aerospace

SAFETY DECEMBER 1976

'Tis the season to go safely

UNITED STATES AIR FORCE

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

aerospace SAFETY

DECEMBER 1976

THE MISSION - - - - - - SAFELY!

SPECIAL FEATURES

REGULAR FEATURES

CORRECTION

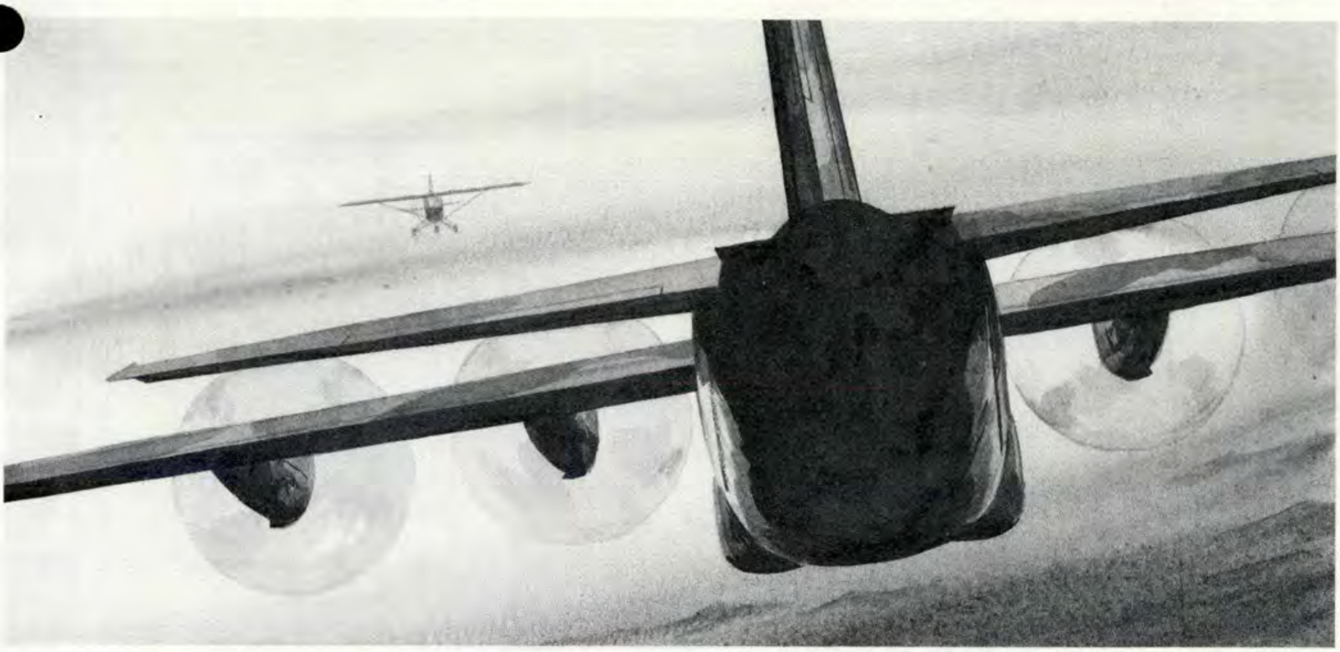
The last sentence of the article "Thunderstorm? Cumulonimbus?" which appeared on page 1 of the September issue should be changed to read: "Aircrews should take the same precautions when briefed about cumulonimbus as they do when briefed about thunderstorms."

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

SUBSCRIPTION—AEROSPACE SAFETY is available on subscription for $10.35 per year domestic; $12.95 foreign; 90¢ per copy, through the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Changes in subscription mailings should be sent to the above address. No back copies of the magazine can be furnished. Use of funds for printing this publication has been approved by Headquarters, United States Air Force, Department of Defense, Washington, D.C. Facts, testimony and conclusions of aircraft accidents printed herein may not be construed as incriminating under Article 31 of the Uniform Code of Military Justice. All names used in accident stories are fictitious. No payment can be made for manuscripts submitted for publication in the Aerospace Safety Magazine. Contributions are welcome as are comments and criticism. Address all correspondence to Editor, Aerospace Safety Magazine, Air Force Inspection and Safety Center, Norton Air Force Base, California, 92409. The Editor reserves the right to make any editorial change in manuscripts which he believes will improve the material without altering the intended meaning. Air Force organizations may reprint articles from AEROSPA[CE] SAFETY without further authorization. Prior to reprinting by non-Air Force organizatio[n] it is requested that the Editor be queried, advising the intended use of material. Su[ch] action will insure complete accuracy of material, amended in light of most recent developments. The contents of this magazine are informative and should not be construed as regulations, technical orders or directives unless so stated.

DECEMBER 1976 AFRP 127-2 VOLUME 32 NUMBER 12

Be Where You Say You Are



CAPTAIN JERRY E. WALKER • 86th Flying Training Squadron • Laughlin AFB TX

Have you ever fudged a little bit on altitude reports while climbing or descending under Air Traffic Control? Well, if you've done it consider yourself lucky. If you are doing it or considering it, you are endangering yourself and jeopardizing the lives of others. Air Traffic Controllers never ask for altitude reports unless a possible traffic conflict exists. In order to allow for adequate altitude separation, it is imperative that all pilots report positions and altitudes with the utmost accuracy and integrity.

Consider this situation and the pilot's action which caused the situation. A C-130 pilot was holding over an NDB in preparation for an ILS approach. The C-130 was cleared for the approach and the pilot began a descent from 3000 MSL in a procedure turn. While the aircraft was descending to 2100 MSL, the procedure turn completion altitude, a PA 28 Tri-Pacer was transiting the area. The pilot of the light aircraft requested radar advisories and reported that his altitude was 2800 MSL.

Approach Control advised the Tri-Pacer that he had a C-130 5 miles from his position, and the pilot of the Tri-Pacer acknowledged that he had the C-130 in sight. The C-130 pilots were advised of the Tri-Pacer's presence and that the pilot of the Tri-Pacer had the C-130 in sight. The C-130 turned inbound to intercept the localizer course. At this time the C-130 flight crew began looking for the light aircraft.

When the Tri-Pacer was within 600 feet of the C-130 it was spotted in the 12 o'clock position by the Flight Engineer. Both aircraft were at the same altitude 2100 MSL. This altitude was confirmed by the right seat pilot who was administering the left seater an annual instrument evaluation. The C-130 took immediate evasive action and cleared the Tri-Pacer by approximately 300 feet. Luckily, the C-130 was at approach speed and saw the Tri-Pacer in time to avoid a disaster. If the C-130 had been at penetration airspeed, a midair collision probably would have occurred.

This incident could have been prevented if the pilot of the Tri-Pacer had accurately reported his altitude as 2100 MSL. The Tri-Pacer pilot's lack of integrity almost cost his life and possibly the lives of the C-130 aircrew. We military pilots certainly fly aircraft with higher airspeeds; and the potential for midair collisions is steadily increasing. The new altitude encoding altimeters relieve us from the need to report altitudes in most cases. Needless to say, equipment will fail and situations will arise in which accurate reports will be necessary. Our integrity must certainly match the highest of professional standards and we must continue to watch for the other guy. ★

1976
DECEMBER
S M T W T F S
1 2 3 4
5 6 7 8 9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30 31
DESTINATIONS
FLIGHT CREW CHECKLISTS
HOW TO FLY
XSC-1
XSC-1
baer

"If Santa Claus Can Do It..."

MAJOR JACK SPEY
475th Air Base Wing

For years around Christmas time I've wondered how Santa Claus managed to fly an overloaded sleigh and nine unruly reindeer from house-to-house, accident-free, or at least nonreportable, and circumnavigate the globe at 900 kts plus; and doing all this reportedly without practice flights, route checks, or any preflight planning that pilots perform routinely.

This year, my curiosity being even more aroused, I asked John, an intel friend of mine, to help me determine if Santa in fact flew any local transition flights around the Pole. Did he have any mock-up rooftops built for touch and go's? Was he flying the route at other times of the year and using sophisticated jamming gear to fly undetected? John, having little else to do (John's a specialist on Liechtenstein) leaped at the challenge, and a large scale effort was launched. Using all possible means of collection and analysis, John soon assured me that Santa flies no locals, the reindeer are barned for 363 days each year, the sleigh is hangared for the same period and Santa spends the year making toys.

"Making toys! Huh. Even Santa has additional duties? How does he stay current?"

John, my intel type, went on to say that at 10 p.m. each night, before retiring, Santa was observed sitting quietly alone in front of the fire, and apparently, just meditating. He makes no sound or lip movement so the Bug and TV implants can shed no light on Santa's thoughts.

After John's report, I was still faced with a quandary. How was Santa Claus, who's primary job was making toys, with an additional duty of flying (and only once a year at that), able to perform flawlessly each year under the most difficult conditions?

My mind was unable to think anymore so I put the whole problem aside. Anyway, I had mountains of paperwork to attend to before Christmas, and I was scheduled to fly the next day.

The next day, the 22nd of December, I was to fly the southbound courier, RON, and return on the 23rd. No sweat! A cold front had passed through the Washington area on the night of the 21st so the weather for the flight was clear and a million.

That morning it was Field Grade Weather—a clear, cloudless winter sky. The preflight was routine, the takeoff smooth, and the southbound leg was effortless. After landing, however, the Red Cap Oil sample revealed that the left engine had to be changed. The turbine oil assayed higher than the ore from the Old Glory Mine in Virginia City. And I was about to miss Christmas!

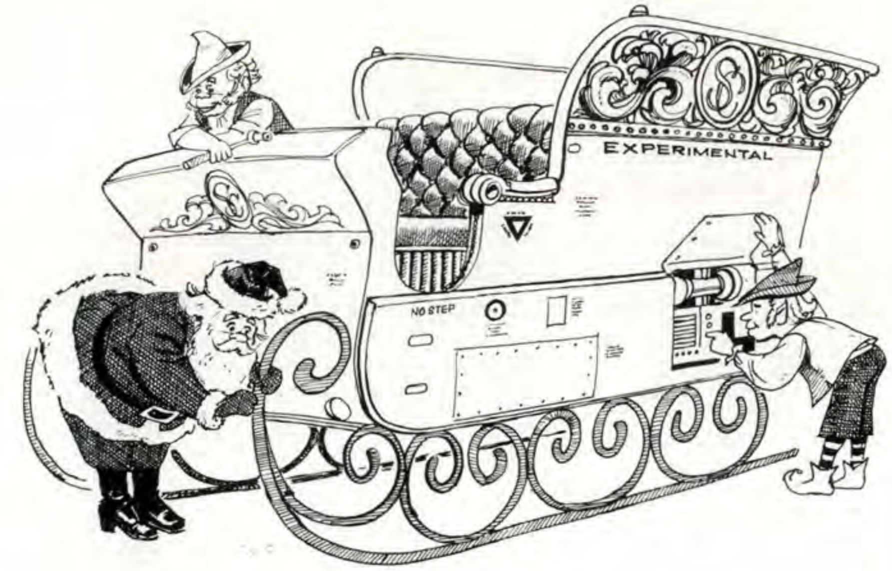
The 23rd was spent killing time while the engine was being changed. You know the type of day: the club for breakfast, the BX, and a golf game with Mike, the Director of Ops. He's a classmate and we're both Rippy Eight.

On the 24th, Capt Jim Russell, my copilot, and I took off for home. But during the delay for the engine change, a low pressure system moved in and had covered Home Plate with snow. And my desk, by this time, would be equally smothered in paperwork, and there was still the unsolved question concerning Santa Claus.

The flight home on Christmas Eve was great until crossing Richmond VORTAC where we caught up with the weather. You guessed it! A good old low pressure area to descend through, with 400 overcast, snow, and 1½ miles visibility awaiting us. (ATIS revealed that the RCR machine engaged the barrier at 30 kts.) As we were handed off to Approach Control, wouldn't you know it—the left generator blew.

At this point, all I'm concerned about is Christmas presents, an overgrossed in-basket, shoveling the sidewalk, and the $64 I lost to Mike playing golf, in addition to the generator light, low vis, and RCR. I remember mumbling something like: "Jim, check that generator and get out the checklist." And I recall slowly fading behind the Saberliner's problem as she sliced toward home. I also remember telling myself, "you can handle this airplane," while slowly drifting farther and farther behind the problem.

Walking toward the car, I complimented Jim for his handling of the emergency and the assistance



he gave me during the approach and landing. As we parted, I recall thinking how far behind the aircraft I had fallen due to forgotten knowledge and a mind full of other matters. I'm glad Jim was aboard.

Christmas Eve was wonderful. Marilyn and the children were jubilant that Dad had made it home in time. As I settled into bed, the phone rang. It was John at the Intel Shop.

"Sir, I'm sorry to bother you but I thought you might like to have our latest on the Santa Claus operation."

"Yeah, John, go ahead."

"OK, sir. Starting the evening of 21 December, Santa spent four hours in what appeared to be flight planning. He had all sorts of charts laid out, and maps covered the floor. He worked till 0200. On 22 December, starting at 1800, Santa went through the same routine and finished work at 0130. On 23 December, at 0700 Santa personally inspected the sleigh, survival gear, and chute. He finished preflight at 1030 and spent the rest of the day going over maps and weather charts. He worked till 0030.

This morning Santa awoke at 1100. He supervised the harnessing of the reindeer. At 1400, he ate a large high-protein, low-residue meal. But then we lost contact with the Bugs and sensors due to problems with the satellite.

"In conclusion, sir, Santa spent 29 hours in intensive preflight planning, and personally conducted a comprehensive preflight inspection. For 4 full days his total mental effort seems to have been directed towards tonight's flight. Any questions, sir?"

"No, John, but I sure appreciate all you've done. I've learned all I need to know. Thanks again, and have a merry Christmas and a safe New Year."

"You're welcome, sir. Merry Christmas." ★

Making The

MAJOR PHILIP M. McATEE
Directorate of
Aerospace Safety

When was the last time you stopped by the comm shop to talk with the technician who is working on that intermittent UHF you wrote up? Or did you go over and see how the flight control team is coming with troubleshooting that roll problem you had with 795 yesterday?

What we're talking about is you (the crew member) getting to know the maintenance people and helping them to help you. Now I realize I'm not talking to all crew members; many of you enjoy excellent rapport with the maintenance troops.

Remember when we used to have squadron concept of maintenance for the fighters or when you airlift folks were on the road with a maintenance team, and the excellent maintenance support you received? Why do you think that was so? It was because the maintenance folks felt a part of the operation. They could see what mission they were supporting. Union cards went out the window and everyone pitched in to get the job done. The maintenance people got to know the aircrews and [illegible]e

.Team

versa. Also, they saw that they were important to the big picture.

Now we know that it takes more people to run squadron maintenance. In these days of budget cuts we no longer can afford it. But what happens to these same maintenance men and women when they are back at their home bases absorbed in the big AMS, FMS, MMS and OMS squadrons? Too often the rapport is lost. The maintenance folks are doing the same job but now they have lost their identity as a part of the team.

Aircrews go their way and the maintenance types go theirs.

Everyone likes to have other people take an interest in his job and that goes doubly for the in-shop specialist. At least the line crew chiefs have involvement with the flight crews, but the in-shop repair specialist rarely see the crews at all, just their write-ups. They lose a sense of belonging to "the team."

Now there are many ways a unit can stimulate this rapport and feeling of involvement. In one unit the crew members were assigned as advisors to each shop in the maintenance complex. These crew members acted as a "big brother" to the people assigned to that shop. They would visit the shop frequently and brief what was going on and the operational results from their side of the house. They would answer questions, discuss mutual problems and, in general, serve as a go-between and feedback loop between ops and that shop.

I really don't feel that such a formal program is necessary. It is just as effective for crews to stop in the shop and talk about what was done on a particular job or how a really difficult write-up is coming. The few minutes spent in these visits give the maintenance folks a tremendous boost and increased dedication because **you** are interested in their work.

This doesn't take a lot of time. Simply following up on your write-ups will probably give you quite a bit of maintenance exposure. Not only are you increasing the morale of the support folks, but you can also greatly increase your knowledge and understanding of your aircraft, its equipment and what makes the whole thing tick. And that's good. ★

THE

REX RILEY *Transient Services Award*

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

OPS TOPICS

PUT ON YOUR MASK

A T-33 was on a navigation proficiency flight at FL 370 when the backseater told the pilot he was going to remove his oxygen mask to blow his nose. Approximately two minutes later, the pilot was unable to get the backseater to respond to intercom. The pilot saw that the backseater's mask was still removed and he was looking dazed. The pilot told him to put his mask on. Receiving no response, he declared an emergency, descended, and diverted to the nearest Air Force base. The cabin altitude prior to descent was 23,000 feet. Later, fully recovered on the ground, the backseater said that he took his mask off to blow his nose, then noticed that he had dropped his pencil. He recovered his pencil, then decided to fill out the form 70, still with mask off. He remembers looking out, thinking how nice it was and how relaxed he felt. He heard the pilot talking to him; but he couldn't concentrate on what he was being asked to do.

IT WAS JUST A BAD DAY

The engine start and ground checks were completed normally and the F-4 was ready to taxi when the WSO told the pilot that there was heavy blue smoke billowing from around the rudder pedals. The IP in the front seat ordered ground egress, shut down the engines and climbed out. The WSO made an emergency ground egress and fractured his heel when he jumped to the ground.

This was the WSO's second ride in the F-4. Maintenance could find no malfunctions and the most probable explanation is fog from the air conditioning vents.

A SLIP FROM THE SWITCH

As the THUD jock completed his before taxi checklist, he checked the landing gear downlock override switch with his thumb while holding the landing gear handle down with his other fingers. There would have been no problem except that one finger slipped off the gear handle and actuated the arresting hook switch. In one sense this pilot is lucky. The external stores jettison switch is in the same area. He could have hit that instead. The check the pilot was performing is no longer in the pilot's checklist (for some fairly good reasons).

TRANSIENTS—BE ALERT

A southern base has reported serious problems with transient aircraft. This base has been forced to curtail transient maintenance operating hours because of reduced manpower. The new hours have been published in the NOTAMs but aircraft continue to arrive outside the transient services operating hours.

While this is a problem in itself, there are more serious aspects. These include attempts at unassisted taxiing, parking, and even servicing by aircrews. Granted, many crews are qualified to perform these functions, but the violations that have occurred have the potential for disaster. There is no excuse for marshalling an aircraft at night without lighted wands, no fire guards for start or performing maintenance during refueling.

No aircraft commander should tolerate such practices around his aircraft. And as a footnote: One of the things you certify when you sign that DD-175 is that your base of intended landing has appropriate *maintenance support to safely complete the mission.*

OPS TOPICS

RECIPE FOR A TAXI ACCIDENT

First, have civil engineers work on the parallel taxiway using barricades to mark the work area. Add some confusion between CE, Base Ops, and tower about just where this construction is located. Then make sure that the barricades used are white and position them on the white painted area of the taxiway.

Once this is ready, take an A-7 pilot taxiing in from a mission. Make sure the HUD combining glass is fogged over, and have the pilot more concerned about locating his parking space than clearing the area immediately in front of his aircraft. Result: one SLUF with a slightly bent nose.

NEW PIREP FORMAT

A new nationwide standardized PIREP format was implemented October 15 by the Federal Aviation Administration, National Weather Service and Department of Defense. When pilots make in-flight weather reports, however, they need not follow the new format. The information they transmit to FAA air traffic and flight service facilities is encoded into the format by ground personnel. After becoming familiar with the format, pilots may want to use it when making reports in order to pass the information along more expeditiously and efficiently.

Under the standardized format, a PIREP will be identified by the letters UA at the beginning of the report. The order in which the data will be encoded is:

OV (location); FL (flight level); TP (type of aircraft);
SK (sky cover); TA (temperature); WV (winds);
TB (turbulence); IC (icing); RM (remarks).

HOW TO ZAP TA

see correction page 28 Feb '77 issue

After the RF-4 landed the pilot did not jettison the drag chute and he did not release it after shutting down the engines in the transient parking area. The crew then left the aircraft *but did not install the canopy initiator pin.* When TA tried to remove the drag chute they discovered it was still installed. A technician climbed up and reached into the cockpit to jettison the chute. Unfortunately, he grabbed the wrong handle and jettisoned the canopy. While obviously the technician was wrong, the aircrew did not help much. It is bad enough to be lax with after-landing procedures at home drome where everyone knows the aircraft, but at other bases where people don't know your airplane as well, you *have* to be sure everything is done correctly, or else . . . .

AERO CLUB ACCIDENTS

There has been an alarming number of Aero Club accidents this year. There are no surprises in the cause factors:

- Flight below authorized terrain clearance limits.
- Loss of control during landing.
- Fuel starvation.
- Inadequate knowledge of aircraft systems and emergency procedures.
- Inadequate pilot checkout and familiarization in a new aircraft.
- Failure to comply with FAA aircraft inspection directives.

In every case the accidents could have been prevented by a more professional, disciplined approach to flying activities. Flying general aviation aircraft requires the same attention to detail as flying a military aircraft.

OPS TOPICS

BAD DAY ALL AROUND!

The right throttle of the F-4 became stiff just after takeoff. With the right throttle still set at mil power, the rpm rolled back to 80 percent. The pilot retarded the throttle to idle; and the rpm stabilized there. Since everything seemed to be working, the throttle was advanced to mil again. The engine responded normally but a "check hydraulic gauges" light came on and utility hydraulic pressure dropped to 1000 psi. An attempt was made to lower the gear but only the nose gear came down and locked. All three gear indicated down and locked when the emergency system was used. Next, the right generator failed. The right engine was operating normally at that time, but shortly thereafter the throttle again stuck at about 99-100 percent. The throttle finally came loose but the engine would not reduce below 95 percent. The pilot planned an approach end engagement, lowered the hook, and used the emergency system to blow the flaps down. The touchdown was good, about 800 feet short of the cable. Unfortunately, the hook did not engage. The emergency brakes were activated and a successful engagement was made at the departure end. Neither the throttle nor the engine master had any effect when the pilot tried to shut down the right engine. Engine shop technicians shut down the engine by disconnecting the throttle linkage and manually moving the throttle linkage arm to cut off. The cause of this mass of problems was a bleed air duct failure which allowed hot air to damage the throttle linkage, wire bundles, and hydraulic lines in the right engine bay.

BLACK HOLE

A C-9 approaching an East Coast air station late on a particularly dark and hazy evening was advised that the field was VFR and to expect to land on the short runway (6000 feet) because the main instrument runway (7000 feet) was closed for resurfacing. As the aircraft crossed the 5-mile DME point, Approach Control advised that the main runway had just been opened to traffic. With the winds light and variable, the aircraft commander elected to use it.

Due to the last minute runway change, the aircraft arrived on final approach slightly high and fast. Corrections were made and the aircraft crossed the threshold at the desired height and speed. As the pilot began to rotate into the flare, with all four landing lights illuminated, he suddenly realized that the runway surface was totally invisible. A fresh coat of black asphalt had been laid and runway markings had not yet been painted. The blackness of the new surface, immersed in a totally black background obliterated all visual reference to the ground. Aircraft height and pitch references were lost. As the aircraft commander began to initiate a go-around, the aircraft touched the invisible surface, and the landing was completed without further incident.

A pilot has to experience an event only once to realize how much he depends on runway markings to judge height and pitch attitude. In this case, no NOTAM had been issued due to lack of a standard NOTAM code for runway markings. The operations duty officer, not being an aviator, had no knowledge and little understanding of the hazard. Of course, steps were taken to properly advise subsequent arriving night flights of the hidden hazard. From NAVSAFECEN Summary 37-76 ★

Winter Flying... Seasonal Work

CAPTAIN JOHN E. RICHARDSON
Directorate of Aerospace Safety

Winter brings both good and bad news for pilots. First the good news: Southern California is less smoggy, and you no longer have to achieve earth escape velocity to top the thunderstorms in Texas and Oklahoma.

Despite those helpful items, for most of us, winter has much more bad news than good. Of course, if you happen to be stationed at Kincheloe or Elmendorf, you have long since checked out on winter flying. But the rest of us do need a refresher on winter.

Let's start with the airplane. When was the last time you looked back in that section of the Dash One on cold weather operations? Many aircraft have special procedures for operating in cold weather. For example, some engines and instruments must be warmed up before operation. Batteries that are not in good shape may totally give up when the temperature gets in the minus category. This, combined with leaking seals and stuck actuators, can be very frustrating.

One of the nice things about winter flying is the increased thrust your engines develop in cold weather. Gone are those long adrenalin producing takeoff rolls. Yet, this is a mixed blessing. If you are not prepared, the additional thrust can produce unusual pitch angles and the more rapid acceleration can overspeed gear and flaps.

Finally, a note on ice and deicing. If you have your aircraft deiced, be sure that fluid has not drained into the flight control areas where it can freeze. Many aircraft have special procedures for deicing. Have the maintenance people at your base show you.

The airplane is important, winter or summer, but no matter how good the airplane, the pilot must be prepared also. How long has it been since you really did any serious instrument practice. Flying a super GCA in CAVU "field grade" weather is no sweat. Could you do it as well in 200 and ½? A smart pilot gets ready for winter by reviewing AFM 51-37 procedures and then by getting in some simulator practice. Not everything you need for winter flying can be practiced in the simulator. Short final at night is no time to review your wet/slippery runway procedures.

Once you get yourself and your airplane in shape you still have one more problem—the weather. You don't have to be stationed at Minot to be concerned about snow and ice. Suppose you plan a cross country from Bergstrom to George. If you take a look at the map you will see that you fly over some of the most rugged terrain in the United States. It gets quite cold at 10,000 feet in the Sangre de Christo mountains. Although the chance of an ejection or forced landing is remote, you should plan and dress for the eventuality. Another practical aspect of dress is the possibility of diversion. It is unpleasant to land at Buckley with only a summer flight suit when the chill factor is minus 40°.

Although the thunderstorms are gone, weather is still a problem. The jet stream is stronger and farther south. It is not unusual to find 100 knot winds at cruise altitude. This can significantly change fuel planning figures. You can avoid embarrassment by checking the winds aloft before you go. (Speaking of winds—they can also be a problem at the surface in some areas.) Winter is the time of the mountain waves. The turbulence associated with that phenomenon is extremely dangerous.

The real secret to successful winter flying is planning. If you have carefully preplanned your mission, and considered the possibilities and problems you won't be surprised by an unexpected turn of events. Planning is even more important now when we get fewer hours and less experience. With your help the Air Force can enjoy an accident-free winter flying season. ★

LEARNING BY DOING

CAPTAIN ROBERT M. HAIL, 28 BMW, Ellsworth AFB SD

During the years of 1968 and 1969 the war in Southeast Asia was at its peak. The Air Force needed many pilots to sustain its offensive and defensive corps of pilots. In this era is when the FAIP (First Assigned Instructor Pilot) truly came into his own. "Experienced" pilots were used, for the most part, as the firstline pilots. But, someone had to train the pilot of the future, the UPT student. This is where the FAIP comes into the picture. A FAIP in general terms was a good stick and rudder man, had a degree of good judgment, and was basically thought of as an adequate, but yet to be proven, IP (instructor pilot).

My story starts in the fall of 1969. I entered UPT at Randolph AFB, TX. The year proceeded as a normal UPT year, long hours, hurry up and wait, pressure to excel, and to "fly and fight and don't forget it."

I had no difficulty at all in the flying phases of training. For that reason, I finished in the upper part of my class. I received my orders to Pilot Instructor Training TDY enroute to my permanent duty station, and obtained 65 hours of flight time plus the usual academics. They put you in the instructor's seat and taught you how to fly from there. A few techniques, a few "watch out for's," several check rides to ensure proficiency, and presto—a new instructor.

I reported to my PCS base with less than 300 hours total flying time. I was given, as are all new IPs, several orientation rides in different phases of instruction, to ensure that I had had adequate training and was ready to assume my role in the instructor force.

You then are assigned to a flight. The students in the flight are senior and in the last phases of the course, if at all possible.

Your student pilots are average or above, to allow you to build up the needed experience with the least amount of close calls. These close calls can be with the ground or other aircraft by allowing the student to fly beyond his abilities, and maybe yours.

Now I am ready, I've had all the training, the orientations and a few student rides. I want to be a good IP, therefore I explain maneuvers to the student flying and try not to keep my hands and too much pressure on the stick.

AN AEROSPACE SAFETY I WAS THERE

I have been an IP for almost three weeks now. We are in the four-ship formation phase. It is early in the phase, about the fourth ride and my student would like to take some movies of the flight for future references and for retrospect. I agreed to allow the movies and we briefed on when and where he is to take them and the proper procedures we will use to exchange aircraft control. We then met with the other three IPs and their students. The flight was briefed per the checklist and everything was normal. Since I was the newest IP and my student was only average, we were assigned the nr four position.

The atmosphere was good, it was the last flight of the day for all of us. With an instructor in each of the aircraft, we could get some good "work" done.

Takeoff was normal and the formation proceeded to the area for wing work and rejoin practice. My student was taking movies intermittently throughout the climb, level off, and some wing work.

I was flying well so the student could see where the position to be flown was and how the formation worked as one.

After the student had finished taking movies, I told him to stow his camera. I repeated myself three or four times to ensure it was secured and would not interfere with the controls. This action was very important for me in the accident investigation.

Once I was content with his stowing of the camera, we exchanged control of the aircraft. The student flew 5 to 10 minutes and was doing fairly well staying in position. We were now doing wing work, climbing and descending turns. A shallow descending right turn was transitioning to a shallow left descending turn when it happened.

Number three was riding high on the lead aircraft and my student was riding high on number three. I had been trying to get him to push forward on the stick to get down. This pushing forward seems very out of place when first learning to fly formation. When the left turn was indicated, number three popped up high and my student followed his lead. All of a sudden, the four ship was out of his sight. I could see them just over the canopy rail. I took the aircraft and corrected. The combination of our being high, requiring less than one "G" to recover and the formation descending to the left, gave sufficient G to dislodge the student's camera. The camera, which had been stowed between his legs instead of his side pockets or the map case, "floated" up and struck the canopy.

The canopy failed and plexiglass "exploded" outward. The front canopy had only about 15 square inches left intact. I broke away from the formation and called "out." At this time I was pushing on the stick to increase our rate of descent. We had been at 18,000 ft before the decompression and I wanted to get the aircraft to 10,000 ft quickly.

I recovered to level flight and was heading back to base when the right engine failed. The noise was tremendous. I could hardly talk to my student in the front seat, let alone over the radios. I told him to run his seat full down and keep his hands on his lap to keep them out of the airstream. I called "in the blind" that I was returning to base, that I had lost an engine, and that my pitot static instruments were erratic, because of the loss of pressurization.

Number three saw us and tried to rejoin. After making one pass he rejoined. I could hear and talk enough to explain my emergency and told him to lead back because of my poor communications and instrument readings.

I returned to base, made an uneventful landing, and had the honor of being met at the end of the runway by the wing commander. Earlier that day he had given us his "glad to be here at my new base and take command speech."

SECONDARY EMERGENCY—STRESSES

After the explosion of the canopy I reacted as any well-trained pilot. I ensured that I had control of the aircraft, descended because of the decompression, took care of my failed engine, and pointed the aircraft towards home. All of this taking place in a matter of seconds.

Now comes the reaction stresses, or as I call it, the "secondary emergency." Here I am, a second lieutenant, I've been an instructor for 2½ weeks, have just over 300 hours flying time, and now I've broken an aircraft on the wing commander's first day. The only think that could make it worse is if the other engine quits and we have to bail out and lose the aircraft totally.

"I've been an instructor for 2½ weeks, have just over 300 hours flying time, and now I've broken an aircraft on the wing commander's first day."

The mind is a wonderful machine. It can quickly analyze a situation, take proper action and in this case leave you 15 minutes to worry about what they are going to do with you.

I have already had the explosion and reacted, I've lost an engine and descended to reduce decompression effects and get the aircraft flying properly. I am heading towards base with communication problems and instrument fluctuations. I am now following the aircraft who put me into the position which caused the situation. Now I am set. The hardest part is over, or is it? All I have to do now is land. Wrong! Now I have to relive the incident two or three times on the way back, try to fly off of another aircraft, listen to radios as best I can, so if worst come to worst, I can get back without him. I have to figure out position from the field to stay oriented, airspeeds to land at. Of course, the most important problem now is, "what are they going to do to me now?"

By the time I get back to base and land, I've had two PCS moves, an F.E.B. (Flight Evaluation Board) and have ended my career before it has begun. I know that it is always the pilot's fault and if you are training a student "it is" the IPs fault.

At this time, I have recovered from the secondary emergency. I have convinced myself I took care of the emergency properly, I am going to land and save most of the bird, and that is what I practice

emergency procedures for, in case it happens some day. For me it just happened earlier than most.

All of my fears were answered. The wing commander met me at the runway, walked by me to look at the aircraft, and then walked back to ask "What the hell happened?"

As I had assumed, my flying duties were reduced to zero for 3 weeks, with me working in the squadron commander's office on "odd" jobs. After the investigation was all over, they came to me. My squadron commander congratulated me on a fine bit of flying, bringing back the aircraft, but how did I let myself get there in the first place—"Don't you know better?"

A little more residual training and back into the fire I went, a little more experienced.

IDEAS ABOUT FAIPS

Time required FAIPS during the war years. At one time my squadron was 60-65 percent FAIP during 1970-72. Now it is still 55 percent.

The idea of making IPs out of good flying students is valid. But a risk is involved here as anywhere. This risk is putting low time, inexperienced pilots or IPs into a high risk or high exposure repetitive situation.

I do believe that the new man should continue training on the job—buddy IP flights, etc. The more time and experience he can obtain, the better he will be.

Now that there is no great demand for FAIPS, the number should go down. Let him go out into the real world and get his experience.

I do believe, in my case, that the experience I gained as a young IP made me more aware. I could relate better to the student because we weren't far apart in years and our experiences were similar. I was a buffer between the SEA returnees and the students, trying to keep both perspectives in the real world.

There will be FAIPS who have adjusted and have earned their way; also some weak ones. We have to help as best we can with their shortcomings. Together, maybe we can all fly well and safely through the total effort. ★

SITUATION AWARENESS One key to safety

CAPTAIN LARRY KANASTER, Kunsan AB Korea

Situation awareness on the part of individuals can play a major role in decreasing accidents and accident potential. All accidents are related by one factor—the individual(s) involved was not aware of the potential for the accident or chose to ignore the "warnings" for the accident. This is "situation awareness."

Let's relate this first to flying. All pilots were taught basic aerobatics. Take the aileron roll—few of us would label this maneuver as dangerous (type aircraft not withstanding). We perform such a maneuver with plenty of altitude, airspeed, in VMC conditions, and so forth so that it is a "safe" maneuver; if we dishout or stall, our altitude acts as our safety cushion. Now what if we do the same maneuver immediately after takeoff? Is it still the same "safe" maneuver? The answer is maybe! For example, many flight demonstration team solos have done just such a maneuver routinely with few accidents associated with it. The reason: total situation awareness throughout the maneuver by the pilot on aircraft position, altitude, attitude, and aircrew proficiency.

The maneuver is not *first* practiced after takeoff, it is worked into gradually. It is practiced with plenty of altitude with the pilot getting used to the timing involved and eventually moving down toward the deck. The pilot is comfortable in the execution of the maneuver and can detect and react to unplanned situations with relative ease. His "situation awareness," or in this case "experience," tells him when to roll, how much to roll, how much and when to unload, and so forth. He would know how much of a "dishout" his aircraft will normally give him and how much he can safely accept. He would quickly detect, say, a lack of engine response while still rolling to a "safe" attitude.

Those of us not accustomed to such a maneuver so close to terra firma would naturally be slower to detect and to react to the same situation. For us the maneuver might be called "dangerous." Why? Because we are maneuvering in an area for which we are unsure of our abilities and our aircraft's capabilities. In other words, our situation awareness is lacking throughout the maneuver.

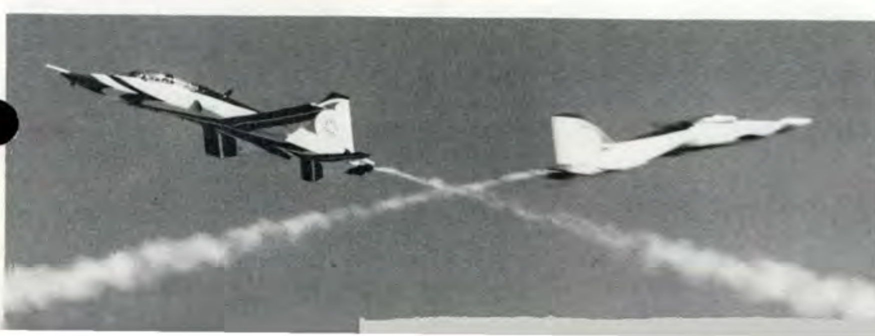
Suppose we decide to fly such a maneuver anyway. I would bet most pilots flying an aircraft capable of such a maneuver could safely accomplish it—assuming everything goes as planned. Supposing it doesn't go as planned—say we experience a flameout or perhaps our stick-and-rudder abilities this particular day are not up to our usual standards—we have no "out," no cushion. Now if we practice the maneuver at altitude, gradually moving lower and getting used to our reactions *and* the aircraft's, the maneuver becomes safer.

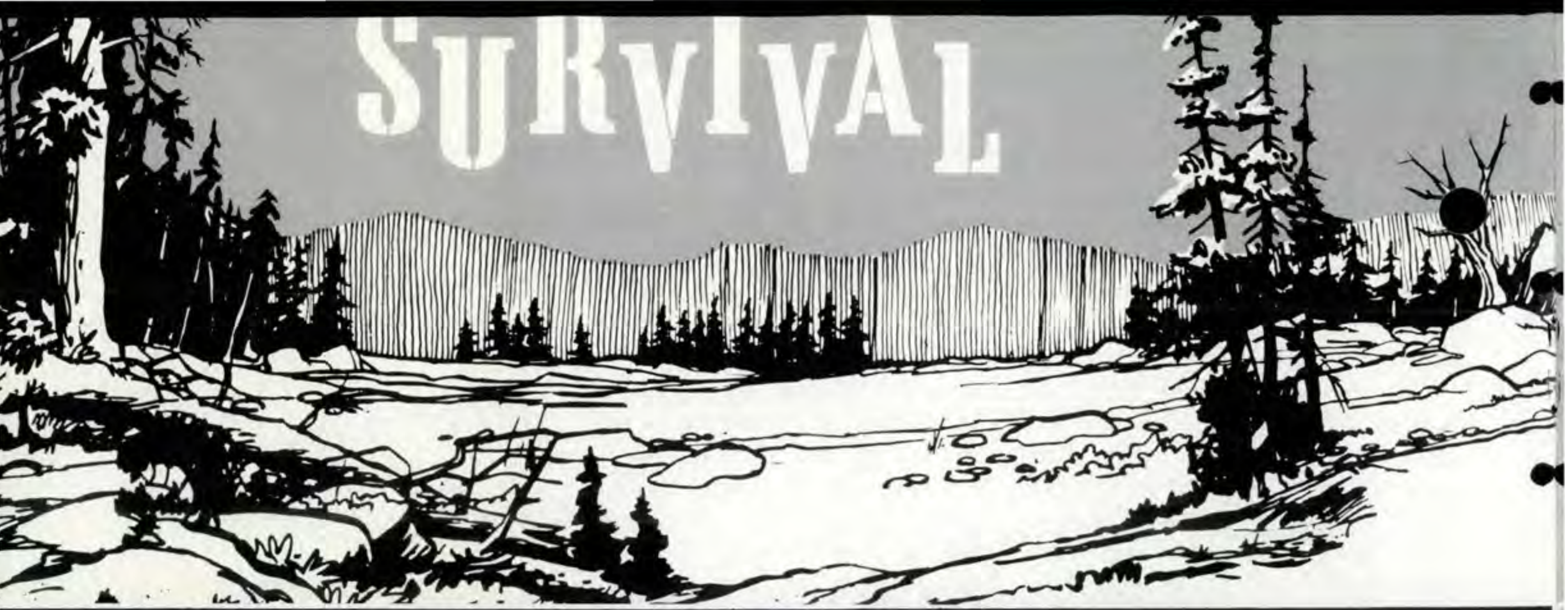
Take another situation—how often have we flown a "lousy" gunnery pass, or loop, or GCA, or just about any maneuver? By "lousy" I don't necessarily mean below "book" standard, but below *our normal* standard. Probably not too often, but often enough. Assuming the aircraft performs as it should, what is the reason? Perhaps it is our proficiency, psychology, crossed biorhythms, or what not, i.e., we're not up to standard at *all* times and in every situation. Thus the "safety pad" comes in! However, we can't always have a pad. For example, an engine failure in an F-100 on takeoff as the gear is coming up leaves little "safety pad" available. We compensate for this by closer attention to engine instruments, emergency procedures, and thoroughly knowing our egress procedures. We know whether we could still land straight ahead or will have to zoom the aircraft and eject. If we land, do we automatically run off the runway or do we go into a barrier? Going off the runway, what might we hit? What barrier is on the departure end and is it set up? Again, *situation awareness.*

Such an example, is or should be, the basis for most all of our training programs. We cannot close our eyes and ears to quoted "dangerous" flying. We must find first the reason why it is dangerous and then either eliminate the maneuver, if it has no potential for us, or train slowly to achieve proficiency in its execution. Proficiency then becomes one of our bywords. But now we have the problem of defining "proficiency."

When is an individual proficient? Is it when our training squares are filled? Is it after 1500 hours in type? Hardly. The answer lies with the individual. Some proficiency is directly related to flight experience—the more times you do it the better you get. But, concurrently, the more times you do it the easier it is to recognize when you are *not* doing it correctly, or when the conditions are such that you probably should not attempt the maneuver at all. This is experience, but a more appropriate term is *situation awareness.* Experience is a term considered as "sometime down the road" by our newer aircrews. After all, how can a second lieutenant or a "slick-winger" be experienced? This is where situation awareness comes in. Instructors, flight leads, old heads—all must talk not merely the maneuver, i.e., *how* to do it, but also *when* to do it (or more appropriately, when *not* to do it). I do not mean our regulation minimums, for in war there are no "minimums" as such. Sure, we can recognize quite easily when not to attempt a particular maneuver at altitude and in peacetime, whether our concern is actually safety or following regulations. But can we recognize this same thing at lower altitude and in wartime? Maybe. But why not work to change that "maybe" to "probably."

Situation awareness can play a major role in reducing our accidents. As we approach any situation we must be aware of the possibility for success and the penalty for failure. If success is not reached, we must also know our alternatives. The risks, then, are either fully acknowledged and accepted or the maneuver is not attempted. At any rate, *situation awareness* has put us far ahead of the game. ★





red flag

The Captain sat quietly beside his wingman during the debrief. He was reflecting upon the engagements he had had that day. All had not gone well. But, being shot down in a simulated combat situation was handy because he saw his errors and was determined, if jumped again by an aggressor, the tide would turn the other way. For the moment he was relaxing and looking forward to the club, hot shower, and downtown Las Vegas. But his thoughts were interrupted by the voice of roll call and the realization that his name had just been mentioned to be a survivor in the next day's scenario.

With some trepidation, he found the survival team chief to ask about the next day's exercise. The team chief made it sound sweet and simple: "Just show up at 0545 and we'll brief you then, and don't go home with the idea that this exercise is going to be rough. Hopefully you'll enjoy it and learn a great deal."

This scene is repeated daily throughout the Red Flag Exercises at Nellis AFB, Nevada. Det 2, 3636 CCTW, at Nellis is charged with conducting the survival aspects of these exercises. The objectives of the scenarios are to give as many crew members as possible the opportunity to experience an SAR effort first hand, to learn by that experience and sometimes by the mistakes made, and to learn what problems can be expected in a survival situation. These problems will be the primary focus of this article. What we are going to highlight are the recurring mistakes we of Survival have observed at Red Flag in the hopes that all aircrews will heed them and give them some thought.

0545 came early and the Captain showed up for the briefing nervous and wishing he were Blue 4 rather than Survivor 1. The briefings went quickly from the total SAR force to the safety briefing by the insert chopper crew, the insert site selection, and finally the individual survivor briefings.

For the survivor briefing, the Captain and one other survivor were assigned to specific survival instructors and they met to go over the equipment found in their seat kits and to discuss the scenario for the day. The Captain was thoroughly knowledgeable on what each item in his kit was, but a little hazy on just what to do with his URT-33 beacon. When asked what actions he would take with the beacon once on the ground, he stated that he probably would destroy it and bury it. When asked if he was sure about his decision, the Captain had some doubt, but stuck to his guns.

During the scenario briefing he was told that any decision made in the field was his—the instructor was there only to observe and ensure his safety, but he could ask questions and seek advice if necessary. He was, in effect, to pretend that his instructor was not even there and press on as if alone. The instructor would step in and offer instruction or guidance only if it were required to ensure completion of the scenario.

Once the briefings were finished, the Captain gathered his gear and the team proceeded to the insert aircraft. This particular Red Flag exercise was using H-53 Super Jolly Green Giants and the crew chief soon had all their gear stowed and they were ready for takeoff. The flight to the training area was long and boring, but it finally ended with a low-level run-in for insert. The Captain and his instructor deplaned and moved out of the rotor wash. The Jolly departed with a clatter and left a very noticeable silence, but the big green aircraft was soon heard again as it sought the site of its next insert, where the second survivor, his instructor, and a safety observer were to be let out.

The Captain's instructor briefed him on the specifics of his shoot-down; where he landed, what condition he was in (he sustained a painful blow to the right wrist upon impact and couldn't move his fingers) also, the fact that enemy activity was close and had seen his chute. Having no further questions, his instructor simply said "Have at it and good luck."

The first item of business was to dispose of the chute. Along with this, the Captain didn't feel he'd need his raft or some other minor equipment, including the URT-33 beacon. So he decided to bury it all right at the site. The ground was very hard and rocky; his next choice was to carry it with him and discard it along the trail when a better concealment site was located. So, with one good arm he picked up his gear and started moving in the general direction of a likely hiding spot. By now he had wasted a good bit of time at the landing site and was in a hurry to move on. Soon, however, he found it difficult to carry the items he wished to discard and make good time. He picked a spot and again tried to bury the "extra gear." Again, no luck. Finally, frustrated, he started to pile rocks on the equipment to conceal it.

CAPTAIN RONALD E. VIVION
Programs and Current Operations Branch
3636th Combat Crew Training Wing
Fairchild AFB WA

About this time, his instructor stepped up and pointed out a few things. First he had left a very definite set of tracks from the impact point. The ground was hard but the tracks still showed up. Also, by burying his equipment on the trail he was taking precious time, using energy, and worse, definitely convincing the enemy that this was his route of travel. The instructor suggested he just roll up that extra equipment in the brown or green part of the chute and leave it under a bush or rock at the landing site. He further suggested that if he moved carefully and slowly, stepping on rocks or clumps of grass, he wouldn't leave as clear a trail to follow. Thus unburdened, he pressed on.

Once again, he ran into travel problems as he picked the military crest as a travel route—about three-fourths of the way up the ridge line. This route was taught at the Survival School but didn't work well in the desert. It was obvious that there was no vegetation on the hill, so he shifted to a dry creek bed. He was able to use the vegetation and also use terrain masking, thus his route was well concealed.

He found a good hiding spot that was in relatively high terrain and would offer good concealment to the Jolly when he came in to pick him up. His instructor complimented him on his choice of sites and thus bouyed up, he began preparing for rescue. First, he took out his PRC-90 radio and turned it on. Nothing. He couldn't remember if it was supposed to hiss or not, but he assumed that the battery was dead, so he changed it. Still nothing. Suddenly, the cold sweats hit. No radio. Just as suddenly he recalled the URT-33 beacon two miles back under a bush. Now he understood why the instructor had asked that pointed question earlier. His instructor stepped up and discussed the situation and his options — namely the other signaling devices he still had. He got his mirror, flares, gyro jet, even his whistle out and placed them in pockets where they would be easily accessible. Finally, his instructor handed him a spare radio and told him that for training purposes he wanted him to use the radio but in real life he would have been unable to have voice communications with rescue.

Just as he was settling down and enjoying the peace of the area, he heard a jet engine in the distance. Then came the blessed call: "Downed aircrew, this is Sandy Lead . . . over." Establishing contact, he was soon busy, answering Sandy's questions about the area, his condition, known enemy activity, etc. Finally, after three tries, he was able to vector the A-7 directly overhead.

As Sandy departed the area he told the Captain to keep his head down and relax, the Jolly would be there in a couple of minutes. Also, he was given a thorough briefing on how to prepare his smokes and what to do when Jolly came into his area. There followed that interminable wait as the survivor puts all his faith in the SAR forces, hoping and praying they would return.

Shortly after Sandy was out of sight, he spotted a movement on the opposite hillside. He couldn't see for sure who it was but was amazed that at better than half a mile he could hear footsteps, a cough and bits of conversation. Assuming that this was the enemy, he noted their position and route of travel and made ready to warn Jolly when he arrived.

He first spotted the A-7s as they flew cover for the Jolly. Then into the valley came the big green chopper and suddenly things happened fast. The Captain had just given the position of the enemy troops when Sandy called for a mirror flash. He put down his radio and fished out his mirror. Because he was in a bush, he stepped out in the sunlight, then came another transmission, and he had to dive into the bush to answer. Sandy was still calling for mirrors while the Jolly called for a better description of his area and then a hold-down for DF steer. Suddenly, Jolly called for smoke, so once again he set down his radio and grabbed his flare.

The only way he could see to pull the lanyard was with his teeth. But his instructor was quick to point out that by placing a foot on it h could pull it one handed. In all, about 20 seconds passed before he got the MK-13 flare ignited and smoke finally began to rise. But then he noticed that smoke was also coming from the hillside where the enemy was located. He tried to tell Sandy about this but the radio was busy with talk of a bogus smoke and the Sandy rolling in for strafe. He looked up in time to see the A-7 on a strafing pass on his own position.

It took another five minutes to straighten out who was the real survivor. At last, the chopper was overhead, a PJ came down on the penetrator and helped him on. He then rode the penetrator into the aircraft where another PJ started treating his wounded hand. The same scene was then played again as the Jolly located the second survivor and effected another rescue.

Finally, as they prepared to depart for home, both survivors suddenly realized they were very tired but a bunch pleased that they had been snatched out of there.

Back on base, the survival instructor met with the Captain to debrief. His conversation touched on some problems that had been observed—the beacon, disposing of his extra equipment, tracks in the dirt, travel techniques and the use of his signaling devices. The Captain left the briefing much more aware of what it would take to survive that situation and reflecting back, he did enjoy himself.

But what could he have done to prevent all these problems from cropping up? Next month we'll take each of his problems and a few others and discuss the pros and cons of each.

Questions and comments concerning these articles should be addressed to 3636 CCTW/DOO, Fairchild AFB WA 99011 or AUTOVON 352-5470. ★

GOOD SHOW

Major Charles L. Miller, USAF, formerly with Military Airlift Command is now on an exchange posting with the Canadian Armed Forces Air Transport Group here. He was recently awarded a flight safety "Good Show Award" for the incident described below.

Major Miller is shown receiving his award from Colonel John C. Henry, Base Commander, Canadian Forces Base Trenton. The aircraft is a standard Boeing 707 modified for air-to-air refueling from wing tip pods (not installed).

Major Miller was aircraft commander of a CC137 tanker conducting an air-to-air refuelling mission with two CF5 fighters. The mission proceeded uneventfully from home base of the fighters at CFB Bagotville until arrival over Rankin Inlet on the northwestern shore of Hudson's Bay, where the CF5s were to do a photo recce. While deploying the refuelling hoses for a final top-up prior to descent, the starboard boom and hose assembly extended to its maximum with a severe thump. Subsequent attempts to retract the hose were unsuccessful and the assembly remained jammed at approximately 32 ft extension.

The fighters were topped up from the port refuelling pod, carried out their mission and were escorted back to home base using the port pod for en route refuelling. After exhausting all possibilities to retract the boom and hose assembly and verifying the safe handling characteristics of the aircraft at approach speeds, Major Miller and crew flew the tanker to home base and carried out a low approach and overshoot to allow visual examination of the jammed pod by technical personnel.

Maintenance personnel verified that nothing additional could be done to retract the assembly, and emergency vehicles were alerted for the subsequent landing in the event that residual fuel in the hose caught fire. Major Miller landed the aircraft to the right of the runway centreline, allowing the starboard wingtip and refuelling hose to extend over the grass, touching down and stopping so that the hose and refuelling basket did not make contact with any part of the runway. The skillful landing resulted in no damage to the aircraft, refuelling hose assembly, or aerodrome lighting facilities.

Investigation revealed that the hose response strut had failed, causing the drogue assembly to travel unchecked past its limit of travel, damaging and jamming the internal mechanism of the refuelling pod.

Captain W. J. Cross
Canadian Forces Base Trenton
Astra, Ontario ★

THE IFC APPROACH

LOW ALTITUDE WIND SHEAR

In 1975 a Boeing 727 air carrier impacted the ground approximately one-half mile short of Runway 22L at John F. Kennedy (JFK) International Airport. The National Transportation Safety Board determined that, "the probable cause of the accident was the flight's *encounter with wind shears* associated with a very strong thunderstorm located astride the ILS localizer course."

This accident is part of an upward trend in the number of wind shear accidents, both in the departure phase as well as the arrival phase of flight. What is wind shear? It is, very simply, a relatively fast change in wind velocity and/or direction. These changes in velocity and direction may occur in both the horizontal and the vertical planes.

WHAT CAUSES LOW ALTITUDE WIND SHEAR?

The great majority of low altitude wind shear conditions are caused by thunderstorm or frontal activity. Winds associated with thunderstorm activity may be encountered up to 15 miles from the storm and can be very complex. Because of the many variables inherent in thunderstorm-generated wind shears, this article will not attempt to discuss the effects of such wind shear, nor provide guidelines as to what to expect. If such conditions must be encountered, improper anticipation of wind shear effect could add to an already dangerous situation.

The severity of frontal wind shear is dependent on the type of front, temperature change at the surface across the front, and frontal speed. As a general rule, the amount of shear is greater along warm fronts. If the temperature change at the surface is 10 degrees Fahrenheit or more, or the front is moving at 30 knots or more, you should anticipate significant low level wind shear. The best source of information concerning frontal activity is your preflight weather briefing. One other point should be noted. Frontal wind shear will occur *behind a cold front* and *ahead of a warm front*. You should plan your arrival accordingly —be on the ground well *before* cold front passage or well *after* warm front passage.

WIND SHEAR AND AIRCRAFT PERFORMANCE

Before trying to understand what happens to an aircraft as it passes through a wind shear, we should first understand what inertia is and how it comes into play. According to Webster, inertia is "a property of matter by which it will remain at rest, or in uniform motion in the same straight line or direction unless acted upon by some external force." How does this apply to our problem? Applying Webster's definition of inertia, an aircraft flying at a constant *Ground Speed* (GS) will have a tendency to maintain that ground speed until the aircraft is affected by some external force. Note that the inertia of an aircraft is with respect to the earth, not the air mass it is flying through.

Now let's see how a sudden increase of head wind (or decrease of tail wind) affects an aircraft's performance.

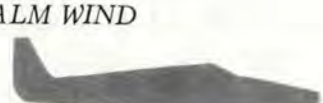


Figure 1a

Flight through calm air mass

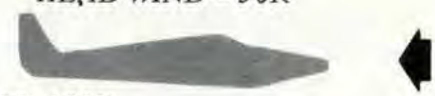


Figure 1b

Instantaneous reaction to sudden HW

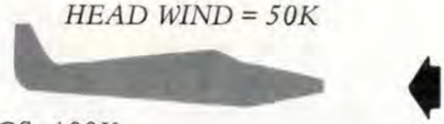


Figure 1c

Indications after a short period of time

Starting with Figure 1a, the aircraft is in stable flight (let's assume Indicated Airspeed (IAS) and True Airspeed (TAS) are the same) in a calm air mass. In Figure 1b, a sudden Head wind (HW) of 50 K is encountered. Because of inertia, the GS tends to remain at 150 K; however, the IAS will show an increase of 50 K (from 150 K to 200 K). If power inputs are not made by the pilot, the aircraft will gradually slow to 150 KIAS again (since the aircraft will seek the airspeed it is trimmed for), resulting in a new GS of 100 K as indicated in Figure 1c. Figure 2 shows the effects of a sudden encounter with a 50 K Tail wind (TW).

Figure 2a

Flight through calm air mass

By the USAF Instrument Flight Center
Randolph AFB, Texas 78148

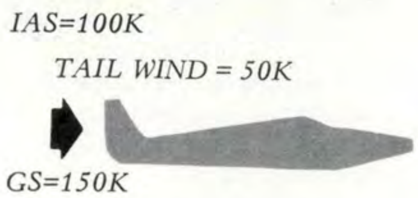


Figure 2b

Instantaneous reaction to sudden TW

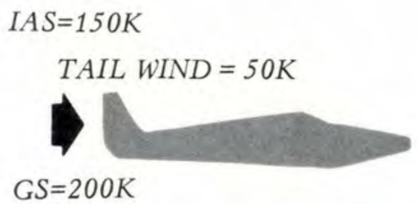


Figure 2c

Indications after a short period of time

Notice the effect that the tail wind has on indicated airspeed in Figure 2b.

In addition to the changes that occur in airspeed and ground speed, wind shear affects aircraft attitude also. In Figure 1b the aircraft experienced an increase of 50 K in IAS. If the pilot did not apply any force to the controls, the aircraft would pitch up (See Figure 3).

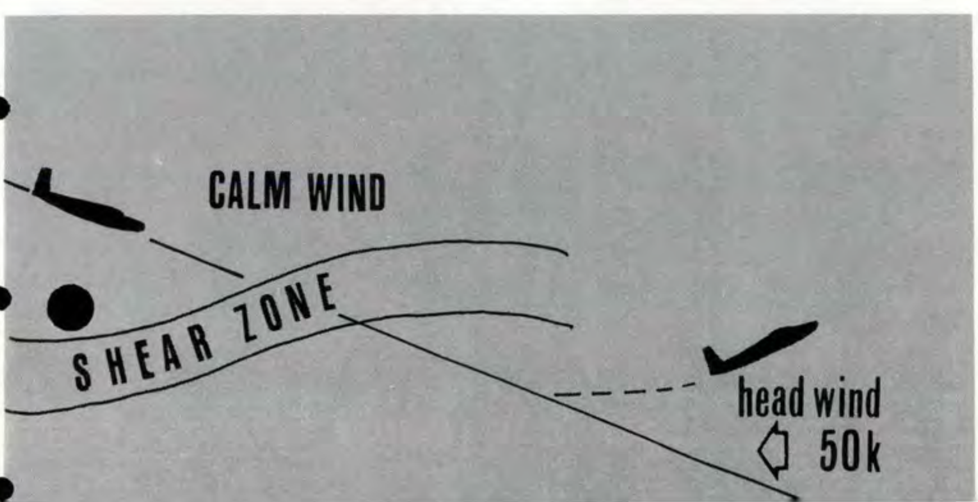
How would you expect an aircraft to react if a tail wind were suddenly encountered as in Figure 2b? With the initial loss of IAS the aircraft will pitch down (See Figure 4).

Figure 4

A HYPOTHETICAL SITUATION

Let's assume we've decided to terminate a flight with an ILS approach. The weather is: sky partially obscured, ceiling 2,000 broken, visibility 5 miles with haze and surface winds down the runway at 10 K. Thunderstorm activity exists in the area of the airport. We pass the outer marker and start down the glide slope, on course and on approach speed (140 KIAS). At about 600 feet above touchdown the airspeed jumps to 155 KIAS and the aircraft is going above the glide slope. What would your reaction be?

Most pilots would reduce power in an attempt to slow to 140 KIAS again and apply nose down pressure on the controls to remain on, or get back to, the glide slope. Let's assume we reacted in the same way. We've attained 140 KIAS again, GS is now 115 K, and we are approaching the glide slope from above. At about 400 feet above touchdown we suddenly lose 15 K of indicated airspeed and our vertical velocity increases by 1,000 fpm. Can we recover before we impact short of the runway? Think



about it. Our power is at a reduced setting; our IAS is now 125 K (15 K below approach airspeed); GS is at 115 K; and aircraft attitude is lower than normal. Lotsa luck! !

The conditions encountered in this hypothetical situation are very similar to those encountered by the Boeing 727 at JFK. What, if anything, could be done to avoid such a predicament? We could have bypassed our destination and landed at our alternate. That's one solution, but what if, due to the urgency of our mission or for some other reason, we had to penetrate such conditions.

GROUND SPEED CAN BE A LIFE SAVER

How can GS be of aid to us? First, consider the conditions on the surface. If we calculated an approach speed of 140 KIAS (also TAS for our situation), then the 10 K wind down the runway would give us a GS of 130 K (140 K – 10 K). This time we'll fly the same approach through the same conditions; however, now let's use *two* target airspeeds, a minimum IAS of 140 K AND a minimum GS of 130 K.

We have just passed the outer marker, on course, on glide slope and have established 140 KIAS. Our GS is 130 K (this shows that we have a 10 K head wind at this point). The IAS suddenly jumps to 155 K and the aircraft pitches up. Our GS will stay at 130 K for a short period of time, but gradually the aircraft will seek the IAS that it is trimmed for, if no power or control inputs are made. The overall result will be a gradual decrease of both IAS and GS. How do we react this time? Since our GS is already at the minimum of 130 K, we will have to maintain or add power in order to prevent the loss of GS. In addition, we would adjust our pitch to maintain or recapture the glide slope. Now, our speeds will be 155 KIAS and 130 K GS. At this point, GS is our controlling speed. As we encounter a loss of head wind, the IAS will suddenly change to 140 KIAS and the GS will remain at 130 K. I think you will agree that we're in a much better position to recover this time. Comparing the two approaches, our second approach has us at a higher IAS (by 15 K) and a higher power setting. We've improved our chances of counteracting the downdraft and sudden loss of head wind, and of making a successful missed approach or landing.

Sounds like a super technique, but what about those of us who don't have reliable GS indicators or don't have any source of GS read out at all? The best advice that can be offered is to increase your approach speed (IAS), if you determine that wind shear on final may be encountered (pilot reports are probably your best source of information).

The use of minimum GS and minimum IAS is the best technique known to counteract low altitude wind shear. Research is being conducted in the detection of wind shear using both ground and airborne equipment, but it will be some time before any of these projects bear fruit.

Hopefully, this article has, in a very basic manner, introduced you to the sources of low altitude wind shear and how it affects aircraft performance. There is additional information being published on this topic daily. Read it and understand it. It only takes one encounter with wind shear for it to be your last. ★

PICTURE QUIZ

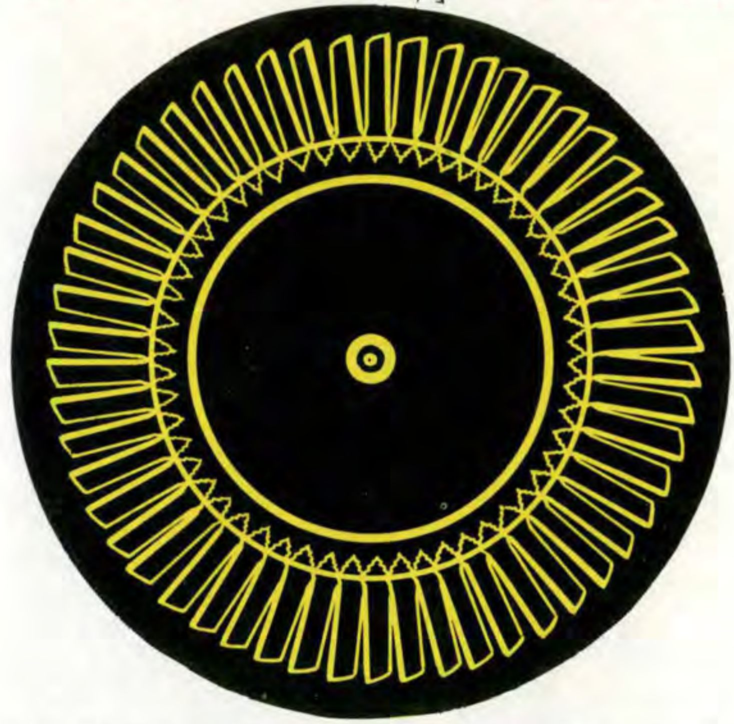
can you identify these aircraft?

Part of the tradition and history of the Air Force is rooted in the many machines famous and obscure which have served in the past. So for you nostalgia buffs we are starting a feature. Here are four aircraft from the past. How many can you name?

★ A P-35
B O-47A
C P-37
D B-23

HOLD THE ICE, PLEASE

MAJOR PHILIP M. McATEE
Directorate of Aerospace Safety



At this time of the year we usually have warned of the dangers of aircraft icing. Before we made the same pitch this year, we decided to have the computer here at AFISC identify what have recently been the greatest icing dangers.

We found that while incidents caused by airframe icing have decreased, engine icing is a different story.

The largest icing problem confronting the jet pilot today is engine inlet duct lip, engine dome nose and inlet guide vane icing.

Since January of 1974, there have been 16 incidents where the cause was ice ingestion by an engine. Included on the list was the tragic loss of a CH-53 helicopter with 16 fatalities. In that accident induction ice was dislodged and ingested causing catastrophic compressor failure and a total loss of engine power. Fortunately, the other cases did not involve fatalities but the potential was there.

It is important to recognize that while all USAF jet aircraft have engine anti-ice systems, not all have engine *inlet* anti-ice systems, so you must be very familiar with the system operation on your aircraft.

You should also know the conditions under which ice can form. The conditions most common to engine inlet icing occur when the free air temperature is between +5°C(41°F) and −20°C(−5°F) and visible moisture is present or the dew point is within 4°C(7°F) of the free air temperature. Remember when visible moisture is present, engine inlet icing can occur over a wide range of temperatures, above or below freezing. The increase in air velocity as it enters the aircraft engine duct, the engine compressor inlet and the compressor inlet guide vanes causes a drop in temperature of the entering air. Moisture in the air becomes super cooled as it passes through the engine inlet and it can cause engine inlet icing even though external ice is not being formed on the aircraft.

The following incident will illustrate: An FB-111 was cruising clear of all clouds at FL 220. As the aircraft approached its target area, nr 1 engine stalled and rolled back to 60 percent, then completely flamed out. The pilot made a successful airstart and returned to base. After landing, damage from ice was found to the fan case and the first stage compressor. On preflight the auto ice detector had been inop, so the crew was to use manual anti-ice if required. The pilot stated that, since he was clear of clouds at all times, anti-icing was not used.

Should a pilot find himself in an icing environment and have ice build-up on wing leading edges and windshield, etc., before he has initiated anti-ice procedures, he should assume that ice has started to build up in the engine inlet and inlet guide vane area as well.

If you find yourself in this situation it would be a good idea to switch the ignition ON before

HOLD THE ICE, PLEASE
continued

actuating the engine anti-ice system. Keep the ignition on until the ice is gone and stable engine operation is resumed.

When anti-icing system activation is delayed until after ice has already formed, there is a chance of ice breaking off in large pieces and being ingested into the engine. The same situation occurs when the auto-detection system is inoperative and manual anti-ice is used after ice has built up.

[illegible] compressor damage due to [illegible] ingestion occurs, the pilot should [illegible] is ON or OFF.

Engines with compressor damage from ice ingestion are likely to operate stall-free up to about 85 percent rpm. However, this will depend on the amount of damage incurred. A damaged compressor has a greatly reduced stall margin and will stall with very little inlet duct airflow distortion. Rapid throttle movement, abrupt attitude changes, and tight turns should be avoided.

Although engine inlet icing has caused the greatest number of in-

When ice builds upon wing leading edges and the windshield, before anti-ice is turned on, the pilot should assume ice buildup has started on engine inlet and IGV. Photo at left shows damage to engine from ice.

cidents, there are two other icing dangers that I would like to touch upon.

Recently, a commercial airliner on a ferry flight was destroyed when the aircrew failed to recognize pitot icing. The cause was, tragically, failure to turn the pitot heaters on prior to takeoff. As the pitot tubes iced, the airspeed kept increasing as the inlet aperture was decreased. The crew responded by increasing the angle of attack to reduce the increasing airspeed. This was continued until the aircraft stalled.

The Air Force, fortunately, has not recently suffered a crash caused by pitot icing, but we have had three cases that could have if the pilots had not recognized what was happening. The first incident was caused by excessive water in the pitot static system coupled with a pitot heater failure. The pilot had constant airspeed but was rapidly overtaking lead. Airspeed increased, then dropped to zero. A safe approach was made on his leader's wing.

The two other cases are nearly identical. Both aircraft were on high altitude intercept missions in the vicinity of thunderstorms. Each aircraft received a lightning strike and shortly thereafter airspeed indication became erratic. Both pilots recognized pitot static malfunctions and requested escort aircraft to assist them. In both cases the cause was a burned out pitot heater as a result of the lightning strike. If the pilots in all of these had not correctly diagnosed the pitot static problem the ending could have been tragic.

The last type of icing is airframe icing caused by slush on the taxiway or runway. All of you have heard of slush being thrown up from the runway and freezing

in the wheel wells. Well, recently, this led to two cases of frozen landing gear or switches which then failed to extend properly. Again, the guardian angel of aviators intervened and the landing gear was coaxed down and locked. To highlight how severe a problem slush can be, here is an accident involving a civilian aircraft.

The aircraft was on a scheduled flight. The weather was close to minimums with fog and falling snow, and the temperature was right at freezing. The pilot had the aircraft completely deiced prior to taxi. On takeoff roll the pilot noticed about ½-inch of slush on the runway; but all instrument readings and acceleration were normal. Aircraft rotation and liftoff were normal but the aircraft was unable to climb. Despite full power, the aircraft mushed into the ground and was severely damaged. That is what slush thrown up by the gear and adhering to the aircraft can do.

The message in all of these icing tales is to recognize the dangers in time to take protective measures. According to the record, you are more aware of the dangers than ever before. With your continued awareness and prompt action, I hope it is even more difficult to find an icing subject next year.

(Portions of this article have been adapted from previous articles on the subject. Our thanks in particular to Northrop Talon Service News and Lt Col Charles R. Barr, Directorate of Aerospace Safety.) ★

FLY SMART!

CAPTAIN DONALD K. FENNO, Directorate of Aerospace Safety

Did you know that military aviation suffered its first flying loss back in 1908 when Army Lieutenant Thomas E. Selfridge lost his life in an aircraft accident which Orville Wright managed to survive?

Did you also know that the first published aircraft accident rate (fiscal 1921, USAF Accident Bulletin) was 467 accidents per 100,000 hours of flying? In today's terms, that equates to 1,565 accidents per year. Whew! Can't imagine what they were thinking in those days to accept such losses as normal. Agree with me so far? If you do, I "Gotcha," because those accidents were no different from those we are experiencing today. We were losing crews and aircraft to such things as operator error, materiel failure, or maintenance. Those terms sound familiar? They should! Those are the same terms used to describe today's accidents.

Why are today's rates so much lower than yesteryear's? Well, today we devote a lot of time, effort, and money into making flying safe. IFR, radar, and systemized safety are but a few of the things that contribute to safer flight; and over the last 10-year period, innovations such as these have reduced our major accident rate from 5.9 in 1965 to 3.5 in 1975, fatal accidents from 113 in 1965 to 33 in 1975, and aircraft destroyed from 262 in 1965 to 79 in 1975.

We can stop patting ourselves on the back, however, because we still paid about the same amount ($367 million in 1965 and $325 million in 1975) and the fatalities and aircraft losses are still unacceptable. Today's accidents can be categorized within the same areas as the early ones: human error, mechanical failure, and environment caused. My concern is that human error has contributed nearly 56 percent to our accident rate over the past 10 years and will continue to do so until something is done. It is a fact that the proportion of human contribution has not significantly varied since the Air Force started counting accidents. The principal person that can do something is you, the pilot, the navigator, or crew member.

One of the biggest contributors to human factor accident rates is operator error. This category appears everywhere the aircraft flies. For example, during 1975 the following accidents occurred and have been attributed to human error:

Pilot Induced Takeoff Accident	*3*
Pilot Induced Landing Accident	*10*
Midair Collision	*4*
Collision with Ground Non-Range	*7*
Control Loss	*13*

Remember, the crew is the common denominator in all of these accidents.

To digress a moment, I want to dispel a common rumor; the accident board does not attempt to "hang" the crew. In fact, in most cases they bend over backwards to avoid doing so.

One specific area in which you, the pilot, have control is the area of "pressing." (Pressing manifested itself in many of the operator error accidents in the early 1900s and still does.) How many times have you or someone you know gone beyond the "normal" point of recovery for a maneuver to get the "better score" (collision with ground, range), continued any unsafe maneuver because of peer pressure (pilot induced landing accidents), or just happened to fly out of the flight envelope (loss of control). In these instances, was it really worth it?

Many "good" pilots and crews have been ejected from the game of life because of crew error. In aircraft where the crew concept is needed, the navigator, engineer or copilot are just as responsible for monitoring and *think*ing safety as the AC. Ponder for a moment; what are your chances of survival if you allow the AC to exceed parameters and buy his headstone (collision with ground, non-range)? What I'm trying to say is we (the Air Force) can only institutionalize and instrument the safety game of flying to a point, then the ball is thrown to you, the operator! Ultimately, it is you who makes the decision.

We are improving in terms of fewer accidents. But we have more than enough attributed to materiel failure and the environment, so we don't need the "mistake" of a crew to add to our total. This is one area where you, the crew, have direct control. So let your actions in all situations reflect your internalized decision to fly smart (safely). I leave you with one last thought. Everyone in the Air Force is "the best crew member"; however, can you honestly say to yourself, "I am the safest crew member in the Air Force?" Safety and "The Best" go together! ★

Mail Call

**This is your magazine.
Please send us your comments and critiques, thoughts and ideas to help us respond to your needs. Send to
Editor
AEROSPACE SAFETY Magazine
AFISC/SEDA
Norton AFB, CA 92409**

As the Steward Standardization NCO, 99th Military Airlift Squadron, Andrews AFB, Washington, DC, VC-9C—VC-140B type aircraft, I enjoyed your article in the July *Aerospace Safety* magazine entitled "Escape."

Another reason for writing is to find your source of information regarding the 100 yard distance you quoted after crashing before you stop to look around. We have been unable to find a source other than CDC605XOA, Air Passenger Specialist—In flight, which states 50 feet (minimum). This distance even as a minimum is out of the question. We have been teaching 100 yards as long as I have been here, until the CDC was brought to our attention.

Your response would be appreciated.

ROSS H. PORTER, TSgt, USAF
Stan/Eval Steward
99 MAS, Special Missions (MAC)
Andrews AFB, Washington, DC

Like you, we haven't been able to locate a firm 100-yard requirement. The USAF Crash Survival Investigator's School, the USAF Accident Investigator's School, the USAF Accident Investigator's Course and the USAF Survival School teach 100 yards. Those fortunate enough to walk away from an airplane crash don't want to get killed by a piece of exploding airplane. The photo above of a 120-pound piece of DC-8 wing illustrates our point. One hundred yards may be too far, but it may not be far enough. It's a good, convenient figure most people can estimate.—Ed.

SUBJECT: Do you know the answer?—Article, Aerospace Safety, Aug. 76.

In part, question number eight reads . . . You are in the weather and lose communications just after point A (Figure 2). You climb to 7000 feet *at* point *B* because of the MEA. . . .

It seems to me that in case of lost communications the pilot would need to be *at* 7000 feet (MEA from point B to C) prior to point B. I would like to hear some comments on the subject.

Keep up the good work.

ANTONIO NAZARIO, 1Lt, USAF
39 TAS
POPE AFB, NC

1. In response to your inquiry, the following applies.

a. In accordance with the Federal Aviation Regulations Part 91.119 (b), "Climb to a higher minimum IFR altitude shall begin immediate-

ly after passing the point beyond which that minimum altitude applies, except that, when ground obstructions intervene, the point beyond which the higher minimum altitude applies shall be crossed at or above the applicable MCA (Minimum Crossing Altitude)."

b. FLIP General Planning defines Minimum Crossing Altitude (MCA) as "the lowest altitude at certain fixes at which an aircraft must cross when preceding in the direction of a higher minimum enroute IFR altitude (MEA)."

c. MCA's are depicted on IFR enroute charts.

2. The answer given in question #8 of the August 1976 "IFC Approach" article reflects the guidance quoted above. If you have any further questions regarding instrument flying, feel free to contact us at AUTOVON 487-4276/4884.

RICHARD L. BUESINGER, Lt Col, USAF
Chief, Flight Standards Division
USAF Instrument Flight Center
Randolph AFB TX

1. Reference: July 76 OPS TOPICS. "GOTCHA"—this note on Air Traffic Control Radars is a good one but it only touches part of the problem. That 141 crew may well have been working with Tactical or Air Defense radars which do paint weather quite well when the switches are set to do so. The addition of circular polarization to the radar set makes it possible to see through rain clouds which would otherwise mask the aircraft the controller wants to see. However, it also hides turbulent areas.

2. Since it is desirable for the Tactical Weapons Controller (17XX) to know where the weather is for offensive and defensive tactics, he wants it on his scope and has switches to add it on or remove it as needed. The Air Traffic Controller (16XX) is more concerned with the proximity of various aircraft and lining them up with the runway, etc. Therefore, he wants to remove the weather so he can see all the aircraft all the time. The aircrews should remember, when requesting radar services, to know whom you are talking to and what the capabilities are. A systems approach to modern flying is a good one. Ground radars are an extension of the aircraft instrumentation and should be well understood by the aircrews using them. They are part of the system. Just ask any pilot that has done his career broadening in the 17XX or 16XX career fields.

JAMES E. BRIDGES, Major, USAF
Commander
82d Tactical Control Flight (TAC)
Holloman AFB, NM ★

My Brother's Keeper

CAPTAIN JOHN E. RICHARDSON, Directorate of Aerospace Safety

An inexperienced pilot attempts to fly an ACM maneuver for which he is unqualified. The instructor allows him to continue to an out-of-control condition and the crew is forced to eject.

A student pilot is known to be having trouble handling the T-38 in the traffic pattern. He consistently lets the aircraft get slow prior to final turn. One day returning from a formation mission solo, he stalls the aircraft in the final turn and crashes.

A flight of A-7's completes air refueling then proceeds to a practice area. The flight lead does not call for any fuel checks and so the fuel feed malfunction in one of the A-7's goes unnoticed until too late.

A transport makes several approaches to an airport that is below minimums. The aircraft flies in heavy icing conditions for several minutes. On the go-around the aircraft stalls and crashes.

A pilot is known to have several personal problems. For several weeks he has been depressed and preoccupied. He confides to friends that he has not been sleeping well. On an overwater range mission, he does not pull out in time. The aircraft sinks immediately and is not recovered.

All pilots have a self-image which includes independence, competence and skill. We do not like to admit that we are fallible. The old feeling that, if you are really a pilot, you've got to think you're the greatest, can be an insidious trap. If you can't admit mistakes, you usually can't correct them.

This reluctance to admit our own failings also makes us unwilling to recognize weakness in others. To identify any pilot as less than perfect is to cast doubt on ourselves. So we tend to gloss over errors and mistakes. We are not willing to take a stand and say "No. This pilot is not able to perform."

We can no longer hide from our responsibility. Aircraft and trained crew members are too valuable today for us to adhere to the qualification by attrition philosophy. Each of us must work to help one another to the best of our ability. The "hack it or die" approach is as outdated as the Sopwith Camel. We *are* our brother pilot's keeper. ★

☆U.S. GOVERNMENT PRINTING OFFICE 1976 789/855/40

UNITED STATES AIR FORCE

Well Done Award

Presented for outstanding airmanship and professional performance during a hazardous situation and for a significant contribution to the United States Air Force Accident Prevention Program.

CAPTAIN **FIRST LIEUTENANT**

Jeffrey L. Moddle Warren B. Shaw

401st Tactical Fighter Wing

On 26 January 1976, Captain Moddle, instructor pilot, and Lieutenant Shaw, pilot, were on a local transition ride in an F-4C. Captain Moddle had just completed demonstration of a minimum time turn. As the nose of the aircraft approached the horizon, he retarded the throttles and was about to ask Lieutenant Shaw to take control of the aircraft to practice the maneuver. Before relinquishing control, Captain Moddle noted the nose of the aircraft continuing to rise and attempted to lower the nose with forward stick pressure. He discovered the stick frozen near the extreme aft position. He asked Lieutenant Shaw if he was holding the stick and received a negative reply. As the aircraft nose continued to rise to 60° of pitch, he directed Lieutenant Shaw to select afterburner and began a rudder roll to the left. Upon experiencing the uncommanded nose rise, Captain Moddle had immediately activated the rear cockpit paddle switch to disconnect auto pilot and stab augmentation systems. With no results from his switch, he directed Lieutenant Shaw to hit his paddle switch, check front trim circuit breakers, and see if his checklist was lodged in front of the stick. As he controlled the aircraft pitch attitude with afterburner and rudder, Captain Moddle directed to prepare for ejection and selected guard channel for a "Mayday" call. Both pilots were attempting to move the stick forward with muscle power and full nose-down trim. After 540° of turn with airspeed 120-150 KCAS and angle-of-attack fluctuating from 18-24 units, Captain Moddle asked for one last maximum joint effort to break the stick loose before ejecting. On this attempt the stick broke loose enough to recover to level flight. During their immediate return to base, they completed an approach configuration controllability check. A successful straight-in, approach-end barrier engagement was made with reduced stick available. After the aircraft landed, maintenance personnel discovered an AIM-7 cable dust cover lodged in the stick bell crank. The teamwork and airmanship exhibited by Captain Moddle and Lieutenant Shaw resulted in the safe recovery of a valuable aircraft. WELL DONE! ★


IT'S COLD OUT THERE...
LA
205


ARE YOU PROPERLY CLOTHED?