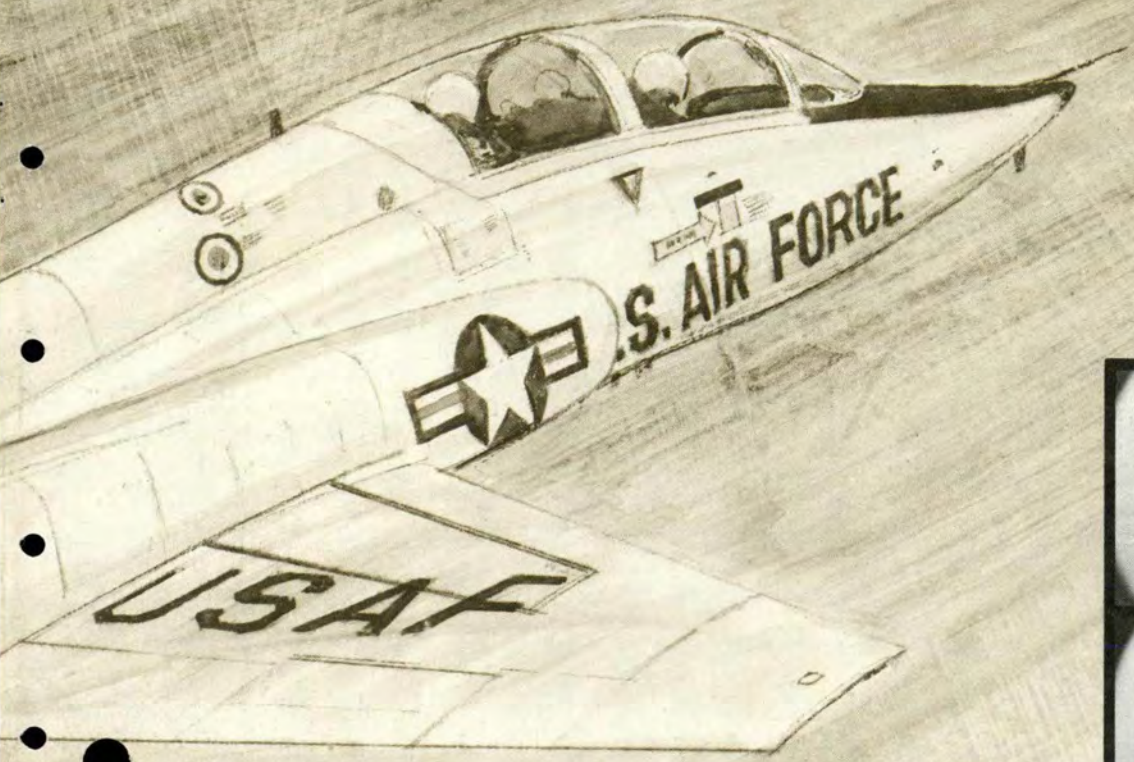
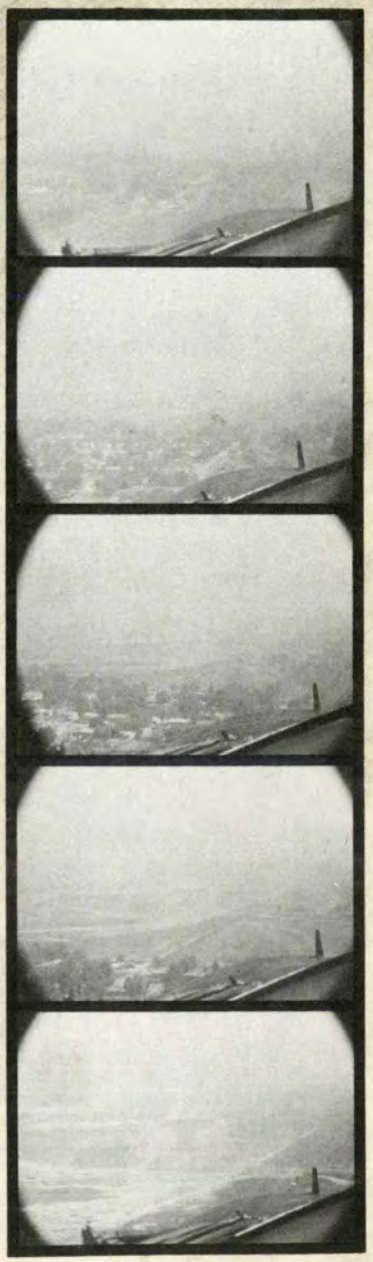
aerospace
SAFETY NOVEMBER 1978





LIGHT ON THE STAR
How well do you really know those lost wingman procedures?

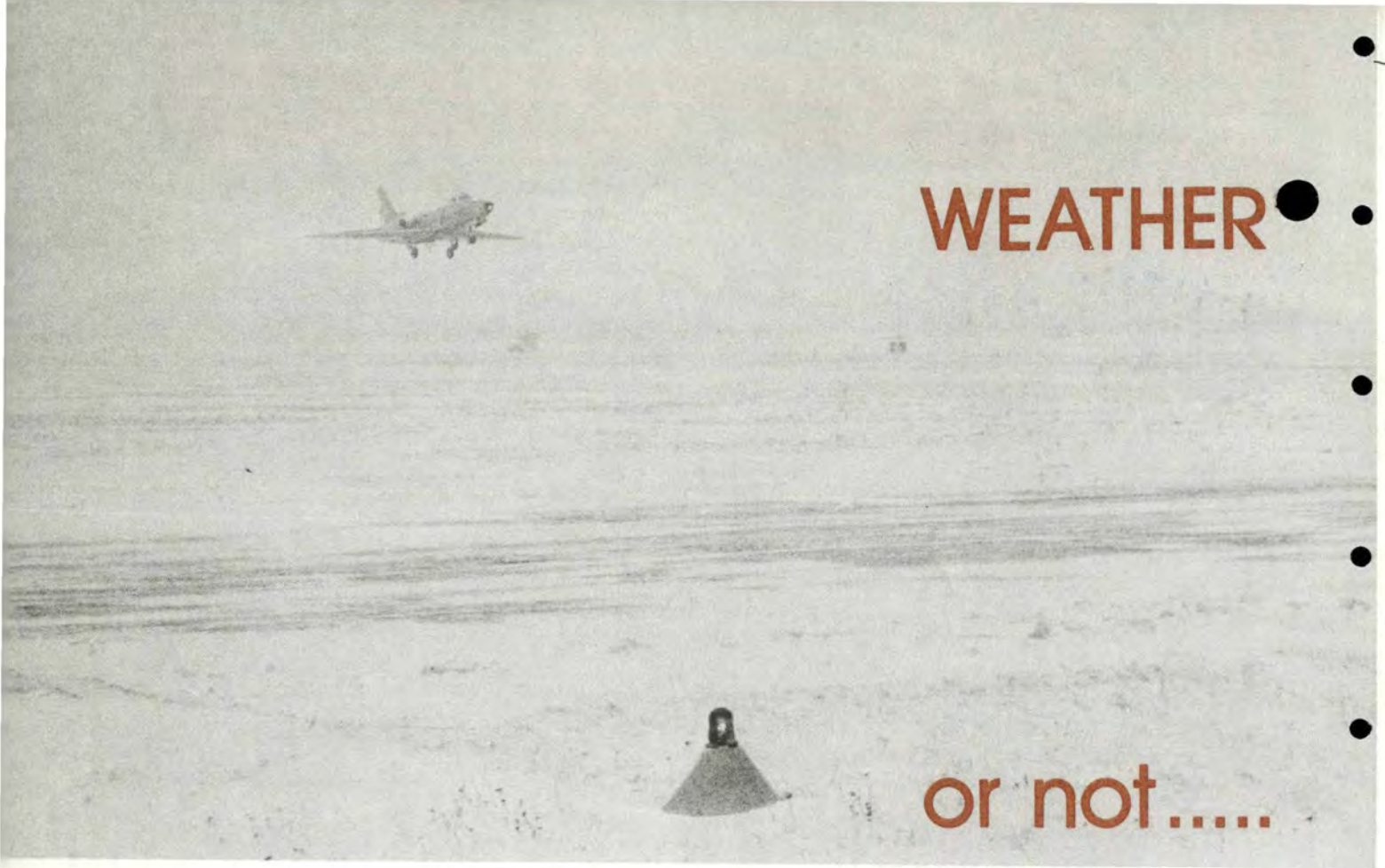
When you're up in the air you've got to come down

Weather Or Not

AIRCRAFT ICING
Never underestimate its chilling effects

Sliding Home
Hydroplaning season is here

LOSS OF CONSCIOUSNESS
New research shows pilots can black out completely . . .
. . . and not even realize it.



WEATHER or not.....

CAPTAIN DAVID V. FROEHLICH • Directorate of Aerospace Safety

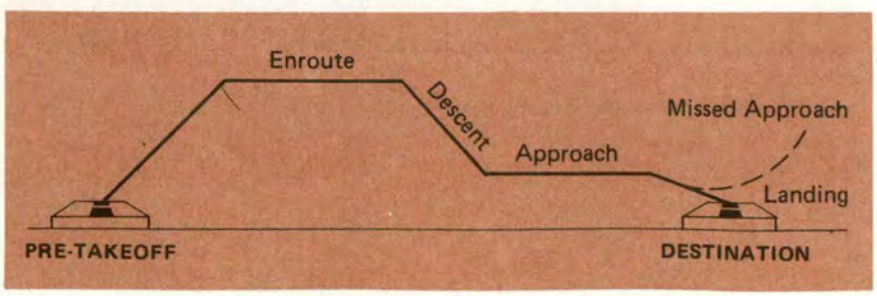
"Slipshod 36 – Podunk AB 1630 Zulu weather is a measured 300 overcast, one and a quarter miles visibility with fog."

This conjurs up different questions, locations and problems to different aviators. That 300 foot overcast may only be several hundred feet thick, or several thousand feet thick, or even layered up to 25,000 feet. Another thought – temperature and freezing level. That overcast is nowhere near as formidable with the freezing level at 12,000 feet above it as the same 300 feet with the freezing level on the ground. That's my point! Heavy into winter as we are now, it's a good time to review some ceiling-busting techniques while sitting comfortably on the ground. For a quick review, I'll divide your weather approach and landing into five phases: pre-takeoff, enroute, descent, approach and transition.

PRE-TAKEOFF

Before you leave base ops or the squadron, get as ready as you can. Take that few extra minutes to study the approaches, high terrain, obstacles and facilities at destination *and* alternate. The word is – prevent surprises! Know the type of lighting you will be looking for when you break out; try and have a mental picture of the end-of-runway environment; jot down info you may need out of the IFR supp. Do anything on the ground that may prevent intra-cockpit fumbling in the air. Having done both little machine, single operator flying and heavy, group effort aviating, I have to feel that often the fighter-type operator is better prepared when he leaves the ground. He has to be! There isn't anyone else to search through an L – whatchamacallit for an intersection or juggle IFR supps and letdown books. I have caught myself thinking (in my large cockpit flying days), *"we'll* have time to look over the approaches and ge

Current weather info is essential to safely complete all phases of a flight!



out the books on the way." Heavy drivers – beware! On the routine trip, that plan may work unless you end up fighting engine, electrical, hydraulic or other similarly distracting problems. All of a sudden, you may find yourself running out of that "time to study the approach."

Not to belabor the point, but there is also a wealth of good info in the previously advertised APQ (airport qualification) film strip series that I (in my first 11 years of flying) never saw. Only when I became a part-time MAC teeny weenie airlines pilot did I see many of the APQ films on stateside bases. These films can be super familiarization tools for any aircraft operators.

The other pre-departure info that the operator should obtain is weather info. The pro not only departs with his 175-1, but he has read it! Vacuum out the weather shop! The basic 175-1 doesn't tell you everything you may want to know. Get some trend opinions from the weather-guesser, ask questions and have the whole situation firmly entrenched in your mental computer. There is a wealth of expertise and info behind most weather counters, but a lot of weather folks have been intimidated into giving short briefings and not editorializing. Don't find yourself "up there wishing you were down here asking."

ENROUTE

The weather info problems lead me into some enroute considerations for the aircrew. Query the metros along the way! Don't wait until the IAF to call your destination metro facility for an update. Calling along your route accomplishes several goals. It may allow you to change destinations/alternates while you still have extra options. Secondly, you can more precisely plan your entrance and type of approach by watching trends. Lastly, your calls (with good PIREPS) will help complete the picture for the metro folks to pass to the next aviator. ATC, approach controls and towers can also provide some good info on current conditions. Use everything at your disposal.

Spend time (prior to destination) reviewing descent, approach, landing and missed approach procedures with all concerned. The crew concept is of prime importance! The more eyes and minds you have working on the arrival, the better, CAUTION – confusion may be hazardous to your health. When I advocate total crew involvement in approach and landing, I temper that with the fact that every individual must know exactly what his function is. A low ceiling/visibility approach is no place for extraneous questions or interphone chatter! Prevent that type of confusion by thorough pre-flight and enroute briefings.

DESCENT

You have arrived! Somewhere above and approaching your destination, you have made your decision to attempt an approach and landing. That may sound strange and somewhat negative, but I think that frame of reference might be the healthiest!

Just because the field is above published or command minimums, doesn't automatically mean you have to go there. It is still your decision! The decision process should include weather, crew capability, aircraft condition and mission. That's what you get paid for! Weigh the factors and decide!

Like I said, you've decided to go – and you've planned and briefed. What kind of descent? Many folks fly enroute descents to low altitude approaches or vectors. If you have no freezing level problems, that plan may be acceptable. If the icing level is in the soup, a published penetration may get you down through it quicker. That's why a full picture of the cloud tops, bases, thickness, layers and freezing level is critical to your decision process. Your descent and approach decision will include all those factors. It's pretty obvious that you don't want to ask for or accept a descent or approach that will subject you to continued icing or turbulence. By the same token, if you find yourself in those conditions ask for a change. If you don't get a change within a reasonable time, and icing/turbulence is becoming a problem, declare an emergency, squawk and change! Better to explain later than ding one in! Anyway, word to the wise – make sure you've put some forethought into your descent.

APPROACH

We're down rootin' around in the low altitude regime. You can still be in several types of weather environments. Again, the word is mental preparation! I seem to have the most problems with the type of ceiling that sounds the easiest. Take two types of typical destination weather and think about your own experience.

I have flown in the clear for several hours and arrived at destination with an overcast far below me. The deck is reported to be only about 600-800 feet thick with ragged bases near minimums. This is (I think) tougher than arriving in the soup and being in until you break out at minimums. The first case presents a much greater

Better to be down here asking, than up there wishing. . . .

adjustment problem. You have to force yourself to really wire the approach and cross-check prior to the soup, whereas the approach in continuous weather gives you time to settle down in the total IFR environment with no peeking. Not much you can do to change the situation other than being aware of the problem. One suggestion – if time and gas permit and you're stuck with a cloud deck like the ones described above, you might consider changing your normal configuration point, configure early and cut down the number of actions and distractions required while in that cloud layer.

The choice of approach will be dictated not only by the weather and facilities available, but also by personal preference. If you, the driver, feel more comfortable with a precision GCA than an ILS, do it! Use the ILS for a back-up, but choose your own approach, you're the one who has to get the machine down.

At the risk of repetition, if you're in a crew situation, make sure your partner knows the precise division of tasks and functions in the cockpit. There should be no uncertainty going down the glide slope as to what will happen when minimums are reached.

TRANSITION

This is the point where you've aced the approach and arrived at the point in time and space where the book says you should be able to look up and see the runway. Most of us know better. Not very often do all of the magic parameters meet at the published point. More often: (1) You'll break out of the actual overcast a few hundred above minimums but have trouble picking out the runway because of reduced visibility; (2) You level off at MDA and look, sight the runway and promptly drive back into the scud; (3) You arrive at minimums, on glide slope, see the end of the strobes and perform the patented but foolhardy "duck-under" maneuver placing yourself in mid-overrun out of airspeed, altitude and ideas all at the same time; (4) You are at the missed approach point, can see the ground below but nothin' but clouds out front and fight the temptation to "press just a little." There are a variety of conditions which can be encountered at the "peek point," most of which can be enticingly deadly. I can only preach two major sermonettes. Decide exactly what your actions will be and (if in a multi-place machine) make absolutely sure the crew coordination is clear.

When you fly by yourself a lot, you have a tendency to develop your own checkpoints! When I was making an approach to a near-minimums airfield, I had a "peek-point" at 100 feet above minimums. At that point I looked up and right back down. If I glimpsed any portion of the runway environment, I knew exactly where to look when I hit minimums 100 feet later. If I glimpsed nothing but "yuk" outside, I was mentally prepared to start the go-around after the next 100 feet. The point to be made is integrity. Approaches, glide slopes, minimums and all the other neat stuff in letdown books are there for a reason. Don't cheat – it ain't worth it!! The odds are against you! Have a plan and stick to the plan when you reach the missed approach point.

RECAP

I've spent a fair amount of time and verbiage discussing only the last 5 or 10 minute period of most flights. Reason – I feel in many cases, the approach is the single most critical phase. Granted, there is high risk in low level routes, on the range or many other regimes, but those phases of flight are very realistically trained for. The operator is dependent on himself and the machine. During the approach and landing phase in marginal weather, the operator is dependent on himself and the aircraft, but also at the mercy of Mother Nature. Be prepared and prevent surprises! It's not healthy to try to fool Mother Nature! ★

The successful end to a weather mission and approach — runway in sight — land!

NOVEMBER 1978

UNITED STATES AIR FORCE

aerospace SAFETY

THE MISSION - - - - - - SAFELY!

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DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

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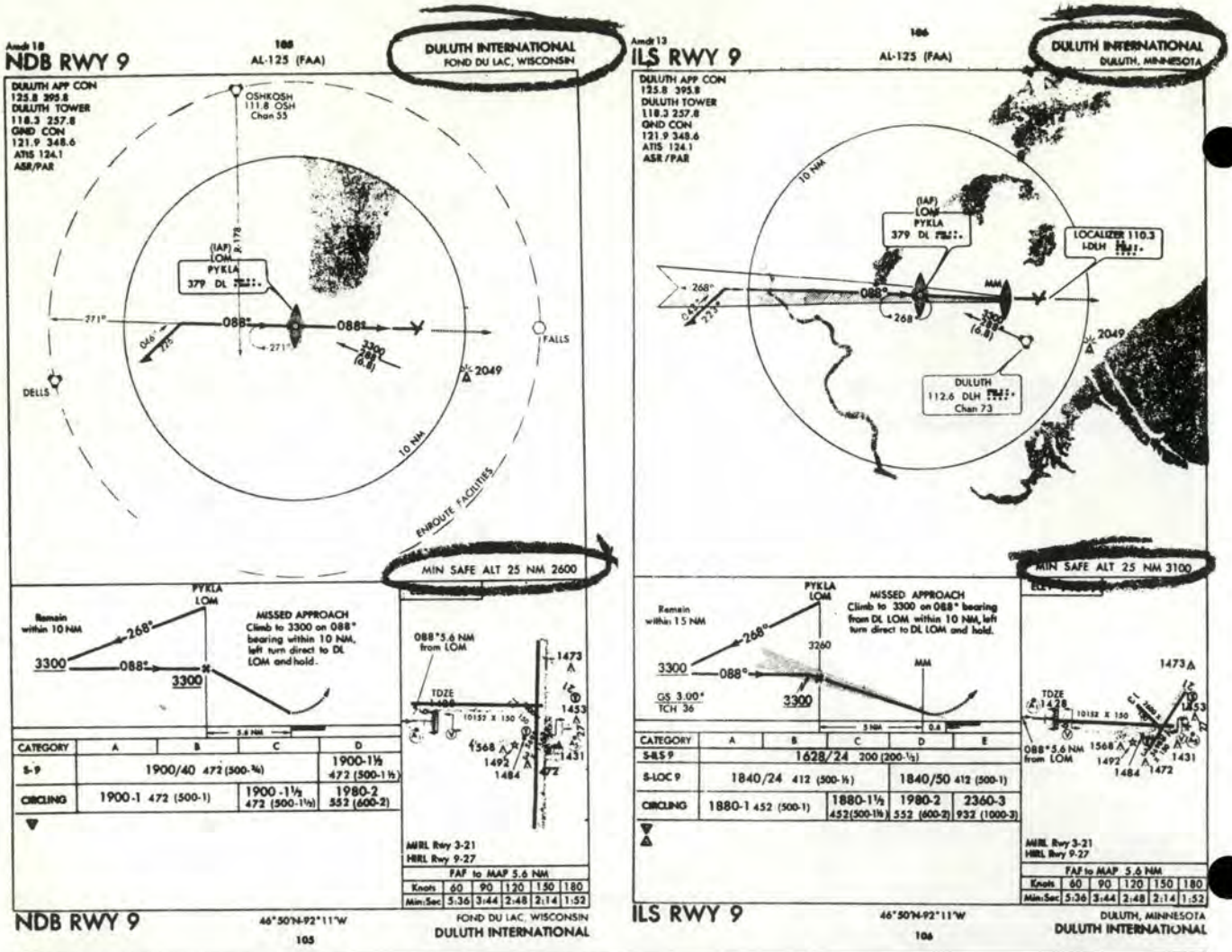


Surprise

MAJOR JOHN N. MODDERS • Safety Officer 133 TAW/SE

Observe the NDB RWY 9 approach plate (above left). One might think that execution of this approach would bring you to Duluth, Minnesota.

Gotcha! Somehow in the printing process, the approach to runway 9 at Fond Du Lac, Wisconsin, became mixed with the Duluth NDB RWY 9 approach. Murphy strikes again!

All items on an approach plate are important, but some are more important than others; such as, minimum safe altitude. At the real Duluth (ILS RWY 9), (above right) the minimum safe altitude within 25 miles is 3100 feet, because of some towers 5 miles east of the field that are 2049 feet MSL. The composite plate (above left) shows 2600 feet MSL. You have just lost 500 feet of protection.

Another cause for excitement would occur when you tried to orient yourself on a circling approach using the airport diagram given, which is for Fond Du Lac. Can you picture taxiing at Duluth at night using that airport diagram?

Moral of this little story: Be a doubting Thomas. Even the trusted approach plate can be in error. Compare approach plates for the different approaches at an airport. In this case, the airport diagram and the incorrectly placed lakes were immediate giveaways.

Finally, and perhaps most important, check those minimum safe altitudes against every source of information available. ★

AIRCRAFT ICING

MAJOR PHILIP M. McATEE • Directorate of Aerospace Safety

That time of year is here when we must change our list of things to worry about, from thunderstorms and wet runways to in-flight icing and slippery runways. Of course, depending on the area in which you fly, you may still have thunderbumpers. Just as in summer, aircraft icing still occurs. The difference is one of probability and severity.

During the summer, the freezing level is comfortably above us when we are making approaches, and enroute we can almost always get above the worst combination of moisture and freezing temperatures. Not always so in winter.

First of all, we want the cleanest (aerodynamically) aircraft possible. In this we don't really get a choice, but most of our birds are pretty clean with very few protrusions to easily collect ice. Ice will rapidly collect on any object that presents an uneven surface such as antenna masts, etc. The fewer things sticking out, the better.

Two conditions are necessary for the formation of structural ice: The presence of visible liquid moisture, and free air temperature at or below freezing. Also, the aircraft surface temperature must be less than 0°C. Sometimes, due to airfoil-caused air expansion, the temperature of the aircraft surface can be about 2°C colder than the surrounding air.

The temperature range in which both ice and water co-exist in clouds is generally from 0°C to -20°C. In the atmosphere, supercooled liquid water can exist well below the freezing point of water. In fact, supercooled liquid water has been found at temperatures lower than -40°C and altitudes above 40,000 feet. This supercooled water, although frequently found in an unnatural state, will immediately freeze if it comes in contact with any object (aircraft). Speed also is a factor in ice formation. As speed increases, icing increases up to about 400 kts. Above that speed the icing danger decreases due to heat of friction. Above 575 kts, icing is rarely a problem. For most Air Force jet aircraft, that means the greatest danger is in *visible moisture,* at *below freezing temperatures* and at *relatively slow airspeeds.* Does anytime in a normal mission meet all three prerequisites? You bet—on *approach.* Long let-downs and approaches can add ice faster than you can shake a stick. A long step-down descent followed by an in-clouds approach can give even the best birds a problem. So, enough said. Limit your exposure time in those conditions.

Now, let's review the three basic types of structural icing.

CLEAR ICE

This is a transparent ice with a glossy surface identical to the glaze which forms on trees and other objects during a freezing rain. Clear ice is usually smooth, but if mixed with snow or sleet it can be rough, irregular and whitish. The deposit then can be very blunt-nosed with rough bulges building out against the air flow. Clear ice usually forms on the leading edges of wings, antennae, intake ducts, etc. It is the most serious of the various forms of ice because it adheres so firmly to the aircraft and is very difficult to remove. Formed by the relatively slow freezing of large supercooled water droplets, it tends to spread out and take the shape of the surface on which it freezes. Since very few air bubbles are trapped during the slow freeze it is usually transparent.

Conditions most favorable for clear ice formation are high water content, large droplet size, temperature only slightly below freezing, high airspeed and thin airfoils. Encountered most frequently in cumuliform clouds, clear ice also accumulates very rapidly on aircraft flying in freezing rain or drizzle.

RIME ICE

This is a milky, opaque, granular deposit of ice with a rough surface. Rime ice is formed by the instantaneous freezing of small supercooled water droplets upon contact with exposed aircraft surfaces.

This instantaneous freezing traps a large amount of air, giving the ice its opaqueness and making it very brittle. Rime ice usually forms on leading edges and protrudes forward into the airstream as a sharp nose. It has little tendency to spread over and take the shape of the airfoil.

Fast-freezing rime ice can accumulate when the temperature is between 0°C and -40°C, but is most likely to form between -10°C and -20°C. Although frequently encountered in stratiform clouds, it is also common in cumuliform clouds at temperatures below -10°C. Rime ice is comparatively easy to remove by conventional methods, even though it distorts the airfoil much more than does clear ice. It is also frequently encountered together with clear ice.

FROST

This is a light, feathery, crystalline ice structure of snowlike character. It forms in flight when a cold aircraft descends from a zone of sub-zero temperatures to a zone of above-freezing temperatures and high relative humidity. The air is chilled suddenly to below freezing temperature by contact with the cold surfaces of the aircraft, and sublimation (formation of ice crystals directly from water vapor) occurs. Windshields and canopies are especially susceptible to fast formation if no preventive action is taken. This can be dangerous since outside visibility can be completely lost.

Frost deposits are thin and sublimate or thaw off rapidly with continued flight in warm air.

Icing can affect all external parts of the aircraft, but we will only discuss two critical areas.

WING AND TAIL SURFACES

Ice accumulations on wing and tail surfaces disrupt the flow of air around these airfoils. This results in *a loss of lift*, an *increase in drag*, and increases the stall speed (see Figure 1). The weight of the ice deposit presents less danger but may be deadly if too much lift and thrust are lost.

Experiments have shown that ice deposits of only one-half inch on the leading edge of airfoils on some aircraft reduce their lifting ability as much as 50 percent, increase the drag on the aircraft by an equal amount, and greatly increase the stalling speed. The serious consequences of these effects are obvious. And, it should be noted that one-half inch of ice or more can accumulate in a minute in some cases.

PITOT TUBE AND STATIC PRESSURE PORTS

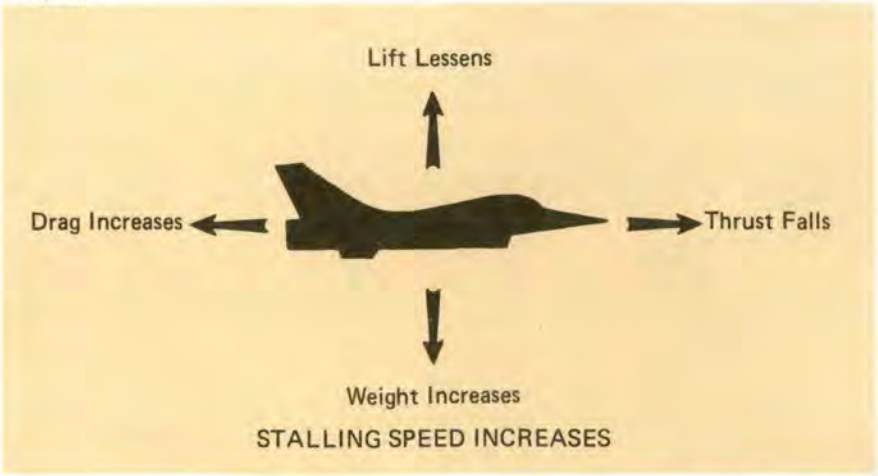
Icing of these components can be extremely dangerous for instrument flight because it can cause very inaccurate airspeed and altimeter readings. Other instruments such as rate of climb and turn and bank could also be affected depending on your pitot static system. Pitot heat must be checked on pre-flight and verified that it is on in instrument conditions. Only a few years ago, an airliner crashed when both pilots *thought* the heat was on. Also, static ports can ice and you must be prepared to furnish an alternate source of static pressure. Remember, when in icing conditions, the static ports are accumulating as fast as the rest of the aircraft. But most of all, ensure the pitot heat is ON and working or the whole ball game is already over.

The amount of ice an aircraft will accumulate is dependent considerably on the type of aircraft and the conditions. Therefore, the following intensity classifications are only general. They apply to clear and rime ice.

LIGHT—

This is an accumulation of ice which can be disposed of by deicing equipment. It presents no serious hazard to aircraft so equipped.

Figure 1



EFFECTS OF ICING ARE CUMULATIVE

MODERATE—

Ordinary de-icing methods provide only marginal protection in this icing condition. Ice continues to accumulate, but not at a rate serious enough to normally affect the safety of flight unless exposed over an extended period of time.

HEAVY—

Ice continues to accumulate despite de-icing procedures. The rate of accumulation is fast enough to cause marked loss of airspeed and altitude, and is critical from the standpoint of flight safety.

At this point, I would like to mention that icing damage to jet engines is a very real problem. This subject is beyond the scope of this article, but be aware that due to the pressure changes, jet intake icing may form well before conditions permit other visible structural icing.

It is important to realize that having de-icing equipment does not allow one to fly indefinitely in icing conditions. It will help and give you time to work your way out of the icing situations, but it will not allow you to fly in icing all day long. There are a lot of reasons why it isn't good enough and one of the main ones is that it doesn't cover the entire aircraft. Another is that it doesn't completely clean off all ice.

So, we can form an important first rule: When ice is encountered, immediately start working to get out of it. Generally, this means a different altitude after approval from ATC. Unless the condition is freezing rain, it rarely requires fast action; but it does call for positive action. If you follow the first rule, and flight plan to limit your exposure, you will have a good jump on ol' man winter. ★

100,000 HOURS Accident-Free Flying

CAPTAIN MARY JO LAUGHLIN • Oklahoma ANG

Major Jerry L. Hume, Chief of Safety of the 138 TFG, Oklahoma ANG, Tulsa, watches two F-100s take off with an intense, yet excited anticipation. Why is this particular flight so special? Because its completion represents 100,000 flying hours without a major aircraft accident. Colonel John F. Loerch, 138 TFG commander flew the historic mission on 5 August 1978. His association with the unit spans the 21-year accident-free period.

Equally as impressive as the 100,000 hours and the period of time this encompasses, are the missions and aircraft included. The unit's last class A mishap was in July 1957, involving the loss of an F-80, but no loss of life. Later that year, the unit was re-equipped with F-86Ds and T-33s and accumulated more than 11,000 flying hours in the following 3 years. In January 1960, the fighter bomber squadron got into the air transport business with the assignment of C-97 aircraft to support the Military Air Transport Service (MATS). This mission continued over the next 12 years and 63,500 flying hours and included a conversion to C-124s.

In October 1972, the 138 TFG reassumed its tactical fighter role with the assignment of T-33s in preparation for F-100 conversion, which was completed the next year. The unit racked up over 18,000 hours in the next 5 years in the F-100.

As of 1 July 1978, the 138th began conversion to the A-7D aircraft, and is now on the way to its second 100,000 accident-free hours. ★

SLIDING HOME

It has been a good day and you see no reason why it shouldn't end the same way.

The runway is in sight five miles ahead and there's light rain, although a heavy shower can be seen at the departure end. You're careful, the landing is normal and the aircraft rolls straight and true. Braking is normal and you discard the idea of catching the departure end cable. Time to turn off—whup! The aircraft suddenly has the bit in its teeth. It turns 180° in a clockwise skid and you end up ignominiously with one wheel off the taxiway in the omni-present ditch.

We've skipped some of the details for brevity, but doesn't this read like chapter XXX—in other words, you've read it before. This crew was the victim of that insidious thing called reverted rubber hydroplaning. This can happen when a relatively smooth surface is lubricated—in this case covered with water—and a tire skids. Heat buildup occurs rapidly and at 600° to 700°F the rubber can revert to its uncured state. It's like you were on a greased sheet of glass; you are helpless.

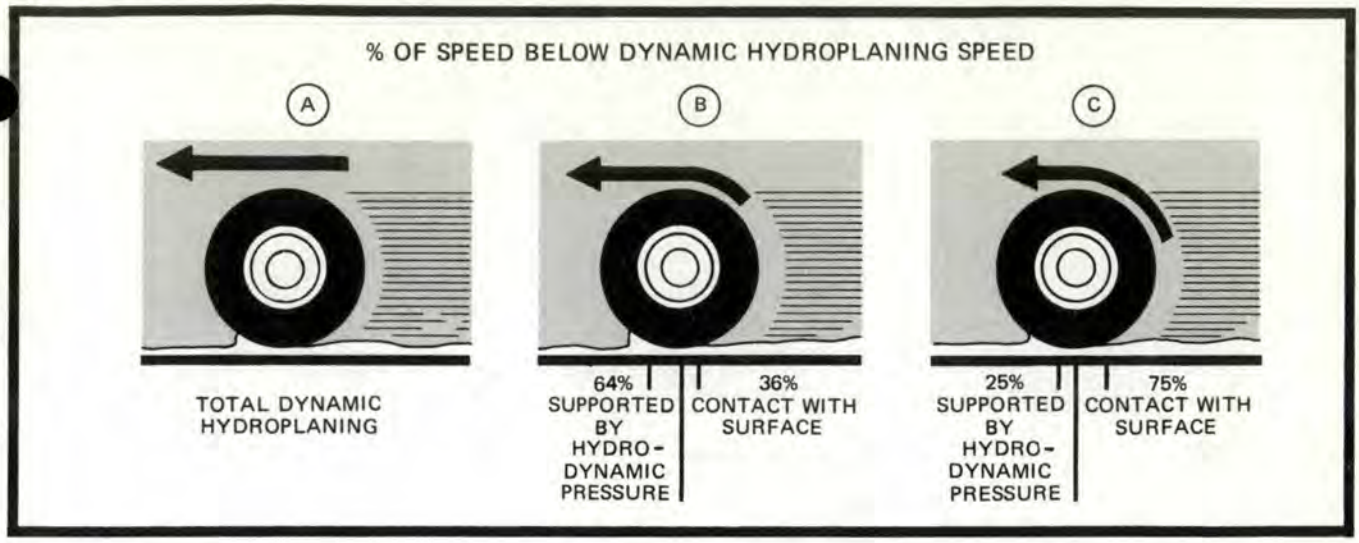
Normally this doesn't occur under dynamic hydroplaning conditions but when a thin film of water covers a smooth runway surface. The condition usually occurs at relatively low speeds and can continue to practically zero speed.

A brief note of explanation for those interested in how this condition can occur.

"Researchers in tire characteristics say there are two sources of friction between the tire and the runway surface. They are *adhesion* and *hysteresis*. Where the tire contacts the runway surface high pressures exist, and strong molecular forces can be generated to resist the relative displacement of the surfaces. These adhesion forces resist skidding.

"Rubber has the ability to conform to the shape of the irregularities in the runway surface. The horizontal components of these potential forces constitute the friction

Figure 1



due to *hysteresis*. If a runway is smooth, such as a smooth glass plate, friction due to hysteresis becomes negligible. If a runway is lubricated with water or oil the adhesion forces become negligible. One of these two sources of friction is necessary. On wet runways the hysteresis component is the only practical source of friction available. However, enough vertical pressure must be exerted to permit the tire to break through the lubrication film and conform to the irregularities of the runway surface. . . ."

"Viscous skidding is not, in the true sense, hydroplaning. It's a condition that exists when the surface is lubricated and the *adhesion* forces are significantly reduced. Skidding starts at lower brake pressures or coefficients of friction. If the runway is relatively smooth, the heat generated from the skidding tire can cause the rubber to revert to the uncured state. . . ."[1]

Fortunately this condition is more rare than total or partial dynamic hydroplaning which is a fairly frequent experience. In total hydroplaning the friction between runway and tire is negated by water deep enough to raise the tire above the surface, so the tire does not spin up. Wheel brakes are useless. If the runway is grooved or the aggregate is new enough to develop a high coefficient of friction, the wheels can spin up and brakes become effective. On a smooth surface, however, if after the aircraft has slowed below total dynamic hydroplaning speed, it may partially hydroplane (see figure 1).

As winter progresses aircrews will experience a number of different conditions. Depending on the weather, you may have water on the runway, slush, ice or snow, or a combination. (A couple of years ago we ran a little quiz. We're repeating it here, with the answers, to jog your memories of what winter runways are all about.)

Define:

IR08, WR / /, SLR16 P DRY, LSR 18, RCRNR, PSR12, SANDED

You, of course, recognize these as runway surface condition readings.

IR08—Ice on runway, decelerometer reading 8.

WR / /—Wet runway (decelerometer readings are not reported for wet runway conditions).

SLR16P—Slush on runway, decelerometer reading 16, patchy; remainder of runway is dry.

LSR18—Loose snow on runway, decelerometer reading 18.

RCRNR—Base operations is closed; a RSC / RCR report is not available.

PSR12 SANDED — Packed snow on runway, decelerometer reading 12, runway has been sanded.[2]

Good sliding . . . er good landings this winter.

P.S. There are several reasons why you may not automatically get an RCR. If you don't, ask. It may be the most important single piece of information you will need for a successful landing.

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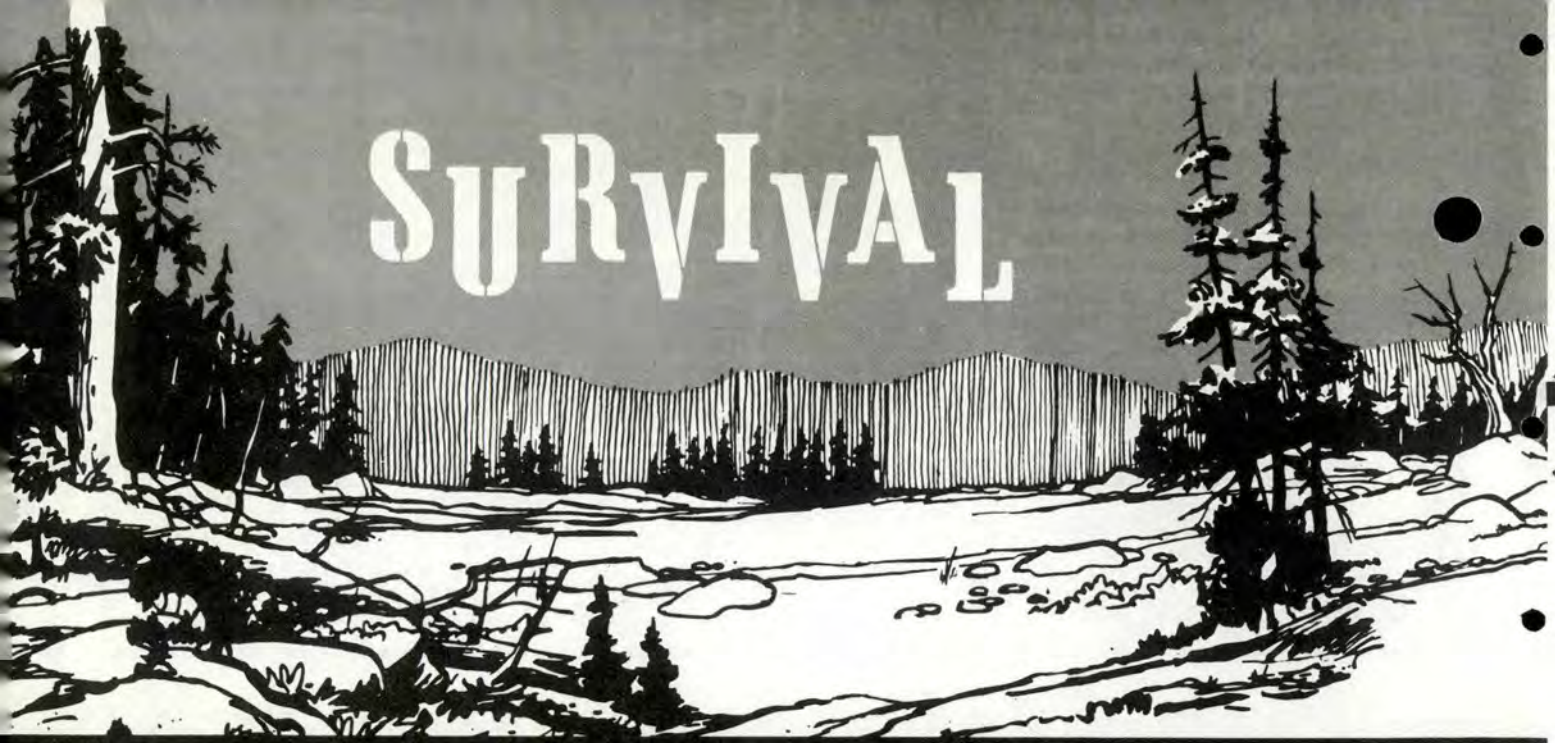

Know Your Enemy

CAPTAIN MILAN J. FRANCESCHI | Operations and Requirements Branch
3636th Combat Crew Training Wing, Fairchild AFB WA

In Southeast Asia (SEA) and with air superiority (AS) only 28 percent of our aircrews were recovered by search and rescue. During a European conflict with the Soviet Union, early AS would be doubtful if they implemented a "First Strike." If our SAR success rate was three out of ten with AS, what will it be when all our aircraft must be dedicated to support tactical and strategic missions?

A European war would be quite different from that in SEA, and we may not be able to dedicate several aircraft just to save one aircrew. We will be flying in extremely hostile airspace. Not only will it be laden with antiaircraft artillery, which proved to be effective in North Vietnam, but the airspace will be protected by the latest state-of-the-art surface-to air missiles and fighter aircraft. This raises the potential of your ending up in the Soviet army's back yard.

In the movie "Patton", George C. Scott outfoxed Rommel because he knew Rommel's tactics. He shouted, "You stupid son-of-a-bitch, I read your book." You probably know all about the MIG series statistics and capabilities, but what do you know about the Soviet ground forces? On the ground, *they* are your potential enemy.

The typical Soviet troop is 19 years old. Very few are career oriented because of rigid adherence to their two-year enlistment standard; therefore, the turnover rate is high – 22% every six months. His life as a soldier is austere: six-day work week, $5 a month paycheck, and normally no leave (10 days in two years if he's a good boy). Since he is accustomed to such strict discipline and living a spartan existence, he makes a good line soldier for he obeys orders without question and can live under primitive conditions. This same quality is also a disadvantage since he has blind obedience to orders, and regimentation spurns any creativity or initiative.

Realism is stressed in every phase of his training. Because of this, 75% of his training is conducted in the field. Chemical, biological, and radiological gear is worn for extended periods of time in field training conditions. Since Soviet tactics emphasize surprise, 20-30% of all training is at night and seldom cancelled due to bad weather conditions.

Unclassified information on what you could expect if captured is virtually nonexistent; however, you can draw your own inferences from Soviet history and this data:

1. Karl Marx in reference to guerilla warfare: "A nation fighting for its liberty, ought not to adhere rigidly to the accepted rules of warfare . . . ."

2. Evidence of what they have done (callous brutality) to their own people to compensate for insufficient technical capability: Parachutists were dropped (without parachutes) in bags stuffed with hay into deep snow.

3. In *The Gulag Archipelago,* Aleksandr I. Solzhenitsyn describes 31 interrogation methods (psychological and physical to include torture) which were used against Soviet civilian prisoners. Sleep deprivation was the most used method. Also, prisoners were tried in accordance with laws promulgated today for past actions.

Here are some bits of information which may help you when on the ground:

1. Enlisted men are trained to fire accurately under low visibility at moving targets and from moving vehicles. (He's a good shot, don't press your luck.)

2. Routes of travel are marked in advance by scouts. (You may be able to see where a unit is traveling for intelligence purposes or to stay out of the way.)

3. Scouts are sent out 100 meters (30 meters at night) in advance with rear security 200 meters in back of the main ground forces. (If a couple of bad guys pass by, hold your ground for many more may follow.)

4. Extensive use is made of mines and booby traps in defensive gaps, forested areas, and during withdrawals from an area. (Avoid these areas if practical when evading.)

5. U-shaped apertures and shields for nuclear attack are built at regular intervals in the lines. (An abandoned Soviet position may have a radiation shelter already constructed. It could protect you.)

6. Crews stay with damaged tanks. (Do not bother dead tanks.)

7. Recon patrols are sent out day and night to take prisoners. (The enemy does not sleep at night.)

8. A column passing through a forest will normally put out foot patrols on parallel trails. (If you run into one foot patrol, a 90° escape route may run you into another foot patrol.)

9. Offensive operations are avoided in the forests. (A good place to evade, but watch out for mines and booby traps.)

10. Recon helicopters have IR spotting equipment. Search lights are displayed 10-15 seconds then turned off. (They can see you at night. The search light pattern may enable you to move to a more advantageous position.)

11. Radar, sound, and heat monitoring devices, and night vision devices are operations normal. Night vision devices are not effective in fog or heavy rain. (They don't have to see you directly to find you, but the best time to travel is under cover of fog or heavy rain.)

12. Rest stops range from 5-10 minutes on short nights to 20-30 minutes on long nights. (If they stay in position longer than that, they are probably setting up camp.)

13. Paths through mine fields are marked with one way different colored glowing markers. (Your route of escape through a dangerous area may be marked for you.)

14. The soldier's first aid kit is covered with rubberized cloth and sewn into his tunic. He also carries one emergency ration which may be consumed only when the division commander orders it. (If you find a body, take these items.)

15. Due to 22% of combat units changing every six months, tactics and maneuvers must be standardized and are therefore predictable. (Study his tactics.)

16. Troops will dismount from APCs when threatened with mines or anti-tank weapons. (If you spot this kind of activity, don't follow them.)

17. Only officers have maps. Map overlays are not used – they mark directly on the map. (If you find a map, you're in luck.)

18. In deep snow conditions, they operate in open areas rather than in forests. (Again, forests are a good place to hide.)

Soviet doctrine emphasizes surprise, speed, and offense. Long winter nights, snowfall, blizzards, fog, and strong frosts can be used to achieve surprise. They used these tactics in World War II with excellent results.

The Soviet soldier is well-trained physically and mentally for living in adverse environmental conditions. He will probably attack you during inclement weather on a holiday. During the first few days of the war, your chances of being pitted against him are high. He has the hammer – you should know a little bit about him. Are you prepared?

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NEWS FOR CREWS

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

COLONEL HENRY VICCELLIO, JR.
Chief, Rated Officer Career Management Branch • Air Force Manpower and Personnel Center

FIGHTER PILOT ELIGIBILITY CRITERIA FOR THE F-15, F-16, A-10

Why didn't I get an F-15? . . . I've got all kinds of squares filled. Why is there a Short Tour Return Date (STRD) cutoff for conversion into new fighters? . . . I just came back from remote, so why couldn't I go to Eglin?"

I hear these and similar questions constantly in conversations over the phone and during my visits to the field as Chief of Rated Assignments at MPC. It's obvious that many folks currently receiving other than new fighter assignments are unhappy, and – in some cases – separate rather than accept the assignment they've been selected for. In response to these concerns, my intent with this article is to provide you with a clearer picture of our game plan in manning the new generation fighters and your role in that plan. The audience I'm addressing this to is those of you who are current or previously qualified tactical fighter pilots who have achieved the experienced (500 hours mission time) category, but aren't currently stationed at a unit undergoing conversion. I won't address the assignment outlooks for UPTs, first assignment IPs (FAIPs), or inexperienced fighter guys, since they are considered differently and handled under different rules of engagement.

SHORT-TOUR ELIGIBILITY

Most folks get emotional about remote tours – more specifically, why the STRD is such a big factor in new fighter assignments. To explain why it's this way, let me set the stage by reviewing our general concept of new system growth. To keep up with the production line at minimum aircrew training cost, a five-year period of in-system utilization is planned for all the guys assigned to the new systems. This means guys who check out in the F-15 between 1976 and 1982 have stayed, and will continue to stay in that airplane – few, if any, PCSs to staff/AFIT/supplement/other cockpit jobs are planned. Since no extra RTU training is available to qualify a backfill if we did reassign them out of the system, we plan on keeping them there to maximize system growth and get each converting unit up to full manning as fast as possible. Needless to say, these guys won't be pulling any short-tour duty – flying or otherwise – since the new systems aren't yet based remote. For two reasons, therefore, we impose a STRD criteria on new system eligibility. First, we have to identify and protect a group of guys sufficient to sustain our short-tour requirements over the five-year period that each of the new systems are levy-exempt. Our current cut-off dates do just that, and with *no* breathing room. (Table 1). In fact, as soon as we determine that changes in inventory or requirements will allow us to move the date back, we do so – and have done so twice thus far for the F-15, making more of you eligible for conversion. Looking at it from the other side of the cutoff point, to let relatively short-tour-eligible guys convert would be unfair to others who might then have to go remote with a more recent STRD. The key factor is RTU training capability – since it'll still be there after the production lines slow down at the end of the five-year "growth period," we'll be able to start moving the new-system "old heads" to other jobs – including their fair share of assignments to short-tour areas. This should happen in the '81 time frame for F-15 jocks, '82-'83 for A-10s, and '83 and beyond for the F-16. So hang in there; if your STRD needs an update, go get it! Twelve to 18 months down the road, you'll be on the move with a very recent STRD – both points decidedly to your advantage. Without that update, your chances of getting a piece of the action are virtually nonexistent.

TABLE 1
NEW SYSTEM CONVERSION ELIGIBILITY CRITERIA

Short Tour Return Date (STRD)

Number of Remote Tours	Minimum STRD (or more recent.) F-15	F-16	A-10
0	Jan 74	1 Remote required	F-4 Jan 74 Non F-4 Jan 73
1	Jan 71	Jul 73	F-4 Jan 71 Non F-4 Jan 70
2	No STRD Requirement		

Oversea Duty Selection Date (ODSD)

Converting MAJCOM	Minimum ODSD (or more recent.) F-15	F-16	A-10
PACAF/USAFE	NA	NA	NA
TAC	Jun 72	Jul 73	NA

NOTE: Inventory/requirements are reviewed semi-annually for possible readjustment of STRD/ODSD criteria

WHERE THE ACTION IS

For those of you who have recently completed a short tour but *still* can't seem to get into that new fighter, let me now discuss our conversion methodology and how you can maximize your chances.

During the five-year "growth period" for each system I described above, all opportunity for experienced fighter pilots to enter new systems comes through their reassignment to a base undergoing conversion to that system – either just before the conversion starts, or during the process, which lasts about a year for the average wing. Given our current rated management philosophy of (1) all operational fighter aircraft sharing in the production of new fighter pilots, (2) the requirement to minimize PCS costs, and (3) the necessity to provide a nucleus around which a new unit is built, the composition of a conversion wing can be broken into four categories: the on-base resource, the fair share of UPTs and FAIPs, the system-experienced cadre, and the worldwide available fighter resource (that's you).

Typical Converting Unit Resource Mix

On-Station Resource (experienced & inexperienced)	40%
New System Experienced Cadre	15%
Worldwide Resource	15%
UPT/FAIP	30%

FIGURE 1

Figure 1 shows a typical conversion squadron by source. We've been trying to maximize the on-base resource to save PCS funds and enhance unit continuity through the conversion. We keep the UPT/FAIP input as high as possible to maximize the absorption (production) of new fighter pilots, thereby reducing the traditional high flow through F-4 units. The cadre provides the system familiarity that's essential to rapid unit tactics development. As you can see, only a few new system slots are currently available for you experienced guys on the move. We do our best to spread these slots around and offer equal opportunity. We don't apply any additional eligibility criteria; in fact, the timing between a pilot's availability and the training slot is often the biggest player. To improve this opportunity, we're currently taking two actions. First, we're notifying the proportions of cadre and on-station resource so as to increase inputs from the worldwide resource. Our experience through four conversions has indicated that we can increase the number of on-station/worldwide convertees while maintaining the desired levels of theatre and mission experience. Second, we have been working with TAC/DOOT to make certain modifications in the F-15 training syllabus that have allowed the entry of a few extra folks – mostly on short notice, but all from the worldwide resource. We intend to pursue both these initiatives to the max extent possible.

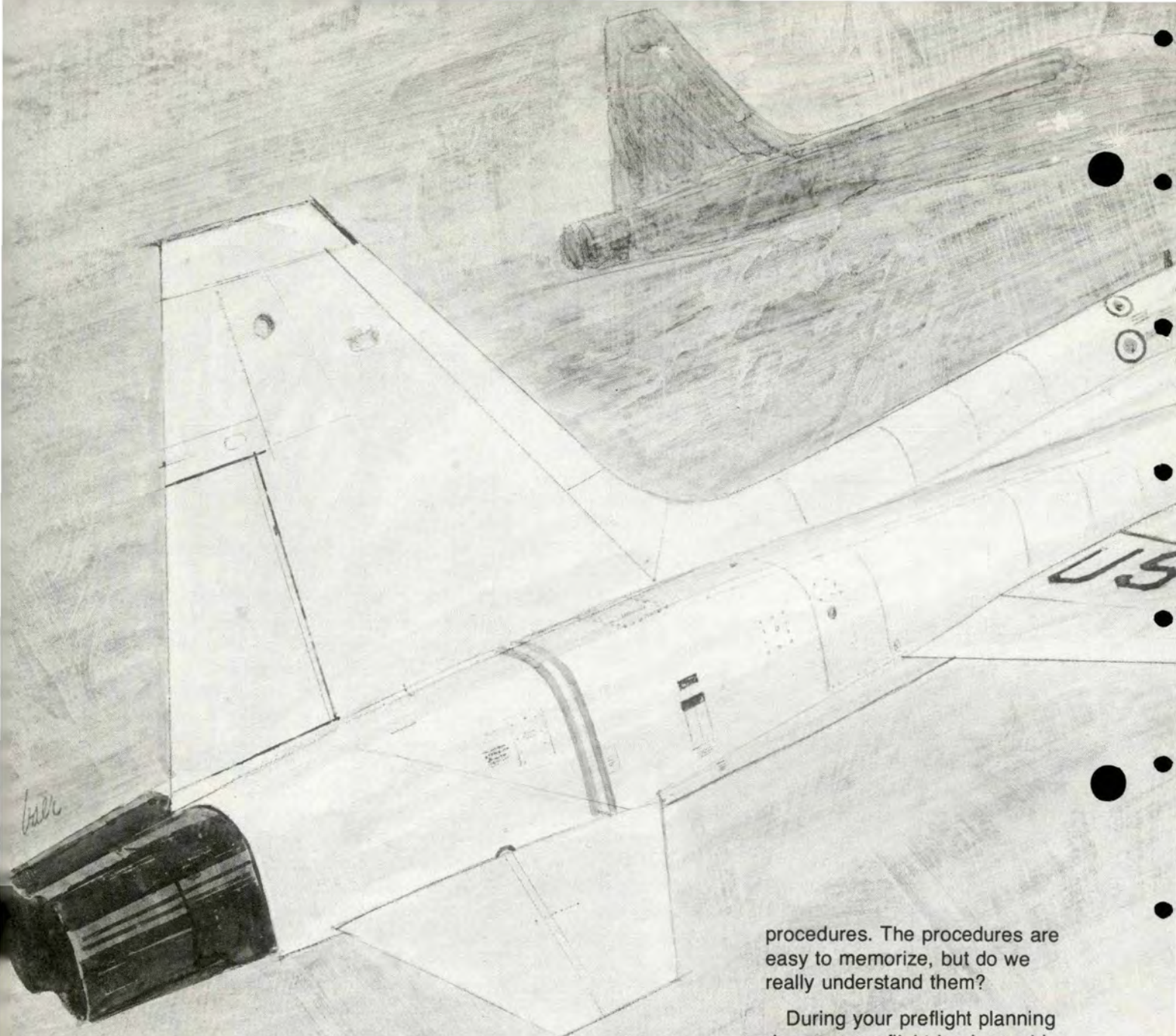
THE BOTTOM LINE

As the foregoing points out, new system opportunity is currently slim among experienced fighter pilots at non-converting units. The most common misperception I hear is that . . . "If I don't get into a new system now, I *never* will." Nothing could be further from the truth! It's simply that the numbers can't make it happen for the big majority of you at this particular point in time, since only 20 of our 118 tactical flying squadrons are currently equipped with new systems. Before you FACs, ALOs, staff guys, and Phantom drivers slit your wrists, however, let me reiterate that this limited opportunity – currently about four percent or so – will grow by 1983 to over 60 percent, and will be over 90 percent just a few years later! In 1985, for example, the 20 squadrons cited above will have grown to 74. Knowing that you mid-to-senior captains are most concerned about timeliness of *your* conversion opportunity, let me offer a few observations. First and foremost, if you like your present job, stay put and perform well. Time is on *your* side, and if you're doing well in the mainstream of the fighter business, I wouldn't want you to move unless absolutely necessary. If you've been thinking about a staff or non-flying tour but aren't sure of the best timing, perhaps now would be best, returning to cockpit duties when new systems have opened up more. If, on the other hand, you're the impatient type who wants to accelerate straight up or shoot tanks at 5,000 feet slant range *right now,* the bottom line is simple – get your STRD updated if you need to, and get to where the action is! Search out the (classified) conversion planning for the system of your choice, volunteer for duty at bases scheduled to convert, be there with sufficient retainability to convert, and perform well. If you're as serious as you claim, you'd better get moving – the line to Kadena is already forming!

Hoping that this article has avoided the "blowing smoke" so often associated with us personnel types, I invite your feedback to myself, my Fighter Shop, or your MAJCOM rated career managers. We favor two-sided conversation, and are doing our best to "tell it like it is."

ABOUT THE AUTHOR

Colonel Viccellio is currently Chief of Rated Officer Career Management at AFMPC, and is a member of the Air Force Readiness and Conversion Committee which is tasked with the overall management supervision for the TAF conversion. His background includes tours in the F-100 and A-1, and duty as an F-4 ops officer, squadron commander and ADO in the 33TFW at Eglin AFB, FL. ★



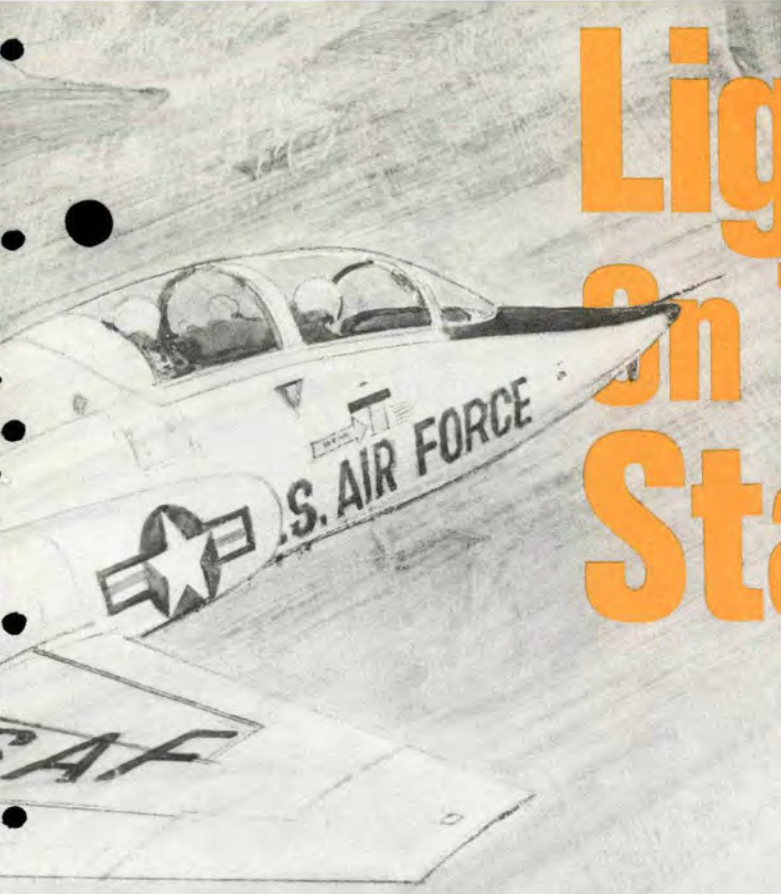
MAJOR PAUL L. TILEY
Directorate of
Aerospace Safety

The clouds were getting thick, but I could keep the "light and the star" in sight most of the time. Then the flight went into another cloud bank. One, two, three seconds and I still could not see lead. "Blue 4 has lost you, lead. I'm going lost wingman."

A lost wingman procedures briefing is one of those briefings that tend to get passed over with the phrase, "lost wingman procedures are standard." True, the lost wingman procedures we learned in the T-37 are the same ones we are using in our newest aircraft. But, recently we have experienced an increase in fatalities during lost wingman procedures. The procedures are easy to memorize, but do we really understand them?

During your preflight planning do you, as a flight lead, consider the weather, the real need to penetrate the weather in formation, and your wingman's ability? You might be able to rearrange your sequence of events to avoid the worst weather. Or, you might be able to arrange a radar trail departure.

As a wingman, do you take part in the preflight planning so you'll know where you are going? Or, do you expect the flight lead to do it all? When you acknowledge the clearance prior to takeoff, do you really understand it? If you



Light On The Star

Thorough knowledge of lost wingman procedures may save your life.

have to go lost wingman, will you be fumbling to get your SID book out? Will you know the next checkpoint on your route of flight?

Once you're airborne and in the weather, what happens when you go lost wingman? The purpose of lost wingman procedures is to ensure separation from the rest of the flight. But, how do you, as flight lead or wingman, ensure separation after the initial move? Most 55-series regulations require the flight lead to transmit his heading, airspeed, and altitude to help ensure separation. If you, as the lost wingman, can determine an altitude or DME separation then you've accomplished the first step.

You can't stop flying your aircraft there. What do you do next? You transition to instruments and, since you are in the weather, contact the controlling agency for a separate clearance. The controlling agency can help you ensure your separation from the rest of the flight. If you are having radio problems, and can't contact the controlling agency, squawk "emergency" and proceed on the flight plan as cleared. Don't be afraid to squawk "emergency"; that will ensure the controlling agency keeps the rest of the flight away from you.

Let's talk about transitioning to instruments. AFM 51-37 has a good section on spatial disorientation. This may well be your worst problem. Why spatial disorientation? Consider, you have your head turned left or right, concentrating on keeping the "light on the star," and you've been going in and out of the clouds. The "light on the star" fades out, you wait, but lead is gone. You get worried and start trying to fly instruments while cross-checking outside to see if you can pick up lead. Your eyes are in and out, back and forth; the perfect set-up for spatial disorientation. If you get it, remember—trust your instruments. If you have another guy in the aircraft, tell him you are disoriented. He may or may not be able to help you.

If, while ensuring separation from the rest of the flight, or while transitioning to instruments, you lose control of the aircraft, you still have an alternative—EJECTION! Most flight manuals say that if you are out-of-control eject at 10,000 feet. That one last attempt to save the aircraft is the one that kills.

If you do everything right, you keep your separation, you transition to instruments, and you get your own clearance; DON'T be in a rush to rejoin with the rest of the flight. Too many pilots, who have done everything right, catch a glimpse of the flight and try to rejoin before they lose sight again. Very few of them make it. If you have your own clearance and hard altitude, maintain it until you are SURE you can make a controlled rejoin. If you can't make a controlled rejoin, talk it over with lead on the radio. The best course of action may be to RTB. ★

Rex Riley on the road again! This trip we visited eleven bases and received some super service from most. The common denominator to good transient service seems to be attitudes and lateral cooperation. We also picked up some feedback from aircrews and TA folks which is worth passing on.

INFORMATION

Aircrews—To save you some embarrassment, hassle and frustration, let me remind you that the good old days of being met by the TA folks **with tools** are mostly gone. In the battle against cost and FOD, the CTK (Consolidated Tool Kit) program was born. This system provides a centralized and inventoriable tool supply to be signed out on a task-by-task or shift-by-shift basis. This is an over-simplification of the system, but essentially it means that ramp folks aren't carrying all the tools they used to. Many TA outfits have thru-flight or BOP "mini-kits," but they can't possibly carry all types of tools necessary. Moral—Be a little sensitive and try to work with the system. The same program that causes the TA folks not to have all those tools may also save your engine.

Don't depend on the computer to get the next leg of your stopover to your destination. I'm not down on computers, but if you have several legs that are short, you may beat your inbound flight plan! A phone call to base ops or TA at your stops may prevent TA from being surprised by your arrival and, therefore, smooth your turn.

Retained Awards

WRIGHT-PATTERSON AFB, OH

Good service and facilities! One of the best flightline snack bars around. A very spread out place but transport and availability is excellent. If you plan to RON, call ahead for reservations to avoid a possible long ride to the other side of the base. Lots of other airdromes and slow-movers around, so keep your head out and eyes open.

ROBINS AFB, GA

Continues to be a super place to stop or turn. Lots of traffic and crowded ramps makes taxi caution a necessity. Best quarters we've seen in a while. Folks are really tryin'!

New List Additions

VANDENBERG AFB, CA

A quiet, pretty place on the coast! Only open duty hours, 5 days a week, but good service and facilities. No barriers, 8,000 foot runway and always file an alternate (IFR Supp.).

ANDREWS AFB, MD

They really have their act together! Attitudes and performance have definitely become service oriented! CAUTION: Lots of traffic, ramp freezes, VIP priorities and other unique problems require some empathy and forethought on the part of aircrews. Despite these local problems, Andrews folks are trying hard. Work with them, try not to surprise anyone, and you'll get well taken care of!

PLATTSBURGH AFB, NY

Good TA service and ops facility. Food and lodging are a little distant, but good transport will help you get there OK.

COLUMBUS AFB, MD

UPT traffic and multi-runway operation make this another place for eyes open on arrival and departure. Good service, base ops and quarters if you plan an RON.

MACDILL AFB, FL

Save a little extra gas for vectoring around the St. Petersburg landmass on arrival to MacDill. Also —don't let the 500 foot wide runway monster getcha! A fast turn during peak Phantom time may be a problem due to gas or AGE availability, but MacDill TA folks do well! Same advice—don't surprise them! If you've got strange requirements, bunches of aircraft or oddball arrival times, give them an advance phone warning. Outstanding stopover.

PATRICK AFB, FL

Super facilities! Not too much transient traffic but a lot of local training and light plane sightseers up and down the coast. IFR Supp says up to 4-hour delay, so call ahead if you're in a hurry.

NO CIGAR: A pair of bases we visited have some problems. No names, but don't let a guilty conscience bother you unless . . .

- Base X—might have just as well been closed. Lackadaisical TA, ho-hum fuel truck driver, dark and almost empty base ops, nonexistent transport. You'll know it if you stop there!

- Base Y—Super quarters, food facilities, base ops. TA and crowded ramp is dangerous. TA is severly undermanned for the ramp situation, hours of operation and traffic amount and variety. Base aircraft parked on transient ramp causes unhealthy taxi and parking situation. If the shoe fits . . . .

A Commercial Message: I've gotten some comments like "Arrghh, you're putting them on the Rex Riley list; I really got a bad deal at that #*!!;! base!" Keep in mind our visits are a one-time every two year-or-so stop for often as little as two hours.

Hopefully, we arrive unknown and wander around attempting to get an objective view of the service and facilities. We may or may not succeed. A base may know we are coming; we may hit them at a slack time or for some other reason we may get better (or worse) treatment than the average jock. That's exactly the reason we depend on info from airplane drivers to supplement our evaluations. Keep the cards and letters coming! ★

THE

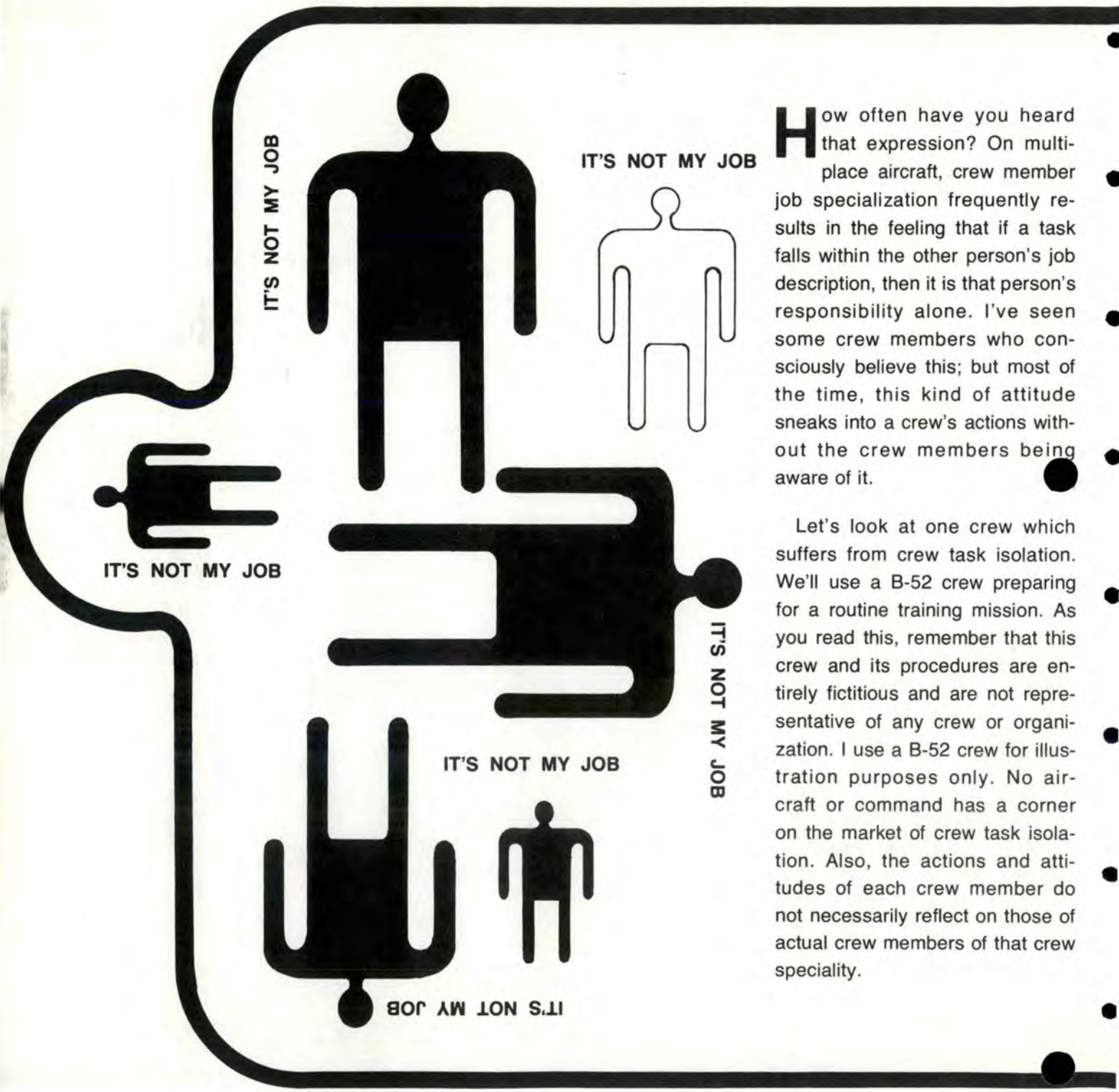
REX RILEY

Transient Services Award

LORING AFB	Limestone, ME
McCLELLAN AFB	Sacramento, CA
MAXWELL AFB	Montgomery, AL
SCOTT AFB	Belleville, IL
McCHORD AFB	Tacoma, WA
MYRTLE BEACH AFB	Myrtle Beach, SC
MATHER AFB	Sacramento, CA
LAJES FIELD	Azores
SHEPPARD AFB	Wichita Falls, TX
MARCH AFB	Riverside, CA
GRISSOM AFB	Peru, IN
CANNON AFB	Clovis, NM
LUKE AFB	Phoenix, AZ
RANDOLPH AFB	San Antonio, TX
ROBINS AFB	Warner Robins, GA
HILL AFB	Ogden, UT
YOKOTA AB	Japan
SEYMOUR JOHNSON AFB	Goldsboro, NC
ENGLAND AFB	Alexandria, LA
KADENA AB	Okinawa
ELMENDORF AFB	Anchorage, AL
PETERSON AFB	Colorado Springs, CO
RAMSTEIN AB	Germany
SHAW AFB	Sumter, SC
LITTLE ROCK AFB	Jacksonville, AR
TORREJON AB	Spain
TYNDALL AFB	Panama City, FL
OFFUTT AFB	Omaha, NE
NORTON AFB	San Bernardino, CA
BARKSDALE AFB	Shreveport, LA
KIRTLAND AFB	Albuquerque, NM
BUCKLEY ANG BASE	Aurora, CO
RAF MILDENHALL	UK
WRIGHT-PATTERSON AFB	Fairborn, OH
CARSWELL AFB	Ft. Worth, TX
HOMESTEAD AFB	Homestead, FL
POPE AFB	Fayeteville, NC
TINKER AFB	Oklahoma City, OK
DOVER AFB	Dover, DE
GRIFFISS AFB	Rome, NY
KI SAWYER AFB	Gwinn, MI
REESE AFB	Lubbock, TX
VANCE AFB	Enid, OK
LAUGHLIN AFB	Del Rio, TX
FAIRCHILD AFB	Spokane, WA
MINOT AFB	Minot, ND
VANDENBERG AFB	Lompoc, CA
ANDREWS AFB	Camp Springs, MD
PLATTSBURGH AFB	Plattsburgh, NY
MACDILL AFB	Tampa, FL
COLUMBUS AFB	Columbus, MS
PATRICK AFB	Cocoa Beach, FL

CREW TASK

CAPTAIN EUGENE CAISSE • Directorate of Aerospace Safety



How often have you heard that expression? On multiplace aircraft, crew member job specialization frequently results in the feeling that if a task falls within the other person's job description, then it is that person's responsibility alone. I've seen some crew members who consciously believe this; but most of the time, this kind of attitude sneaks into a crew's actions without the crew members being aware of it.

Let's look at one crew which suffers from crew task isolation. We'll use a B-52 crew preparing for a routine training mission. As you read this, remember that this crew and its procedures are entirely fictitious and are not representative of any crew or organization. I use a B-52 crew for illustration purposes only. No aircraft or command has a corner on the market of crew task isolation. Also, the actions and attitudes of each crew member do not necessarily reflect on those of actual crew members of that crew speciality.

ISOLATION....OR... "IT'S NOT MY JOB"

P Aircraft Commander
CP Copilot
RN Radar Navigator
N Navigator
EW Electronic Warfare Officer
G Gunner

The time: 0730 on mission planning day.

The place: The squadron mission planning room.

The navigator and the copilot are working at the table and the pilot, the RN, and the gunner enter.

P: Nav, have you got the flight plan finished?

N: I worked on it for about 4 hours last night, but Scheduling just called and changed everything, so I hafta start all over.

P: *..?!!, that really puts us behind. Well, hurry up and finish it. Co, you stay here and see how much of the fuel log you can do. The rest of us will go and get some breakfast as long as there's nothing for us to do. We'll be back in an hour. Have it done by then because I want to brief at noon. I've got things to do this afternoon.

RN: Just our luck. Now we'll blow the best part of the day on mission planning. Let's go eat.

N: (After the breakfasters have left) *!!#½. You'd think those guys would hang around and help us.

CP: Sure would like to upgrade soon.

Two hours later, the pilot, RN, and the gunner return from breakfast.

P: You guys got the mission done?

N: Almost. Sure could have used some help, though.

P: You're the nav—the flight plan is your job. Now, let's get going. We've got target study in 10 minutes.

CP: I don't have the fuel log done yet. Why do I have to go to target study anyhow? That's navigator business.

P: We have to go. By the way, has anyone seen the EW today?

G: He's in the crew lounge. He got here about 15 minutes ago.

P: Go get him.

The EW enters, carrying a cup of coffee and a copy of "Scientific American."

EW: Hi, guys. When do we brief?

P: Where have you been? Mission planning starts at 0730.

EW: When I get here at 0730, all I do is sit around and do nothing until it's time to brief. My mission planning only takes about 20 minutes.

P: Well, we're supposed to be here at 0730, and that means all of us. Gunner, you draw the pilot's chart while we go to target study.

(The pilot, copilot, radar nav, and nav go to target study and return in about an hour.)

P: Okay crew, let's finish this up. We'll brief at noon.

N: I don't know if we can be done by noon. These scheduling changes are complicated.

RN: Yeah, and I have to compute timing charts for these new targets.

P: You can do that after the briefing. I want to brief at noon so that I can paint my house this afternoon.

Time: 1330. The briefing is over. The pilot, EW, and gunner have gone home.

N: I need someone to help me check these courses and distances.

CP: I found a slight error in the fuel log. This will keep me busy for a while.

RN: I've still got to review the aircraft history. Those guys always run off right after the briefing. I wish they would stay around and help.

The time: 0530 the next day.

The place: Base Ops. The crew has assembled for the flight.

P: Hey Co, let's check our clear-

CREW TASK ISOLATION continued

ance against the flight plan.

CP: Job Control just called and changed our tail number. I've got to recompute weight and balance. Also, the NOTAMS have to be manually checked today. We're not going to have time for coffee.

P: Where'd the rest of the crew go?

CP: They've gone to breakfast. I wish they had hung around to help.

Thirty minutes later, in the snack bar. . . .

N: The pilots didn't get in here to eat. I wonder what they're doing?

RN: They probably got busy. But don't worry about them. The pilot didn't worry about us yesterday after the briefing and we got busy and he went home.

EW: Did anyone ask the pilot when bus time was? It ought to be about now.

N: Don't worry about it. When he wants us he'll come and get us.

About 10 minutes later, the pilot sticks his head in through the snack bar doorway and says, "Let's go, we're late." The crew gets on the bus and heads for the aircraft.

Let's analyze the pre-mission activities of this crew, specifically looking for areas where the lack of crew empathy causes potential mission degradation.

The crew assembled at 0730 on mission planning day. The navigator had constructed the mission the night before and was prepared. However, an unavoidable scheduling change necessitated a flight plan revision. The pilot, believing that flight plan construction is exclusively navigator business, decided to leave until the flight plan was done. The copilot, working on the fuel log, remarks that he would like to upgrade soon so that he can be an AC and go to breakfast while the other crewmembers work.

Later, the copilot objects to being required to attend target study, remarking that it's "navigator business." He doesn't realize that he is an essential part of the bombing team. This probably isn't his fault. His navs don't use him as they should.

The Electronic Warfare Officer is really in left field. He's the most specialized member of the crew, and he uses this fact to isolate himself. He can't see why he should have to spend the entire day with his crew when his specialized mission planning activities take only a short time. Again, we see a case where the crew is not using him as the valuable resource that he could be.

The crew completes the formal briefing, but there is still much undone. The paperwork needs to be checked, but that's navigator and copilot business. The pilot goes home. No empathy. No crew coordination.

The next morning the tables are turned. After the weather briefing, the navs disappear in to the snack bar, while the pilots wrestle with all those little pre-mission details and changes. The navigators express little concern about whether or not the crew arrives at the aircraft on time, believing that it's "pilot business."

This fictitious scenario shows us how crew task isolation degrades crew members' working relations. They may fly a good mission, but after the trying mission planning session, they are probably not at their psychological best. Or maybe they won't fly such a good mission, because one overworked crew member made a critical paperwork error while the person who should have been checking it was eating breakfast or painting his house. It takes a well organized and integrated crew to safely fly a complex mission, not several independent specialists. That's why it's called a "crew." ★

OPS TOPICS

WING GROWTH

The KC-135 pilot, at a commercial field to pick up passengers, was concerned about the proximity of a passenger loading stair parked about 30 feet forward and 18 inches left of the left wing tip. When he requested it be moved, he was assured that the marshallers could safely handle it. They didn't and the wing tip struck the stand. Because of the location of the turn pivot point, the wing swung out an extra three feet and once the turn began the wing could not miss the stand.

STARFIGHTER REUNION

February 1979 marks the 25th anniversary of the first flight of the F-104 Starfighter. To commemorate this event, a reunion will be held in Phoenix, Arizona, 15, 16, 17, and 18 February 1979. Anyone who has flown the F-104 or has been closely associated with its development over the years is invited to attend. For further information please write:

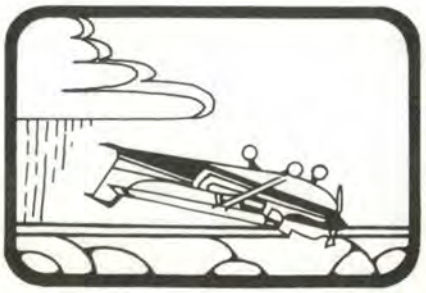
Starfighter 25 Ltd
P.O. Box PP
Litchfield Park, Arizona 85340

AIRCRAFT & THUNDERSTORMS DON'T MIX

Recently, two similar mishaps in which Aero Club aircraft received major damage illustrated, yet again, that aircraft – of any sort – just don't mix well with thunderstorms. In the first case, the Cessna 172 pilot had planned his return from a local flight to just beat the expected arrival time of the storm (no comment). He landed in the clear, but on taxi the aircraft was flipped over onto its back by the first gust of the thundercloud.

In the second case, another Cessna 172 pilot was told (some way out) that a cell was located seven miles north of, and not expected to affect, his destination. Sure enough, the storm changed direction in time for the gust front to upset the aircraft as it taxied to parking.

In both cases, the pilots were some distance from any visual indications of hazardous weather during approach and landing. The second case, particularly, is a striking example of how quickly a situation can deteriorate; in the space of a couple of minutes, reported wind at the field went from 250/18 vis 8 miles to 350/35 gusting 50, vis ¼ mile. – Sqn Ldr Peter White, RAAF, Directorate of Aerospace Safety.



VALUE YOUR TAIL?— CHAPTER TWO

Chapter one of this saga can be found in *Aerospace Safety* – May 1978. Chapter two is as follows: A C-130 was on a support mission to the "same" remote site outside the CONUS. However, the plot changed from a maximum effort takeoff to a maximum effort landing. The runway gradient remained the same – up to 12 percent. Maximum effort landing procedures and airspeed were briefed and used. The crew indicated that the aircraft experienced an unexpected increased sink rate after crossing the threshold and the touchdown was evaluated as "firm" but not "hard." No one examined the aircraft for damage and the crew prepared for takeoff. When passing the end of the runway after liftoff, the crew noticed a small piece of sheet metal on the runway and site operations determined that it had come from the C-130.

Chapter one of this saga was classified as a Class "C" incident; substantial structural damage in chapter two made it a Class "B" mishap. LET'S NOT WRITE CHAPTER THREE AS A CLASS "A" MISHAP! – Maj John D. Woodruff, Directorate of Aerospace Safety. ★

LOSS OF CONSCIOUSNESS During Air Combat Maneuvering

MAJOR JAMES E. WHINNERY, Ph.D, M.D
MAJOR ROBERT M. SHAFFSTALL, M.S
SIDNEY D. LEVERETT, JR., Ph.D

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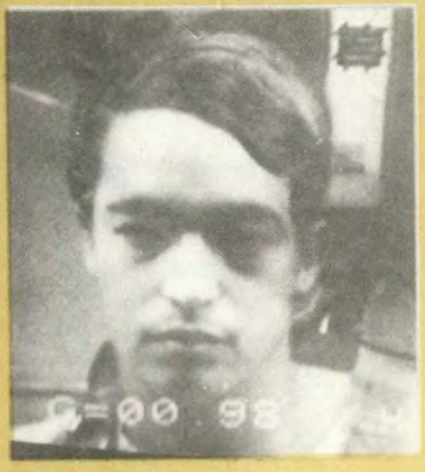
The authors state that during a high-G maneuver a pilot may lose consciousness for several seconds. Can this account for the loss of some of our high performance aircraft and crews?

Loss of consciousness (LOC) can be induced in aircrewmen when their G tolerance is exceeded. This is true even with all the additional benefits of new anti-G suits, protective M-1 and L-1 straining maneuvers, and tilt-back seats. The higher the G load the more likely it is that a pilot will be in an acceleratory range which exceeds his individual G tolerance. With more operational high performance aircrews, especially those flying the F-15 with its high-G onset rate (as great as 10 G/sec), we can anticipate a greater likelihood of LOC during aerial combat maneuvers. The danger of LOC is not limited to the F-15 since a variety of other aircraft can achieve a high enough G level to exceed the average pilot's tolerance.

These levels of increased G forces applied on aviators in modern high performance fighter aircraft are no longer airframe limited but instead are limited to the ability of the human body to withstand the excess G forces. Acutely, the G-limiting symptoms constitute a spectrum of decreasing sensorium ranging from greyout through blackout to a final loss of consciousness. The threshold for onset of greyout, blackout, and LOC are variable and are influenced by the rate of onset of G, duration of G, previous G experience, heart rate and blood pressure along with other associated



posures include the officers and airmen of the USAFSAM human acceleration research panel, USAF aircrewmen undergoing medical evaluation and students in various USAFSAM aeromedical courses undergoing high-G orientation. Although every effort is made to prevent LOC, its insidious onset makes an occasional episode inevitable. These G exposures are routinely videotaped for future reference and "instant replay." Several episodes of G-induced LOC were recently reviewed on the subjects who had ridden the USAFSAM centrifuge since 1976 and suffered LOC. The time of incapacitation was measured during the LOC episodes as recorded on videotape. The time of incapacitation is defined as the interval that begins when a subject is unable to respond visually or verbally to any stimulus to the

factors. The induction of these G-limiting symptoms is considered to be secondary to a progressive circulatory decrease in the blood supply to the retina and brain during increased G.

In the Crew Technology Division of the USAF School of Aerospace Medicine (USAFSAM), we routinely subject individuals to various levels of G-stress on a human centrifuge. Those who undergo G-stress ex-

LOSS OF CONSCIOUSNESS continued

moment when he has return of either of these functions.

Our results indicated that the overall mean time of incapacitation of subjects who experienced LOC during centrifugation was 15.0 sec with a range from 9.0 to 20.5 sec. The time of incapacitation appears to fall within this range regardless of the G level, the onset rate, the characteristics of the subject or the previous G experience of the subject.

For most acceleration exposures there is theoretically a finite time between complete blackout and LOC; therefore, it is possible to have complete loss of vision and still remain conscious. However, we have observed many instances during a rapid G onset run in which blackout and LOC occur simultaneously. The average time from peripheral light loss to LOC has been found to be around 1.7 sec. Previous documentation of G-tolerance limits has shown (during centrifuge experimentation) that peripheral light loss (greyout) occurs between 0.6 and 1.0 G before blackout, with blackout preceding LOC by 0.5 to 1.0 G; and from greyout to LOC there must be an increase of 1.0 to 2.0 G. Consequently, the likelihood of experiencing a loss of consciousness episode should increase with increasing G level.

Whether or not a pilot going through a high-G aerial combat maneuver (ACM) and undergoing LOC will fortuitously be able to return to a low-G environment with subsequent rapid recovery is a complex question and depends on several factors. In addition, whether or not immediate aircraft recovery would be possible upon return of consciousness is not known. Our results indicate the LOC induced by isolated increased G-stress induces a mean incapacitation time of 15 sec. This represents the lower limit for the time of incapacitation since during the centrifuge exposure the subject is returned immediately to +1.0 GZ at the first sign of incapacitation. A pilot flying an aircraft would probably experience a longer time, depending on the rate of decrease in G forces and the amount of time required to gain aircraft control after regaining consciousness and overcoming the attendant disorientation and confusion.

The most important finding in these observations on our subjects at USAFSAM was that an episode of G-induced LOC may not be recognized by the subject. Several of our subjects, including aircrew members, did not believe they had undergone LOC until instant replay review of the videotape recording. Consequently, it is possible that a pilot in a high-performance aircraft who loses consciousness may be unaware that anything had occurred, with subsequent failure to report such an unwitnessed event. No significant residual symptoms other than transient amnesia and confusion were manifest by any of the subjects. Some subjects did experience a tingling sensation in the extremities post LOC.

Even 15 sec of uncontrolled flight in a high-performance aircraft can be a very long time in which the aircraft can travel great distances. It goes without saying that there is a great amount of danger present when LOC occurs in a high-performance aircraft. It is therefore beneficial for all aircrewmen, especially those who will be regularly exposed to a high-G environment, to have a healthy respect for G-induced LOC and to have the most up-to-date information and training on methods to protect them from LOC. ★

GROUP GROPE 5

The Combat Pilots Assn Group Grope 5 will be held 27-29 October 1978 at Shangri-La, Route 3, Afton, Oklahoma 74331. For additional info call one of the following numbers: 918-742-8693, 213-822-1755, 713-721-6375. ★

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MAJOR

Richard G. Rose

162d Tactical Fighter Training Group (ANG)
Tucson, Arizona

On 11 April 1978, Major Rose was number three in a flight of three A-7D aircraft flying a training mission. The mission was uneventful until Major Rose extended the gear on downwind during the VFR overhead traffic pattern. The right main gear indicated an unsafe condition. Mobile control and a chase aircraft confirmed that the main gear was up and locked and the gear doors were open. The landing gear handle was stuck in the down position and all attempts to jiggle the handle, and/or recycle the gear proved futile. The emergency gear extension system was activated but the right main gear still remained up and locked. The aircraft was porpoised and yawed in an attempt to loosen the linkage and allow the gear to extend, to no avail. A conference call to factory representatives confirmed there was no other known method to extend the gear. Major Rose decided to make an approach end barrier engagement. As the aircraft touched down 500 feet short of the barrier, the right wing started to drop but was flown back up with the residual air flow. A successful engagement was made as the aircraft decelerated in a right hand turn as the right wing tip contacted the runway. Major Rose's successful landing of the aircraft resulted in a minimum amount of damage. His superior airmanship and prompt actions saved a valuable aircraft and averted possible injury or loss of life. WELL DONE! ★

Anatomy Of A Mishap Investigation

YOU ARE THE RECORDER

CAPTAIN JAMES J. LAWRENCE • Directorate of Aerospace Safety

THE PRELIMINARIES

The rotors of the camouflaged CH-53 helicopter slowly wind down. The crew chief gives an all clear sign and a group of despondent officers and enlisted men cautiously approach the awaiting air machine. These are not happy people. Their mission is the first cog in the machinery known as a mishap investigation.

The group is called an Interim Safety Investigation Board. Their goal is to secure the mishap site, gather applicable evidence, send out initial notification reports and generally make ready for the Formal Board, convened by the MAJCOM or numbered Air Force authority. The destination is a tactical target range where the wreckage of an Air Force fighter is resting. A black scarred length of ground slowly becomes visible as the CH-53 nears its destination. The interim board begins to pick up the path of the wreckage pattern. The earth is littered with the remains of aircraft components. Security police are already on the scene to divert the curious.

A crew member is dead. His body rests close to the ejection seat some distance from the initial impact point. The interim board can find no evidence of an ejection attempt. No time to ponder possibilities now. There is work to be done. The mortuary people are on the way; pictures must be taken; aircraft fluid samples must be gathered; ordnance must be accounted for; classified equipment has to be located; measurements need to be taken; components must be identified and labeled on a wreckage diagram. Back at home base, flight and personnel records must be gathered; maintenance records impounded; an 8-hour message sent; witness statements taken. These are busy people.

THE INVESTIGATION BOARD

Members of the safety directorate at the Air Force Inspection and Safety Center (AFISC) have received initial notification of the mishap. Details are sketchy. They know only the aircraft type and that there is a fatality. Initial indications are that this accident may fit the criteria for which AFISC has con

tracted in the Professional Military Investigation (PMI) Program.

PMI is a test. The theory is that an experienced group of people with several mishap investigations under their belts can do the job more efficiently. Hopefully, such a team can more precisely identify root causes and develop recommendations that will prevent a recurrence. AFISC committed itself to five such investigations during the test phase. Convening authority still resides with the MAJCOM, and AFISC goes out only by invitation. Four of the five have been completed. This one could well be the fifth.

The PMI team is placed on stand by and contacts with the MAJCOM safety office are initiated. The AFISC team consists of a Board President, an Investigating Officer, a System Engineering Adviser and a Recorder. The first three are the permanent corps. The fourth goes to the slowest moving company grade officer. I feinted left when I should have cut right and was selected to volunteer.

Our intuition held true and the invitation came. Armed with investigation kits, the team departed Southern California. Arrival at the base of the mishap occurred the next morning, less than 24 hours after the crash.

THE INVESTIGATION

My first impulse upon arrival was to jump right into the investigation effort. More experienced heads, however, convinced me to cool my heels. Organization is the name of the game, and that role falls into the hands of the recorder. The first step is to bring the team up to date with the progress of the Interim Board.

The investigation board was not yet complete. Life support and life sciences members were supplied locally but the pilot and maintenance members were coming in from another base and were not due until that evening. The real action then would not commence until tomorrow. That left the afternoon for planning and coordinating. The other AFISC members build the plan but coordination is the forte of the recorder.

The first step is office space, and not just a cubbyhole, but a large work area. Room is needed for the board members, eight in this case, and for any technical representatives that might be invited in. Aside from desks, you need a file cabinet, work tables, chalk boards, bulletin boards, supplies, typewriters, and a good deal of administrative assistance in the form of typists. The base safety office is your initial contact for procuring these items. Look for a person with a lot of stripes and a few years on station. That person will possess the contacts that will be needed to help you function as a recorder. If you find such a person, he or she will be an invaluable asset, as you poke around a strange base.

That first day is well spent, if you can manage to make initial contact with those agencies that you will depend on most during the investigation, e.g., the photo lab, base reproduction, base supply, and graphics. Talk with the head man. Explain your purpose and what support you expect to need. Discuss priorities and be sympathetic to his other work demands, but firm in your own requirements. A little human relations goes a long way.

The investigation began the next day with the field effort. The team was airlifted to the wreckage site. The first step was to make a walk-through of the entire wreckage pattern. The team didn't linger on any one component but just tried to get a feel for the entire scene. After that initial contact, the exercise was repeated, but in greater detail. Here they tried to identify components and establish the sequence of wreckage breakup.

At this point, the goal of the investigators is to concentrate on the HOW aspects of the accident and leave the WHYS for later analysis. The task at hand is evidence and data gathering. The board needs to determine the flight path of the mishap aircraft, the glide path and airspeed at impact. They looked for signs of yaw, bank, FOD or birdstrike; compared impact marks to previously measured dimensions of the aircraft; located the engines and flight control actuators.

Probably the most important activity during this first day is to determine what technical assistance the board will require. You determine this by deciding on what questions need answers. Were the engines running prior to impact? If so, at what power setting? Were the flight controls operating properly? Was the pilot over-tasked with a combination of mission and system requirements? Once you determine the questions that need answering, the next step is to call AFISC for help in answering those that are beyond the board members' capability. The Policy and Programs Division people have contacts with the ALC's and contractors for needed expertise and they will handle the details of arranging support.

Our investigation revealed the need for engine and hydraulics specialists, an aircraft manufacturer's representative, and a human factors specialist. They were on scene in less than 24 hours after we called in the request. It also appeared that valuable evidence could be uncovered by sending the instruments to the ALC for impact analysis and by taking the actuators to their manufacturer for teardown and analysis. Company aero engineers worked on maneuverability parameters.

As the investigation progresses, it's easy for the recorder to become engros-

Anatomy of a Mishap Investigation continued

sed in his administrative functions and lose contact with the progress of the investigation. Beware of this happening; don't let it happen. Force yourself to get and stay involved in the investigative process. This knowledge will make your job much simpler from a communication standpoint, for you are the focal point for communications, and from the standpoint of setting your priorities for accomplishment of support tasks. Additionally, this will ensure you personally learn from the experience and not just hone your administrative skills.

The field effort progressed. Selected components were airlifted in for further study. Engines had to be trucked from the accident site for local teardown by the engine specialists. Maintenance work areas had to be arranged for. The team decided that there was no need to bringing in the wreckage for reconstruction, a common action by investigation boards. All that had to be learned could be gleaned at the mishap site. In three days the field work was complete.

THE ANALYSIS

Once the evidence from the field is complete, the real search for the WHYS begins. Each member of the board must now study all factors that bear on his area of expertise. The pilot member dug into the personnel and flight records. He also studied flight manuals, phase manuals, and training records. The pilot member must be a current flyer in the mishap-type aircraft and his familiarity with equipment and mission is important to the investigation.

The maintenance member is also an expert in the aircraft involved. He oversees all local teardown efforts. Life Sciences is filled by a flight surgeon and life support by an equipment specialist. Each man must cover every aspect of the investigation in their specialty. The investigatigating officer is the board's chief of staff. He directs the effort and keeps the members moving in the desired direction. The president determines policy and manages the entire effort. The recorder gets headaches, for he assists each member in the accomplishment of their duties and is the repository for all they uncover.

Although each member is pursuing his own area, the total effort should be moving in one direction. This goal is accomplished by having team meetings every day. Each member briefs the group on his efforts and findings. Priorities change on a daily basis and the players have to be informed. Communication is a key to success. What one person may know could be the information another needs to answer his questions or solve his problem.

TDR results were coming in and the team members were busy completing the AF 711 series forms required by AFR 127-4. The recorder must keep track of all the evidence, reports, and forms being worked. I suggest you use a three-drawer filing cabinet system. Set up each drawer with a section for every TAB to be used in the formal report. Use drawer 1 for material being worked and supporting evidence documents. Use drawer 2 for completed material: AF 711 documents, typed statements by witnesses, teardown reports and other data needed in the formal report. Use the last drawer for material you have reproduced and is awaiting compiling and insertion in the formal document.

Some other helpful hints for the recorder. Keep a telephone log of incoming calls and track follow-on actions required and accomplished. Set up a reproduction log to record the comings and goings of material to be duplicated. Use some type of message board to relay information to other board members. Keep a file of all correspondenc and messages received or initiated by the board.

Another major aspect of this phase is the interview of witnesses. Testimony usually appears verbatim in the formal report. Again, this is the recorder's problem. Two methods are available. You can tape the proceedings, then have them typed using a transcribing machine, or you can use a court stenog-

rapher. The latter is the preferred method, but a court stenographer may be difficult to obtain. Support must be planned in advance. The board members should prepare proposed questions prior to the interviews. Make sure the witness understands the privileged status of his testimony and the difference between a safety investigation and an accident investigation. The safety investigation is solely for mishap prevention purposes, whereas the accident investigation is conducted per AFR 110-14 to provide factual data for other purposes.

THE GOAL

The reason for the entire investigation comes next. That is the formulation of the findings, causes and recommendations. Everything done so far has been to support this function. The total effort is worthless unless the root causes can be identified and actions are proposed which will prevent future mishaps of the same type. Everyone takes part in this segment. The group must come to agreement on the chain of events that led to the death of that pilot and the destruction of that aircraft.

The group must distinguish between that which is a cause and that which is a result. Then recommendations have to be developed. The questions must be posed, "What can be done?, and at what level can it be done?, so that we can prevent a similar mishap from occurring again." The adopted recommendations should answer those questions. The results of these sessions comprise the real meat of the final progress report and TAB T of the formal mishap report.

As this activity unfolds, the recorder remains busy with the demands of the board. Typing support really comes into play now and reproduction is a constant concern. As work is completed by the other members, it has to be edited, proofed, drafted, coordinated, finalized, then duplicated. These are perhaps your busiest times. Expect long hours, frustration and pressure from several sources.

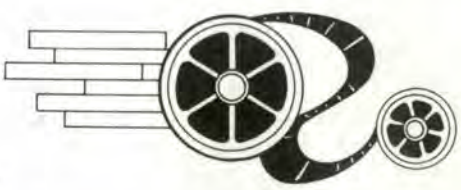
The remaining board duties are predominantly clean-up in nature. When all material is reproduced, the reports must be put together and mailed out. Briefings, with appropriate visual aids, are usually required for the convening authority. Thank you letters to those who assisted you should be prepared for the board president's signature. Expect last minute changes, keep a positive attitude and do your best.

In reflecting on my experiences as a recorder, I have mixed emotions. On the negative side, there is a lot of errand running and go-foring. Menial as well as meaningful tasks become your daily concern. But like most bitter pills to swallow, the end value is worthwhile:

First – you are participating in an apparatus that has noble goals: the saving of future lives and resources.

Second – you have the opportunity to exercise your talents in organization, control, coordination, communication and human relations. All the things the college and PME textbooks talk about as the axioms of management and

Third – you get a better understanding of the impact of the safety attitude in the daily execution of your assigned duties, no matter what they are. The investigative process is exacting and challenging; and well worth your time as an observer and participant. If you get the call, approach it as you would any valuable experience in your chosen career. ★



MIDAIR COLLISION FILM

Just released! AFISC, through the production facilities of AAVS, has just completed a videotape show on a recent A-7 midair collision.

This show details the how and why of the events leading up to the mishap.

This 12-minute show, in living color, is just the attention grabber for any unit meeting. Supervisors will love it because it gets across some points difficult to handle otherwise. Pilots will love it because it points out some fatal mistakes to be avoided. Commanders will love it because it might save some lives, equipment and the mission.

To get a copy on loan, free of charge, go to your base film library and ask them to order VC3 AVR 214, A-7 MIDAIR COLLISION BRIEFING.

☆U.S. Government Printing Office: 1978—783—114/1