aerospace SAFETY

DECEMBER 1977

UNITED STATES AIR FORCE

aerospace SAFETY

THE MISSION - - - - - - SAFELY!

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DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

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DECEMBER 1977 AFRP 127-2 VOLUME 33 NUMBER 12

NEWS FOR CREWS

Information and tips to help your career from the folks at Air Force Military Personnel Center, Randolph AFB, TX.

CAPTAIN TOM DREIER
Rated Career Management Branch, AFMPC

During the drawdown from SEA, operations and personnel managers of the tactical fighter resource recognized the need to better quantify required advanced weapon system training. It became obvious from the onset that no single staff agency could adequately determine training requirements in isolation, and that a defensible, systematic Air Force process was essential during an era of ever increasing budgetary scrutiny. From that premise grew the Rated Distribution and Training Management (RDTM) process and a major change to the aircrew assignment system at MPC. Since both RDTM and the corollary assignment system impact aircrew assignments, an understanding of both should prove valuable in establishing achievable short range career goals.

RDTM

RDTM is a coordinated MAJCOM/Air Staff process to systematically review rated requirements over the Five Year Defense Program (FYDP), to quantify and distribute the resource available to meet those requirements, and to define necessary advanced weapon system training. Representatives from Operations, Personnel, and Manpower at the Air Staff, along with their counterparts at the MAJCOMs, meet periodically to examine the current and projected aircrew force. The Air Reserve Forces as well as enlisted aircrew representatives are active participants in the RDTM process.

Rated requirements used in this process are determined by HQ USAF, DCS/Programs and Resources applying quidance from the Office of the Secretary of Defense (OSD) to obtain the force structure required to assure a specific war-making capability. Because of the expense involved in maintaining our crews at a 100 percent wartime level, some peacetime crew ratios are maintained at a level below the wartime requirement. The difference constitutes the requirement for rated officers in AFIT, PME, and the rated supplement. These requirements, as well as generalized operations staff and a portion of the ATC instructor requirements, are "fair shared" among the ten major weapon system groups. This allows individuals from all weapon systems to share equally in the inherent career broadening and executive development aspects of these positions, while providing the respective areas with a representative cross section of the operational force.

It should be noted that changes in higher level guidance result in an altered requirements structure. This eventually impacts on career patterns an individual can expect in the Air Force. In the last few years requirements have been decreasing faster than anticipated. As a result, both rated and support accessions (the new officers brought on board) were cut drastically to stay within authorized end strengths. This created a much greater opportunity for rated officers in non-rated duties than the actual stated rated supplement requirement. The very low UPT/UNT rates of today are rapidly reducing both the rated surplus and USAF capability to place rated officers in support duties.

AIRCREW ASSIGNMENTS AT MPC

As a result of the information made available through RDTM and advanced computer capabilities, aircrew assignments have undergone some recent changes at MPC. Assignment teams with functionally qualified resource managers are now organized along the lines of RDTM weapon system groups. The teams are currently manning from the worldwide available resource directly to the wing level at most Air Force units. Each rated officer is tracked by primary weapon system regardless of where he is currently serving. Thus, each individual has a specific aircrew resource manager who makes or coordinates every assignment—even an assignment from one support position to another. As an active participant in the RDTM process, today more than ever, the aircrew resource manager can ensure that individual desires are included in each assignment, and that each assignment tracks to Air Force goals. ★

ABOUT THE AUTHOR

Captain Dreier is a graduate of the US Air Force Academy. He is a former C-141 pilot who has been assigned to the RDTM Analysis Section of the Rated Career Management Branch, AFMPC, for the past 3 years.

EFFECTIVE CUMMON

CAPTAIN JAMES J. LAWRENCE • Directorate of Aerospace Safety

Communication, in the formal sense, is a process by which information is exchanged between individuals through a common system of symbols, signs, or behavior. Let's look at this metaphorically. A dump truck has to move a load of gravel from the storage area to a construction site. Picture this storage area as the sender and the construction site as the receiver. The truck is the mode of communication, and the gravel is the information. Successful communication is dependent on the movement of the load intact from point A to point B.

Now, let's assume that the dump truck has a malfunction, say a loose tailgate, and as it travels the distance from A to B, what happens? Some of the information leaks out. B only gets part of the whole message, and maybe not enough to fully understand the intent.

We in the aerospace business are constantly faced with this situation. Our communicative skills directly affect our ability to safely operate a multi-million dollar vehicle. Yet, the tailgate constantly slips open, either by human error or equipment malfunction. As this occurs, vital information is lost or overlooked. Communication has ceased, and the results can be disastrous.

This leak can be caused by interrupted transmissions, background noises, equipment malfunctions, inattentiveness, or just plain misunderstanding. Whatever the cause, the effect is identical; not enough communication to input the proper information for the old gray matter to compute. Result: Cumulo-granite clouds, midair collisions, unnecessary accidents, and near misses that make your knees shake and have you thinking about the adequacy of your life insurance coverage.

Case nr 1. The original clearance accepted by the pilot of a light jet called for a Standard Instrument Departure, with a right turn, then a Jet Route to destination. The clearance called for a climb to 17,000 feet MSL, exactly as the pilot filed it. Just prior to takeoff, the controller instructed the crew to maintain 9,000 feet, until further notice, because of other air traffic in the area.

Put yourself into this pilot's position for a moment and interpret the

ICATION

...You're life may depeend on it

information he received. Would you:

A. Take off and climb straight ahead to 9,000 feet, until further notice? or

B. Take off and fly the original clearance, using 9,000' as an altitude restriction, until further notice?

If your answer was A, then you, like this pilot, were destined to lose a grudge match with a mountain. The controller's intent was more like that stated in B. The proper answer is:

C. Question the departure instructions.

That dump truck leaked out an important part of its pay load, rendering the pilot's chosen action invalid and in this case fatal. The best way to close that gap and stop the leak is to be inquisitive. Analyze what you hear in relation to the factors relevant in your situation. Swallow a little pride and request more information, if what you have received isn't totally clear.

Hundreds of examples of misinterpreted ATC instructions could be cited. They occur daily. The causes could be malfunctioning radios, misunderstanding, interrupted transmissions; the list is endless. Some result in much more severe consequences than others.

Case nr 2. A transport began its enroute descent. The aircraft was cleared to 5,000' MSL. The pilot called back, "Understand cleared to 3,000 feet." This transmission was blocked out by another aircraft calling control. The transport was then handed off to Base GCA. The initial call to GCA was, "With you, passing 5 for 3,000 AF XXX." The GCA controller was issuing control instructions to another aircraft and only heard the call sign. He informed the transport to stand by. Shortly thereafter, it impacted a mesa at an altitude of 3,050' MSL, destroying the aircraft and killing all aboard except one crew member.

How do we avoid a mishap like this? The first obvious answer is, know the characteristics of the terrain at your destination. Sure, that's basic and this knowledge could have kept the crew from accepting that clearance without question. The communication gap, however, was just as responsible in the failure to avert this tragedy. There are some basic rules to follow that can help to avoid pilot/ATC communication errors:

1. Be suspicious of all clearances received. If they do not appear proper—question them immediately.

2. LISTEN to what is said—do not hear what you anticipate hearing.

3. Use your full call sign in every transmission to preclude misunderstanding.

4. Read back clearances IAW Airman's Information Manual procedures. That is: Call sign first—then repeat of the clearance.

5. Maintain radio discipline and do not accept less from those controlling you from the ground.

EFFƎCTIVƎ CUMMONICATION

continu

The information flow between pilot and controller is subject to gaps and leaks which can render the communicative process ineffective. These gaps must be plugged by us, the aircrew members. Realistically speaking, our risks are much greater than those of the man on the ground, so we must be the ones to demand total understanding.

To help stop these leaks, it is necessary for all aircrews to remain totally attentive to the information coming across the air waves.

Case nr 3. First contact with departure control after takeoff:
Control: ". . . (Aircraft 1) climb to 280, report passing 160."
Aircraft 1: "Roger, turn left to 280 and climb to 160." (This would put the aircraft directly on track toward high terrain near the airport.)
Control: "Roger."
Aircraft 2: ". . . (Aircraft 1) check that was a clearance to 280 and not a turn."
Control: ". . . (Aircraft 1) climb to 280, report 160."
Aircraft 1: "Thanks very much (Aircraft 2), climbing to 280."

This second aircraft was paying more attention to the information flow than was the first aircraft or the controller. His excellent attentiveness possibly prevented a major accident. If all aircrews were similarly attuned to the flow of information in all directions over their frequency, the possibility for conflict would be reduced. This is especially true for transmissions concerning descents, climbs, or assigned flight levels for other aircraft that cross through your present altitude. To properly monitor such transmissions, military aircrews have to be on the frequency used as primary by the majority of aircraft. If you have a VHF radio, use it when working the airways or when on the ground at civilian airfields. UHF is the more commonly worked radio at military aerodromes and during arrival and departure at military fields. Monitor both, if you have the capability, but use the most frequented mode as primary so the majority of others will also hear what you have to say.

Communication between the ground and the air is only one aspect of in-flight communication difficulties. Sometimes the short distance between aircrew members represents a gap so great that all the gravel leaks from the dump truck, and there is no information flow at all. The cause can be equipment oriented or it may be directly related to the crew's unexplainable inability to communicate with the other crew members.

Case nr 4. An IP and student on a nav training mission heard a loud pop and a buzzing noise that preceded complete loss of the interphone and UHF radio. The IP, in the front seat, assumed control of the aircraft by shaking the stick. The student felt the IP control inputs but did not recognize the stick shake, which was meant to indicate transfer of control. The student continued on the controls with the IP until he felt the IP's second shake of the stick. He then relinquished control. On downwind the IP thought he felt the student on the controls and again shook the stick. The student took this as a sign to resume control. Each pilot, without being aware of it, was counteracting each others control inputs. The IP felt that loss of control was imminent and elected to eject due to the altitude being 300' below the safe controllable ejection envelope.

When the student's cockpit filled with smoke from the IP's ejection blast, he decided to abandon the aircraft.

Equipment started this crew's communication difficulties but it went farther than that. Communication is not limited to the spoken word. As I stated in the beginning, this information flow can also be through symbols. The "I've got it/You've got it" symbol was misinterpreted by both crew members. Better pre-mission briefing prior to the radio failure could also have prevented evacuation from a perfectly flyable aircraft.

More often, however, a failure of equipment doesn't enter into the communication gap. Pilots and other aircrew members sitting virtually in each other's lap, fail to communicate thoughts, feelings and observations to their fellow crew member. They become so engulfed in their own thoughts or problems, that they neglect the need to communicate important information to others who may need it. The annals of aircraft accidents are chock full of just such omissions.

Case nr 5. On climbout, a tanker experienced a pressurization problem. A descent was requested and subsequently received down to 2,700. During the descent, communication between the flight crew and controller ended abruptly. The aircraft wreckage was sighted 20 miles northwest of the destination airfield. Two operations causal factors cited were:

1. Supervision—the instructor pilot failed to ensure safe crew coordination during a critical phase of flight.

2. Operator—the pilot flying the aircraft failed to maintain a safe terrain clearance altitude, probably due to distraction, task-oversaturation and channelized attention.

This mission was a short leg and the multitude of Air Force and Command enroute requirements, coupled with an in-flight problem, caused the communication link between crew members to completely break down. Controller voice transcripts revealed normal radio conversation right to the point of impact, indicating neither crew member recognized or communicated an error in desired altitude.

Why do you think the Air Force spends all that money to purchase extra seats in the cockpit? Four eyes are better than two. Six eyes are better than four. True. Only if the message moves from the eyes, to the head, to the mouth, to the others in the crew, so that they know what is going on. Many gear up landings and unprecipitated crashes in multi-seat aircraft can be attributed to some form of communication breakdown.

Communication is one of those staples in life that we commonly take for granted. Exchange of words or symbols has no substance unless meaning and understanding flow with the exchange. We have all feigned concentration while listening to a speaker's words, later to realize that we didn't absorb one iota of his message. Listening and understanding is an art to which textbooks have been dedicated. In our aerospace business, communication takes on special importance. Your life and the lives of your crew and passengers depends on your ability to effectively communicate. It is up to you to fix that tailgate and stop the information leak between yourself, the controller, and your fellow crew members. ★

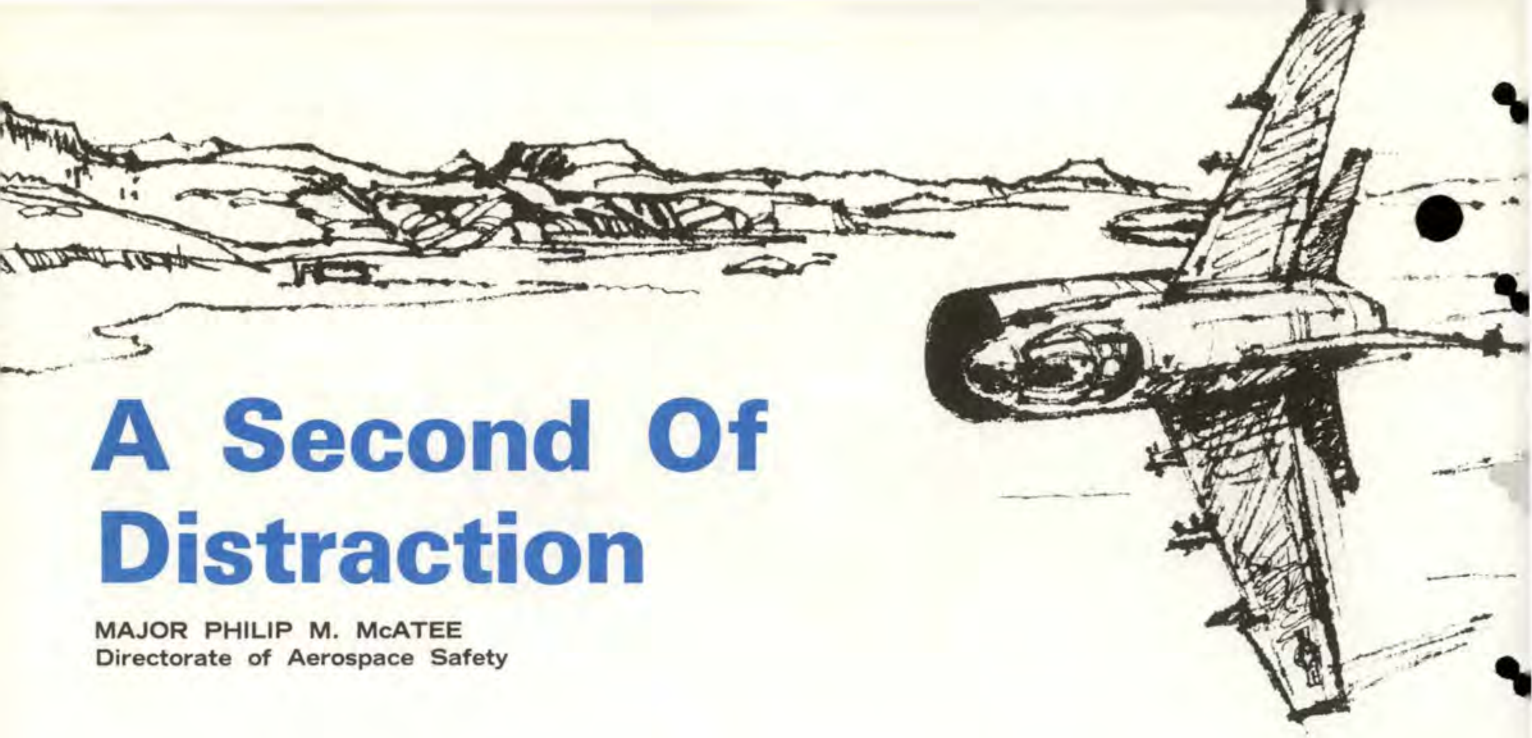
OK IS NOT OKAY!

Why not? Okay for starters let's look at one likely misuse of OK. Suppose we have an aircraft tooling along at the highest altitude in our sector or airspace at a busy time and the pilot requests a change to a specific higher altitude (not in our sector). Further suppose that our reply is "OK, stand by." Now suppose the pilot only hears the "OK" and starts the altitude change. Things could become not-so-OK in a hurry. Can't happen? It can, but it shouldn't!

Okay, to add to the problem, the controller in this theoretical incident misused OK to acknowledge receipt of the pilot's request, not to approve it. But how is the pilot to know that? If he's sharp, he'll request confirmation or otherwise realize that specific clearance to "climb and maintain" was not received. But, he may not, especially if he has become accustomed to using or receiving sloppy phraseology. Similarly, when aircrews acknowledge with "OK" it's difficult to know whether they mean "roger," "affirmative," "will comply," "that's correct," or something else.

According to most dictionaries, OK and Okay are used primarily to express agreement or approval. OK means "approved" not "stand by" and not "Message received, reply follows." But in ATC, OK is not approved phraseology, and it's not "Professional"—OK is not OK in ATC!

Okay now, this blurb on OK should be enough of a reminder to KO OK in ATC. Okay?—From FAA/Air Traffic Service (ATS) Bulletin No. 77-4, September 1977. ★



A Second Of Distraction

MAJOR PHILIP M. McATEE
Directorate of Aerospace Safety

The mission was to be a normal four-ship search and rescue (SAR) training sortie. The wake-up and briefings were early, but early wake-up had gotten to be a fact of life in their business. The briefings were given by the flight lead and covered all facets of the mission including the special requirements and participants for the SAR. All aircraft were equipped with practice bombs, which were to be expended during the early part of the mission, and 175 gallon external tanks. The weather for the target area was expected to be good. All four pilots were well qualified, and their mission today should be "normal," if any high-speed, low-level, simulated combat mission could be termed normal. Call signs for today's run would be Nancy 01-04.

Pre-flight, start, and taxi out for Nancy 01 flight were normal. The flight had been slightly delayed by ATC, but the delay would have no bearing on the mission. The flight made a routine takeoff and proceeded on an IFR clearance to their range. Following an enroute descent the flight cancelled IFR upon entering the range boundaries and ingressed low-level in a wedge formation. Nancy 01 was in the lead with 02 in extended fighting wing maneuvering to either side. Nancy 03 and 04 were 1½ NM in trail in line abreast formation. All the practice bombs were expended on their preplanned target from pop-up deliveries.

Nancy 01 flight then began the SAR which was to be the major part of their mission. After receiving initial information from an orbiting "King" aircraft, Nancy 01 and 02 started an electronic search for survivors while 03 and 04 climbed and refueled from orbiting tankers.

After refueling, Nancy 03 contacted 01 who said he knew the general area of the survivors but had not pinpointed their location. Nancy 01 and 02 then proceeded to the tankers while 03 and 04 continued with the electronic search. While ingressing to the survivor's area in a low-level trail formation, 04 lost sight of 03. They were unable to quickly rejoin, so 04 started back to the last known position of the "Jollies" (rescue helicopters) to get them ready for the run in to the survivors. Meanwhile, 03 continued the search alone and was able to establish radio contact with one of the survivors. After two passes he was able to get a good mark on his position and continued his search for the remaining one.

Nancy 01 and 02 had by now come off the tanker and were told by O3 of the location of the first survivor. 01 and 02 went to help 04 find the Jollies, as their position was in doubt.

Nancy 03 finally established radio contact with the last survivor and was about to get an ADF bearing on him when he spotted a mirror flash from a nearby hill and turned toward it. As he approached the hill where the flash originated, he received simulated missile/ground fire and realized the flash had not been made by the survivor but by exercise enemy ground forces.

Nancy 03 immediately made a 4-5 G, 100 degree bank left turn, starting at 150 feet AGL and climbing to approximately 300 feet. He was concerned at keeping an "angular relationship" with the ground

forces and then rolling out and repositioning.

Nancy 03 was looking toward his left, 9 o'clock to 0830 position, at the ground forces, and as he applied more Gs to keep the angular relationship, he allowed the nose to come down through the ground horizon. Since his attention was diverted to the ground personnel, he was not aware his nose had dropped more than he had intended. He rolled out, still looking back at the threat. Suddenly his attention was drawn to the front of the aircraft.

Less than 3 seconds after the roll-out Nancy 03 impacted the ground.

The preceding story of Nancy 01 flight could be any, or a composite, of several aircraft-into-ground accidents that dramatically illustrates how unforgiving the world of tactical flying can be. We all must be keenly aware of the short time available to correct a nose down pitch during high-speed, low-level maneuvers. Immediately ensure adequate terrain clearance at the first hint of distraction. Remember, during high-speed, low-level flight, the sky will not forgive even a second of distraction.

The demanding techniques required for tactical low-level flying are very well discussed in "When You Have To Go Low" by Captain John Jumper in the Spring 1977 issue of *USAF Fighter Weapons Review*. A short segment from this article dealing with low-level terms will be a helpful close.

"As we progress lower, the most difficult skill to learn or teach is the level turn. The following techniques are designed to provide constant awareness of the aircraft's nose track, relative to level flight. This is done in three distinct stages:

"1 ROLL-IN. When the turn is signalled or called, check for a visual reference 90° to the flight path. This will preclude the distraction of checking the compass, and the reference can be used for any delayed or in-place turn. The roll-in should be a rapid, unloaded roll to a bank angle which will allow the nose to track a straight line along the horizon. Obviously, we don't know what that bank angle is until we are established in the turn and can identify trends in nose position.

"2 ESTABLISHING THE TURN. In order to monitor trends in nose position, the eyes should be focused on the ground at left ten o'clock (for a left turn), so that peripheral vision includes the nose of the aircraft at one extreme and a view of the terrain being turned into on the other. As the turn progresses, this eye position allows constant cross-check of proximity to the ground vs any tendency the nose has to rise or fall. Corrections should be made by adjusting bank angle. Use of rudders is not recommended once the turn is established since your inputs will disturb our interpretation of nose position. Once a smooth nose track is established, we can briefly afford to check the progress of the turn, position of lead, and area of lookout responsibility.

"3 ROLL-OUT. Just prior to roll-out, make a final check of the nose position. If it's still good or slightly rising, roll unloaded to wings level. If slightly below the level reference, roll-out with a slight back stick pressure to break the descent. During roll-out, the eyes should shift to focus attention directly over the nose. This will allow immediate correction of any tendency to climb or descend." ★

The Smoking Pistol

CAPTAIN RONALD E. VIVION • Chief, Operations and Requirements Branch
3636 Combat Crew Training Wing (ATC) • Fairchild AFB WA

This year, at least one otherwise high quality and dedicated Air Force person will "commit suicide." Oh, the doctors won't call it that, and the term suicide won't enter into the minds of the grieving family—but that individual will have done himself in just as surely as if the smoking pistol were found next to the body. Cause of death? **Failure to survive!!** But not survival (or the lack of it) in traditional terms. This failure to survive will take place in very familiar surroundings, while the individual is doing something that is commonplace. The individual will normally be conscientious, think things through, and be endowed with a greater than normal degree of judgment. But the smoking pistol will be there.

Numerous Air Force personnel are indoctrinated in the principles of survival at the various formal survival courses run by Air Training Command. Unfortunately, they tend to be relatively narrow in their thinking about the act of keeping body and soul intact. Survival is put into the context of unplanned jumping out of aircraft, resisting enemy capture or exploitation, severe environmental factors, etc. But the pistol is cocked and loaded—all the time—everywhere, not solely in the hostile environs of combat.

This year's "suicide" victim will have received formal training in survival. He will have had continuation training at his home unit on the gear he flies with, and the procedures necessary to survive if put into the situation. The message will be remembered—but only in the context of aircrew survival. The victim will carry on all of his normal routines without a thought of losing his life—but lose it he will.

He will go for a drive in the woods, or just down the street. All the safety devices will be used, because he knows that seat belts, shoulder harnesses and head rests can save his life. But regardless, he will kill himself.

Let's bring this lethal weapon out and examine it. Its major components are forgetfulness and complacency. We all know that survival gear is necessary, or else we wouldn't take extra precautions to care for our bodies when the environment is extreme. But we forget to put the extra blanket, candy bars, tire chains, bucket, shovel, etc., in the trunk of our car. Why **should** we remember when it's safe and warm in there.

To illustrate my point, consider the old man I once encountered delivering the mail into the Montana wilderness. It was during the dead of winter, and he was using a piece of over-the-snow equipment to get over his route. I noticed, quickly, that the heater in his vehicle wasn't working, and he was dressed like the "blizzard of 97" was on its way. When I asked him why he didn't fix the heater, he smiled knowingly (obviously in tolerance of a stupid question) and explained that he had purposely disconnected the heater. "After all," he said, "machines are built by men and as a result, pick the worst possible time to break. If I didn't have to dress like this to keep alive inside this thing, it would quit and no doubt kill me." He recognized the pistol, and respected it.

Of course, our modern machinery is more reliable than in years past, but people (and most

probably our suicide victim) become complacent. Remember how people crossing the great American desert used to hang two canvas water bags from their hood ornaments? Recall, if you can, the last time you saw one of those. Complacency is also found in all those families that keep bleach, poisons, paint and medicines down low—well within the reach of small children or nearsighted adults. I could go on and on with the list of potential killers around us.

The bottom line of what I'm harping at is that survival doesn't take place solely in the woods, POW camps, or at sea. It is here and now—all around us. Every act, every piece of machinery or tool, every common-place item or environment, or set of circumstances can kill you (if you work hard enough at it). Survival means keeping yourself alive and in the best condition possible. If you insist on squeezing the trigger, you will be successful in wasting your life. Or worse yet, the muzzle might be pointed at your child or loved one. So make your choice—dead by your own hand, a murderer of another person, or totally aware . . . so that the pistol never has a chance to smoke.

Questions or comments concerning the information contained in this article should be directed to 3636 Combat Crew Training Wing (ATC)/DOTO, Fairchild AFB WA 99011 or AUTOVON 352-5470. ★

THE

REX RILEY
Transient Services Awar

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 AFB	Colorado Springs,
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, C
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, O
DOVER AFB	Dover, DE
GRIFFISS AFB	Rome, NY
KI SAWYER AFB	Gwinn, MI
REESE AFB	Lubbock, TX
VANCE AFB	Enid, OK
LAUGHLIN AFB	Del Rio, TX
FAIRCHILD AFB	Spokane, WA
MINOT AFB	Minot, ND

USAF IFC APPROACH

Pilots attempting to land without being fully aware of where they are in relation to the runway continues to be a problem during non-precision straight-in approaches. Some reasons for this are:

• The misconception that approach design guidance is formulated to provide a normal descent at the Missed Approach Point (MAP) for all aircraft from Minimum Descent Altitude (MDA) to the runway.

• Lack of planning for a normal visual glide path to the runway from MDA.

The MAP is just what the name implies. It is the point from which the missed approach commences. It is not, nor was it ever intended to be, the point from which to maneuver to land. Approach design does not attempt to provide normal descent to the runway for all aircraft from the MAP. The MAPs position in the approach is primarily dependent on missed approach criteria. It is seldom dependent on final approach criteria.

As an example, the HI-ILS 2 RWY 31 localizer MAP depiction at Ellsworth AFB, SD, may lead the pilot to believe that at the MAP he will be in a position for a normal descent to the threshold. ILS approaches with associated localizer minima depict the ILS MAP from decision height alone. The instructions adjacent to the timing block, for the non-precision portion, indicate "FAF to MAP 6.2 NM" which places the MAP over the threshold. Most high performance aircraft would require an extremely long runway to safely land if they started descent from the MDA at the threshold.

Let's look at a less extreme example. The MAP is placed at .7 NM from the runway on the TACAN RWY 25, Langley AFB, VA. If the pilot departs the MDA when at the MAP for the threshold, he will need to descend at approximately 5° or 500 feet per nautical mile descent gradient, which will be too steep for some aircraft. For an aircraft on final at 150 KTAS, this would require a vertical velocity of 1325 feet per minute. The pilot should plan the non-precision approach so that he arrives at MDA in a position to make a normal descent. The May 1976 "IFC Approach" article on Visual Descent Points (VDPs) explains in detail how this may be accomplished. VDPs are currently being published on several approaches and will be included on many approaches in the near future. When no VDP is published, the pilot should

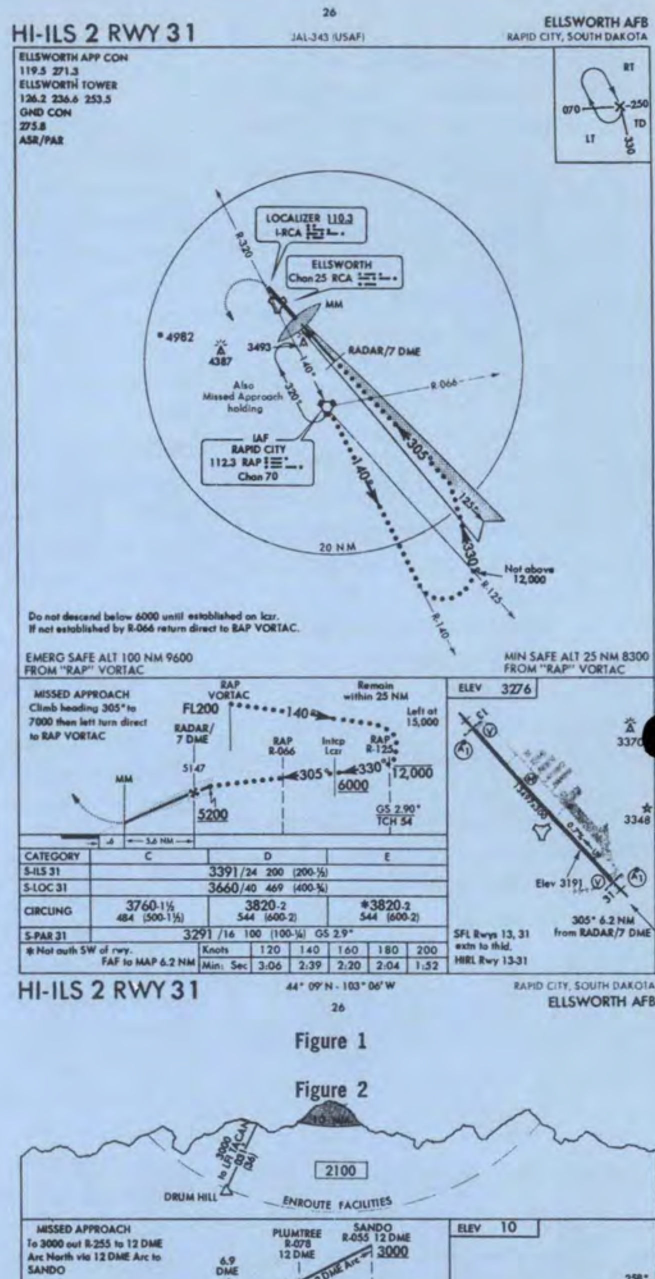
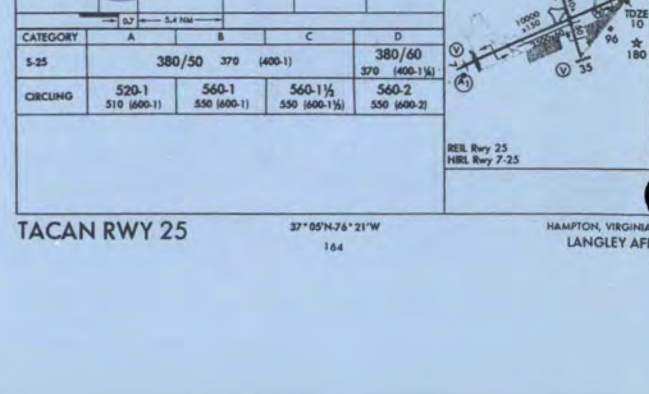


Figure 1

Figure 2



use whatever is available to define a VDP, such as timing or DME. If this point is computed and overflown while looking for the runway or while descending to MDA, the pilot will at least be aware that if he elects to land he may be descending at a greater-than-optimum rate.

A VDP will normally provide a three-degree descent gradient to the threshold, but the VDP is not necessarly the last practical point from which to land. For each particular approach, each aircraft has a last practical point from which a safe landing can be made. Several variables, such as runway length and aircraft maneuverability, make it impossible to designate such a point on each approach plate. This last practical point, beyond which the pilot is committed to a missed approach, must be determined by the pilot for his particular situation.

If a pilot has no way of determining a VDP or last practical point from which to land, visibility must be such that there is absolutely no question in his mind about where he is in relation to the runway. Although our flying directives define approach lights as part of the runway environment, the pilot may want to remain at MDA if approach lights are all that can be seen. By departing MDA with only the approach lights in sight, he may be flying a dangerously dragged-in final approach or land short due to an illusion of being high. He should be totally aware of his position in relation to the runway and initiate an optimum descent at a pre-computed or published VDP. Copies of the May 1976 "IFC Approach" article may be obtained from the USAF Instrument Flight Center, Randolph AFB TX, AUTOVON 487-4276.

POINTS TO PONDER

Many pilots feel that since they are allowed to file and fly into a field "visibility only," that is, with ceiling below required minimums, that "visibility only" minimums are enough to safely accomplish every approach. Crew members must realize that "visibility only" is a beneficial concept which allows operational flexibility for those experienced enough to use it. However, experience in limited visibility is not a factor of flying hours. It is a factor of having flown into marginal weather conditions often and/or having acquired the habit patterns and knowledge necessary for safe completion of such an approach. To assume that numerous hours of flying time have prepared the crew member for coping with weather conditions of 100 feet ceiling and ¾-mile visibility on a non-precision approach, for example, is a serious oversight. Few of us have had the training or experience to handle these conditions. Therefore, extreme care and thoughtful planning should be exercised, with consideration for the type of ceiling, restriction to visibility, airfield lighting, and aircraft performance, to ensure safe completion of the "visibility only" approach.

Q: Can I depart an airfield on an IFR flight plan and proceed direct to an unpublished radial/DME fix off a TACAN non-co-located with the departure airfield? Also, can I file fix-to-fix navigation between random radial/DME fixes in the route of flight block of the military flight plan?

A: FAA Handbook 7110-65, Air Traffic Control, paragraph 297, instructs air traffic controllers not to accept a flight plan whose route or route segments do not coincide with designated airways or jet routes or with a direct course between NAVAIDS unless the route or route segments are defined as follows:

a. The portion of the route which cannot be defined by a designated airway or jet route or a course between NAVAIDS is defined in the flight plan as a point composed of the following:

(1) A location identifier.

(2) Azimuth in degrees magnetic.

(3) Distance in miles from the NAVAID.

b. The NAVAIDS selected are VOR/VOR-DME/VORTAC/TACAN NAVAIDS authorized for use at the altitude being flown and the distance from the NAVAID should not exceed the distance criteria for the NAVAID being used.

c. The distance between the fixes used to define the route does not exceed:

(1) Below FL 180—80 miles except that for celestial navigation flights. The distance in (2) shall apply between fixes used to define the celestial navigation portion of the route of flight.

(2) FL 180 and above—260 miles.

The key to this discussion is "positive course guidance." If, upon departing an airfield, you have positive course guidance enroute to a designated fix

USAF IFC APPROACH continued

or airway/jet route, then it is permissible to enter a random radial/DME fix in the military flight plan, as long as the distance to the fix is within the service volume area of the NAVAID being used for course guidance, and that course guidance beyond the fix is available for continuation of the route of flight. NOTE: Some air traffic control computers will not accept random radial/DME fixes as part of the flight plan.

For a discussion of the military operations authorized to define portions of their routing in accordance with degree-distance routing (fix-to-fix-to fix), consult the July 1976 "IFC Approach" article.

In addition, when filing to a TACAN-identified Initial Approach Fix (IAF) from other than a published feeder route, ensure that positive course guidance can be provided until reaching that IAF. ★

New SAR Technique

US Army Air Traffic Control Activity

What's up in the way of aid when you are down? Inadvertently that is!

The Department of Transportation is coming up with the answer. Their Federal Aviation Administration (FAA) organization has effectively synthesized computer techniques, radar display facilities, and, of course, personnel skills to exploit these technical resources to improve air safety and rescue operations.

The Department of Transportation is using a spinoff from its computerized air traffic control radar system to help locate downed aircraft in remote areas and speed the rescue of survivors.

Developed by FAA, the new technique uses recorded radar data to reconstruct the flight path and pinpoint where the missing aircraft disappeared from the radar scope.

Since the technique was introduced in 1975, the number of aircraft located through its use has increased steadily from two that year to 14 in 1976 and to 15 through the first 4 months of 1977.

To date the technique is credited with saving one life. That involved the 17-year-old pilot of a light plane that crashed in a remote mountainpass near Lake Tahoe, CA, in March. FAA data enabled them to zero in on the location and get the surviving pilot out before a heavy snowstorm moved into the area. The technique uses a computer program that originally was developed to detect possible malfunctions during testing of the new computerized air traffic control system. This system provides FAA controllers with direct radar readout of such vital information as aircraft identity and altitude. Two years ago, controllers and technicians at FAA's Denver Air Route Traffic Control Center theorized that it also could be used to aid in locating downed aircraft and worked out the procedures with the cooperation of the Air Force Rescue Coordination Center at Scott AFB, IL.

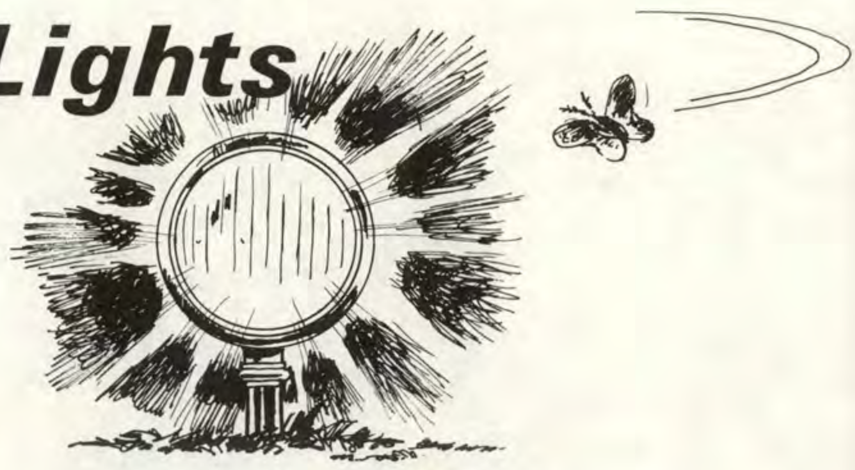
The radar data on aircraft targets is recorded on tape and retrieved for analysis in the form of a computer printout. The printout provides position data on all aircraft that appeared on the radar screen at any given period.

However, using the printout to trace the flight path of a missing aircraft to the point where it disappeared from the radar screen requires skill and specialized knowledge. Only a few controllers in each center presently have the necessary training. Also, because of equipment differences, the technique can only be used at 15 of the 20 Air Route Traffic Control Centers in the country.

So FAA is developing a new computer program that will simplify the task and make it possible for just about anyone in the center to reconstruct a flight path. This involves design and production of special software to enhance the capability of the FAA computer resources to better support the search and rescue mission. All 20 centers are expected to have this capability within the next 2 to 3 years.

Things are looking up in the fine art of looking for you when the need arises.—Courtesy **US Army Aviation Digest.** ★

Approach Lights In Sight



CAPTAIN JAMES J. LAWRENCE
Directorate of Aerospace Safety

On a hazy summer evening about mid-August, I lounged comfortably in the grass at a local park. As I pondered the mysteries of life, the flight path of a moth caught my eye. It meandered back and forth as if in search of something. I remember being absorbed in the idea of an aircraft with equal maneuverability. As the moth neared a bright light source, its flight path became more direct. It seemed as though this bright light, when discovered through the haze and fog, offered some form of sanctuary for the insect. The moth flew in a straight line toward the ever brightening light source, closer and closer. The moment it reached the alluring light, ZAP! ZAP! One hundred and ten volts zinged through the body of the moth, and its remains split-S'ed onto the ground. I remember thinking "What a sneaky way to kill bugs."

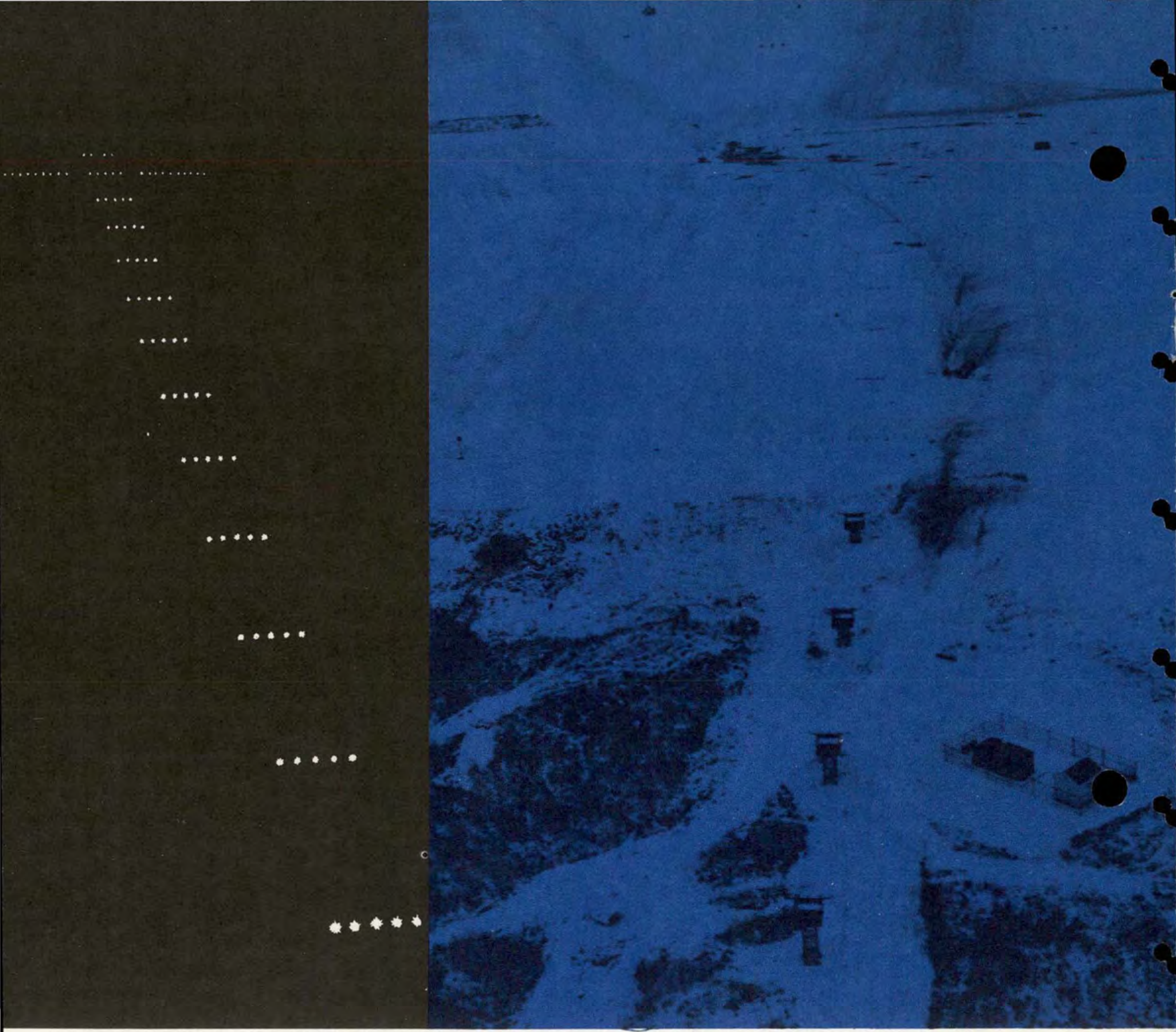
This summertime reverie came back to mind recently as I scanned an NTSB review of approach and landing accidents in the 1970-1975 time frame. Restricted visibility conditions were the major hazards in each accident analyzed. What really caught my eye, was that most of the accidents had occurred after the pilot not flying called the approach lights in sight and the AC went visual. In each case, the aircraft's rate of descent increased rapidly until the crew realized that they would land short. In each case, pull up action was initiated too late, resulting in major aircraft damage and, in some cases, several fatalities.

I began to wonder if someone had set a trap for we pilots. Not wanting to be allured and then ZAPed, I decided to look more closely into this phenomenon.

At first. my research led me to the possibility of false impression by the pilots arising from "visual illusion." That made sense, but it quickly led to incomprehensible terms like accommodation, convergence, stereopsis, static cues, dynamic cues, contextual cues. Fancy diagrams and examples of optical illusions were abundant. These illusion charts are fun, but I find it difficult to directly relate them to this problem. I decided to stick more closely to the NTSB report and attempt to offer practical explanations and pilot options.

Military and civilian pilots are faced with the same mission demands. These demands often require operation in adverse visibility conditions. This fact of life is inescapable and one of the reasons pilots make all that extra money. So, if we have to live with it, how do we deal with it? Proficiency is an answer; but let's assume that stick and rudder-wise, you are the top man. Instrument procedure-wise, you have no equal. You have just flown an ILS that by itself should get you a one on your next OER. At decision height, your copilot has the approach lights and calls "land."

This is where we are in those NTSB accidents studied. These highly skilled pilots flew excellent approaches, had the lights in sight, and proceeded to dive at them much too steeply. They didn't realize their error until it was too late. Sure, the approach lights are the important link between instrument flight and the real world. They provide lateral and roll guidance which the pilot needs to correctly set up his landing on the runway. What they do not provide is any guidance regarding glide slope deviation and angle of descent. They can also produce the potentially dangerous illusion that



At decision height, the pilot picked up the approach lights. He maneuvered slightly to the right to properly align the aircraft for landing. The approach lights, however, offered no information on his aircraft's rate of descent. Right, glide slope information in the form of visual references, VASI, or an outside/inside cross-check would have averted this mishap.

APPROACH LIGHTS IN SIGHT continued

the aircraft is too high or that the nose has pitched up.

This vertical guidance is available, in VFR conditions, by the horizon, the aiming section of the windscreen, and the projected impact point of your aircraft in the landing target area. These are not available in low visibility conditions. If you can see the VASI's, then glide slope information is handy. If you don't have VASI's or cannot yet see them at decision height (which is often the case) you could be in trouble. The pilot may transition to outside references prematurely because of the precise and positive lateral guidance

These highly skilled pilots flew excellent approaches, had the lights in sight, and proceeded to dive at them much to steeply. They didn't realize their error until it was much too late.

the approach lights provide. Additionally, USAF Flight Dynamics Laboratory studies indicate that it can take as long as 5 seconds for a pilot to transfer from heads-down to heads-up reference and derive meaningful data from any visual cues.

Heads-up Displays (HUD), that is aircraft descent, glide slope, airspeed or other information displayed on the aircraft windscreen, would help alleviate this diving for the lights tendency. Only a few aircraft, however, are so equipped with HUD. Most of us have to rely on other information during this critical phase of flight. The NTSB reported several conclusions which emphasize this point:

- Low visibilities compromise the quality and reliability of the visual cues on which the pilot flying relies for vertical guidance; therefore, only the timely and proper integration of flight instrument data into the flight can detect or prevent undesired excursions from the correct flight path.

- Continuous monitoring of the aircraft's flight instruments is necessary from the OM to landing. The duty to monitor these instruments should be assigned as a specific task to a specific crew member.

- Instrument flight procedures should be maintained to the lowest possible altitudes commensurate with the approach procedure. Call outs which can result in a premature abandonment of instrument procedures during the approach should be prohibited. Sighting calls should be limited to visual acquisition of either the airport, the approach lights, the runway lights, or the runway . . . .

- Altitude call outs for both visual and instrument approaches should be standardized . . . .

- Greater use of the autopilot and approach coupler will augment instrument approach safety . . . . The autopilot should remain engaged, if feasible, until descending to the autopilot's minimum certified altitude.

With all this in mind, the question that arises is concerned with the adequacy of visual cues when the pilot makes that decision to land or execute a missed approach. The term runway environment is often used, but an adequate explanation of what is considered to be runway environment is not clearly available. Many pilots feel that the approach lights constitute runway environment. The NTSB has stated that a crew should have the runway threshold in sight at DH or go-around. The NTSB later added that the pilot flying the approach should monitor the instruments continuously until either the runway threshold or runway lights are called in sight.

FAA, ICAO, and some Air Force directives are not quite so specific; they rely on the pilot's judgment to evaluate if the visual cues for the runway environment are sufficient to execute a safe landing. The important point is that there should be no doubt in the pilot's mind that he should continue the approach or get in the throttles and go-around. If he elects to continue, based on the sighting of approach lights alone, he had better integrate the external references with what his aircraft instrumentation is telling him about rate of descent.

After an extended descent in IFR conditions, and a hair raising precision approach to minimums, those approach lights can be a welcome sight. But like that moth, aircrews must beware of being drawn into these lights. Remember that the normal descent rate visual cues are probably not available, and the lights may lead us into flying a rate of descent much higher than is acceptable. To many pilots, this excessive sink rate was not discovered until it was too late for corrective action. If you don't have that HUD, an outside/inside cross-check is necessary to avoid being zapped. ★

OPS TOPICS

SWEET DREAMS

How many physiological incidents does it take to prove a point? Here's another one. A flight test engineering student was being administered his engineering final in an A-37. The profile called for a tech order climb to FL 220, followed by airwork at that altitude. After 20 minutes of flight, the instructor pilot noted that the student was not responding to verbal directions. The IP quickly reached over and selected 100 percent oxygen for the student. Ten seconds later the student began to respond. Post flight investigation revealed a large leak around the upper portion of the student's mask. According to the student, this leak had been present since his training began 8 months prior. This was the first flight for the student where the cabin altitude exceeded 18,000 feet for any length of time. Students, thoroughly involved in the business of learning a new craft, are often the victims of life support equipment oversights. Instructor pilots and the life support personnel can pick up the slack. But the responsibility is still the individual's. How do you stack up?

TO TOW OR NOT TO TOW?

Airlift control element personnel were marshalling a cargo aircraft near a hangar at Aviano AB, Italy. When the marshaller directed a sharp right turn, the aircraft's left wing tip struck the hangar door. WHY? Were taxi guide lines available? Yes! Were wing walkers available? Yes! Two pilots? No, three and the third was busily engaged observing the left wing tip clearance. Five people and not one demanded adherence to the distance clearance criteria published in AFR 60-11. Taxi accidents are costly in terms of repairs and lost mission capability. The sad part is that nearly every taxi accident is avoidable if crew members and marshalling personnel would simply remember "Less Than Ten, TOW."

PIN SIN

A T-33 aircraft made an intentional wheels-up landing on a foamed runway. Fire Department rescue personnel helped the pilot deplane and ushered him off to the hospital. In attempting to safe the ejection seat, it was discovered that the seat pins were not in the aircraft cockpit but in the pilot's jacket pocket. This seat had recently been modified, and the fire department did not possess the correct seat pins.—Major William D. Harrison, Directorate of Aerospace Safety.

BE ON GUARD

Concorde test pilot, Brian Trubshaw, offers these basic rules to follow to eliminate accidents that are blamed on aircrew error:

Be suspicious—don't take anything on trust.

Be prepared—know your emergency procedures.

Be professional—no one ever flies as well as he ought to.

Don't be complacent—it can happen to you, and the day you assume it can't, it will

Don't be overconfident—the day you have all the answers, either retire or start worrying.

Don't be afraid to admit an error—no one is perfect.

OPS TOPICS

THE BENDS

On climbout, passing 13,000 feet, the KC-135's pressure warning light came on. Cabin pressure was at 11,000' and remained approximately 2,000' below the ambient pressure as the aircraft continued its climb. The aircraft commander decided to continue the refueling mission, selecting a lower refueling altitude, because the first set of aircraft receivers were already airborne. After level off, the boom operator checked in that he was OK, but remarked that he could feel the reduced pressure in his joints. The AC instructed the crew to immediately notify him if anyone experienced any other adverse symptoms. After 30 minutes of operations at that altitude, the boom operator reported that he was experiencing sharp pain in one of his joints. The pilot started an immediate descent and the pain began to subside. An uneventful landing was made. The boom operator, however, was still experiencing some pain and was taken to the hospital for treatment. The filght surgeon decided to have this crew member airlifted to Brooks AFB Medical Center for compression chamber treatment.

An excerpt from AFR 60-16, Chapter 6, is repeated for pilots faced with a similar situation: "If it is observed or suspected that an occupant of any aircraft is suffering the effects of decompression sickness, the pilot will descend as soon as practical. Landing will be accomplished at the nearest suitable installation where medical assistance can be obtained. . . ."

COMPLACENCY??

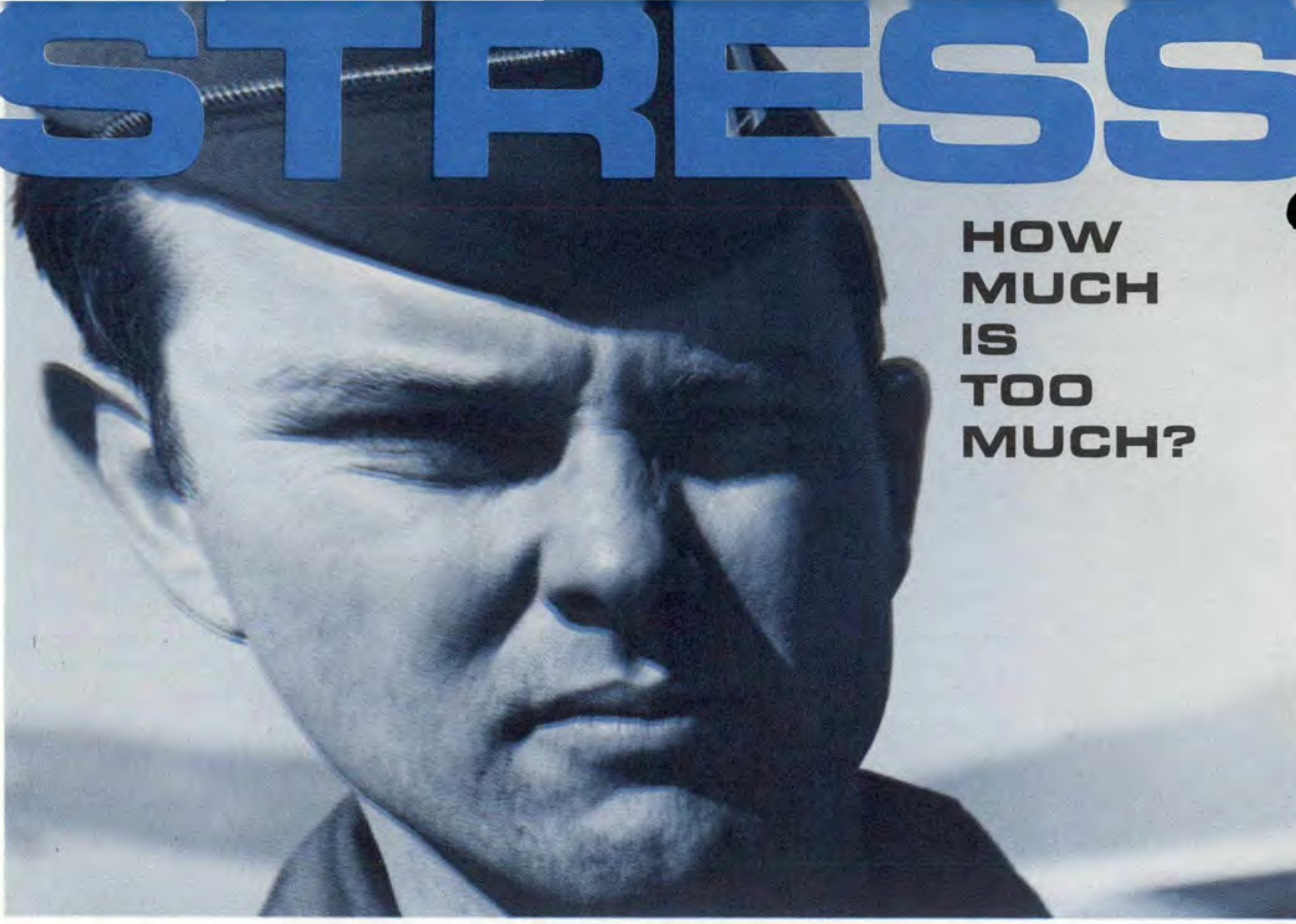
The funny thing about hydroplaning is that it doesn't discriminate against any type aircraft. Little airplane drivers probably daydream of the technological benefits of anti skid brakes and thrust reversers. The big guys, however, must guard against the ever present problem of becoming over confident. Case in point—a C-141 on approach to a Navy base. Weather was reported as 300 feet broken, visibility ¾ mile, with light rain showers. While on downwind, approach control relayed a braking report by another MAC aircraft of fair to poor. Following an excellent PAR, the subject C-141 landed on the 7,500 foot runway and initiated maximum reverse thrust and maximum braking. Shortly thereafter, the aircraft came to a stop off the end of the runway with all tires imbedded 5 to 9 inches in the mud. In between, tire skid marks, runway steam cleaning, a blown number eight tire and seven others with flat spots all indicated severe hydroplaning in the last 1,000 feet of the landing surface. A landing on a short, wet runway with braking action of fair to poor overtaxed the aircraft's and the crew's stopping capability.

4TH TFW BECOMES "DUAL-BASED" WING

The 4th Tactical Fighter Wing, Seymour Johnson AFB, NC, has been named to replace the 49th TFW, Holloman AFB, NM, as Tactical Air Command's "dual-based" unit. Under the "dual-based" concept, two of the wing's squadrons will be operationally committed to US Air Forces in Europe to support US commitments to the North Atlantic Treaty Organization. The 4th TFW is picking up the new mission because the 49th TFW is changing from F-4 Phantoms to the F-15 Eagle air superiority fighter. ★

STRESS

HOW MUCH IS TOO MUCH?



LT COL JOHN R. ALBERTS • Directorate of Aerospace Safety

In 1976 we had the fewest flight mishaps and destroyed aircraft in our history. The resulting conservation of aircraft and personnel, together with the savings in dollars required for repair of damaged aircraft, is an achievement in which we all can take pride. However, close examination of the types of accidents experienced in 1976 shows very little change from the past 15 years. The numbers are smaller as flying time decreases, but the percentage by type remains constant and highly predictable.

There are six types of mishaps that are basically operational in nature and for which prevention is an operational matter:

- Pilot-induced control losses.
- Range mishaps.
- Collision with ground off range (nothing basically wrong with the aircraft).
- Midair collisions.
- Landing and takeoff mishaps (pilot).

Figure 1 shows that the percentage of types of mishaps hasn't changed much over the last 15 years.

The predictability of these mishaps should help us determine where we must place our emphasis to achieve greater reductions in our losses. However, knowing the types of accidents we can expect is only one side of the prevention coin. Unfortunately, we are extremely good at determining "what happened," but terribly poor at identifying "why it happened," especially when dealing with the operations type mishaps listed. This article attempts to answer some of those "whys" as we see them.

Analysis of these operations—people-caused mishaps shows that very few occur because of gross breakdowns in discipline or deliberate and wilful departures from procedures or directives. We find the same true of maintenance type mishaps. In fact, we have found that most are the result of mistakes

Figure 1

TYPE	% 1962-1969	% 1970-1976
Landing (Pilot)	10.0%	10.5%
Collision Ground (Off Range)	11.0%	11.4%
Control Loss (Pilot)	4.0%	4.4%
Midairs	4.5%	4.8%
Range Mishaps	14.0%	12.3%
Takeoff (Pilot)	4.0%	3.8%
TOTAL	47.5%	47.2%

made by good people trying hard. We have noted, however, that more often than not, they also involve a very subtle and sometimes completely overlooked element which can be characterized by a stretching of the rules, a bending of procedures, or a minor deviation from established procedures or tech data. In fact, we find that more than 30 percent of our operational and maintenance mishaps include a factor which indicates something was not quite right—a subtle breakdown in discipline. This is evidenced by indications of:

• Pressing beyond minimum altitudes and airspeeds.

• Stretching weather or fuel minimums.

• Ignoring landing airspeeds and gross weights.

• Failure to follow all of the steps all of the time.

We believe one of the major problems which generate deviations of this type is that, almost always, the result is a victory of some sort or another, rather than a mishap. Consequently, this slight stretching of the rules meets with tacit approval or even encouragement by supervisors and by all others who are attempting to accomplish the same mission. The net result is that it becomes attractive to cut corners, to get the job done, or to fill the squares by whatever means possible.

What is overlooked is the fact that our procedures have been developed over the years through some hard evaluations of what is the best way to accomplish a mission, as well as from very painful lessons learned when we didn't have good solid procedures to follow.

In terms of wins and losses, the risk itself seems minimal at the time. We forget—all of us—that we usually lose the aircraft and sometimes the crew.

We believe many of these subtle breakdowns in discipline are precipitated by a high level of stress within the unit. No matter how it is generated or how it is localized within the unit, stress usually manifests itself in pressure on all personnel to complete the mission as quickly as possible with good marks. The result is always the same:

• Good people making errors in judgment while attempting to get the mission accomplished in a time compressed atmosphere.

• Good people doing a job as best they can.

• Good people attempting a task for which they may not have been trained, or which is above their skill level.

In other words—overcommitment of our people either by themselves or by their immediate supervisors.

Many times, these deviations will have tacit approval, if not the outright support of management simply because *they are the only way the job can be done under the circumstances existing at the time.* Yet, the hard question to answer is why these efforts sometimes manifest themselves in an accident.

Why does a pilot

• try to salvage a bad pass on the range, press minimums, and place himself in a non-recoverable position? (Several have occurred this year on dry passes!)

• delay ejection from an unrecoverable aircraft until the last possible second, or below minimum ejection limits?

• try to salvage a bad landing pattern/approach with plenty of fuel for a go-around?

• continue an approach with weather below minimums with fuel to divert to an alternate?

• continue an ACM intercept not having all aircraft in sight, or below altitude and airspeed limits?

• fly a perfectly good aircraft into the ground?

Why do many of these mishaps happen with another pilot or crew member(s) aboard?

Whys! Many whys, but few real answers. The many of us still around who have had our fangs scraping the floorboards to "try one more shot" really know why, but ours was a victory, not a smoking hole, and I'm afraid the victors too seldom equate the two. Sure, we know "what happened," but how often do we really face up to "why it happened?" Peer pressure? Pride? Overcommitment? Or, all of the above? We believe "all of the above" and that basically the majority is the direct result of management and/or self-imposed stress on the individual(s) involved.

If we are to make further progress in the prevention of mishaps, all of us must be aware of the stresses we place on ourselves, and managers must be aware of the stresses they place on their people —how they are generated, and their results. We must also realize that in military organizations, some stress will always exist. In fact, most people actually perform better under some stress. The hard point is "how much is too much?" *The danger point is reached when the job cannot be accomplished as prescribed.* This is both a management and individual decision. Management must attempt to quantify the stresses placed on personnel; the individual must realize how he reacts under stress, both management and self-imposed.

As the stress level increases, all must expect the corresponding overall impact as well as localized hot spots and make a smart determination on how to reduce that level to normal. If mission requirements preclude it, the next step is to determine what can be done to live with it. We owe it to ourselves and our people. ★

Passenger Briefings

MAJOR JOHN E. RICHARDSON
Directorate of Aerospace Safety

When you are scheduled to carry passengers on your aircraft, how do you handle the passenger briefing? All too often the passenger briefing is relegated to a "quickie" catch-as-catch-can affair as the crew disappears into the cockpit.

Even when the crew tries to give a good briefing, they may be hampered by the fact that they are not really communicating. Not all passengers are pilots or even necessarily experienced air travelers. This means that jargon, technical terms, or obscure references to the operation of aircraft systems will be meaningless to the passenger. We, the aircrew, are usually so familiar with our aircraft that we overlook explanations which another might need to fully grasp the meaning of the passenger briefing.

Ordinarily this is not a big problem but, in the event of an emergency, it can be extremely serious. Here is an extract from the NTSB report on a civil aviation mishap. In this mishap, better briefings would most probably have solved the problem.

"On November 12, 1976, a Dassault Falcon Fan Jet, operated by a large American company, crashed at Naples, Florida. The National Transportation Safety Board's investigation revealed that the nine passengers encountered severe difficulties in evacuating the aircraft because the passengers lacked knowledge of emergency procedures; they were not briefed before departure; and there were no placarded instructions for opening the main cabin door or the two overwing exits.

"Specifically, although a passenger briefing is required by 14 CFR 91.199,* the pilots did not brief the passengers before takeoff regarding the location and operation of the main door and the overwing exits. Some of the passengers rarely flew on company aircraft and one passenger had never flown on a company aircraft until the day of the accident. None of these passengers could recall having been briefed by a pilot. Although several passenger briefing cards were available in the cabin, the passengers were not directed to refer to them before takeoff.

*The portion of Title 14, Code of Federal Regulations, pertaining to the FAA.

"In addition, the passenger who occupied the jumpseat did not know that a shoulder harness was available for his use even though he had occupied the jumpseat on several occasions. Although this upper torso restraint was only a single diagonal strap, the Safety Board believes that his chest injuries would have been averted had he worn the restraint.

"The Safety Board also found that, while a placard was attached to the main entry door containing instructions for closing this door, there were no instructions for opening the main entry door. The passenger in the jumpseat tried to open the door after the accident, but he was not able to do so because he did not know that the three door controls had to be actuated in sequence and that the door had to be pushed outward while simultaneously actuating one of the controls. The illustration and accompanying written instructions on the passenger briefing cards did not communicate clearly the location, identification, and proper sequencing of the door controls. The card also failed to communicate that the door would not open unless the proper sequence was followed.

"The timely evacuation also was affected by the lack of instructions for opening the two overwing exits. Requirements for emergency exit operation placards are contained in 14 CFR 25.811. The passengers correctly actuated the handles which unlocked the two emergency exits, but they did not realize that they also had to grasp the hatches and pull them inside the cabin. Neither emergency hatch contained placarded instructions to direct the passengers to pull the hatch away from the fuselage opening. As a result, the two overwing exits were not opened. Our investigation disclosed that the passenger safety card incorrectly illustrated the overwing exit hatch configuration installed in that aircraft.

"Finally, a small carpet on the floor at the main entrance area became wedged underneath the door which separates the passenger cabin from the main entrance area. As a result, the door jammed closed. Placards on this intra-cabin door warned that the door was to remain open during takeoff and landing, but the jumpseat passenger had closed the door before takeoff. The passengers in the cabin were unable to open the door; thus, access to the main entry door was blocked until the carpet was removed. . . ."

AFR 60-16, General Flight Rules, defines the basic requirements for USAF aircraft passenger briefings. The aircraft commander must ensure that all passengers are briefed on safety of flight items. The briefing must include certain items listed in 60-16.

PROCEDURES TO BE FOLLOWED IN EVENT OF AN EMERGENCY

This should include a detailed description of emergency exit routes and the signals for and directions to be followed in an emergency. You might also mention emergency equipment locations (fire extinguishers, etc.).

One other item which was an important factor in the Falcon mishap was that the passengers were unfamiliar with the operation of the doors and emergency exits.

USE AND OPERATION OF LIFE SUPPORT EQUIPMENT

A cabin depressurization is enough to get a pilot's attention, what with lights and horns, but for the passengers it can be really traumatic. Under stress, it is very difficult to remember those quickly mumbled instructions about oxygen procedures.

So, a few extra moments spent during the briefing can help to ease the problems with orygen equipment. During the briefing you should also cover procedures for smoke and fumes in the aircraft and how to use the masks.

PRECAUTIONS, RESTRICTIONS, AND SPECIAL PROCEDURES

Here is where you should cover any special problems or factors relating directly to your aircraft. For example, the T-39 is extremely noisy when the speed brakes are deployed. This can be frightening if a passenger is unprepared. In the accident cited, the intra-cabin door was closesd by a passenger in violation of regulations.

If rough weather is forecast, it's a good idea to brief the passengers and emphasize the importance of seat belts. It could save an injury if you hit some turbulence.

Passenger briefings are a way of life for some aircrews. For others they are a rare and unfamiliar chore, but a most important one. It is a proven fact that the passengers' comfort and safety and even the safety of the aircraft can depend on the quality of the pre-departure briefings. ★

WHY SAFETY?

MAJOR THOMAS R. ALLOCCA • Directorate of Aerospace Safety

The Air Force expends a considerable amount of effort, materiel and funds in support of its philosophy that mishaps constitute a needless waste of resources which can and must be prevented. Is this level of safety effort appropriate? That is a question of infinite complexity which could be addressed by resorting to classical mishap statistics such as improved accident rates, decreases in aircrew fatalities and the like. Or one could wax philosophical about the more esoteric reasons for accident prevention, touching upon factors such as the humanitarian and social benefits which accrue from enhanced safety. But what are the practical, "hard-nosed" reasons for being safe?

ACCIDENTS ARE EXPENSIVE

Mishaps cost money — modern mishaps cost lots of money. In 1964, the average cost of a flight accident approximated $940,000; 10 years later this average figure jumped to 2.2 millions. In 1976, the dollar loss experienced in flight accidents exceeded 250 million dollars. And while these cost figures are heady, some safety experts believe that the true costs of accidents are understated.

There are a number of mishap-associated costs which have not been included when the accidental dollar loss is tallied. For example, destroyed aircraft dollar losses have reflected only the original purchase price of the aircraft and not current year dollars or replacement costs; the costs of injuries or fatalities and the costs to complete the investigation have not been included in the mishap dollar losses; the costs incurred in litigation have not been recorded. If such figures had been included (as they are beginning in 1977) the yearly dollar losses would increase dramatically.

ACCIDENTS DECREASE EFFICIENCY

All mishaps reduce efficiency and effectiveness. They are, furthermore, symptoms that something is wrong. If we agree with the National Safety Council's view that "accidents don't just happen but are caused" then we must also agree that mishaps occur because of a loss of control over people, materiel, processes or the environment. This lack of control will inevitably detract from an efficient and effective operation.

A mishap always adversely affects the operation of a unit: it is never "scheduled" and often happens at the most inopportune time; it may disable the "top gun" or destroy the "queen of the fleet." At the very least, it is certain to detract from management's performance by pulling key supervisors away from their primary spheres of responsibility—not only to replace the damaged airplane (and crew), but also to arrange for the necessary practice of mishap investigation.

ACCIDENTS HURT MORALE

A high accident rate can destroy a unit's morale. A particularly bad mishap makes everyone in the unit nervous, sometimes apprehensive or fearful. Repeated accidents can give people the impression that their unit does not care about them or, far worse, that the Air Force is not doing all it can to reverse an unhealthy trend. People lose confidence. They lose interest in doing their job well. They lose morale.

ACCIDENTS HURT PUBLIC OPINION

We are, of course, public servants. Building a good reputation among those we serve is second only to building a good reputation among those with whom we serve.

A good safety record enhances our Air Force public image. The Air Force gets to be known as a "going outfit" and "a good place to serve." Unfortunately, however, accidents detract from a well-nurtured reputation quickly and viciously. And this is particularly true for those mishaps which are sensationalized and draw adverse public attention.

So when the taxpayers buy an F-15 or a C-5 or an E-3, it is truly in the best interests of the Air Force to operate it as effectively and safely as possible. Because when we do so we assure the public that we can efficiently manage sophisticated and expensive programs.

ACCIDENTS IMPAIR READINESS

Mishaps detract from the quality and effectiveness of our defense posture.

To wit.

In the five year period from 1972 to 1976, the following numbers and types of aircraft were added to USAF's fleet:

NEW AIRCRAFT ADDITIONS, 1972-76	
Total	1087
Bomber	3
Cargo	130
Fighter/Attack	950
Others	4

(Source: AFLC/LOAC)

In that same five year period, the following numbers and types of aircraft were destroyed in mishaps:

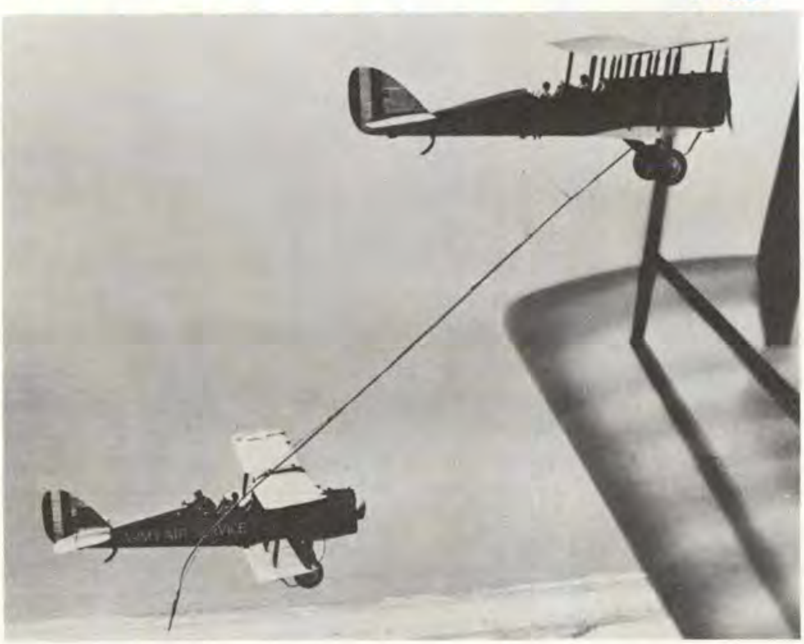
AIRCRAFT DESTROYED, 1972-76	
Total	459
Bomber	23
Cargo	34
Fighter/Attack	301
Others	101

In other words we—through mishaps—negated by almost 50 percent the additions to our coffers over the five-year period. The numbers speak eloquently of the loss in mission capability—and readiness—wrought by accidents.

Accidents hurt. They hurt in the ways outlined in this short article and in many other ways. They are expensive, contribute to inefficiency, wasteful of resources and impair readiness.

Why safety? Because any way you slice it, we can't afford the cost of not having it. ★

Name That Plane



This month's Name That Plane is slightly different. While most early aircraft enthusiasts will be able to recegnize the aircraft, here are some other brainteasers.

1. When were these air refueling tests conducted?
2. What was the endurance record?
3. Name the members of the crew, and the aircraft which convincingly shattered this record a few years later.

For the answers turn to Page 28.

THERE IS A WAY

Annually the Air Force recognizes a given number of individuals, units and commands for outstanding performance in safety. However, competition is keen and not all win major awards. To recognize all of those, AEROSPACE SAFETY is featuring one or more in each edition. In this way we can all share in recognizing their fine performance and, perhaps, learn some valuable lessons.

Nominated For The Chief of Staff Individual Safety Award

TSgt Hubert O'Clair

392d Communications Group (AFCS)
Vandenberg AFB CA

A dynamic program that resulted in an outstanding safety record in 1976 earned this nomination for Sgt O' Clair. Among the many innovations Sgt O'Clair made to the unit program were an AFMV driver improvement course and a special driver training class for young drivers. Both the AFMV and PMV accident rates were reduced. His efforts also improved motorcycle safety and identified serious hazards in other areas that could then be eliminated. The unit safety record reflects Sgt O' Clair's superior performance and dedication to duty.

Lt Col Thomas A. Duke

341st Strategic Missile Wing (SAC)

As Chief of the Safety Division, Col Duke manages missile, nuclear, industrial and traffic safety programs for Air Force elements within a 23,000 sq mile area. In addition, the division is responsible for airfield safety, although there is no locally assigned flying program. The division provides safety services to tenant flying units and transient aircraft at Malmstrom AFB, Montana, which has more than 25,000 approaches and departures per year. Ground safety, however, requires the most attention because of the many miles of roads and traffic within the missile complex and an environment that is conducive to accidents. Under Col Duke's leadership Air Force motor vehicle accidents were reduced by 50 percent and injury accidents to an all-time low. The number of work days lost was reduced from 513 in 1975 to only 130 in 1976. Missile convoys proceeded throughout the complex without incident, and maintenance drivers covered 1.6 million miles with only three reportable mishaps. The many programs, ideas and accomplishments of Col Duke earned him the nomination for the Chief of Staff Individual Safety Award.

Nominated For The Koren Kolligian, Jr., Trophy

Captain John C. Moore

904th Air Refueling Squadron (MAC) • Mather AFB CA

Captain Moore and crew were on a night refueling training mission in a KC-135 when the number 2 engine fire warning light illuminated. When immediate emergency actions failed to extinguish the fire, Captain Moore shut down the engine, began return to Mather AFB, and sent the boom operator aft to visually check the engine. Flames were streaming to the tail of the aircraft. Captain Moore began a high rate descent in turbulence, ice, and thunderstorms which had to be circumnavigated. The fire was extinguished, and Captain Moore made a three engine landing. The fire had burned through the cowling and blackened the strut. If the fire had not been extinguished it could have progressed into the wing and the aircraft might have been lost. Captain Moore analyzed a serious in-flight emergency and took prompt action to prevent loss of the aircraft and possibly some of the crew. ★

NITE FLITE

MAJOR JOHN E. RICHARDSON
Directorate of Aerospace Safety

A soft night breeze stirred the brush beside the aero club ramp and gently rocked aircraft tied there. With no moon to diminish their glory, the stars in the clear black Texas sky glittered like a jeweler's dream.

A flash of light from a suddenly opened door cuts through the darkness and laughter and conversation shatter the quiet as a group of four walks from the club building and across the dark ramp to their aircraft.

A quick preflight and then the staccato bark of a Continental engine startles an owl perched in a nearby cactus. The small aircraft taxiis out to the runway and soon lifts gracefully into the dark.

A routine flight? Probably. More and more general aviation flights are being conducted at night, and as the frequency of these flights increases so does their exposure to the special problems of night flying.

While most military pilots are trained and highly qualified for night operations, the same is not always true for general aviation pilots. They have much less opportunity for the training that makes night flying safe and fun. This, then, will be a discussion of some of the special problems you will encounter at night.

NAVIGATION

The first and most obvious difference in night flying is the problem of navigation. It is very difficult to navigate at night by map references alone. Even highly trained aircrews find such methods difficult. Thus, it is imperative that any pilot be thoroughly familiar with basic electronic navigation techniques. You should be aware of the procedures and the limitations associated with the equipment in your aircraft. An airways map showing the navigation facilities and Victor airways is a good investment for night flying. But be sure it is current. An out-of-date map can be dangerous.

Some knowledge of instrument approach procedures is also valuable. Tracking in on a VOR final approach is much easier than trying to visually find a field, lost in the bright lights of a city.

NIGHT VISION

The subject of night approaches brings up one of the real differences in night flying—vision. Unlike owls, our eyes are designed for daylight, so we are out of our element at night. This causes problems for pilots. First is lack of depth perception.

It is very difficult to judge the proper approach angle and descent rate at night. The best way to prevent either a short or a hard landing is to use any available approach aids. VASI or ILS glide path guidance is best. Night vision is a fragile thing. Without going into the physiology of rods and cones and visible purple, a good rule of thumb is to allow 30 minutes for night vision adaptation. However, if your eyes have been exposed to extremely bright light during the day—like at the beach or on the ski slopes—the time for night adaptation may be more than twice as long. You can reduce the effect by wearing high quality sunglasses in bright conditions. A hat alone isn't enough. Glare and reflected light are the real problems here.

The other vision related problem in night flying is spatial disorientation. There are so many aspects of this phenomenon which we could discuss that it would take a separate article of its own.

The one really important point is everyone is susceptible to spatial disorientation anytime visual clues are limited.

The best defense is a good knowledge of instrument procedures and techniques. This is also important since at night it is easy to inadvertently fly into unseen clouds and suddenly be totally dependent on instruments thus creating the classic situation for a spatial disorientation accident.

There are many other subjects which can be addressed about night flying, but perhaps the best approach would be a series of short checklist like tips.

- Plan your flight carefully.
- Go over the route and be familiar with the landmarks that should be visible at night. This is particularly important for the arrival airport. Know what the runway environment will look like, where the city is, and have an idea of what the aerodrome light pattern will be. It will prevent a case of temporary disorientation (a nice term meaning lost).
- Check the AIM and NOTAMS for status of approach and lighting aids at destination.
- Make sure your flashlight works.
- Check out the electrical system in your aircraft. Test both the interior and exterior lights. A blacked out approach to a strange field is a thrilling, but rather unpleasant experience.
- FILE A FLIGHT PLAN. (Don't forget to close it after landing).
- Ask for radar flight following if you're VFR. In the terminal areas ask for Stage II or III service or a radar monitored approach.
- Practice night flying often enough to maintain some proficiency in night landings.
- Have an enjoyable flight. ★

"FLYING SAFETY

The perfect end to a

MAJOR JOHN D. WOODRUFF

"AND IN CONCLUSION"

Here we are at SHAKEY 13's briefing, (what a weak call sign). It's a standard mission, the same old low level route we've flown hundreds of times. And, of course, afterwards we'll shoot transition at the home drome.

Yes, yes, I know, the same old standard inspections, and we'll taxi and runup at the same old place. Abort procedures, heck, I know that hasn't changed; I'll just grab a few quick winks (commonly known by aircrews as checking your inner eyelids for holes). Yes, yes, I know the departure well, and the recovery procedures haven't changed either. After all, there are only so many ways to recover at an airfield.

Why are they covering emergency procedures? That's why they have you memorize the boldface. Yes, I know the route well; I could fly it blindfolded after the several hundred times I've flown it. The times, locations, headings, and altitudes are all canned. Why do they rebrief this crap? Obstacles and terrain en route . . . I bet they haven't moved any of those mountains lately. Listen to this. Just as I thought, he didn't brief that new TV tower I saw them building last week. Boy, these guys never get the word.

The weather? Sure . . . same as always . . . clear and a million. Why are they briefing alternate airfields? I'm coming home if I have a problem. My wife would kill me if I spent another night out on the road. No new frequencies . . . you'd think they would at least change the radio frequencies every once in a while. And that stupid IFF, only lead has to know that stuff. Everyone else will be squawking standby. Look here, it's those intell weenies again. Time to check my eyelids; you can learn more in *US News and World Report.*

Boy, here's the biggest joke of all—the flying safety officer. And in conclusion . . . "Remember that flying safety is paramount." HA . . . HA . . . HA, is that not the standard ending to all our briefings. What a joke . . . we're all professionals . . . who needs to remind me to fly safe? Why, I'm the safest guy in the Air Force. Remember . . . it's a good landing if you can walk away from it. "Flying safety is paramount" . . . what a joke!

"FLIPPANT ATTITUDES"

How many times have you sat through a briefing and had some or all of the same thoughts cross your mind? Never, I'm sure! Why, they couldn't be talking to me . . . they must be talking to Tom or Joe or one of the new guys. It's

IS PARAMOUNT"

perfect briefing

Directorate of Aerospace Safety

new to them. I've done all this at least a hundred times. And then, there's that comment about flying safe. What a cop out. They say it every time. I know they only say it because they have to . . . it's in a regulation somewhere . . . it's tradition. Besides, I'm gonna get the mission done no matter what. Who needs to remind me to fly safe?

"THE TEXTBOOK ANSWER"

What is "flying safety?" One definition is that flying safety is "the coordinated effort to assure safety of aircraft in flight or in operations directly connected with flight." The safety philosophy evolved out of a needless waste of human and material resources. The safety program is required by public law, and its primary thrust is the prevention of aircraft accidents and the extension of combat potential through resource conservation. Flying safety has many facets: hardware, tasks, attitudes, actions. Awareness of safety is everyone's business. Safety ties all the facets of operations, maintenance, and logistics together.

"THE REAL MEANING"

Let's return to SHAKEY 13's briefing. Really, safety was addressed throughout the briefing. It might not have been labeled as such or maybe we didn't recognize it; but it was there. Why do we have briefings in the first place? Aren't they to inform us of what we are to be doing . . . so we all do the same thing, at the same time, and in the same way. We might think of this as standardization, but doesn't it fall under a higher order "of a coordinated effort to assure safety?" The overriding concern of standardization is safety!

Through the format of a mission briefing, we address safety in its most practical sense. The operations, navigation, weather, communications, and intelligence inputs all address the safety implications of the mission. How safe would our mission be if we all flew our own SID, used a different radio frequency, ignored the terrain and obstacles en route, didn't pay attention to the weather forecast, and all used different procedures.

"THINK ABOUT IT"

The next time you sit down in a mission briefing, think of the relation of all the items covered in the briefing to safety. In some way they all tie in to our flying a safe mission. You and your machine are a scarce and valuable resource. Everything you do—ground training, simulator, written exams, checkrides, mission briefings—is preparing you to fly safely. Flying safety is not a cop out. It brings it all together. ★

Mail & Miscellaneous

Send your ideas, comments, and questions to:
Editor, Aerospace Magazine
Norton, AFB, CA 92409

WHAT EVER HAPPENED TO HANGAR FLYING

Reference subject article. Major Woodruff basically answered his question in his second paragraph if he had just thought about it. I will agree that hangar flying is a super learning experience but it takes time. For the past three years, I have worked as both a flight and academic instructor in TAC. During that period, time has been a premium between student and IP and I would assume it to be the same in an operational squadron. Lack of experienced pilots has forced our student to instructor ratio to about 2 to 1 or 3 to 1 at times. IPs are flying twice a day (10-12 hrs) and student flying once, going to class for 2-4 hours, and simulator, not to mention additional duties. There is no such thing as an instructor with a "free couple of hours" for a "Hangar Flying Session." When we cut money we always cut people and when people are cut the best means of teaching go down the drain.

That is "WHAT HAPPENED TO HANGAR FLYING."

EDWIN C. DENHAM, Captain, USAF
58TTS Instrument Instructor
Luke AFB AZ

HOW LOW CAN YOU GO?

Major Mike Reavey's article "How Low Can You Go?" in Sept 1977 issue was a good mental exercise for me in that it caused my mark one computer to register everything from excitement to total dismay.

The real lesson to be gained from SEA (not to forget Korea, six day, etc.) is that we will need a full bag of tricks when it's our turn at bat again. The low high low profile has its place but it's a lot like caviar, in that it can get pretty damn salty if served a la carte. It needs to be on a nice big silver platter with a lot of alternatives. And lest we get too locked onto the SAM threat, we should remember that there are a lot of other things that can eat you alive right above the tree tops. (Subjective opinion developed by author Circa, 27 July 1965.)

The actual training tips described in the article were presented well (except for the last one). It's a lot like firing on the dart, it's high performance work that helps one to know what is meant by true feather edge flying. So much for your accolades—now let's look at that last sentence once again "P.S. Trim Nose up." ??

Could I have been wrong all these years? Or was I just afraid to push down on a stick that is already close to full forward at 500 knots plus? Any reader that has ever lived through one of the famous 105 roller coaster rides will tell you that full forward trim is the only answer for total and positive control. Airplanes, control sticks and pilots' hands are all designed for pulling, not pushing. Over!!

ROBERT B. PURCELL, Colonel, USAF
Asst Dep Comdr for Maintenance
7th Bombardment Wing
Carswell AFB TX

HOW STABLE IS YOUR F/RF-4?

Aerospace Safety magazine, Jul 1977, carried an article on page 13, by Major Paul Tiley, titled "How Stable is your F/RF-4?" According to the story and chart illustrated, the addition of a centerline tank would increase the stability index of the aircraft from 73.8 to 87.4. However, T.O. 1F-4E-5, page 3-34, Note 3, states: fuselage mounted stores are not used in determining airplane stability index.

Could we, in the field have clarification?

JOSEPH Q. ADDAIR, MSgt, USAF
OL B 32TFS Q.C. Technician
APO New York 09292

We referred your letter to the author who provided this reply. Thanks for writing.—Ed.

"MSgt Addair is correct in stating that TO 1F-4E-5, and the pilot's dash one, state that fuselage mounted stores are not used in determining aircraft stability index.

"In the figure used in the article, the difference between a 'typical' F-4E two tank configuration (73.8) and a 'typical' three tank configuration (87.4) is the addition of a travel pod (BLU-27B unfinned). The titling of the configurations was meant to be a general title." ★

NAME THAT PLANE ANSWER

The answers to our questions this month are:

1. 1923
2. 37 hours, 15 minutes
3. In 1929, a Fokker C-2 called "Question Mark" set a new endurance record of over 150 hours. The crew included Major Carl Spaatz, Captain Ira Eaker, and Lieutenant Elwood Quesada.

If you didn't guess, the aircraft are De Havilland DH 4-B's.

PLEASE... SHARE THIS MAGAZINE

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NITED 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.

Lt Col Louis D. Durham

Capt Mark E. Kuno

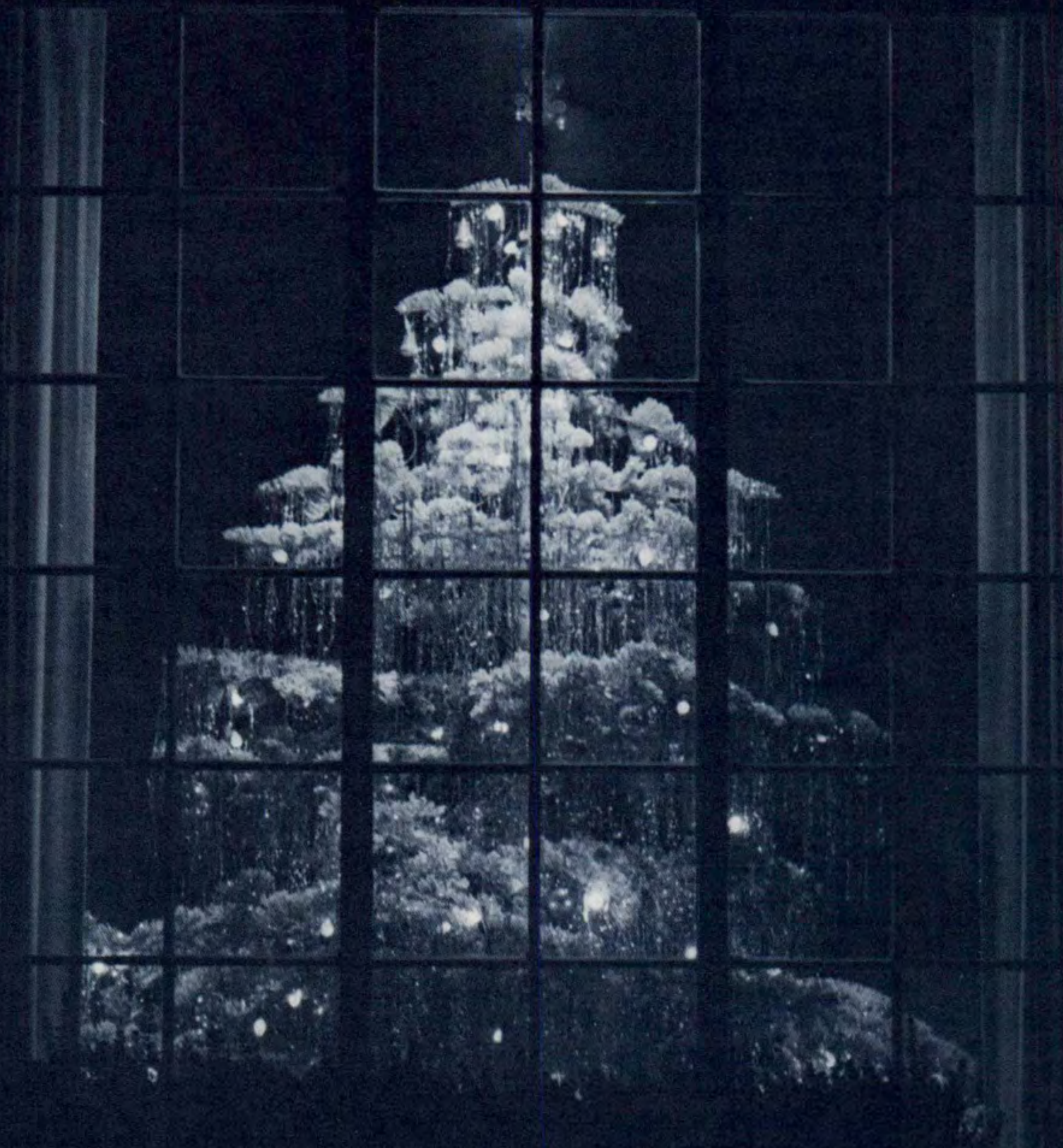
TSgt Raymond A. Verbeck

Sr Amn Clem Collins III

601st Tactical Control Wing

On 3 May 1977, shortly after takeoff on an instrument check flight for Colonel Durham, the second-stage hydraulic system on the CH-53C started to fluctuate 200 to 300 PSI. Moments later, the second-stage hydraulic pressure dropped below 800 PSI (normal pressure is 2600 to 3300 PSI) causing the second-stage servo out caution and pressure lights to illuminate. Captain Kuno, displaying outstanding knowledge of the aircraft systems, realized the fluctuation in the second-stage hydraulic system indicated more serious problems. Requesting and receiving clearance to return to base, Captain Kuno, turning to final, elected to turn off the malfunctioning second-stage system. During final approach, the first-stage hydraulic system pressure fluctuated 400 to 500 PSI and there were uncommanded control inputs. Then the utility hydraulic system began to fluctuate 50 to 100 PSI. Captain Kuno turned the second-stage hydraulic system back on to take advantage of any pressure that might be left in the system. The uncommanded control inputs dampened out except for yaw kicks in the tail rotor pedals. Because of the possibility of uncontrolled flight due to the dual hydraulic system failure, Captain Kuno decided to land immediately. By skillful handling, he landed the aircraft in a field approximately 1½ miles from the runway. Captain Kuno's rapid, accurate analysis of an impending emergency together with the teamwork exhibited by his aircrew reflect the highest standards of performance. WELL DONE! ★

Season's



Greetings