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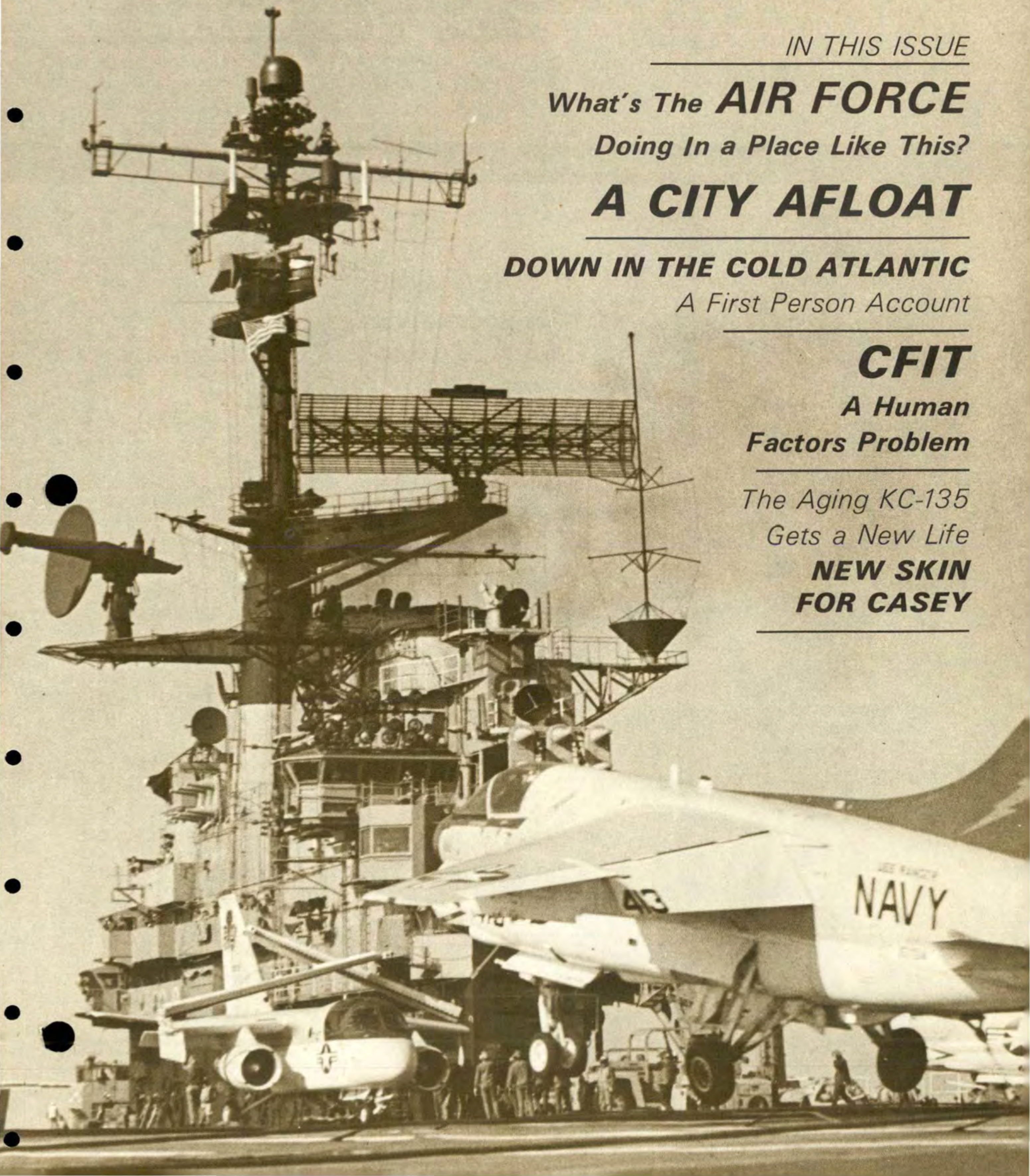
SAFETY FEBRUARY 1978



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UNITED STATES AIR FORCE

aerospace SAFETY

THE MISSION - - - - - SAFELY!

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FEBRUARY 1978 AFRP 127-2 VOLUME 34 NUMBER 2

"Mais Ou Sont Les Neiges D'Antan?"*

With apologies to Francois Villon

**But where are the snows of yesteryear?*

As I grow older I find myself thinking more and more of "How it used to be." A sign of approaching senility? Could be. Anyway, an article in the 4 November 1977 *TIG Brief* by Major General (Richard E.) Merkling jogged my memory bank. Perhaps the recollection is worth passing on.

In 1958 I was assigned to a two squadron F-100 wing being formed at Misawa AB in northern Honshu, Japan. We were replacing the last straight wing HOGS (F-84s) in the active force. Coming from Nellis, Luke and Victorville, as most of us did, the transition was a real shocker. At the start, there might have been a half dozen pilots in the whole wing with 500 hours in the HUN (F-100) and, with the exception of the HOG pilots, probably less with real winter flying experience in any bird. Added to the usual difficulties of mastering a new weapons system were the year-round fog and the winter snow. And did it snow! Sixty inches the first year, a staggering 220+ inches the second year and, if I recall correctly, about 100 inches in the third year.

The winter weather posed a real problem to our inexperienced bunch, since there was no really suitable weather alternate to Misawa for the HUN. Chitose, 125 mi north on Hokkaido Island was usually worse than Misawa whenever the snow and fog rolled in. Yokota, 320 miles south, was generally out of the question as an alternate because of fuel requirements. Accordingly we usually were forced into landing where we took off—at home plate. The HUN performed well at Misawa, the low temperatures assured that. Getting the bird stopped on 9,000 feet of wet runway at best and hard-packed ice and snow at worst while maintaining directional control at the same time was another story.

An easy solution to our problem might have been to stand down from November to March. But this would never have been acceptable to our hard nosed air division commander, an old SAC type BG. So we learned to cope with the winters. With remarkable results I might add, for during the three winters I spent there we never had a HUN in the barrier, even with a no-chute.

The snow removal people were good but there was no way that they could keep the runway completely clear. To help them and us, a relatively simple procedure was devised. The first flights of the day, to include the F-101 and F-102 squadrons, took off down wind if the tail wind component was not too bad. That usually cleared at least half of the active runway of the snow and ice the plows had missed and provided reasonably good braking action on landing rollout. This little trick undoubtedly helped us stay off the barriers those first three winters. And yet staying out of the net didn't always work year-round.

For too many of we HUN drivers a no-chute in summer (there wasn't much spring and fall at Misawa) was followed shortly by the explosion of the pylon cartridges cleaning off the stores and the radio call, "barrier, barrier, barrier." Either that or hot brakes in the de-arm area. It probably happened at least monthly. Got expensive too. Some of you are saying "Why . . . ?" You thinkers already have the answer. It was our attitude, of course. In the winter we worked harder; we flew more hours than in the other seasons but our attitude changed. Jocks tried harder to fly the right air speed, land at the right point, and in the right attitude. We anticipated the no-chute and mentally planned our landings as if the barrier would not work when needed. We knew all too well that if one of us tied up the runway by engaging the barrier the rest of the flight was in a real world of hurt. Unfortunately, that attitude, like the long johns we wore, seemed to come off when the snow melted.

I would not argue that we were the best HUN outfit ever, or the only fighter squadrons to fly under severe weather conditions. We *were* good, and for me it was a proud three-year association. We also had our share of dumb, pilot-error accidents. Which brings me to the point.

Wouldn't you agree that if we all applied the same attitude to all our flying, year-round, as our bunch did toward winter landings at Misawa, some good friends, yours and mine, would be around to have their memory banks jogged too? General Merkling would agree. He was an F-101 driver there at the time.

How's your attitude? Seasonal or year-round? ★

PAUL M. DAVIS, Colonel, USAF
Assistant to the Commander for Quality Assurance
Oklahoma City Air Logistics Center
Tinker AFB OK

CFIT

A Human Factors Problem

MAJOR JOHN E. RICHARDSON
Directorate of
Aerospace Safety

An airliner on an approach to a familiar airdrome crashes into a mountain 25 miles from the airport.

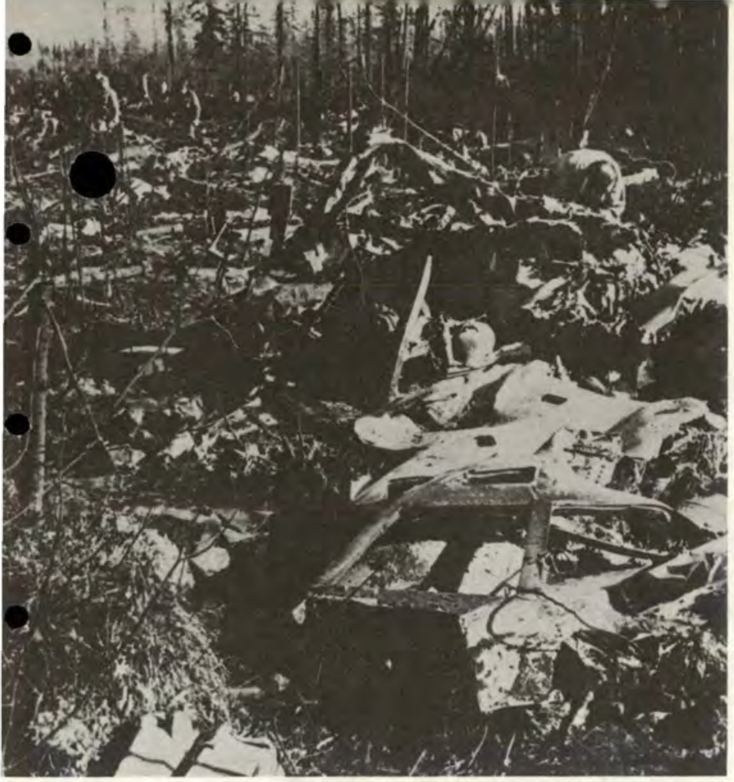
An Air Force transport on approach to an Air Force base crashes 29 miles from destination.

An F-4 crashes in an open field 13 miles short of the air base.

In each case the aircraft was operating normally. The crews were not incapacitated, and the weather was not a factor. Yet without warning, each of these aircraft descended below a minimum safe altitude and crashed.

These are three examples of a type of accident which the NTSB has labeled "controlled flight into terrain" (CFIT). While not strictly defined, the concept behind this term is an aircraft in normal flight without emergencies, and with no warning to the crew, flys into the terrain or water. The definition includes a wide range of mishaps —climbs as well as descents. But it does exclude those where some external force such as severe weather or equipment malfunction is causal. Examples of such exclusions are the Eastern Airlines 727 which crashed at JFK after encountering severe windshear and downdrafts from a thunderstorm; or the T-38 in which the aileron connector failed in flight causing the aircraft to go out of control.

The CFIT mishap is particularly disturbing because it should be preventable. The problem is to find the key. The aviation world is replete with attempts at solutions: radar altimeters, coupled approaches, GPWS, Mode C, etc. Some of these mechanical fixes have been fairly effective; the commercial carriers have not had a CFIT mishap since FAA mandated fleet-wide installation of a GPWS. However, the mission, flight operations and environment of USAF flying is often different from that



experienced by commercial carriers. This plus the distinct human element intermingled in every CFIT mishap makes it extremely unlikely that any single piece of equipment will be a universal cure-all.

Flying today is a complex business. And this complexity has greatly increased the mental effort required of the crews. Researchers in engineering psychology have found that sustained mental effort decreases performance just like physical work.

Since there are no mechanical failures associated with CFIT mishaps, we must look elsewhere for answers. The complexity of flying and its effect on people is a good place to start.

In its early days in aviation, human factors or human engineering, as this study of the man-machine interface is called, was pretty much relegated to cockpit design and crash survival efforts.

More and more attention is now being focused on the problems of human reliability and performance. Data from the studies made by psychologists on work performance in ground jobs can be applied to flight. In fact, the problems become more acute because in flight the performance demands are more critical and the margins for error much less. For example, the level of demand on a pilot for a typical flight can be roughly plotted:

The demand levels for other complex airborne tasks like air refueling, ACM, or ground attack are comparable to that for approach and landing. A curve plotted for mishap experience looks very similar.

The conclusion that mishaps occur when demand on the pilot is highest is certainly not earthshattering. These times are the so-called "critical phases of flight" when the margin for error is small-

FIGURE 1

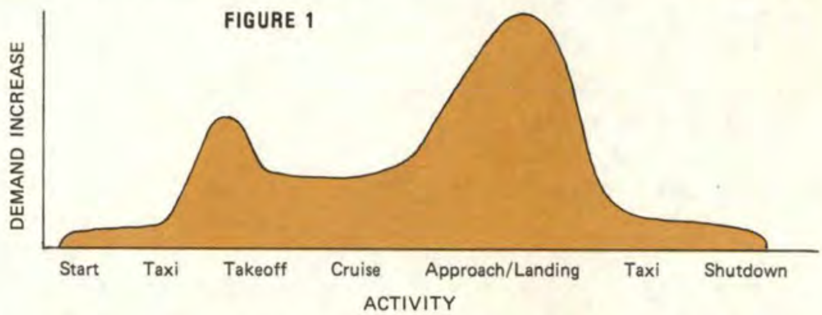
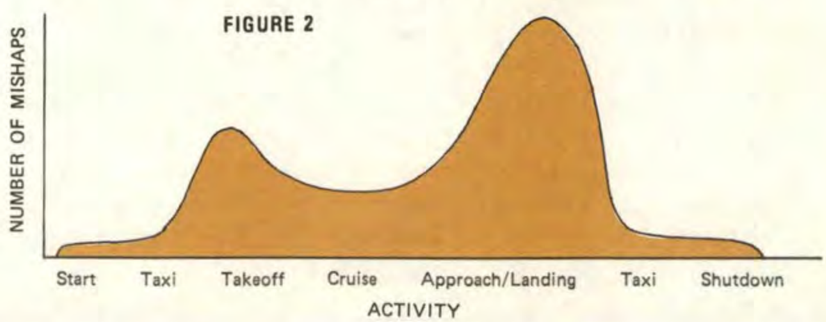


FIGURE 2



est. This is precisely why we need some knowledge of human factors which can reduce this margin even more.

AROUSAL AND STRESS

By arousal we are referring largely to stimulation which contributes to the general physiological and behavioral "alertness" of the individual. There is an optimum range of stimulation. Within this range the individual is capable of performing at maximum efficiency. The problems occur when stimulation is beyond the optimum range. Then the level of alertness and arousal is affected. If stimulation is too low, boredom sets in and leads to inattention and low sensitivity to stimulus. Any pilot who has flown a long night mission knows the effects of low stimulus levels. And it is entirely possible that such low arousal could lead to an accident. A commercial airliner over the Atlantic experienced an autopilot disengagement. The aircraft entered a slow spiraling descent unnoticed by the crew and ultimately lost 30,000 feet before the crew recovered.

On the other end of the scale over-arousal or extremely high levels of stimulation can lead to hypersensitivity, loss of muscular control, and, ultimately, total disorganization in responses. This form of over-arousal is most common in jobs requiring rapid performance of highly complex tasks under hazardous conditions (e.g., aircrews or air traffic controllers). Flight instructors frequently encounter this situation with students just learning a new task.

A KC-135 launched on a standard refueling mission. The instructor pilot and upgrading aircraft commander were flying. To accomplish a required training item the flight directors were in gyro mode for takeoff. This was not the normal mode so this placed additional demands on the student. Shortly after lift-off the aircraft developed a directional control problem. The IP concluded that nr one engine was failing and reduced power to get a relight. This action increased the drag, and the aircraft rolled rapidly to the left. The IP tried to take control, but the pilot in the left seat did not relinquish control. The resulting over-controlling, as both pilots attempted to correct, caused the aircraft to lose flying speed and crash one-half mile past the departure end of the runway.

FATIGUE

Fatigue can be defined as a state whereby a crew member has feelings of inability to perform, an aversion to the task at hand, or a lack of interest in the situation. Fatigue is a progressive condition. At moderate levels a pilot or aircrew member can cope with fatigue and still perform satisfactorily. However, as fatigue increases, the finer distinctions of judgment are lost and the potential for mishaps rises rapidly. Fatigue has played a part in many Air Force mishaps. Usually we talk of lack of crew rest or excessive crew duty time. These are the deficiencies, but the real cause is fatigue. Crew size doesn't matter; the two most recent mishaps in this area involved a fighter and a large transport.

The fighter crashed on a TACAN approach at home base after a weekend cross-country. The investigators discovered that the crew had not ensured they had adequate crew rest during the weekend. It is probable that fatigue contributed to a crew error resulting in impact with the trees 1½ miles short of the runway.

A transport struck a mountain some 17 hours after the crew started their duty day. Once again, fatigue contributed to an error which led directly to the mishap.

STIMULUS AND RESPONSE UNCERTAINTY

The more certain a person is about the events occurring and what the response should be, the better he performs. For example, if a pilot is unfamiliar with an approach his or her attention is channeled to the approach plate details. This means that there is less capacity to deal with aircraft control radio transmissions, etc. When the pilot is uncertain about the situation, bad weather, aircraft emergencies or unusual circumstances, there is hesitation in responding or even inappropriate responses. The problem of habit pattern interference can occur: An F-4 pilot who, in the confusion before an ejection, raised the guillotine handle instead of the ejection ring. He had reverted to his previous aircraft experience where the armrests contained the ejection triggers. Sometimes a pilot is unwittingly placed in a position where his or her capacity for response is exceeded.

Shortly after lift-off a flight of two fighters entered weather. Number two was not very experienced in weather formation and lost lead in the departure turn. He was unable to transition to instruments, became disorientated and crashed.

TASK INFORMATION PROCESSING LOAD

The human mind can only grasp a finite amount of data at a given time. Once the volume of data input exceeds the brain's capacity for processing, some information will be selectively discarded. What items are discarded depends on numerous variables—the internal priority system of the brain, the intensity of the stimulus, etc. The problem is that the information processed by the brain may be less important than that discarded. The other aspect of this situation relates to factors discussed earlier—arousal, fatigue, and response uncertainty. As the factors exceed optimal levels, the ability of the brain to process data is affected. This means that highly complex or extremely rapid decision-making becomes very difficult as stress increases.

An Air Force bomber was making a non-precision approach to home base. The weather was deteriorating, and the command post had suggested the possibility of diversion. On the approach the aircraft descended below MDA and crashed 3 miles from the end of the runway.

Half a world away a flight of fighters was weather recalled to their home base. Lead attempted to make a visual approach in very marginal weather; and in the final turn the aircraft entered a heavy rain shower. Witnesses saw the aircraft come out of the shower in an extreme bank angle and steep dive. The pilot attempted recovery but was unable to complete it before ground impact.

These are not the only human factors problems in aviation. Cockpit design, lighting, visual display, noise and vibration levels are all important considerations. However, these are of more concern to engineers and designers. The items discussed in this article are the ones which apply to all aircraft. Further, solutions to these problems often are accessible to units or aircrews rather than just to designers. For example, fatigue can be countered by adequate crew rest and careful crew scheduling. True, there are very explicit directives on crew rest, but in the past three years at least three fatal mishaps have been directly attributed to crew rest violations.

Obviously, something more than directives is needed. Here is where operations supervisors need to carefully examine crew scheduling. Also, what is the unit policy and practice on crew rest on TDY? One of the crew rest mishaps occurred during TDY.

Uncertainty about the proper response and too much information input to be handled completely are two problems that can quickly complicate an already critical situation. In flight this can occur when pilots and crews are faced with complex and confusing data sheets or checklists which must be accomplished during critical phases of flight. A common item which can be very confusing is the low altitude approach plate. Very often the mass of data printed on that plate makes it almost impossible to decipher the proper course or could cause the crew to overlook the information because it is too difficult to process. Training is an important consideration here. A crew familiar with the approach or procedure will need to expend less mental effort. But, designing checklists, approaches and procedures as simply as possible will do much to reduce the uncertainty and also the processing demands.

There is no simple solution to CFIT mishaps nor to human factors problems. But, we can give human factors the broad effort it so richly deserves. And when we address the "people" side of the accident question with something approaching the precision we devote to the mechanical problems, we will have a major stride towards correcting the knotty CFIT mishap. ★

SNAKEBITE . . . . Ho Hum

CAPTAIN HOWARD R. ALLEN
Training Development Branch, 3636 CCTW (ATC), Fairchild AFB, WA

"Survival School, Sergeant Rugged, may I help you, sir?"

"Yes, please, I'm in charge of continuation training for my outfit, and I need some information on snakebite. Can you help me?"

"I think so, what exactly do you need?"

"Well, . . . I thought I'd hit 'em with some real scare stories—you know, that one and two stepper stuff, to get their attention. Then I'll hit 'em with the old cut-and-suck method. Do you think I ought to have a live demonstration? For realism, you know!"

"I see. Why are you making such a big deal over snakebite? Do your students need this training?"

"They certainly do. The jungle and desert are full of those nasty critters and besides I have to make the briefings interesting."

"There are plenty of dangerous snakes in the world all right, but I think you're letting folklore and superstition guide your thinking."

"But what about the millions of people all over the world who are bitten each year?"

"Did you know that only about 3 percent of those are fatal? And here in the US only 10 or 12 out of 8,000 bitten by venemous snakes actually die. And incidentally, up to 95 percent of the survivors received no first aid treatment at all."

"That's very interesting, but what do I do if one of the thousands of rattlesnakes that live in our training area bites me?"

"Your chances of dying from a rattlesnake bite are about one-third less than they are for dying from a bee sting. If you don't sweat the bee sting, don't sweat the rattlesnakes."

"Oh sure, it's easy for you to quote statistics, but what do I teach my people? They want to know the proper method for treating snakebite. How far do I make the cut? Where do I put the tourniquet? How do I . . . ?"

"Whoa, hold on there, slow down, you are getting excited, which is exactly what you should avoid in case of snakebite. Shock, quickened by fear and panic, is probably a greater enemy than the bite itself. Keep the patient quiet, reassure him he is not going to die, and you will do more good than if you whipped out your survival knife and began to cut on him. In fact, if symptoms do not occur, or are mild, in the first 3 to 5 minutes following the bite, complete immobilization and sterilization of the bite area may be the only treatment needed."

"But there must be a standardized medical treatment for snakebite. Why, it's . . . it's the Air Force way."

"We can find medical opinions supporting different points of view, but before you, an unqualified amateur, employ any cutting tools on yourself or a buddy, I urge you to consider the damage you might cause, using a treatment that may not be needed at all. Excessive bleeding from the knife wound and infection from the blade or the sucking mouth can cause even greater problems than the bite itself."

"Are you telling me there is nothing I can do to help my poor snake-bitten buddy?"

"I think a better idea is to educate him in the classroom to eliminate the mystique surrounding these creatures. Let him know how safe he is and you eliminate one of the enemies of survival—fear. Do this and he will be less likely to panic or worse yet, surrender to the enemy just to get out of that snake-infested jungle or desert. Let me put it this way. Are you a gambling man?"

"Well, I've been known to wager a buck or two on a game of chance."

"OK. Let's play the odds. You are a survivor on the ground, and rescue is not immediately available.

• The odds are you won't even see a snake. The snake will avoid you. You can help by using care where you put your hands and feet. Avoid wood piles and rubbish heaps where snakes may be hunting rodents.

• If you do see one, it probably won't be poisonous. In the US only 10 percent of the species of snakes pose a danger to human life.

• If it is poisonous it probably won't attack you unless forced to by you.

• If it does bite, venom may not be injected. Defensive type bites, unlike bites to kill for food, inject little or no venom. No poisonous snake in the world is looking at you as a seven-course dinner.

• If it does inject venom the odds favor your survival even if no first aid is given at all.

"In other words, if you see a snake, don't figure on **him** biting you, figure on you biting **him** . . . for food. If you don't need the food, leave him alone and he'll go home. Have I convinced you that you need have little fear of dying from snakebite?"

"Uh, I guess so . . . but what if . . . ?"

Questions or comments concerning this article should be referred to 3636 CCTW/DOTO, Fairchild AFB WA 99011, or AUTOVON 352-5470. ★

The dangers of snakebites are normally overestimated by the average person. A calm, levelheaded approach is what is needed.

NEWS FOR CREWS

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

MAJOR JAMES L. HOBSON, JR.
Chief, Tactical Airlift Career Management Team, Air Force Military Personnel Center

The career opportunities in today's airlift systems are virtually unlimited. An individual can progress from squadron level through MAJCOM, Air and Joint Staffs in such specialties as tactical and strategic airlift, rescue, weather, special operations, and special missions, just to name a few. The continuing goal of increased force stability will produce longer tours in the operations field, a general rise in experience levels, and the opportunity for valuable experience and increased responsibility.

Training costs have risen drastically in the last few years. Pilots who have been out of the cockpit can expect shorter requalification courses based on their experience and time out of the weapon system. To further reduce training costs and maintain necessary experience levels, most rated officers can realistically expect to remain associated with one weapon system world (e.g., tactical airlift, strategic airlift) throughout their careers. Assignments may consist of aircrew duty, wing/NAF/MAJCOM staff tours; operational commands, and general ops staff positions throughout the Air Force. Opportunities for career broadening assignments in the supplement, PME and AFIT, will remain but in fewer numbers than in the past. Most of the supplement requirements will be in technical career fields.

CURRENT ITEMS OF INTEREST IN AIRLIFT ASSIGNMENTS

ATC/IP Requirements: The airlift systems have a requirement to support the ATC/IP force with approximately 75 inputs in FY78. This is a challenging opportunity to fly another aircraft and at the same time impart some airlift experience to our new pilots. It's a 4-year controlled tour offering instructional and staff experience, with return to your airlift weapon system upon tour completion. Apply via AF Form 90.

Navigator Manning: There is a projected shortage of airlift navigators for rated duties in the spring of 1978. This is a result of reduced UNT production, delayed INS conversion and an overage in the rated supplement. To help alleviate this shortage, many majors and lieutenant colonels will be returning to operations as their normal supplement tour ends. While entry into the supplement will be reduced, approximately 75 airlift navigators per year will be selected on a best qualified basis for supplement duties. Application is also via Form 90.

C-5 Force Management: C-5 pilot entry prerequisites have been expanded. Pilots with a minimum of 1600 hours total time are eligible to apply. Priority will be given to junior officers. Based on flying hours/training limitations only a small number of select pilots can be accepted. Selected officers will attend the 9-week C-5 qualification course at Altus AFB, Oklahoma, with a final assignment to either Travis or Dover AFBs. Interested officers should apply via AF Form 90.

C-9 Force Management: We have aeromedical airlift C-9s stationed at Clark, Scott and Rhein Main AFBs. Pilot inputs for C-9s come from UPT, first assignment IPs (FAIP) from ATC, rated officers with no weapon system identity and finally, previously experienced C-9 pilots. Generally speaking, pilots who have major weapon system identity (all model C-130s, C-140s, C-141s, WC-135s and C-5s) are not currently eligible for C-9 training (89th MAW excluded). Most C-9 pilots can anticipate a minimum of two tours in the aircraft prior to any broadening assignment outside the weapon system.

Assignment Timetable: Officers completing overseas assignments, HQ AF controlled tours, and rated supplement tours are screened for reassignment 9 months prior to PCS movement. After resource managers make appropriate comments relative to future utilization, all records are reviewed by a board of senior officers. This board determines whether the next assignment will be to rated or non-rated duties. The board meets approximately 8 months prior to your move. It is imperative that we know your desires and future plans before the board convenes. The AF Form 90 is the proper vehicle to transmit this information. For assignment purposes, we should have a copy of your Form 90 no later than 10 months prior to your tour completion.

We make every effort to match your next assignment with the preferences you've outlined on your Form 90. Should you have questions regarding your Air Force career, feel free to call your Wing Career Advisor or the career managers at AFMPC. You can reach the Tactical Airlift Team on AUTOVON 487-4951/3332 and the Strategic Airlift Team on AUTOVON 487-4961/3140. ★

OPS TOPICS

EARLY INDICATORS OF A PROBLEM

On initial takeoff, the C-130 IP stated the aircraft seemed to be nose heavy. About an hour and forty-five minutes later, the IP noticed the student pilot's performance seemed to be deteriorating. The IP took control of the aircraft and discovered the elevator control was extremely stiff. Five degrees of nose up trim was required to relieve the heavy stick pressure. After a controllability check and isolation of the elevator boost pack the controllability problems were relieved. An uneventful landing was made at home station. Watch those early indicators—they are trying to tell you something!—Maj John D. Woodruff, Directorate of Aerospace Safety.

JUST A LITTLE OFF THE TOP, PLEASE!

In two separate instances, F-100 aircraft nearly had close encounters of the hard kind (contact) with trees. The first was on a TACAN approach, in rainshowers, approximately two miles from the runway. The pilot thought he had good visual references with the runway using runway lights and VASIs. He departed the MDA and descended into the tree tops, one mile short of the runway. His go-around was successful as was his subsequent controllability check and full stop landing. The other pilot was momentarily preoccupied with an airspeed deviation while on a low level ingress sortie, approximately 100' AGL. The aircraft dipped down and to the right and before the pilot could recover, the right wing trimmed the top off a 45′ tree. He also recovered safely. Both are very, very lucky pilots.

FORMS FOD

The care and feeding of an F-15 engine does not include AF Forms 781. In fact, they will give the engine a $182,000 bellyache. That's exactly what happened recently when a 781, inadvertently left in the nose gear well, entered the engine as the gear was retracted after takeoff. The pilot reviewed the forms, then left the area. The crew chief replaced the forms in the nose wheel area, a local procedure not used at the pilot's home station. Neither remembered them later on when the aircraft was started. Could this happen to you? Think about it.

TELL SOMEBODY!

A USAF aircraft had a near midair collision (NMAC) with a light aircraft. The pilot landed and filed a HATR. The identity of the civil aircraft was never determined. If you experience a NMAC, TELL the controller about it and tell him you are going to file a WRITTEN REPORT after you land. That verbal report initiates the investigation and alerts the controller to try to identify the other aircraft if possible. We are NOT trying to get a violation against the pilot. We are trying to find out WHY he did what he did.—Maj Joseph R. Yadouga, Directorate of Aerospace Safety.

HOW TO SOLVE AN ATC DELAY!

A Sheik's aircraft was given a 4-hour delay for departure from Heathrow, England. The Sheik's pilot called the tower and said, "The Sheik would like to know the reason for this delay." The tower controller replied that the delay was a result of "a strike by the ATC assistants at West Drayton Center." About 5 minutes later the Sheik's pilot again called the tower and stated "The Sheik would like to know how much West Drayton would cost." —Courtesy *Crosscheck*. ★

LT JEROME L. PETYKOWSKI
VC-2

The author, a Navy pilot, was forced to eject over the Atlantic 30 miles off the coast of North Carolina in December 1976. This is his first hand account. We are reprinting it here for the lessons learned value to USAF crews.

I was scheduled as a backup target tow on a routine air-to-air missile firing exercise. Unless my services were needed, all I would have to do was fly up and down the coast in a standby status. So, early that morning as I dressed for the event, I toyed with the idea of not wearing the bulky, restrictive CWU-33/P ventilated wet suit. The last few days had been warm for December, and although the water temperature was 50°, the air temperature had been a bit warmer. Besides the normal clumsiness and discomfort, wearing the suit meant that I would be unable to reach the upper ejection handle if anything did happen. In the end, however, common sense prevailed. I complied with SOP and donned the wet suit.

After checking in with GCI, I established myself in the prescribed holding pattern. I was flying along —fat, dumb, and happy—when in quick succession, I noticed a bright red and white flash to my right, heard a loud explosion, and felt a tremendous push forward. The flight controls and UHF were immediately inoperative, and the plane began to spin inverted. I was in a poor ejection position—off the seat and nearly pinned against the canopy. Because of the tremendous negative G forces, however, there was no way I could better it.

After attempting several Mayday calls, I reached for the lower ejection handle and attempted to punch out. Unfortunately, I did not have a firm grasp on the handle, and my hand slipped. The second time, I made sure that I had a good grip. As I yanked the handle, I tried to throw my body back to get some sort of acceptable ejection position.

In a flash I was out of the air-

craft and spinning violently as I experienced seat-man separation. The next thing I remember was that I was perpendicular to the risers, watching the parachute canopy deploy. I saw the spreader gun fire and the canopy blossom. The opening shock knocked the wind out of me. Once I was able to clear my head, I tried to assess my situation. I felt OK, but was still trying to regain my breath.

Looking straight ahead, I saw an aircraft in a nose-low, left-wing-down attitude. At first I thought it was my A-4. Then I realized that it was not on fire and was afraid that I had panicked and punched out of a salvageable aircraft. Once I was able to focus my eyes, I realized it was not an A-4 but an F-4. Although confused, I was relieved to see that he was coming back to circle me. I attempted to contact the Phantom via my PRC-90 survival radio. I could hear some static, but was unable to receive any voice transmission. After making a couple of calls to let them know that I was OK, I began preparations for water entry.

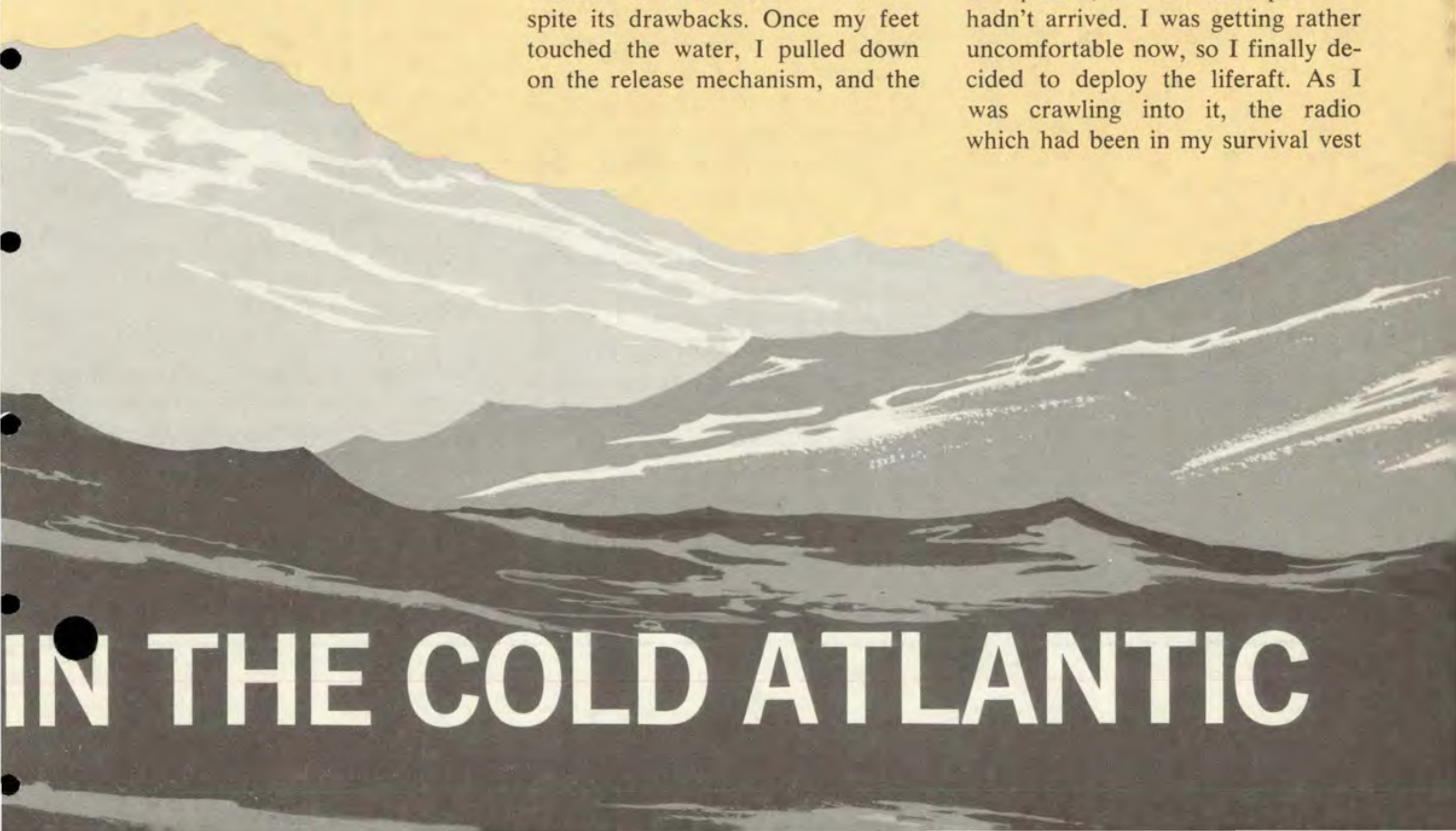
I replaced the radio in my survival vest pocket and inflated my LPA. It worked as advertised, although the right side of the collar failed to inflate fully due to the restrictiveness of the Velcro tape. As I reached back to loosen it, a shot of pain went down my neck and back. For the first time, I realized that I had been slightly injured during either the ejection or the parachute opening.

With the LPA inflated completely, I reviewed my survival procedures for water entry. I decided against deploying my liferaft at that time because the CWU-33/P made even the slightest movement seem like a Herculean task. I decided that as long as my LPA was inflated, I'd have plenty of time to deploy the raft once I hit the water. I then checked for the Koch fittings and found them easily within my grasp. I realized, however, that I still had my gloves on. I stowed them in my survival vest and again reached up and put my fingers near the opening of the release fittings. As I drifted down through a solid undercast and toward the black Atlantic, I thanked God that I had decided to wear the wet suit despite its drawbacks. Once my feet touched the water, I pulled down on the release mechanism, and the chute drifted away about 20 feet behind me.

Once in the water, I took out my radio to contact the Phantom which had been circling me on the way down. I still didn't deploy my raft because I was confident that I'd be picked up soon. The Phantom pilot obviously had a good fix on my position and was probably radioing it back to the SAR helicopter. Besides that, I had expended quite a bit of energy because of the wet suit, and I felt exhausted. I decided to lie in the water and rest until I could again catch my breath.

After about 10 minutes, the Phantom left but was almost immediately replaced by a C-130 which I spotted approaching my position. He was proceeding directly toward me, so I called him on my radio. As he passed over, I called again to give him an "on top" call. As he turned away, I figured that he would circle my position until the helicopter arrived.

Little did I know at this time that no one was reading me nor did they have me in sight once I entered the water. I was just a black spot in a black ocean. Five or ten more minutes passed, and the helicopter still hadn't arrived. I was getting rather uncomfortable now, so I finally decided to deploy the liferaft. As I was crawling into it, the radio which had been in my survival vest



IN THE COLD ATLANTIC

Down In The Cold Atlantic continued

somehow slipped free and fell overboard. I had not ensured that it was attached to my vest by a tether line. I felt sick that the radio was gone, but cheered myself with the thought that the SAR helo would be there very soon.

As time passed, I could not understand what was taking so long. The seat pan had an emergency beacon, and I was sure that everyone would home in on that. I had also dispensed some green dye marker, so I also had a constant visual marker in the water.

I noticed several aircraft in the area, generally circling my position. I attempted to get their attention with my pencil flares, but this seemed to have little effect. I realized I had to make myself more visible, so I reached into my survival vest and took out my strobe light. I pushed the button; it worked for about 20 seconds and went out completely. I always carry two strobe lights, so I was not too worried as I pulled out the second. I became concerned, however, when it failed to work at all. Aircraft—C-130s, H-1s, and H-46s—were continually passing either over my position or within a mile and a half of it, and I could not attract their attention!

By this time, I had been in the water for an hour and was becoming rather anxious. I could not understand why none of the aircraft made an effort to rescue me. I began to think that I might have had a midair and the SAR efforts were being concentrated on the other crew. I still had no idea what had caused my plane to explode and crash.

Finally I noticed an H-46 coming almost straight towards me. It was no more than 100 yards away and approximately 200-500 feet off the water. My hopes soared as I took out a smoke flare to attract his attention. By the time I had popped the flare, the helicopter was nearly abeam of my position. My confidence took a nosedive as I watched him continue toward the coast without acknowledging my signal.

I now became very concerned that things just weren't right. Another 20 minutes passed before a Coast Guard C-130 flew directly over me. I tried to signal him with a pencil flare—again to no avail. At this point, my confidence was at its lowest. Despite all my efforts, no one had spotted me, and I couldn't understand why. I could see the C-130s and H-46s conducting their expanding square search pattern approximately 5 miles to the southeast of my position. I was becoming very cold by this time, but I refused to let myself think of what would happen if they did not find me soon. Instead, I took an inventory of my remaining signaling devices and planned how best to use them once another opportunity presented itself.

Two hours had gone by since I had entered the water when a Marine C-130 passed directly over the top of my raft. I fired another signal flare, but again no acknowledgement. Then it occured to me that, although the liferaft was bright orange and should have been easily visible, my flight suit was dark like the ocean, and my body was covering most of the orange raft. I unrolled the orange edge flaps and began to wave them. The plane began to circle my position, and I thought that someone had finally sighted me. I heard an H-46 coming and shot a flare directly in front of its path. I was overjoyed when the pilot initiated a hovering turn toward me. I popped the night end of my flare to help him with the wind direction and waited until he lowered the horse collar. I then abandoned the raft, swam to the harness, and was lifted aboard the helicopter.

It was not until later that night that I found out the full story. The F-4 that had originally spotted me had me in sight until I hit the water. Once I released myself from the chute, I became virtually part of my surroundings. The Phantom was low on fuel, so it was forced to return to base prior to the C-130 arriving on station. Although the C-130 crew had a TACAN position, they were too high to see me in the water. In effect, I was invisible. Since I had lost my survival radio, I could not contact them verbally nor could I use the emergency beacon. The radio in the seat pan worked for only 15 minutes before it too succumbed to the elements. For 2 hours I was lost, and the SAR people had only a general idea of where I was. The only reason the H-46 finally did sight me was by pure chance. The pilot in the right seat happened to look in my direction and saw me floating in the ocean. They never saw any of my flares or other signals.

Looking back on the experience, I would like to offer some conclusions and recommendations. The most important and vital point that I'd like to pass on is the importance of that antiexposure suit—providing it's on your back rather than on a hanger in the paraloft. It is very possible that I would not be around today to write this article had I not worn my CWU-33/P. I don't like wearing "the bag" any better than anybody else, and I could have rationalized not wearing it because I was "within gliding distance of land." But look how far my A-4 glided with a Sidewinder up its tailpipe! Anybody that doesn't comply with the letter and the spirit of the 120° combined sea/air minimum temperature rule is literally betting his life that his airplane is going to make it back. Personally, I like living too much to make that bet.

Other comments I'd like to pass on:

- My complacency in thinking that my exact position was known caused me to delay my actions in this emergency. My strong advice is not to delay your survival procedures when faced with any type of emergency situation. Use every means available to you in order to speed your discovery and ultimate rescue.

- I carried two packs of pencil flares with me and used most of them during my time in the water. I was to find out later that although the flares are easily sighted at night, they are difficult at best to see in the day or in poor visibility.

- The strobe lights should have been of much greater value to me. However, despite a recent 90-day survival vest inspection, the batteries were weak enough to go dead once they were exposed to the elements. In this case, I suggest that the Navy revise its standards as to what determines satisfactory battery performance or find some other, more reliable, power source.

- The green dye, although highly visible during bright sunshine, was virtually useless because of the overcast sky that prevailed during my excursion in the Atlantic. Not exposing the orange raft flaps could have been a contributing cause in my delayed rescue. Another way I could have increased my visibility would have been to use the orange-colored side of the solar blanket provided in the seat pan survival kit. By cutting a hole in the center large enough to slip my head through, I could have worn the blanket—serape style—thus offering a large orange target for the SAR crews to spot.

- During the initial portion of my experience, I tried removing my helmet in order to relieve some of the weight. As soon as I lifted it from my head, I felt an icy rush of air pass over my scalp. I realized then that the helmet was helping me to conserve precious body heat, as 75 percent of one's body heat can be lost through the head. I kept it on the remainder of my time in the water. Also, during my ride up the rescue hoist, the helmet served me once again by protecting my head when I was summarily lifted into the underside of the H-46. If I had removed it, I'm sure I would have received a painful souvenir of my first helo ride.

- I now carry the large antiexposure mittens that I had previously thought too large and cumbersome to carry with me in the A-4 cockpit. Although my Nomex flight gloves somewhat shielded my hands from the wind, the insulated mittens would have afforded me infinitely better protection against the elements. Toward the end of the 2-hour ordeal, my hands were numb and I was having difficulty manipulating the signal flares. If my rescue had been delayed much longer, I'm sure I would have lost the dexterity necessary to use any of the rescue devices.

- Finally, eat the Charm candies provided in your survival kit. Sugar is energy. Energy provides strength and warmth, both of which are highly desirable in a cold weather survival situation.

My purpose for writing this article has been to share the knowledge I gained from my survival experience so others might avoid the pitfalls I fell into. A cold water survival situation is not pleasant, and preparation and advance planning are the best lifesaving techniques you can employ. I sincerely hope that no one reading this article ever finds themselves in a similar situation, but if they do, I just hope that they have prepared themselves. Believe me, the Atlantic Ocean in December is totally intolerant of complacency and unforgiving of error. —Courtesy *Approach*. ★

New Skin for Casey

LT COL CHARLES L. MILLER
Oklahoma City Air Logistics Center
Tinker AFB OK

The C/KC-135 aircraft, which was designed during the early 1950s with a 10,000 hour design life, entered the USAF inventory in 1956. During its 20-year life, the -135 fleet has compiled some impressive statistics. Of approximately 750 aircraft remaining in service, over 100 have flown in excess of 10,000 hours, over 30 have exceeded 15,000 hours, six have exceeded 20,000 hours and the three highest time aircraft have accrued slightly over 25,000 hours. The -135 fleet as a whole has accrued in excess of 6.3 million flight hours without a single aircraft loss attributable to wing structural failure!

This impressive record is the combined result of the damage tolerance or "fail-safe" design concept and an active USAF/AFLC structural integrity maintenance/modification program. A "fail-safe" design is one that can tolerate the localized failure of one or more structural members without a significant reduction in the residual strength of that structure (i.e., it consists of adequate redundant load paths to carry the stress into the adjacent structure).

The -135, being of a semi-monocoque design, provides over 50 percent of the wing strength through the wing skin. This skin, on the production aircraft, was constructed of 7178 aluminum alloy which was selected for its extremely high strength-to-weight ratio (the highest of the aircraft aluminum alloy family). However, in more recent years, it has been recognized that 7178 aluminum has very low fracture toughness (i.e., it is very "brittle" under cyclic loading stresses).

Throughout the history of the -135 fleet, the Air Force through AFLC, has spent millions of dollars testing, evaluating and modifying the -135 structure to maintain its structural integrity. The most recent effort is through a program to replace the brittle and aging 7178 aluminum lower wing skin with an improved design skin constructed of highly fracture resistant 2024 aluminum (TCTO-989). However, the magnitude of replacing the lower wing structure on a 750 airplane fleet will mean that this retrofit will not be completed on all aircraft until 1988.

To enhance the aircraft structural integrity for those aircraft yet to receive TCTO-989, several modifications have been developed over the past several years. The purpose of this article is to provide advanced crew familiarity with one of these modifications, the acoustic crack detection system (ACDS) prior to its introduction into the -135 fleet.

WHY AN ACOUSTIC CRACK DETECTION SYSTEM?

To maintain a high degree of *fail safe* in the aircraft wing, (as constructed with 7178 aluminum), it is imperative that wing skin panel cracks of intermediate size (one to six inches) are detected *when they occur*, so that they can be repaired prior to subsequent flights. If cracks are allowed to go undetected, subsequent high stress levels (due to high gross weights, maneuvering and/or gusts and the weakened structure) will cause the cracks to run farther until an entire skin panel is broken from edge-to-edge. Complete panel failure (edge-to-edge), based on engineering analysis, can reduce the residual strength of the wing, depending on location, to 60 percent of design limit load, or less, and will greatly increase the potential for catastrophic wing failure.

In the wing area, outboard of the fuselage, the -135 design incorporates a "wet wing." Therefore, a crack in this area will likely be detected on the ground by visible fuel seepage or leaks. In flight, a severe crack in this area will be detected by the crew through a loss of fuel quantity and by visible vapor trailing from the area of the crack. However, the center wing area (integral to the fuselage) fuel is contained in bladder cells and the lower wing skin is not readily visible to ground inspection because of the equipment bay, the air conditioning packs and the keel beam doors.

To provide an early warning of a crack condition in the *center wing area*, ACDS has been designed and tested and will be installed on all C/KC-135 aircraft until such time that the lower wing skin is replaced under TCTO 1C-135-989. (The crack detection system is not required after wing reskin with fracture resistant 2024 aluminum alloy).

WHEN WILL ACDS BE INSTALLED?

The first aircraft with ACDS (TCTO 1C-135-1026) installed, will appear in the January 1978 time period. A full scale installation program averaging 40 aircraft per month will be initiated in February 1978 and fleet-wide retrofit will be completed by September 1979. This installation will be done on aircraft that are captive in depot mainte-

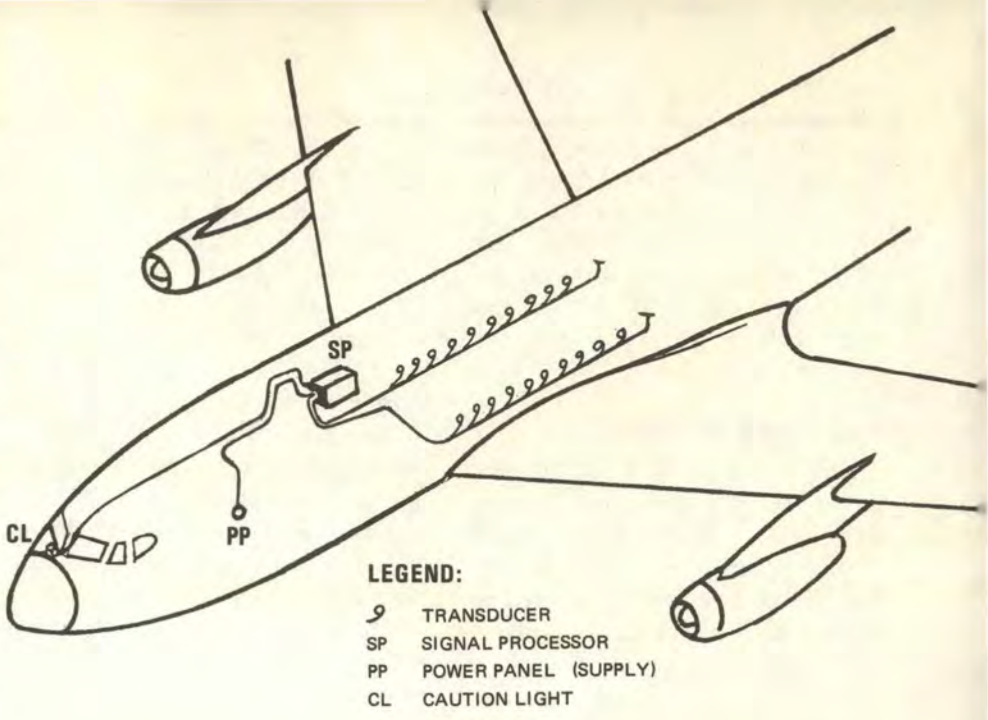
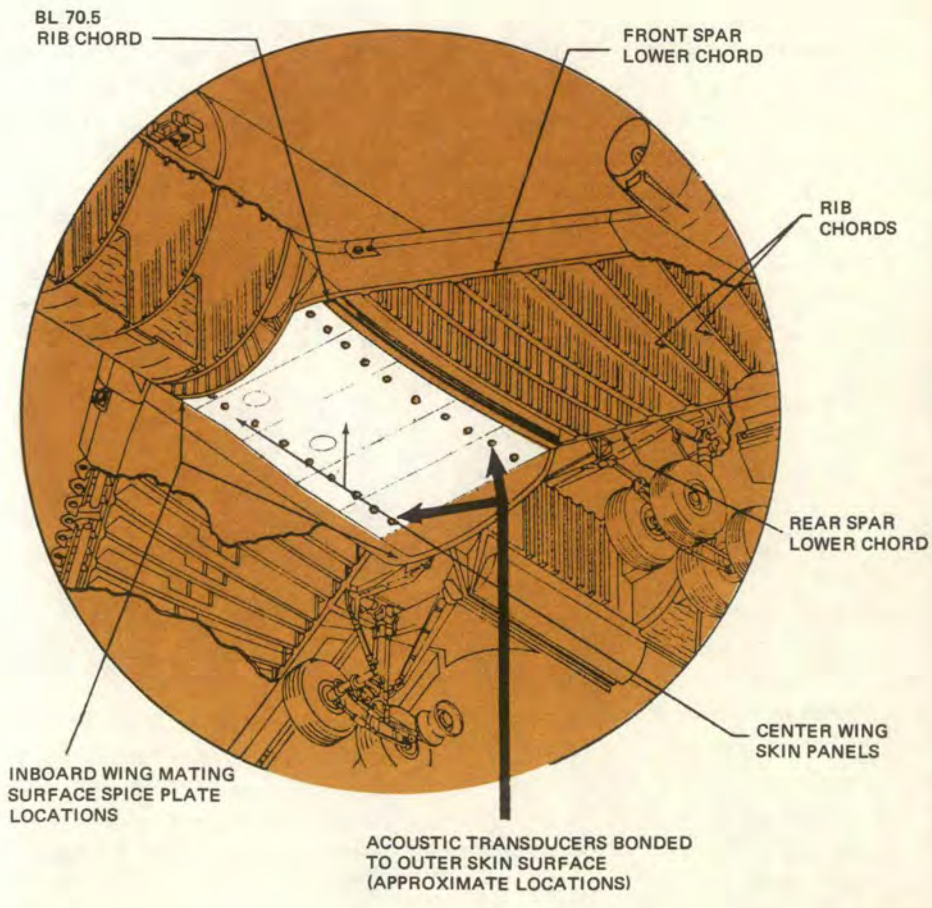


Figure 1

Figure 2



nance and will also require a fly-in program to a "Queen Bee" site. The fly-in schedule will be based on highest time aircraft first. (The ACDS will be removed during the installation of TCTO-989 as the fleet continues to be reskinned through 1988.)

HOW DOES IT WORK?

The system consists of 20 temperature-compensated acoustic transducers that are epoxy bonded to the lower center wing surface. These transducers are connected by coaxial shielded cable to a signal processor located on the right hand side of the aircraft (just opposite the main cargo door). The system is powered by the 28 volt DC TR Bus nr 2 and is operable anytime AC power is available to the nr 2 TR (i.e., AC power is applied to the airplane). The signal processor circuitry filters out all lower frequency signals generated by mechanical noise such as jet engine noise, air flow, landing gear thumps, vibrations, structure flexure (rubbing parts, loose fasteners, joint creaking) hydraulic system noises, hail or rain impingement, etc. The processor amplifies signals in the 200-250 KHz range which are generated by crack growth or "popping" in 7178 aluminum material. This signal will illuminate an amber caution light on the copilot's instrument panel and a red "test/crack" light on the signal processor. Additionally, one of several fuses (internal to the signal processor) is blown to provide a semi-permanent indication as to which skin panel displayed a crack indication. These fuses in no way affect the operation of the system and *must never be replaced* without detailed physical inspection of the affected skin panel by qualified *ground maintenance personnel!*

CREW REACTIONS TO CRACK INDICATION

Illumination of the amber "wing crack" caution light, should be treated as indicated in Section III of the appropriate aircraft flight manual and/or Operational Supplements thereto. The most important consideration is to recognize that illumination of the caution light is *no cause for panic*, but it does require positive actions!

The light is not likely to illuminate during straight and level, unaccelerated flight. A panel is unlikely to propagate an unstable crack unless a high stress level peak is encountered, such as a sharp gust of turbulence, an increase in lift due to rapid maneuvering and/or increase in airspeed (such as during takeoff), or excessive wing bending stress due to lightened wing fuel with heavy body cargo, fuel or payload.

Therefore, it is essential (upon confirming the caution light indication, through the test/reset function) to reduce aircraft center wing stress levels by avoiding/departing areas of turbulence, reducing maneuvering bank angles reducing body fuel weight (by dumping), retaining wing fuel to minimize bending stress, and landing as soon as practicable/possible as the case may require. There is no restriction required on the use of speed brakes or flaps, since neither the buffet nor the change in lift generated by these are critical to center wing skin loads or stress levels.

Secondly, it is important to make a log entry in the AFTO 781 indicating the time at which the light illuminated ("Takeoff plus xx minutes") the total fuel, the body fuel and any significant flight conditions (bank angle, turbulence, etc.) so that engineering analysis can accurately determine the stress level encountered should a crack be confirmed by inspection.

In summary, the acoustic crack detection system on the C/KC-135 is designed to be a highly reliable electronic sensing system, immune to spurious mechanical noises and false indications. It will be implemented to provide an early warning of intermediate cracks in the center section lower wing skin if and when they occur, so that they can be detected and repaired prior to a significant reduction in wing residual strength. This system will add a significant degree of confidence to the structural integrity to an aging fleet until the original lower wing skin material can be replaced with current state-of-the-art skin alloy. ★

ABOUT THE AUTHOR

Lt Col Charles L. Miller, U. of Illinois 1961, completed UPT at Moody AFB Class 62-G. He flew EC/RC-47s in Vietnam, the KC-135Q in support of the SR-71 and was Chief of Safety for the 456 BW at Beale AFB. During a NATO exchange tour he flew the Boeing 707 and was tanker single manager in charge of developing air refueling procedures for the Canadian Armed Forces. His current assignment is major modification program manager (structures) for the C/KC-135 fleet at Oklahoma City ALC.

NAME THAT PLANE

This was the first American bomber to be powered by jet propulsion alone. Two 4,000 pound thrust G.E. engines were encased in the fuselage. For answer, see 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 Larry C. Hoercher

33d Communications Group (AFCS)
March AFB, California

As a volunteer additional duty ground safety NCO, TSgt Hoercher was extremely successful in reorganizing and revitalizing the ground safety program at the 33d Communications Group. Recognizing the need for a better program, he volunteered to take on the job of ground safety NCO. He set up an office independent of the host wing with which he developed a fine rapport and cooperative working relationship. Coupling past experience with a strong initiative for self-education, TSgt Hoercher created the finest ground safety program in the history of that Communications Group. His programs of instruction were directly responsible for the improved safety record of that unit. TSgt Hoercher's most notable contribution was his success in bringing cardiopulmonary resuscitation (CPR) education to the entire March AFB community. He gained CPR instructor status during an off-duty education program and then proceeded to create a base-wide CPR training course. TSgt Hoercher's program has reached over 400 Air Force people and is now being extended to provide this valuable training to local civic organizations. TSgt Hoercher's aggressive, participatory approach to ground safety and his enthusiasm and initiative have resulted in an extremely successful ground safety program.

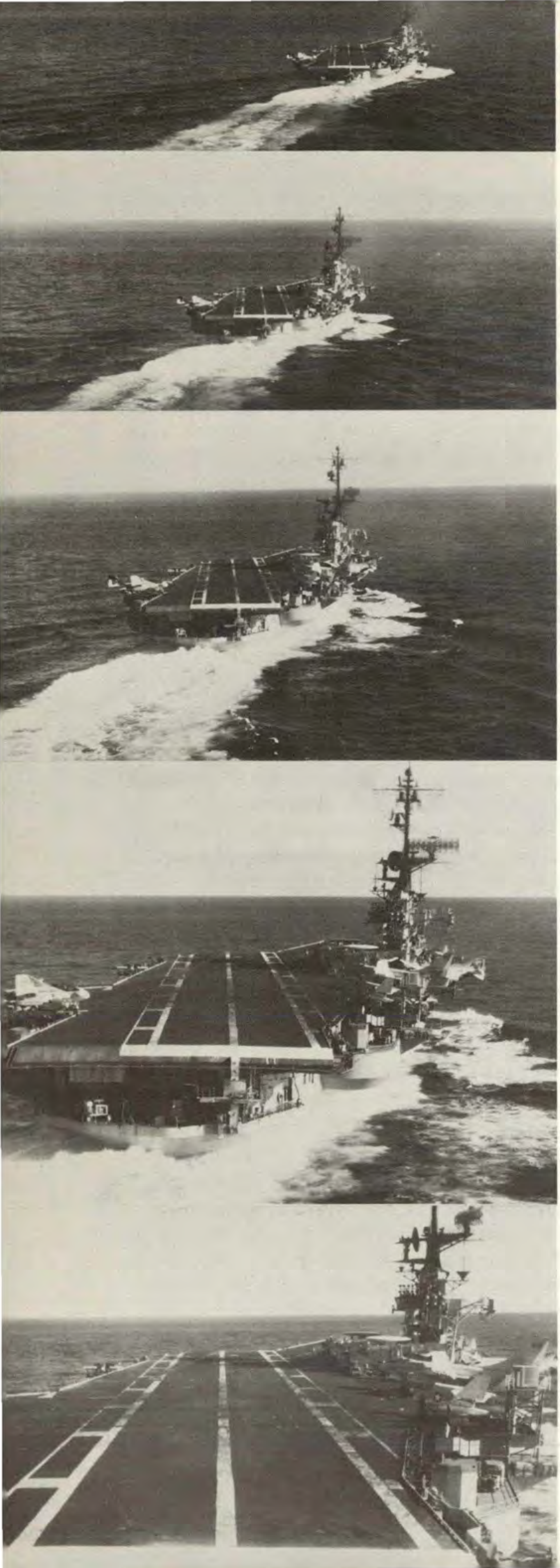
TSgt John D. Sutherland

51st Composite Wing (Tactical) (PACAF)

Carbon monoxide poisoning has been a recognized hazard in Korea. TSgt Sutherland conducted a year-long campaign to educate USAF personnel of its dangers. He wrote a series of articles that were featured in newspapers and on radio. He designed posters and placed warning signs in prominent places to obtain maximum exposure. The result: zero carbon monoxide poisoning fatalities in 1976.

In 1975 the wing had five industrial military disabling injuries. Through his knowledge of AFOSH and OSHA standards, TSgt Sutherland was able to better educate unit commanders and supervisors. That and his expert management of industrial safety education and inspection programs contributed significantly to reducing disabling injuries to one for the year.

TSgt Sutherland also did an outstanding job in motor vehicle accident prevention. He prepared a bilingual vehicle dispatch briefing which is presented by motor pool personnel to drivers leaving the base in Air Force motor vehicles. For all persons attending the local driver's orientation course, he developed a pamphlet describing driving hazards in Korea. His work in all areas of ground safety saved valuable USAF resources. ★



A CITY AFLOAT

Text and Photographs
CAPTAIN JAMES J. LAWRENCE
Directorate of Aerospace Safety

A Navy A-7E streaks past the scenic Pacific coastline heading westbound. The pilot tunes a TACAN station, not found on the regular aeronautical charts, and receives a bearing of 280 degrees at 60 miles. This Corsair II pilot has completed his Navy Undergraduate Pilot Training and transition training in the A-7. All that remains is his qualification for carrier landings. His destination: The USS Coral Sea. A pilot's first landing in a new aircraft is a traumatic experience. A pilot's first landing in a new aircraft on an aircraft carrier can be death-defying.

The pilot contacts the Carrier Air Traffic Control Center (CATCC) which is similar in equipment and mission to our land-based approach controls. He is told he must hold while the ship prepares for the next launch and recovery cycle. The CATCC controller sets up the A-7 pilot in a typical Navy carrier approach pattern: the 340° radial, 20 miles at 5,000 feet, to hold. Another aircraft is on the same radial, holding at 21 miles and 6,000 feet.

Carrier operations are supervised by a senior officer in carrier control. This individual, appropriately named the Air Boss, oversees the total launch and recovery operation. When the deck and personnel are ready for the next cycle, the Air Boss contacts CATCC and has them start the waiting aircraft down. The action begins.

Aerospace Safety magazine sent me there to observe the action. A glimpse at the activities and peculiarities of our sister service, the Navy, is the goal of this article. For most Air Force aircrews, their knowledge of aircraft carrier operations is limited to those carrier landings practiced by crew members on a wetted down hooch bar in Southeast Asia. These imitations of carrier landings usually preceded the dead bug drills and followed the poker game. Naval carrier operations, however, are a great deal more involved. In this article, I will tell the story of the Navy Aircraft Carrier and the massive support it takes to keep this city afloat operating.

Let's leave the A-7 pilot up in the holding pattern for a while and take a look at what goes into making this planned approach and landing possible. The USS Coral Sea, is a "Midway Class" attack carrier officially designated CV-43. The ship was originally commissioned in October of 1947, just after the Second World War. The carrier is older than most of the pilots it accommodates, but it has undergone numerous modifications and modernizations since it was first launched. The most extensive was back in the mid-1950's when the original straight deck was replaced with an angled flight deck and modern steam powered catapults were installed. The Coral Sea boasts a proud history to include five combat cruises during the Vietnam War and air and medical support during the SS Mayaguez incident. To date she has made 18 overseas cruises.

For those of you unfamiliar with the Navy, the size of this monolith ship is mind boggling. Consider that ship's company (those permanently assigned to the ship) normally numbers as high as 2,710. When an air wing is aboard for a combat cruise or deployment, the number of bodies on board increases to 4,400-4,500 people. Just think of the room needed to house, feed and support a contingent this large at sea. The aircraft carrier is nearly one thousand feet long, bigger than three football fields; the flight deck extends over the hull and is 420 feet at the widest point. Her height from the keel to the top of the mast is equal to a 20 story building.

During my 4-day stay aboard the USS Coral Sea, I had the opportunity to observe all phases of carrier support activities. The ship is powered by four geared Westinghouse turbine engines which spin four engine shafts so large, I could not get my arms fully around them. Twelve giant 165 psi boilers provide the steam for these powerful turbines. The ship is fully capable of supplying all the electrical and fresh water needs of the 4,000 plus people on board. Two generators are constantly operating to produce all the electricity for normal shipboard requirements. Five-stage condensers turn sea water into usable fresh water for personal use as well as use in the boilers and turbine engines. Duty on these lower decks is definitely tough. Temperatures normally run about 100°F but can go as high as 140°F in hotter Pacific climates. The buddy system is extremely important, and several engine areas are constantly monitored by closed circuit television.

Above the engine decks are the support decks. Here you find many of the services which complete the definition of the aircraft carrier as a city afloat. Ship services include a print shop, post office and motion picture area. Also available are a butcher shop, cobbler shop, library, bakery, two barber shops, tailor, laundry, dry cleaner and carpenter. The ship's company has doctors, dentists, JAGs and chaplains. There is a 23-bed hospital, a TV and radio station, and a magazine and newspaper office. Take your typical Air Force base directory and jam all the services listed into a 1,000 foot by 400' hangar. That's your typical aircraft carrier.

It should be obvious by now that so many people and functions crammed into this shop necessitates quarters and work areas much smaller than those used by

Air Force types. Upon arrival on the ship, I was escorted to my waiting stateroom, but stateroom is a bit of a misnomer. The room was 8' x 12' with two bunks, dressers, and a small closet area. My initial reaction was that if I encountered such quarters at an Air Force base, I would immediately declare them unfit and pull my crew to a downtown motel. I shortly realized, however, that I had been spoiled, for my quarters were of the best available, especially for single occupancy.

Ship's officer company and Air Wing people often share rooms a good deal smaller than mine, and enlisted personnel live in areas reminiscent of old war movies. Eight or more men are often jammed into an area no bigger than most AF johns. Being alone or getting away by yourself is an improbability. Such conditions, encountered during cruises which could last six months or more, make Air Force life seem rather pleasant by comparison.

During cruises, the work day is just that; a full day's work. Most people average 16 hours of duty daily. This is just as well because there is not much to do beside work. Recreation facilities are limited to evening closed circuit television or semi-new movies in the different wardrooms. Exercise opportunities are confined to the large area, just below the flight deck. Here, one can jog, play basketball, throw a football or a frisby, but these activities are curtailed when the Air Wing is aboard with its 78 aircraft parked on this maintenance deck. All alcoholic beverages are banned aboard ship, as is gambling. Of course, no women are on board a combat ship. Extra-curricular activities are evidently limited.

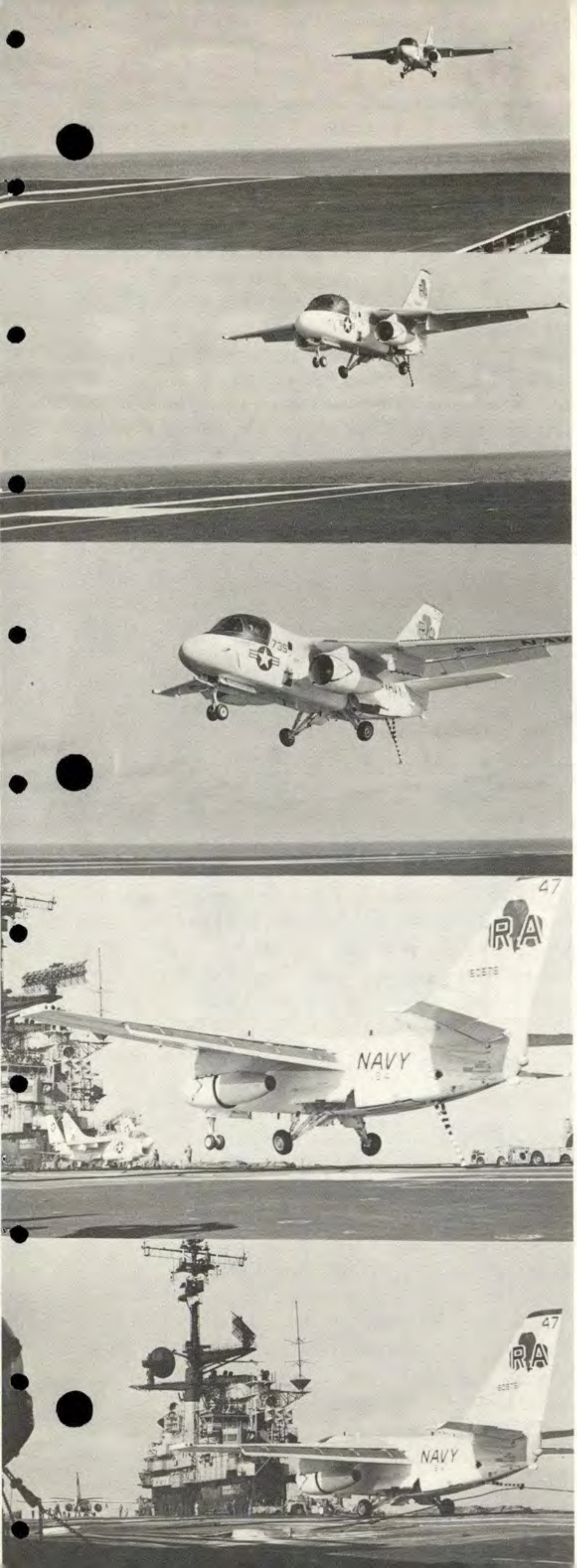
The landing signal officer studies the approach of an S-3. He communicates directly to the pilot. The wave-off signal initiator is in his left hand.

Despite conditions which appear sub-par by our normal working standards, I found the people to be highly motivated and for the most part proud of their ship and duty. This can only be attributed to the maintenance of a delicate line between discipline and motivation, though the typical Air Force person would feel the discipline much more severe than he normally encounters. It is a tribute to the Commander, Captain George Aitcheson and his officer and enlisted supervisors that this balance can be maintained for long periods at sea.

Let's return to that A-7 pilot we left holding on the 340° radial. The purpose of the cruise during which I visited the USS Coral Sea was for carrier qualifications for pilots in the Navy's equivalent to an Air Force RTU. These Navy pilots are transitioning into new aircraft and need to certify their carrier readiness as part of the transition curriculum. A certain number of both day and night Traps (engagement on the cable), touch and go's and CATS (catapult takeoffs) are needed by each pilot.

The CATCC controller receives word from the Air Boss that operations are to begin. During day operations, this ATC controller would bring the plane down to a certain fix then turn him over to the Air Boss for a VFR approach. At night, the poor visual cues at sea demand some type of precision approach. This is supplied by the carrier controlled approach (CCA) controller who takes the hand-off from the approach controller. The CCA man has equipment identical to that of a land based GCA controller. The night flying aircraft is brought to a one-half mile final by CCA and then released for the approach under VFR.

At this one-half mile point at night or abeam the ship in daytime, the pilot contacts the landing signal officer (LSO) who occupies a small deck on the port side (that's left) of the ship, just forward of the fan-



tail (the ship's rear end). There, he is in perfect position to observe the aircraft's rate of descent and line-up with the flight deck. If you remember back to those old World War II movies again, you should be able to picture that guy on the deck frantically waving those hand held red paddles. Those men were the original LSOs. Today, direct radio communication with the pilot makes paddles obsolete.

From experience, the LSO knows how to gauge line up, angle-of-descent, and rate of descent. Additionally, three lights in the aircraft's wheel well area are connected to the pilot's angle-of-attack (AOA) system and show the LSO if the aircraft is on speed, slow or fast. The LSO must rapidly compute these visual inputs and talk the aircraft down if any deviations are present. Should the LSO feel the approach is unsafe, he will initiate a Wave Off (go-around) over the radio and by a visual signal on the optical landing system (meatball). The LSO has complete control of the aircraft at this time and safety of flight is dependent on his competency.

The A-7 pilot's view of the deck is fascinating. He has to fly his approach to a landing strip one-tenth the size of those normally used by non-carrier pilots. One of the keys to doing this successfully is his ability to focus his attention on the meatball and not on the deck. Rate of descent seems high and the movement of the ship up and down can cause visual inaccuracies, if you rely on deck aimpoint alone. The result has often been short or long touchdowns, both of which can be deadly.

The optical landing system is more accurate than our AF VASI system. Glide path deviations are shown immediately by movement of the meatball up or down in relation to a set of horizontal green lights. Get too low and the ball turns red. The Navy carrier pilot works with the meatball and his cockpit AOA all the way to touchdown. As he approaches the carrier, the pilot also uses a red light display on the fantail of the ship to line up properly. This series of red lights running from the deck to the water indicates if the pilot is on course ┬, left of course ‾/‾ or right of course ‾\‾

Should the pilot periodically glance at the approaching deck, he would see deck lighting in the form of white landing zone outline lights, and strobes running down the center. Four arresting gear cables stretch across the deck sitting approximately 8 inches off the ground on flexible metal bridges. A fifth can be in-

The catapult is attached to the nose gear and pulls the aircraft at super high speed (Note: Tie-down chains still in place).

An A-7 is catapulted into the wild blue. Airspeed will be as high as 160 knots when he reaches the end of his short run. Note the catapult steam beginning to rise just ahead of nose wheel as he begins his launch.

After each catapult takeoff, the tremendous amount of steam necessary to power the high speed tow escapes to the deck. The whole area goes IFR for several seconds as the crew readies that catapult for another launch.

stalled which has a net barrier, similar to our MAI[illegible] departure end barriers to trap an aircraft with an in-operative or broken tail hook. The barrier cable is several hundred feet long and each end is connected below deck to a huge mechanism with spools at each end and hydraulic pistons in between. These devices are set at a certain resistance pressure based on the gross weight and type of aircraft to be trapped.

If the Navy pilot follows the meatball exactly to touchdown, he should get a successful engagement with the third barrier from the end of the ship. A lot of things can happen, however, such as a hook skipping over the cable, a cable breaking, or just plain missing the wires. In order to prevent an awfully uncomfortable departure over the end of the deck, the Navy pilot selects full military power just as he touches down, so that he will be airborne almost immediately if the engagement doesn't work. The sensation caused by decelerating from 150 knots or higher to 0 knots in 300-400 feet is quite an experience.

When the aircraft stops and the pilot regains consciousness (just kidding), the cable operator starts to retract the cable under direction of a deck worker called the cable hooker. He carries a large crowbar-like tool which is used to unsnag the cable from the aircraft's tail hook. When clear, the pilot's attention is moved to a taxi director. All taxi directors wear yellow clothing from the waist up so they are easily distinguishable. The director has the pilot raise the aircraft's wings and taxi clear of the flight deck foul line. If the aircraft is going right back out, it lines up for its turn on one of the two operating catapults on the forward section of the ship. If the aircraft is finished for the day or needs maintenance, it is taxied to one of the elevators for movement down to the maintenance deck.

Aircraft going back out follow the green shirted catapult operator's directions. The catapult itself is an ingenious device that consists of a steam generated piston which runs down a cylinder and track with the aircraft in high speed tow. In just a few hundred feet, an aircraft is accelerated to 150 or 160 knots—safe flying airspeed. The tow is via the nose gear or a special harness. The steam is built up to the level appropriate for the type and gross weight of the aircraft next up. Aircraft with afterburners are also held back with a special retainer bar which has a breakaway pull strength specifically designed for each type aircraft. It connec[illegible] to the deck of the ship and the rear of the aircraft.

ithout this bar, the aircraft would not be able to remain static with the afterburners in operation.

The aircraft taxis into position via direction by the green shirts. The catapult is connected at the nose gear or harness point and the hold back bar is installed. The exhaust deflector shields are raised and the CAT officer gives the pilot a run up signal. The pilot advances the throttles to military and checks his instruments. If everything is OK, he selects afterburner, checks for good lights, then salutes to the CAT officer. This indicates the pilot is ready. The CAT officer visually checks the area, and if clear he touches his hand to the deck. The CAT operator again checks the deck then he hits the launch button. The acceleration effect is fantastic but it leaves you with a feeling of total helplessness for a few seconds. Any problem with the CAT can result in your unsolicited entry into the water with one big ship steaming right toward your young body.

For an Air Force safety officer, carrier operations would probably be the cause of his blood pressure climbing to never before attained heights. To the novice observer, the confusion aboard the flight deck uld leave an impression of utter disorganization. But as you continue watching the total action from a high vantage point, you begin to realize that in actuality, it is a highly coordinated exercise. Each man has his particular function, which he performs before passing the aircraft on to the next link in the chain. Accidents, however, do happen and the Navy recognizes the inherent safety difficulties in carrier operations. Aircraft and crew members are dependent on the successful operation of large, intricate machinery. Air Force rules, like the marshalling distance criteria in AFR 60-11, are non-existent on the close confines of the flight deck. Traps and Cats occur within feet of many deck workers. Despite these dangers and opportunities for mishaps, comparatively few occur.

Ships company includes a safety staff, headed by a Commander (AF Lt Col equivalent). These safety managers roam the ship observing all aspects of carrier operation. Safety hazards and unsafe practices are addressed on the spot and a daily safety bulletin is distributed to all work areas which cites observed unsafe aspects for all to think about. The safety officer the USS Coral Sea also publishes a safety brochure ce every two months. This publication offers flight and deck safety articles, recognition for individuals who have significantly contributed to ship safety, and feedback channels for evaluation of the onboard safety program.

Copies of *Approach, Lifeline, Mech* and *Driver* are abundant for aircrews to read. The Navy accident reporting system is almost identical to our AF hazard report and is disseminated to all other similar users, for lessons learned value. A shipboard safety reporting system has been developed which allows an individual to communicate an observed safety deficiency directly to the ship safety staff. The safety officer works directly for the ship's captain in a staff agency capacity and can bypass all normal channels on any ship's function which demonstrates unsafe practices.

In the field of aviation safety, the Navy has some unique problems that are quite different from its Air Force counterparts. When an aircraft accident occurs at sea, the aircraft is normally lost. Salvage operations can only be accomplished in very extreme circumstances. For this reason, the bulk of investigating evidence is normally not present. To help in this deficiency the Navy has developed what they call their pilot landing air television (PLAT) system which has a two-fold purpose. The system consists of several closed circuit television cameras which record all flight deck operations from several angles. Pilots use these films just as professional athletes use game films to visually examine and evaluate their errors, post-flight, and to correct these mistakes in the future. The PLAT system also serves as a safety feedback. Often events on board occur too fast for the naked eye to record, such as some type of CAT malfunction. The PLAT has been used time and time again by safety boards to determine the cause of a particular accident.

My experience during this four-day visit to the USS Coral Seat is onlv partly chronicled here. Space prohibits telling the full story of all the support functions it takes to keep this ship operating efficiently. The days are long, the conditions austere, and the pay low, as it is for all of us. Yet these men serve proudly and cling to many naval traditions despite the inconveniences. The USS Coral Sea is a warship and her men dispatch their business seriously. I wish to thank the COMNAVAIRPAC Public Affairs Office at North Island NAS and the captain and crew of the USS Coral Sea for their hospitality and assistance during my visit to that ship. I'm particularly grateful to Lieutenant Commander Paschall, of the Strike Ops office aboard the Coral Sea for serving as a guide, a source of information, a baby sitter and a friend during the course of my visit. ★

The Aborted Takeoff

IT HAS PAID TO BE READY

MAJOR THOMAS R. ALLOCCA, Directorate of Aerospace Safety

It is a grim axiom among flight safety circles that the pilot is the first to arrive at the scene of an accident. Since this is often sadly true, it behooves this hardy group of souls to do all they can to ensure that they don't join any of their ill-fated brethren. This is especially true for a particularly critical maneuver—the aborted takeoff.

At this point I'd like to introduce examples of numerous fatal mishaps which occurred during aborted takeoffs. I really wouldn't "like to," but it would support my contention that this is a very difficult maneuver to pull off without incident. But you know what? There simply are **not** that many recent examples of tragic mishaps which occurred during rejected takeoffs. Does this make the maneuver any less hazardous? Hardly . . . because it incorporates many facets of danger known to aviation: compressed time, maximum performance, environmental problems (the change from ground-to-air) and the necessity to instantaneously switch from a "go" to a "stop" mentality. Perhaps the most hazardous of these facets is the compressed time problem and the mental switch.

Probably the most difficult "decision in seconds" which ever faces a pilot is an emergency during the critical phase of takeoff. The phrase "decision in seconds" deserves a few words.

It has been said of pilots that they are good differentiators, but not good integrators. I assume this means that too high an escalation of demands on the judgment of the flyer may cause him to make a wrong decision. Well, of course, this is true! Too high an escalation of demands on anyone's attention may lead to an erroneous decision! The logic of this statement will not be labored beyond ". . . I need time to think about this/I'll call you back in the morning. . . ." It follows then that we make an unusually grotesque demand when we insist that a decision—involving equipment valued at millions of dollars and often involving the lives of many people—be made correctly in a matter of a few seconds. Yet, this is precisely what is required of a pilot facing the aborted takeoff decision.

It is unnecessary to detail the mathematics of the performance calculations governing takeoff for various aircraft. Suffice it to say that a multiengined aircraft must be able to take off after an engine has failed, provided it has reached a certain speed the moment the failure occurs. The Flight Manual figures have been authoritatively and precisely determined—a point of undisputed accuracy. But, let's consider, for a moment, the manner in which these figures are derived.

Flight Manual data is obtained by the manufacturer's and USAF's test pilots, working under optimum conditions (from an ideal runway and forewarned with the knowledge that they are going to have to stop the aircraft from a speed just below decision speed).

Since human time lag tends to improve with practice, test pilots who have accomplished this accelerate-stop maneuver several times usually acquire a reduced reaction time. The "average" Air Force pilot, on the other hand, may have accomplished this procedure in the simulator once in the past 6 months, and may never have carried out the exercise at high speed in the aircraft itself. This contrast is further intensified by the fact that rejected takeoffs are extremely expensive (in brake and tire wear and, therefore, are not routinely practiced) and—most im-

portantly—that the line pilot is **not** expecting to abort the takeoff.

The test team conducts their accelerate-stop drill in the most efficient manner possible: feet properly positioned, eager to apply the brakes with little thought to brake wear. The line pilot proceeds by retarding the throttles first, selecting spoilers or other retarding devices, and then applying the brakes. Little wonder the rejected takeoff is more hazardous during "operational" flying than during "test" work.

The difficulty of this dilemma is further compounded by the "engine failure: power or no power question."

The aircraft certification tests are made simulating an engine failure. Test calculations are thus made on this assumption: in the interval between a "failing" engine and brake application, the aircraft continues to accelerate at an **engine-out** rate. The line pilot, in reacting to an engine failure indication on takeoff roll, has no time to wonder whether the indication is real or spurious—he will attempt to stop. But in the event of an erroneous indication, he may be attempting this stop with full engine power—a decided difference over the flight test scenario.

All these elements add up to one unpleasant fact: that the line pilot is faced with a difficult task indeed when he encounters the aborted takeoff problem. There are, however, a number of approaches which can be taken to minimize the very real hazard of a rejected takeoff.

Like so many other safety aspects of modern aviation, the best solutions are expensive—prohibitively so. These "best" fixes could include lengthening a large number of runways all over the world or reducing takeoff weights by considerable amounts. Such ideal solutions, as we all realize, are difficult to fully implement. As a consequence, we're left with alternative cures which often fall into the "improved training" category.

Training **is** an effective solution but it is a "soft" fix, which means that, owing to human variability, it cannot be counted on to be completely effective. In the case of the rejected takeoff, however, the evidence suggests that training has been effective in simplifying the "accelerate-stop" problem.

The training has made our guys ready. The "go-no-go" problem is similar, in many respects, to Hamlet's "TO BE OR NOT TO BE" conundrum. But unlike Hamlet's procrastination, our crews have made their decision. The development of "decision speeds" has simplified this difficult mental transition. And whether we've called such speeds "V_{go}" or "V_1" or "Acceleration check" we've been effective in instilling the fact that although you've got a "go" mentality when takeoff roll begins, it may shortly become a "stop" mentality if a problem occurs. Furthermore, the record shows that we've performed this trick fairly well.

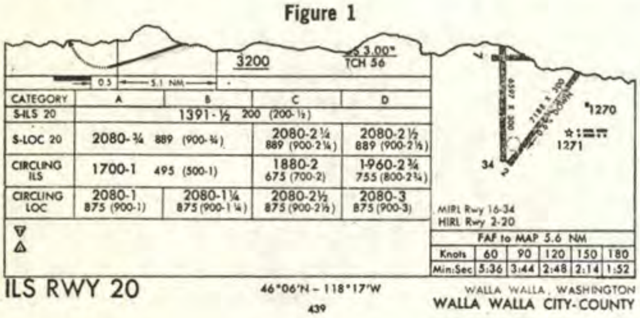
It is appropriate to conclude this discussion with the reminder that mistakes are a normal feature of human behavior and that aviation is a human activity. Another feature of human behavior is the belief that "it won't happen to me." Well "it" might. And if that "it" happens to be a rejected takeoff, I think you'll agree that the argument advanced in this article strongly suggests that you'll be years ahead if you're ready. (Note: The author wishes to acknowledge that portions of this article were extracted from "Human Factors in Air Transportation" by R. A. MacFarland.) ★

USAF IFC APPROACH

Q. Can I circle from a PAR or ILS?

A. Although the precision radar scope can be used to provide azimuth information for a surveillance approach, FAA Handbook 7110.65, Air Traffic Control, does not provide instructions for issuing clearance for a circling approach from a PAR. When flying an ILS to circle, it is advantageous to descend to MDA using localizer only since this will allow maximum time to sight the runway and perform the circling maneuver. In some situations flying the glide slope to the circling MDA may provide lower minimums (Walla Walla City County ILS RWY 20) or may be required for the descent to circling MDA (Yakima Air Terminal ILS RWY 27), (see figures 1 and 2). When flying such approaches, ensure that you are within the circling area for your category aircraft before beginning the circling maneuver. The appropriate circling area for your category aircraft can be found in either AFM 55-9, table 4, or AFM 51-37, figure 7-13. In all cases AFM 51-37, paragraph 6-22c(4) states, "Do not descend below circling MDA until the aircraft is in a position to execute a normal landing."

Figure 1



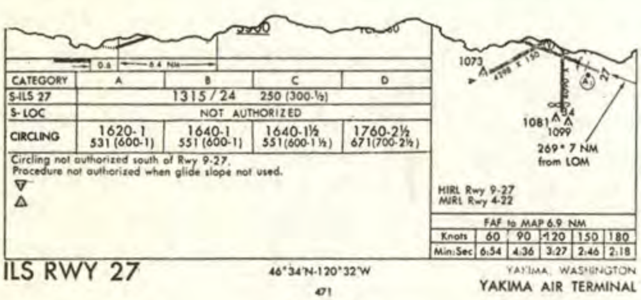


Figure 2

Q. AFM 51-37 mentions Timed Approaches in Chapter 6, under Low Altitude Approaches. What are Timed Approaches?

A. Timed Approaches refer to situations in which the procedure turn or holding in-lieu-of pattern prior to the Final Approach Fix (FAF) will not be flown. Timed Approach clearances include a specified time at which to depart the FAF inbound and may be conducted in a non-radar environment or with radar vectors to the final approach course. The Air Traffic Control Handbook states, "Timed Approaches may be used at airports served by a tower if the following conditions are met:

a. Direct communication is maintained with the aircraft until the pilot is instructed to contact the tower.

b. If more than one missed approach procedure is available, none require course reversal.

c. If only one missed approach procedure is available, the following conditions are met:

(1) Course reversal is not required.

(2) Reported ceiling and visibility are equal to or greater than the highest prescribed circling minimums for the instrument approach procedure in use." The controller should issue a time check to an aircraft before specifying a time to leave the FAF inbound. A two minute or five mile radar interval between aircraft is generally used but this may be increased as necessary.

Q. Recently, while in the High Altitude Enroute Structure, I received a clearance from ARTCC to proceed direct to a VORTAC while outside of the Service Volume Area. Although I was able to properly tune and identify the station, was I correct in accepting the clearance?

A. The Air Traffic Control Handbook states, "When specifying a route other than an established airway or route, the Service Volume limitations of the particular NAVAID should not be exceeded." There is an exception to this. The limitation may be exceeded when routing is initiated by ATC and radar monitoring is provided. So, if you can adequately tune and identify the station, have the appropriate clearance, and are radar monitored, you may fly the facility while outside the Service Volume Area. The radar controller should give an approximate heading to the facility to aid in position orientation. If orientation with facility is subsequently lost, you should inform the controller and request another vector. Remember this only applies enroute. Your planned route of flight should remain within the Service Volume Area of NAVAIDs used.

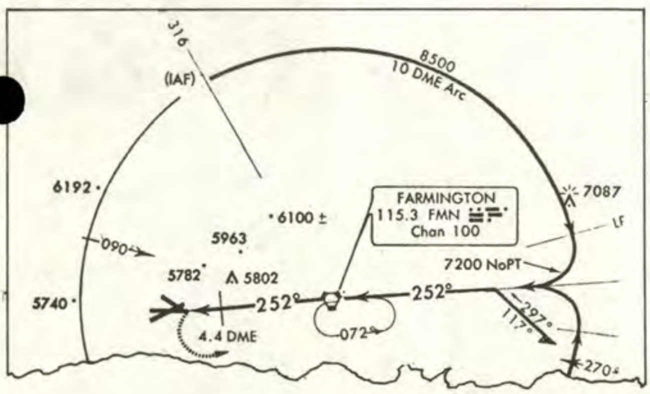
By the USAF Instrument Flight Center
Randolph AFB, Texas 78148

Q. What weather is available from the Air Route Traffic Control center (ARTCC) Metro?

A. You can expect much the same weather information as from Military Metro. Several years back ARTCC initiated a test program at certain centers to provide updated weather information for pilots. Currently, Kansas City Center is the only center with Metro capability. They also have direct service weather radar readout. So, if you are transiting Kansas City ARTCC, give Metro a call on 369.9 UHF for current weather.

Q. If I am filed to Farmington and inbound on the 316 Radial and subsequently cleared for the approach, can I proceed to the 316 Radial and 10 DME Arc, (IAF) Arc East and shoot the NOPT or do I have to go to Farmington and do the procedure turn? (See figure 3)

Figure 3

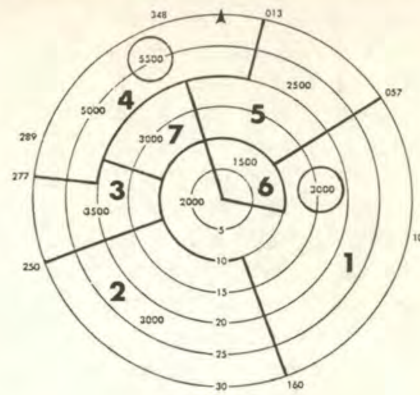


A. In the absence of an amendment to your flight plan route, you should proceed to Farmington and execute the approach from the VORTAC, this would preclude flying the NOPT. However, if you prefer arcing for the NOPT, simply request clearance from ATC.

Q. I have often been vectored below the minimum safe altitude. What allows the controller to issue these lower altitudes?

A. The controller follows a Minimum Vectoring Altitude Chart that has been prepared for all airports (see figure 4). The altitudes provide one thousand feet obstacle clearance (2,000 feet in designated mountainous terrain). When in designated mountainous terrain, but mountains are not a factor, the terrain clearance can be reduced to 1,000 feet. An example

Figure 4



would be approaching El Paso International Airport from the East. Because all the mountains are to the West, the controller can safely vector you with 1,000 feet of clearance even though you are in mountainous terrain. Another factor that adds flexibility to the vectoring altitude is that the controller can vector you at a lower altitude, and provide lateral displacement from an obstacle rather than altitude clearance. For example, see Sector 4 in figure 4. There is an obstacle that would raise the vectoring altitude. Rather than restrict the entire area the controller can vector you no closer than 3 miles to the object (5 miles if the object were beyond 40 miles from the radar antenna), and keep you at 5,000 feet with no compromise of safety.

Q. The last sentence under the CAUTION in AFM 51-37, paragraph 6-16b(2), has created debate and confusion in our unit. Referring to ILS Final, it states, "If the glide slope is recaptured to within the above tolerance (one dot below or two dots above the glide slope) descent may be continued to DH." Does this mean that if I am more than one dot (half scale) below glide slope, after I have descended below localizer minimums, but still above the ILS Decision Height, that I can continue the approach providing I recapture the glide slope?

A. Definitely not. A missed approach must be accomplished unless you are visual. The intent of the last sentence in the CAUTION is to allow the pilot to continue the approach if he is **above** localizer minimums, not if he is below localizer minimums. If you are more than one dot (half scale) below the glide slope and below localizer minimums, you may not be within the safe obstruction clearance limits of the approach and you must execute a missed approach. Change 1 to AFM 51-37 will eliminate the confusion in this CAUTION. ★

MAIL & MISC

NAME THAT PLANE

Reference your "Name That Plane" contest in the November 1977 edition of **Aerospace Safety** magazine, your writer is the person that cannot correctly identify the aircraft on page 12. The fighter shown is a Republic P-47 but it never was a "Juggernaut" as stated in the answer. The P-47 shown in a late model (bubble canopy) of the "Thunderbolt." The P-47 was one of the "Thunder" series built by Republic. Being a colonel in the Confederate Air Force, I am proud to inform your editors that there are still flyable P-47s in existence. To the best of my knowledge, the CAF and the Puerto Rican Air National Guard (PRANG) are the only owners in the world of operable P-47s. The P-47 was referred to as a "Jug" on occasion but that was in reference to the large "jugs" or cylinders found in the massive powerplant.

It is also hard to imagine John Wayne as flight lead of the "Jugs" because a short corporate memory search in my office failed to recall a movie in which the "Duke" flew the P-47. He flew P-40s, Hellcats, and Corsairs, but no P-47s. (The CAF still flies the above mentioned WWII fighters.)

Aside from being picky, picky, picky, I enjoy the Safety Magazine. Keep up the good work.

H. C. STEVENSON
Major, USAF
Colonel, CAF
505 Yorkville Rd
Grafton, VA 23692

Obviously, you know more about the "Jug" than our writer. However, as I recall and recently had confirmed by a longtime Republic/Fairchild employee, the "Jug" got its name from its shape, not because of the size of the "jugs." Anyway, it was a great airplane. As for John Wayne, too bad he missed out on flying the P-47. Thanks for writing and keeping us honest. —Ed.

NAME THAT PLANE ANSWER

The XB-43, which first flew in May of 1946. Its top speed was 507 mph, and it had a 2,500 mile range with an 8,000 lb bomb load.

ALERT AIRMAN

Because a young airman was alert and took immediate action, damage to a landing C-5A may have been prevented.

A1C Roy Zacharias was on duty as weather observer at the Travis AFB Remote Observation Site on the afternoon of 29 June 1977. At approximately 1900Z he noticed that a C-5A on approach to runway 21L appeared to have only one set of wheels on its nose gear. Just minutes later, the aircraft made another approach (on 21R), which brought it almost directly over the observation site. Airman Zacharias, now convinced that his original startling observation had been correct, immediately informed the Tower and the Base Weather Station of the situation.

The crew and controllers would have been unaware of the condition of the aircraft had it not been for Airman Zacharias. Undetected, this condition could have led to a landing that might have proven disastrous to both crew and aircraft. As it was, the crew and operational support personnel were notified, technical experts were consulted, and a safe landing was executed. No damage to the aircraft or injury to the crew resulted. ★

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.

☆U.S. GOVERNMENT PRINTING OFFICE 1978 789/855/54

Major Delbert F. Miller 1Lt Paul G. Bryant

391st Tactical Fighter Squadron (TAC)
Mountain Home Air Force Base, Idaho

Major Miller and Lieutenant Bryant were flying the nr two aircraft in a three-ship student training sortie scheduled to include air refueling and low level navigation. All aircraft systems worked normally until completion of air refueling. As Major Miller's F-111 aircraft left the contact position he noticed a drastic reduction in thrust available. At this time, the crew noticed the right engine rpm decaying toward idle. All attempts to recover the engine, including the automatic airstart system, failed to terminate rpm decay. Following additional dash one procedures, the throttle was placed in the cutoff position in preparation for an airstart attempt. During the airstart checklist sequence, Major Miller discovered he was unable to move the throttle out of the cutoff position. The aircraft left the refueling area and proceeded toward home station accompanied by a chase plane. Major Miller selected afterburner on the good engine in order to maintain altitude and airspeed while attempting unsuccessfully to free the frozen throttle. As the descent for a single engine straight-in approach was initiated, the left engine was retarded from afterburner to military power. Immediately following this throttle movement, the left engine rpm began to decay past the military range. Major Miller took appropriate dash one action, but the engine continued to decelerate toward idle. As the rpm decayed through approximately 50 percent, engine driven generator electrical power was lost, thereby preventing normal radio or interphone communication and compounding an already critical emergency situation. At this time, with both engines inoperative, Major Miller was forced to place the left throttle in cutoff to attempt a restart. Rapidly failing hydraulic pressure made loss of the flight control system imminent. Additionally, the loss of pneumatic throttle boost forced Major Miller to release the control stick in order to use both hands to move the left throttle from cutoff to idle. Using visual gestures, Major Miller instructed Lieutenant Bryant to hold the control stick forward while he completed the airstart procedure. Lieutenant Bryant recognized the need to maintain as much windmilling engine rpm as possible so that hydraulic pressure for the flight controls would be available. Lieutenant Bryant's action provided sufficient engine rpm to allow controlled flight. Major Miller managed to bring the left throttle to the idle position and effect an airstart. The engine was then set at a stabilized power setting sufficient to complete a single-engine landing at Mt. Home AFB. Investigation of the incident revealed a broken throttle cable on the nr two engine. The cause of the nr one engine flameout is still under investigation. Present findings indicate a malfunction within the main fuel control unit. Major Miller's and Lieutenant Bryant's superior airmanship and prompt response to a critical in-flight emergency possibly saved a valuable fighter aircraft. WELL DONE! ★


CONTROL
FOD