "Eight Balls" of the 44th and in trail, the smallest group, the "Sky Scorpions" of Wood's 389th Bomb Group numbering 26 ships.

Only one plane was lost during the takeoffs but during the race across the Med, ten others of the force aborted and turned back to base. Then fate put her hand in. Without warning and without breaking radio silence, "WINGO WANGO," porpoised twice and plummeted into the sea taking the lead navigator, Wilson to his death. Another '24 spiraled down over the site in a vain search for survivors. There were none. Too late, the rescuing plane realized that it could not climb back to formation and it too aborted. Aboard that plane was the Deputy Mission Navigator.

A new plane slid into position as leader for the lead group. A young and inexperienced lieutenant suddenly had the responsibility of mission navigator thrust upon him.

As the force raced toward Rumania, they climbed to cross the Pindus mountains that rose 9,000 feet. The weather above them stacked clouds up to 17,000 feet. Again, fate stepped in.

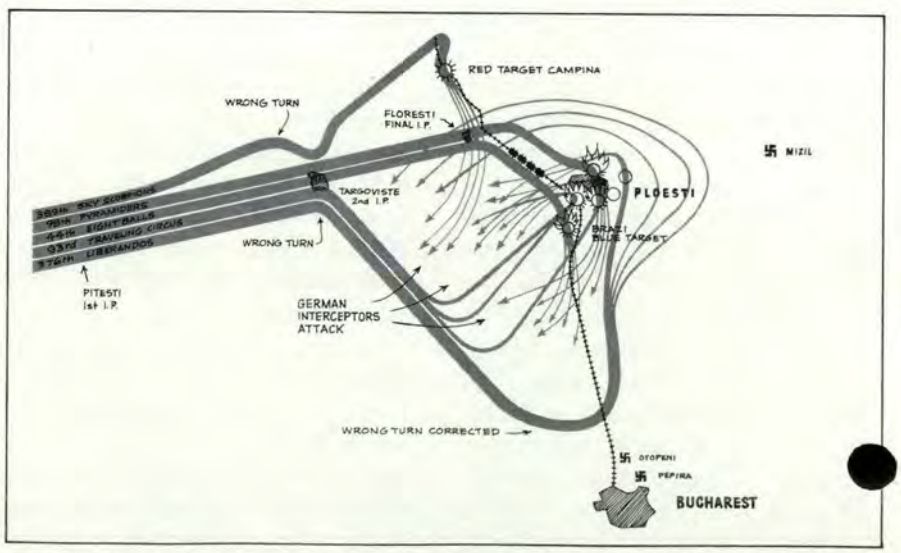
The first two groups made the penetration at 16,000. The other groups entered the clouds at 12. At the higher altitude there was a tailwind. Four thousand feet below, the groups bucked headwinds. Flight integrity was lost and the bomber stream was split. They never regrouped.

The Ops Order set Pitesti, 65 miles west of the target as the first IP. Beyond that lay Targoviste, the second IP. The groups were to turn on the final IP, Floresti, and make the 13 mile run southeast to the target. Ahead of schedule the lead group approached Targoviste. At the low bombing altitude, the ground and its landmarks streaked by too fast for recognition.

Over Targoviste, the second IP, the lead group commander, Colonel Keith Compton, suddenly ordered his pilot to turn. The pilot obeyed taking up the heading for the bomb run. The acting mission navigator in another plane, knowing that they were only over the second IP, stayed on course and continued as briefed —alone.

Other pilots who realized that their leader had turned short were boxed in and forced to make the

Photo shows low level flown by raiders. Aerial gunners dueled with enemy flak batteries.



Declassified map, left, shows routes to target. Solid lines were primary; broken lines denoted alternate routes. Drawing at right shows routes taken by American groups, mistakes they made, the confusion and the direction from which enemy fighters attacked. Circles around Ploesti indicate targets.

turn rather than risk collision. Twenty miles short of the planned turn, the 376th and 93rd Groups began a run on Bucharest . . . Gerstenberg's Fighter Control and Air Defense Headquarters and the heaviest flak concentration in Europe.

Too late, pilots broke radio silence; "Not here! Not here! This isn't it!" and "Mistake! Mistake" Still the bomber stream raced on.

The German defenses were confused. Not about what to do, but confused as to what the Americans were doing. The only target worth the effort was Ploesti. Why the invaders were threatening Bucharest baffled the Germans. Gerstenberg scrambled the defenses in the entire area. Hundreds of German and Rumanian fighter pilots rose to the attack. Nearly 240 heavy AA guns and hundreds more light guns came up on the line.

As they plunged on, Addison Baker wheeled his 93rd Group to the left stabbing straight for Ploesti. His plane "HELL'S WENCH" took an 88 blast in the nose and although ablaze, held straight and level leading his "Traveling Circus" to the target. Having done his job, Baker's plane heeled over and slammed into the ground.

When Compton's "Liberandos" finally turned to the attack, they made their run in from the south, the most heavily defended direction.

The three trailing groups flew the mission as briefed turning southeast on Floresti. The element of surprise was gone. German flak and fighters were ready and waiting. As Kane's "Pyramiders" and Johnson's "Eightballs" bracketed the railroad tracks between Floresti and the target, another Gerstenberg surprise came up. A special train, a flak train, paralleled the course of the low flying planes and hammered at them, downing or crippling bombers on each side of the tracks.

The well rehearsed and carefully planned mission came apart in the burning skies above the refineries. Instead of the orderly flight path that had been briefed, the three separated groups were converging on each other as well as the target. In the confusion, the groups had to seek targets of opportunity rather than the assigned ones. They flew into the smoke with the delayed action bombs of preceding waves going off in front of them and below them. Through all the tortured hell of the bomb run itself, German flak batteries and aerial gunners in the American bombers fired nearly point blank at each other. German and Rumanian fighters carved through the American formations filling the skies with parachutes, junk and death.

Their bombs gone "Tidal Wave" turned for home. Enemy fighters kept up the relentless pursuit, seeking out the cripples and sending them cartwheeling into the Mediterranean.

Twelve hours after takeoff, what was left of the strike force returned to base. Of the 164 planes that had gotten to the target, 110 made it back. More than 70 of those were no longer flyable.

Of the 1700 crewmembers that had flown against Ploesti, nearly a third of that number were dead, wounded, missing or captured before the day ended.

Militarily, it was a disaster. We were too badly hurt to go back . . . not right away. German oil production was not seriously hampered. Within six months, slave laborers had the plants back to cracking capacity.

It was a hairy mission . . . possibly the worst ever flown by American airmen. It did something good, however, for the young Air Force. It established a tradition that we have lived with ever since. No mission of the United States Air Force has ever been turned back because of enemy action. No better testament to courage can be offered. ★

Raiders flew from bases in North Africa, above, nearly 1,000 miles to bomb Rumanian oil fields and refineries shown at right.

Luckless Liberator. Middle B-24, aflame, probably went down. Photo, which must have been taken by someone in the formation, had no information on it.

FEEDBACK and USAF Accident Board Recommendations

MAJOR T. R. ALLOCCA, Directorate of Aerospace Safety

The Air Force annually expends a significant amount of effort, material and funds to enhance flight safety in support of its philosophy that accidents constitute a needless waste of human and material resources which can and must be prevented. Towards this end, accident investigation boards diligently pursue their dual objectives of finding out exactly what happened and then prescribing remedies to insure the problem is not repeated. Are they successful? That is, do we pay heed to their well thought-out recommendations and act upon them? This is not an easily-answered question, but the concept of "feedback" may prove helpful as we search for an answer.

Feedback. Originally popularized by Norbert Weiner in his book, *Cybernetics,* the term refers to the ability of a control system—involving either man, machine or some combination of both—to detect an error from what is desired in an operation and "feedback" that error to a control mechanism which then makes the necessary correction.

Now if we in the Air Force accident prevention business (and that's all of us), have this "feedback" concept down pat the process should go something like this: A mishap occurrs; the board analyzes all facets of the accident; the board publishes its findings and recommendations; the findings and recommendations are validated; the agreed-to recommendations are acted upon and a "large part" of the original problem is corrected. Sounds like a piece of cake, doesn't it? And we've really got it wired, haven't we?

Let's look at some recent accident history to see how wired we've got it. (Note: In the following cases, a broad "problem area" is presented, a recent mishap manifestation of this problem area is discussed and some past occurrences are presented. The accidents discussed in the 1972-1975 time frame are by no means the only "problem area" mishaps experienced; rather, they have been chosen from USAF's data bank for illustrative purposes only.)

Failure to Correct a Known System Deficiency (Fire Warning/Suppression Systems)

The full consequences of a February 1976 major accident may well have been avoided if the aircraft had been equipped with a "quality" fire warning/suppression system. From 1972 through 1975, five accident boards investigating mishaps involving aircraft as dissimilar as the T-38 and B-52 made recommendations to improve the fire warning/suppression systems. Yet in these five cases, the recommendations have not been "closed."

Failure to Implement Corrective Action which would Rectify a Known System Deficiency (Hydraulic Fluid Flammability)

Thus far in 1976, USAF has experienced two major accidents in which hydraulic fluid flammability has aggravated the accident sequence. From 1973 through 1975, we had 10 accidents, the full consequences of which may well have been avoided if USAF had adopted a less flammable hydraulic fluid for use fleet-wide. In each of these 10 accidents, the accident board highlighted the fact that hydraulic fluid flammability contributed to the accident and made recommendations designed to correct the problem. These recommendations are "open."

System with a Long History of Failure (Landing Gear).

We experienced three landing gear-related major accidents in March 1976. In each case the landing gear system had a known record of unreliability. In six accidents occurring between 1972 and 1975 involving aircraft as diverse as the F-105 and C-141, the accident board advanced recommendations aimed at improving known landing gear system problems. In these six instances, the recommendations have not been fully accomplished.

Tech Data Deficiencies.

In January we had a major accident in which tech data deficiencies may have contributed to the accident sequence. Accident boards investigating six mishaps in the 1974-75 time period made recommendations designed to improve tech data deficiencies. These recommendations, involving a myriad of USAF aircraft, are "open."

Training Deficiencies (Manuals, Directives).

A major accident which occurred in February 1976, involved a pilot attempting to execute a maneuver he had never performed as a rated crew member. He was unable to successfully accomplish the maneuver and the aircraft was destroyed. During 1974-1975, four accident boards addressed the area of training deficiencies and recommended that USAF make a concerted effort and collectively address the "training deficiency" problem area. The recommendation of these four accident boards is "open."

Feedback. In one of its simplest "real-world" uses—the thermostatically-controlled home heating system—we find an almost perfect application of the concept. But this is a simple, easy-to-control, mechanical, closed-loop system. Unfortunately, when we attempt to apply this cybernetically-derived idea to the functionings of government agencies and commercial enterprises, it is difficult to get a neat "fit" and a well-oiled and smoothly running system.

For this and other reasons, it would be foolish to suggest that when an accident board recommends, for instance, that USAF procure a less flammable hydraulic fluid, we should expect an immediate response. In such broad areas, we must expect that studies will be made, ideas submitted and opinions evaluated.

Against these bureaucratic exigencies, it is equally imperative to realize that when an accident board recommends a specific course of action, they do so only after they've made an exhaustive analysis and careful evaluation of the possible courses of action which will remedy the situation which caused the accident. Let's not lose sight of this very crucial point — that when an accident board undertakes its proceedings, USAF expects some strong, valid recommendations which will prevent recurrence of the mishap. When we allow bureaucratic problems to delay our response to their recommendations, we do them a gross disservice.

USAF's accident philosophy — that accidents constitute a needless waste of human and material resources which can and must be prevented—deserves our complete support. As an integral part of that support, we must master the concept of feedback. ★

MR. GORDON S. TAYLOR, Directorate of Aerospace Safety

With the advent of the dune buggy, dirt bikes, and increased numbers of outdoor enthusiasts, vast open spaces such as weapons ranges become more and more vulnerable to invasion by unauthorized persons. As spring and summer seasons approach, intentional and unintentional trespassing will substantially increase.

The intruders are usually unaware or unconcerned about the potentially lethal hazards, and the Government is vulnerable to litigation as a result of death or injury occurring to the trespassers. During the past few weeks of gunnery missions on day tactical ranges in Southern California it has been noted that there is a substantial increase in the number of unauthorized people on and around these restricted military areas.

During winter months, range trespassing diminishes, and the pilot may be lulled into a false sense of security. With the spring and summer increase in outdoor activity, pilots have to be extra cautious prior to accomplishing a firing mission to ensure that trespassers are not in the area. This hazard should be brought to the attention of all aircrews and repeatedly emphasized. Proper and thorough target observation must be continuous if we are to avoid a disastrous situation. The following actions are recommended:

- Immediate and repeated notification to all aircrews utilizing weapons ranges that the problem exists and can be expected to increase.
- Review of local policies and procedures concerning range clearing procedures. This includes periodic ground clearing of explosives and munitions residue as required by AFM 50-46 and aerial surveillance just prior to airborne missions. Definite procedures to be followed in the event of noted unauthorized trespassing should be established and understood by all concerned.
- Frequent checks of all access roads and range perimeters for adequate fences, gates, postings, and warnings.
- Publicity in local newspapers to refresh public awareness of the hazards of unauthorized entry into restricted areas.
- Creation of a quick reaction (helicopter if possible) force to apprehend trespassers.
- Command emphasis on range controls and conditions, with evaluation to be made during each unit inspection.
- Review of Command Regulations governing weapons range management, control, clean up, and security, with updating as necessary. ★

The Acoustical Pinger

MAJOR TONY HELBLING, JR.
Directorate of Aerospace Safety

There are not very many significant modifications you can make to a modern day F-4, C-5 or F-111 for a total of $173.00. Especially, if this device could pinpoint a lost aircraft 28 days after it crashed and sank under 12,000 feet of water!

As of this printing, some USAF aircraft and all International Carriers have been modified with this device. The FAA requires that all aircraft required to have a flight recorder also have a pinger on the recorder . . . so it can be located.

The pinger is a small device 4 inches long, weighs 9 ounces, and is about the size of a roll of quarters. It is powered by a replaceable battery with an installation life of one year (if not actuated sooner). The pinger is activated by contact with fresh or salt water. Once activated, it will transmit for 30 days continuously. It transmits on 10 or 37 hertz depending on the model. The international acoustical common is 37 hertz. Several fixed or portable receivers with directional capability are available for signal tracking.

For certain missions, a pinger-equipped aircraft may not be tactically feasible. Under these conditions, the unit can be disconnected with two wing nuts in a few minutes. The unit should be mounted in a moisture free compartment. The aircraft structure will not inhibit signal radiation.

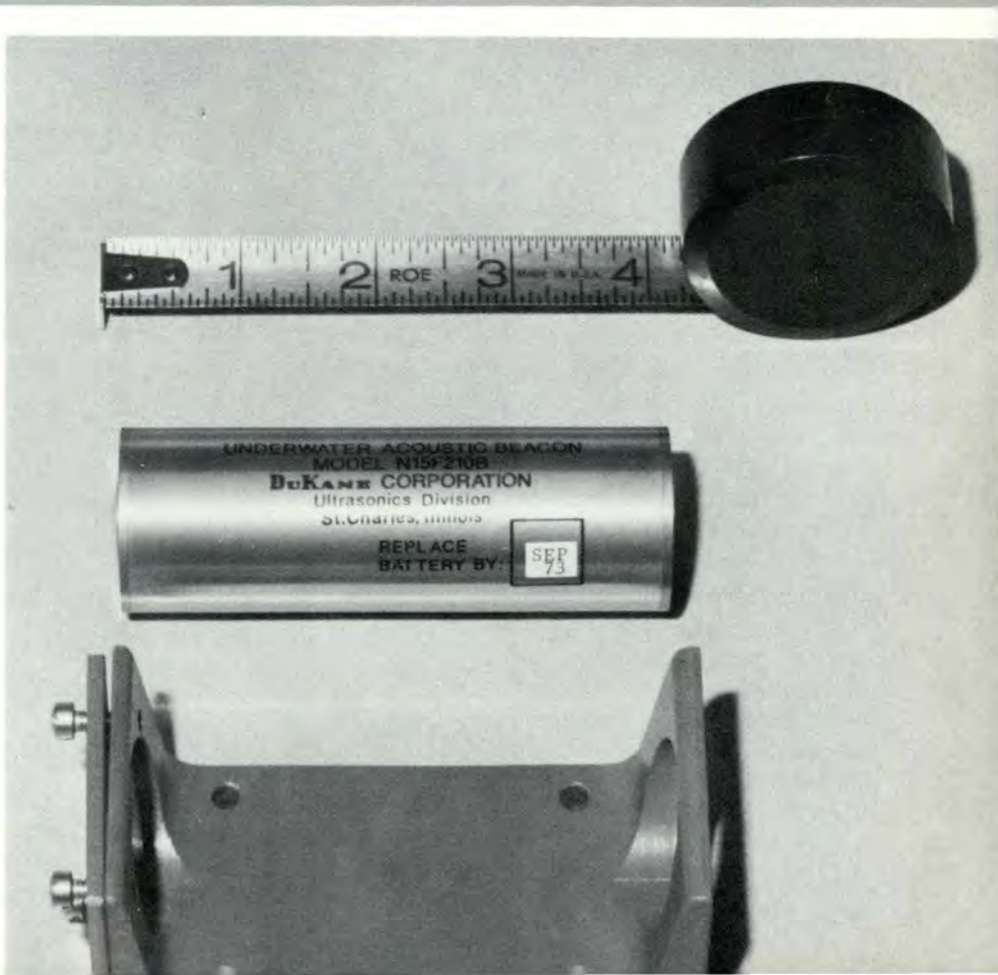
The employment of this device is currently being reviewed. It will be installed in specified USAF aircraft in the near future. Certain test aircraft such as the B-1 already have been modified. The pinger has several other applications and has successfully documented its existence with Navy operations and the FAA.

According to a previous article in the May 1975 US Navy *Approach* magazine, the following tale documents its effectiveness. In 1972 the Naval Test Center lost a valuable F-4 test aircraft during a mission over water. The aircraft crashed at 1400. The search was initiated at 1500 in a Navy crash boat. Upon arrival in the general search area, debris was noted floating in a 4 square mile area. A portable hydrophone device was dipped into the water and pinger signal was received. The signal source direction was determined by rotating the hydrophone until maximum audio signal was obtained. The signal was tracked by stopping the boat every 300 meters and submerging the hydrophone. After tracking for 1½ miles, the signal source reversed 180\ degrees, indicating wreckage passage. A Navy diver slipped into the water with the portable hydrophone unit. The underwater visibility was less than one foot. The diver traveled about 100 meters before "bumping" into the wreckage. The total search time was 95 minutes.

More sophisticated search techniques would be employed in deeper waters. The low relative cost of the unit has enabled its installation on practice torpedoes and mines. It has also been employed on spacecraft nosecones, etc. In 1974, the pinger pinpointed a lost TWA 707 which crashed off the coast of Greece in 11,000 feet of water.

There is no doubt that the acoustical locator could make the difference between a known cause factor versus an undertermined accident. This device should prove a valuable asset in future USAF search and investigative efforts.

. . . PING! ★



THE IFC APPROACH

A recent major aircraft accident which resulted in three fatalities, has highlighted, once again, the potential dangers of circling approaches. The complexity of this maneuver cannot be overemphasized. Consider the circumstances under which you last performed a circling approach at a strange field. In fact, if you've ever performed this maneuver at a strange field, you're probably in the minority. It's a hard fact that most Air Force pilots seldom have a need to fly a circling approach. However, if and when that day comes, you've got to be ready because you won't have time to practice.

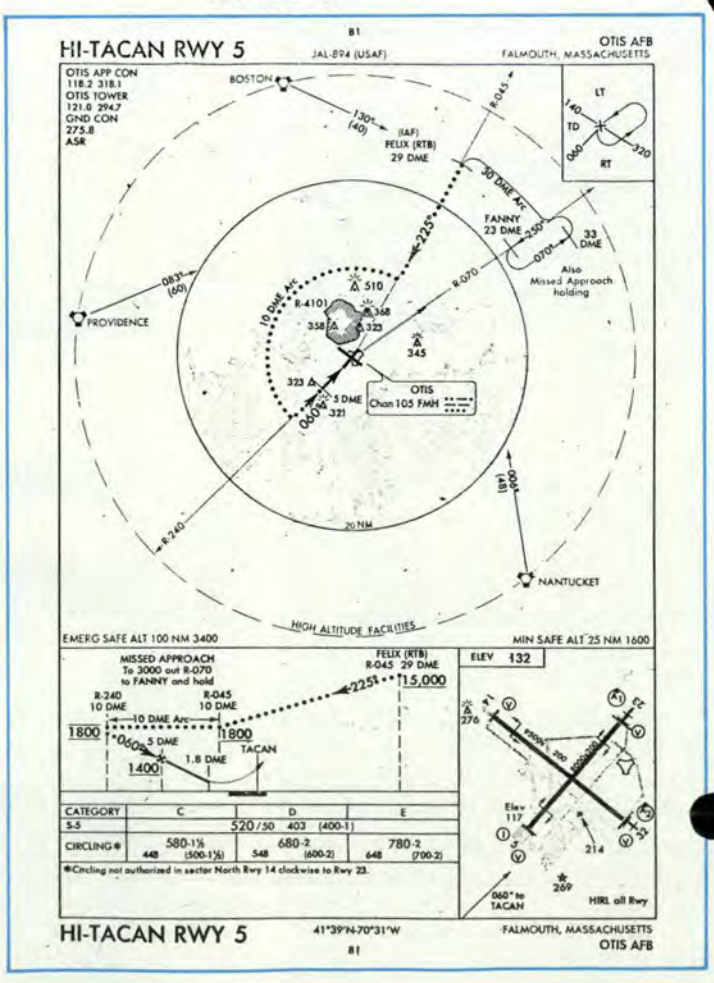
What makes a circling approach so difficult? You've aligned your aircraft with a runway many times before and this should be no different—or should it? Consider the fact that you will be transitioning from instrument flying to visual flying—not just to land the aircraft, but possibly to perform some extensive maneuvering prior to landing. Additionally, if you are at circling MDA, you will normally be lower than your visual traffic pattern altitude. Combine all this with the fact that (1) you may be flying slower than normal visual pattern airspeeds, (2) the runway arrangement may be confusing if you're at a strange field, (3) the weather may be at or near circling minimums, and (4) local restrictions may prevent flight over certain parts of the aerodrome. You can see that the circling maneuver becomes considerably more difficult than a normal visual pattern.

Let's look at some techniques to prepare for the circling maneuver and increase the margin of safety as much as possible. Forecast winds are a good starting point. A clue that you may have to execute a circling approach is a wind favoring the use of a runway without a useable instrument approach.

The forecast ceiling indicates the altitude that you may be using in the maneuver. Remember that circling minimums are just that—minimums. Nothing prevents you from flying higher. If the ceiling allows it, fly an altitude that more nearly approximates your VFR traffic pattern altitude. This will make any maneuvering safer and bring your view of the landing runway into a more normal perspective.

A review of the instrument approach procedure chart during flight planning will reveal any restrictions to circling. A restriction that affects the direction of the base turn would be an important consideration in side-by-side cockpits because the runway may not be visible from the seat of the pilot flying the approach. Look at the approach in Figure 1. In this example circling is prohibited in the northern quadrant of the airfield. If you fly the TACAN approach to runway 5, the direction of your base turn will depend on the runway to which you circle. For example, a circle to runway 14 would require a right base turn whereas a circle to runway 23 would mean a left base turn. In-flight is where the pilot may have to determine exactly how the maneuver will be performed. However, thoughtful preflight planning will reduce the amount of in-flight mental calculations.

FIGURE 1



By the USAF Instrument Flight Center
Randolph AFB, Texas 78148

The infinite variety of circling maneuvers cannot possibly be covered here, but let's discuss three of the more common types. The techniques used are adaptable to most circling maneuvers.

Remember, in all these maneuvers, the wind can have a significant effect on your displacement and must be considered. A wind that blows you away from the runway would result in an angling final and you could exceed the limits of the design circling approach area. More importantly, a wind pushing you toward the runway could cause an overshoot; one of the major causes of circling approach accidents.

a. The 180° MANEUVER: In this situation, you are cleared for an approach to one runway and cleared to land in the opposite direction. In the example shown in Figures 2, 3, and 4, we have been cleared for an instrument approach to runway 36, circle to land on runway 18. The task is to maneuver our aircraft to the position marked with an "X". At that point we can initiate a base turn to runway 18, using normal bank angles, to roll out aligned with the runway. Of course, the position of this "X" will vary for different aircraft or even the same aircraft at different weights and speeds. One way to determine displacement is by consulting the "General Turning Performance" chart in AFM 51-37. For the sake of our example let's assume we need 1.5 NM displacement from the runway to execute our turn.

One technique, as shown in Figure 2, would be to turn at a 45° angle and fly down the length of the runway a distance equal to your desired offset; then turn to parallel the runway. Geometrically, you have described a no wind triangle with two equal sides. This technique reduces the amount of guesswork needed to laterally displace your aircraft. It also allows you to keep the runway environment in sight. The drawback, of course, is that you may need to displace yourself at a distance greater than the length of the runway. In this situation you could add overruns and approach lights to the runway length, so as to achieve the proper offset.

A second technique, shown in Figure 3, is to turn at a 60° angle and fly a distance equal to approximately 2/3 your required offset; then turn to parallel the runway. In this case you would travel approximately 1 mile down the length of the runway to displace yourself 1.5 miles. The advantage of this technique is that you fly a shorter time and distance to obtain the same lateral displacement. It gives you more time to correct for winds on downwind. The disadvantage is that it may be difficult to keep the runway environment in sight.

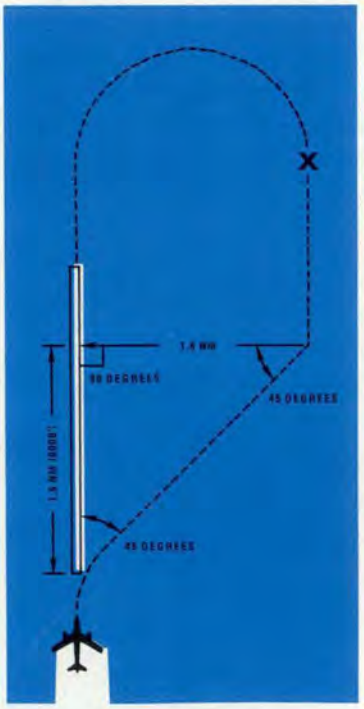


FIGURE 2

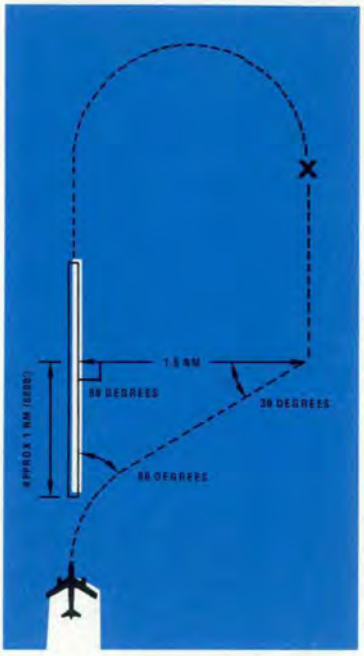


FIGURE 3

If you don't like either of these techniques, consider making two 90° turns as shown in Figure 4. These two turns should give you the displacement necessary for your 180° base turn if the crosswind component is not a factor. While this technique reduces the need for any mental computations on the part of the pilot, it makes it even more difficult to keep the runway environment in sight during the initial part of the maneuver.

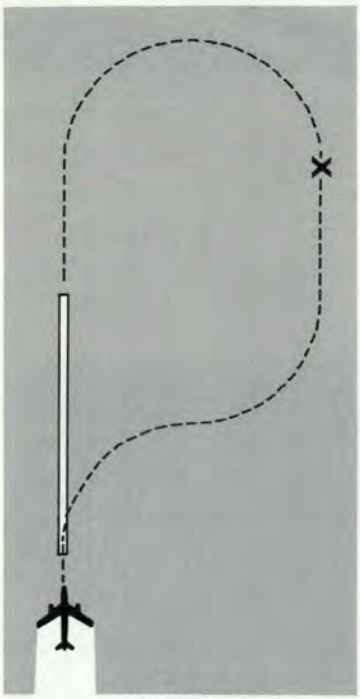


FIGURE 4

b. 90° MANEUVER. The second situation to consider is approaching the landing runway at approximately 90° as shown in Figure 5. Again, our problem is to displace ourselves far enough to allow for a normal base turn. Since our turn to a downwind heading will give us approximately half our required offset (180 degrees vs 90 degree turn), we have only to delay that turn to downwind until we have flown a sufficient distance to cover the other half. If we have a ground speed of 180 knots (3 miles per minute) and want a ¾ mile flyoff (half the 1.5 mile turn diameter), we could time for 15 seconds when overhead the runway, then start our turn to downwind. Different airspeeds and turn radii will require different flyoff times. You should determine one that will work for your aircraft. As with other techniques, be sure to consider the wind.

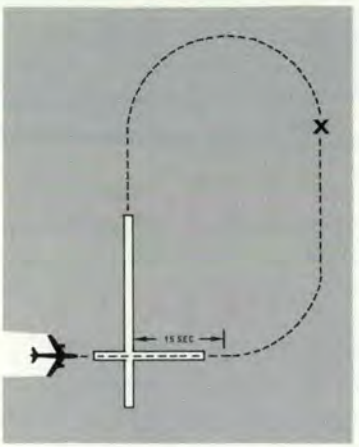


FIGURE 5

c. 360° MANEUVER: This maneuver is useful when dropping off a wingman if you can't make a formation landing, or at any other time when you can't land out of a straight in approach. Here the technique for displacing yourself is somewhat easier. The 180° turn to downwind, as shown in Figure 6, should give you adequate displacement in a no-wind condition. If winds are a factor, vary your bank angle in the turn or use a heading correction on downwind.

As you can see, all of the techniques discussed so far have been designed to give the displacement necessary to prevent overshoots or tight base turns. There is, however, one final point to consider. Starting the base turn abeam the runway threshold would probably result in little, if any, time on final. This would not allow you to make additional configuration changes and/or obtain the desired final airspeed. Therefore, plan your turn to give you the needed distance on final. Here, as in some of the above techniques, a knowledge of your groundspeed can be used to time your flight from the abeam position to a point where you want to begin the base turn. If your ground speed is 180 knots and you want a one mile final to fly the maneuver in Figure 6, time for 20 seconds and start the base turn. (No Wind).

So there you have it. These are a few techniques (NOTE: I said techniques, not procedures) which we have found useful. While they cover only three specific situations, a little imagination on your part is all that is necessary to modify them for use with a wide range of circling maneuvers. Remember that these techniques were designed to help you align with the landing runway. If you still find yourself in a position that would require tight turns for alignment, don't be too proud to go around. Finally, don't wait until you have to fly a bona fide circling approach to try these techniques. Practice them in good weather and light traffic. A little practice will go a long way toward preparing for the "real thing." ★

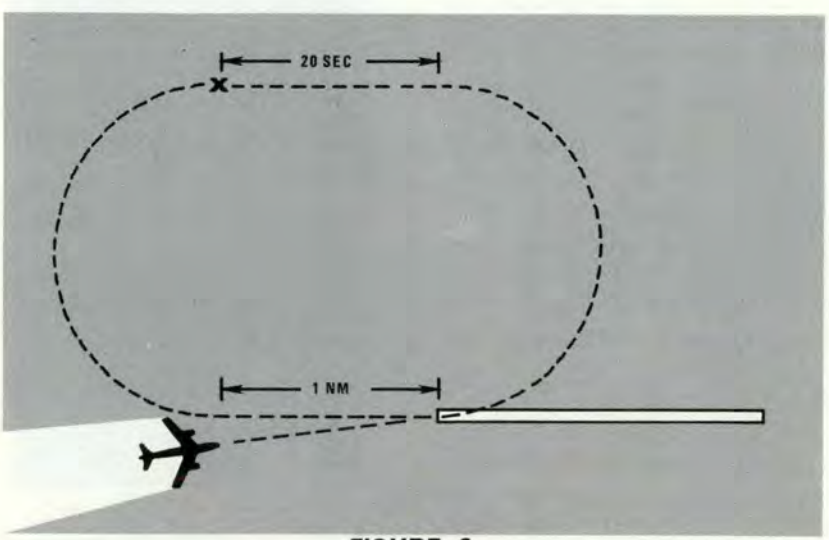


FIGURE 6

MARK HUNTER

THE

REX RILEY
Transient Services Award

Have you ever wondered if anyone cares about the kind of service you get as a transient aircrew? Well, someone does care. In fact a lot of "someones" care, from the base commander on down.

That is why the Directorate of Aerospace Safety in 1958 established a special award to recognize bases which provide outstanding transient services to aircrews. The Rex Riley program is administered by the staff of *Maintenance* magazine and the personnel of the Directorate of Aerospace Safety. A base is considered for the Rex Riley Award when the editor of *Maintenance* has received three or four letters from transient aircrews indicating that services at that particular base are outstanding.

This is where you participate in the program. As you travel to various bases, let the base and the people at AFISC know about the quality of the service you receive. If you have a problem, it can then be fixed or if the people did a good job they can be recognized.

Once the base is placed on the "to be considered" list, a Rex Riley evaluation team will visit and make a recommendation on whether the base merits the award. The final approval for the award rests with the Director of Aerospace Safety.

The Rex Riley evaluation team will visit the base unannounced. They want to see what the service is like on a day-to-day basis. The team will look at the quarters and messing facilities, evaluate base operations, weather and the tower; but what they are really interested in is maintenance. The team will take a really critical look at transient alert. They want to know how well the TA folks are prepared for transient traffic. The team includes maintenance men who will watch servicing and preparation of the aircraft. Other team members will check on the availability of specialists and supply support. Once they have looked over the whole operation, the team will make a recommendation.

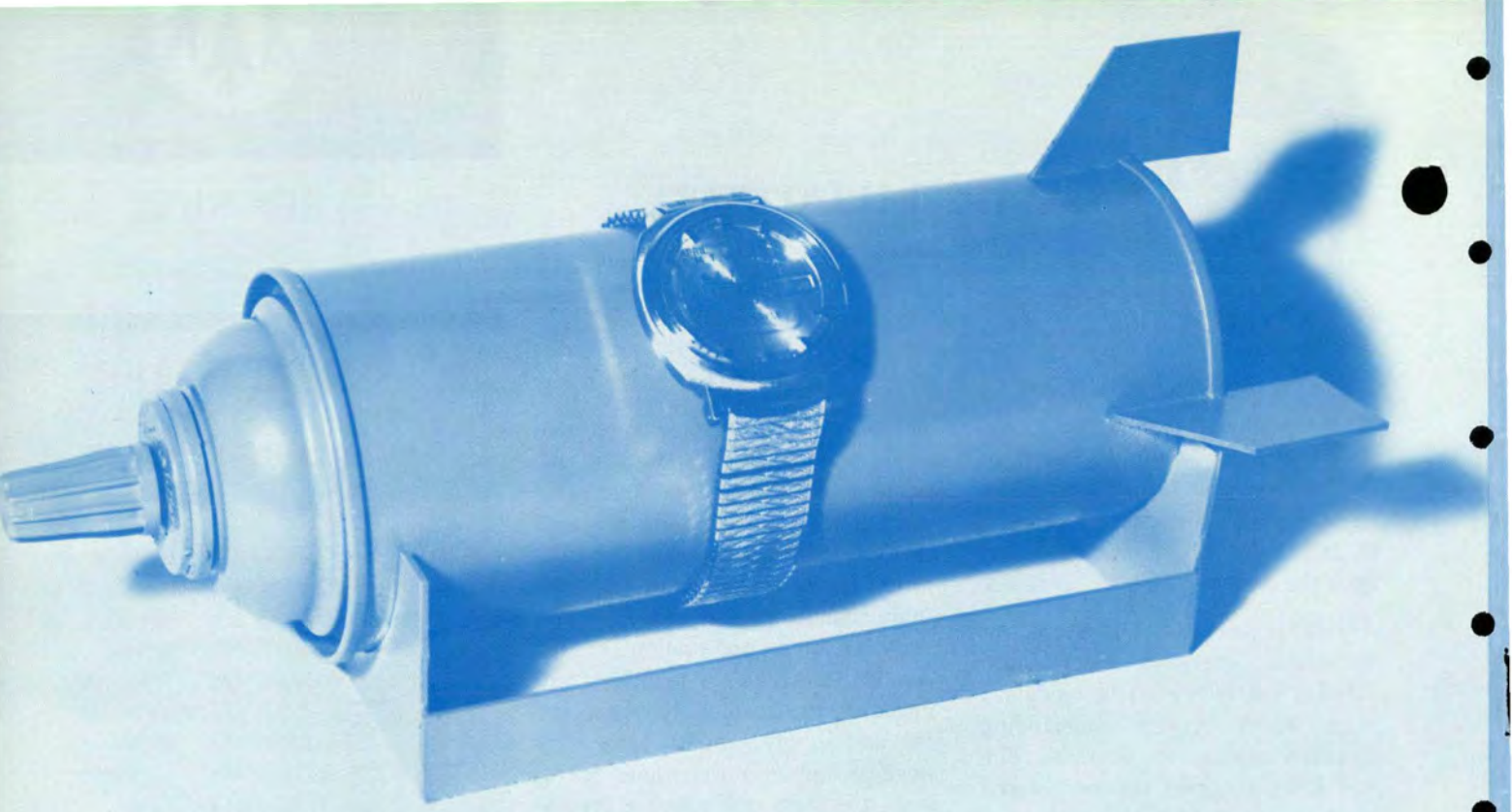
Sometimes a base that has been on the Rex List is removed for one of several reasons. The quickest is for a base to be responsible through haphazard servicing or maintenance for an accident or incident. Bases will also be removed if reports of a regression in the quality of service is verified by one of the Rex Riley teams. Or if a base is unable to provide all the services and facilities, it will be removed. This includes things like quarters, POL and normal maintenance support. That does not mean that every base should have specialists trained for each aircraft in the inventory. But there should be support available to clear up the more common transient problems that can affect safety—radios or instruments for example.

If a base is selected as a "recommended" base, the commander will be notified by letter from the Director of Aerospace Safety. In addition, the base will receive a transient services award certificate and transient alert personnel will be authorized to wear a special award patch on their uniforms. ★

REESE AFB
Lubbock, TX

VANCE AFB
Enid, OK

LORING AFB	Limestone, ME
McCLELLAN AFB	Sacramento, CA
MAXWELL AFB	Montgomery, AL
SCOTT AFB	Belleville, IL
McCHORD AFB	Tacoma, WA
MYRTLE BEACH AFB	Myrtle Beach, SC
EGLIN AFB	Valparaiso, FL
MATHER AFB	Sacramento, CA
LAJES FIELD	Azores
SHEPPARD AFB	Wichita Falls, TX
MARCH AFB	Riverside, CA
GRISSOM AFB	Peru, IN
CANNON AFB	Clovis, NM
LUKE AFB	Phoenix, AZ
RANDOLPH AFB	San Antonio, TX
ROBINS AFB	Warner Robins, GA
HILL AFB	Ogden, UT
YOKOTA AB	Japan
SEYMOUR JOHNSON AFB	Goldsboro, NC
ENGLAND AFB	Alexandria, LA
KADENA AB	Okinawa
ELMENDORF AFB	Anchorage, AL
PETERSON FIELD	Colorado Springs, CO
RAMSTEIN AB	Germany
SHAW AFB	Sumter, SC
LITTLE ROCK AFB	Jacksonville, AR
TORREJON AB	Spain
TYNDALL AFB	Panama City, FL
OFFUTT AFB	Omaha, NE
McCONNELL AFB	Wichita, KS
NORTON AFB	San Bernardino, CA
BARKSDALE AFB	Shreveport, LA
KIRTLAND AFB	Albuquerque, NM
BUCKLEY ANG BASE	Aurora, CO
RICHARDS-GEBAUR AFB	Grandview, MO
RAF MILDENHALL	UK
WRIGHT-PATTERSON AFB	Fairborn, OH
CARSWELL AFB	Ft. Worth, TX
HOMESTEAD AFB	Homestead, FL
POPE AFB	Fayetteville, NC
TINKER AFB	Oklahoma City, OK
DOVER AFB	Dover, DE
GRIFFIS AFB	Rome, NY
KI SAWYER AFB	Gwinn, MI



TIME BOMB

CAPT ALLAN R. SWEENY, 307 TFS, Homestead AFB FL

TICK-TICK-TICK-TICK-TICK-TICK-RRRRRINNNNGGGG!

The alarm clock jolted him out of his semi-consciousness and the fighter pilot knew that he had to leave his dream world and face the reality of the day. Easing himself over the side of the bed he noted that the weekend would be a welcome respite from these five extraordinary days of operations hassle. He also reflected briefly that, having spent most of his flying career in combat, he was still trying to adjust to the changing priorities of peacetime that seemed to overlook getting the job done. These were private thoughts and he still kept them to himself. TICK.

But today he did have a job to do and was looking forward to leading his flight on a familiar bombing and gunnery mission—until he looked out the window. Yesterday's cold, penetrating drizzle was hanging on and he hated the weather hassle more than anything. TICK.

Undeterred, he completed his preparations for the day's work and headed for the ops building. His career had been a rewarding one. He considered himself fortunate to have gained so much experience so quickly. Although a young captain, he had accumulated hundreds of hours of combat time in a variety of stimulating and satisfying missions. Even more important to him was the fact that he had often been entrusted to lead some of the more demanding ones. Much of the satisfaction he gained was from accomplishing those tasks in his own way. He felt good under the pressure of responsibility and had been glad that he was given complete control and flexibility as a mission leader to get the job done.

The weather that had seemed to be lifting on his way to work was confirmed in the day's forecast. The range weather should permit all the required gunnery events, ceiling and visibility were gradually improving, and by the time they were due to return would probably permit VFR recovery.

His flight briefing was smooth, concise, and detailed. His wingman would be another of the more experienced pilots with whom he had often flown. In spite of the VFR weather forecast, he remembered to brief the new IFR recovery procedure. It was the third change in six months, and this time it appeared to be the only one he could use in IFR conditions. What a pain, he thought, to have to put up with all these changes. TICK.

They waited briefly for the wingman to get an aircraft assigned, then headed for the flight line. Engine covers on, downlocks on, canopies closed, starting units not in place. *Typical maintenance again,* he thought. *The crew chiefs are good, but if I had some control over them they might be on time.* TICK.

Eventually they were airborne and in the element he enjoyed: Confidently leading a flight with a trustworthy, reliable wingman. He knew that he could contend with any problem and that his wingman would be there to support him and to take over if he so decided.

Inbound to the range they switched to primary frequency, then to the secondary, then back to primary without reply. The hiss and loud squeal in the radio, a product of poor design and moisture, was no help. It was becoming just plain infuriating. TICK.

With patience, though, contact was made and he calmly covered the required items with range control including the desired events and a request for the latest observation. He almost could have figured it. The weather was still too poor to complete all they had set out to accomplish. *Those weathermen,* he thought, *I can never trust them to give a reliable forecast.* TICK.

Thanks to his briefing they could still proceed with the alternate mission. This they did in spite of the worsening weather, various communications problems, additional pattern restrictions, and a new range officer not totally familiar with procedures. It was a challenge, but he was actually becoming more confident as he successfully overcame each problem. This was his training and experience and he knew he could cope with it all. He was in control and making decisions on his own.

The gunnery completed, they joined up, switched to center, and got clearance direct to home plate initial approach fix. He would like to have received an enroute vector without going out of the way, but this was the new recovery procedure. As they leveled off, Center passed the latest weather observation. *Oh, that is frustrating,* he thought. *Not only is the latest observation 45 minutes old, but it is far worse than what was forecast.* TICK.

Now he set a new bingo, reminded his wingman they would recover in formation but to be prepared to go separately if the weather got worse. Just as he reduced power to a more efficient fuel flow he heard Center pass them to the approach control frequency and direct a descent. He should not accept a descent this far out to so low an altitude because of the narrowing limits of his fuel situation. "Unable descent at this time, Center." But he got no response. *That's typical,* he thought. *They leave you hanging as soon as they can pass off their responsibility.* TICK.

They began a slow descent and switched to Approach Control. As they entered thick clouds the radios started their hiss and crackling, and Approach's transmissions became very distorted. TICK.

He confirmed his altitude and requested an update on the field weather. No response. After several attempts without success they returned to Center frequency. Again there was no response. They returned to Approach Control for a radio check. "Loud and clear," came their reply. And this time they confirmed the altitude. Again he asked for a weather update. No response. TICK.

They were coming up on an extended line of the final approach course, still in clouds in formation when Approach Control passed to them a completely unexpected and inconsistent vector for the situation. To comply would further restrict his options under the weather and fuel state.

"Approach, say again the heading for us," he asked, hoping to prod them into recognizing the error. No response.

"How do you read, Approach?"

"Loud and clear," came the reply.

"Approach, say again the heading for us."

No response. TICK.

Now he had no choice but to take the vector. Fuel was the only concern; terrain was no factor, and other traffic did not use the airspace they were entering. He could cope with it, but he was having doubts about the approach controller. TICK.

It had been 5 minutes since he had last requested a weather update and now, suddenly, Approach passed it to them! It was not suitable for a formation recovery, but he was not

going to let his wingman loose so far from the base under such uncertain conditions. They were still on the incorrect heading. He asked for a radio check. "Loud and clear," came their reply. So they did hear him. He quickly informed them of his position and asked for a new heading. No response. TICK.

"Maintain VFR, sir," said Approach. TICK.

"Unable, Approach. We are IMC requesting a new heading."

No response. TICK.

He could hear the controller passing information and direction to other flights in the pattern. "Is Approach losing control?" He thought. "Can they be so inflexible to the new procedures?" TICK.

"How do you read me, Approach?"

"Loud and clear, sir. Maintain altitude."

"Roger, give us a new heading." No response. TICK. Minutes of silence. No response. TICK.

"Give us a heading, Approach!" No response. TICK.

No response. No response. No response. TICK. TICK. TICK.

That was all he could take. Mashing down the mike button and tightening his grip on the control stick and throttles he bellowed into his mask, "Approach, we are in formation, IMC, heading away from the field, at low altitude, and we want a heading to the field, we want separate recoveries, we want full stop GCA approaches, we want you to wake up down there, turn on your scopes, listen to us, and do your job like we are doing it up here! We want some response, now!" RRRRRRINNNNNGGGG!

His outburst jolted him out of his state and the fighter pilot knew that he had to leave his emotion and face the reality of his position. Regaining some of his self control, he recognized that he was in no condition to continue as the flight lead. He passed the lead to his wingman so that he could calm down. Radio contact was soon reestablished and recovery accomplished with no further problems.

The next day the fighter pilot reflected on the incident. Why had he reacted so? Such immature behavior was not like him. The flight surgeon's reference books were in front of him and he searched for answers. He noted a paragraph on immature reaction to stress*. "Aggressiveness in the solution of problems is desirable behavior. On the other hand, aggression defined as 'destructive attacks' is an undesirable response. It is however, among the most frequent reactions to frustration of other stressful situations."

So it had happened even to him! He remembered also that Alvin Toffler had theorized in *Future Shock* that stress is often a result of the pressure of change. So he had not been able to modify his ingrained feelings to the peacetime situation in which he had to relinquish flexibility and control and depend more on the decisions of others. In combat he would have had more ways out of the same situation.

Another paragraph told him that "the distinguishing characteristic of either panic or rage is that it is uncontrollable." certainly he had been out of control for those few seconds. "The principle way emotion affect thinking is by narrowing, or 'channeling' attention." That is why he seemed to forget everything except that controller. Was there anything else? The book said that "gloom is a more prolonged emotional state." That week's operation could have added that emotion to yesterday's pressures. Environmental stress, it said, affects the mental stability of the pilot by exposing him "to frustrating situations resulting from weather conditions, traffic, the inadequacies of other persons . . ." *Almost an example of yesterday,* he thought.

He read well into the afternoon. The information would be good material to use at the next flying safety meeting. Learning to recognize his own symptoms to stress would be something to work on. He resolved to learn more on this subject of emotion, and to try and understand more about personality.

Ahead of him was a relaxing night at a quiet restaurant. His worries were subsiding and would soon be gone. Tomorrow the alarm would not go off. ★

*Bond, Nicholas A., Bryan, Glenn L., Rigney, Joseph W., and Warren, Neil D. AVIATION PSYCHOLOGY. Los Angeles: University of Southern California, 1968.

CONGRATULATIONS!

The 336th Tactical Fighter Squadron from Seymour Johnson AFB, N.C., completed an unprecedented eight accident-free years of flying while deployed to Bold Eagle '76 at Nellis AFB, Nevada. Commander Lt Col Jimmie V. Adams (center) was on hand to congratulate Maj Fred Luigs and Capt Gil Betz, whose flight passed the safety mark. (USAF Photo)

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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

Accident Prevention

Program.

CAPTAIN ROY M. ALLEN

Detachment 18
39th Aerospace Rescue and Recovery Wing
Plattsburgh AFB, New York

On the night of 4 September 1975, Captain Allen and his crew had just completed an emergency medical evacuation mission which saved the life of a six-year-old auto accident victim. The child, suffering from a fractured skull, had been flown to a local hospital and the crew was returning to Plattsburgh AFB, NY. While on short final, at approximately 50 to 100 feet AGL, the crew heard and felt a loud explosion from the engine compartment of their UH-1N helicopter. This was followed by activation of both audio and visual low rpm warning signals. Sensing complete power loss, Captain Allen reacted instantly, lowered the collective, and entered autorotation. With decreasing rotor rpm, he successfully flew the helicopter to a slide landing on the taxiway, stopping it short of a parked KC-135 Stratotanker. Captain Allen then applied the rotor brake, turned off the battery, and directed his crew to evacuate. Subsequent investigation revealed that the power turbine of the nr one engine had disintegrated, causing the explosion. Fragments from the explosion pierced a titanium firewall and then penetrated the nr two engine, causing it to fail. Captain Allen's skill during the loss of both engines prevented injury or, possibly, loss of life and saved an aircraft. WELL DONE! ★

But honest, all I did was take an extra copy of Aerospace Safety!

The scene above is a bit overdone, but the point is that *Aerospace Safety* has changed with the publication of the new *Maintenance* magazine and Air Force distribution of *Lifeline*. Each magazine zeroes in on a specific audience and *Aerospace Safety* is for aircrews, their commanders and supervisors, and a few support people such as air traffic controllers, life support and survival personnel and flight surgeons.

Distribution is geared to this concept and funds are not available for general distribution as before *Maintenance* and *Lifeline*. We will supply as many as possible, but all units should order, through their PDO's, only the copies needed on a 1 for 10 basis in the intended audience. Thanks, the editor.