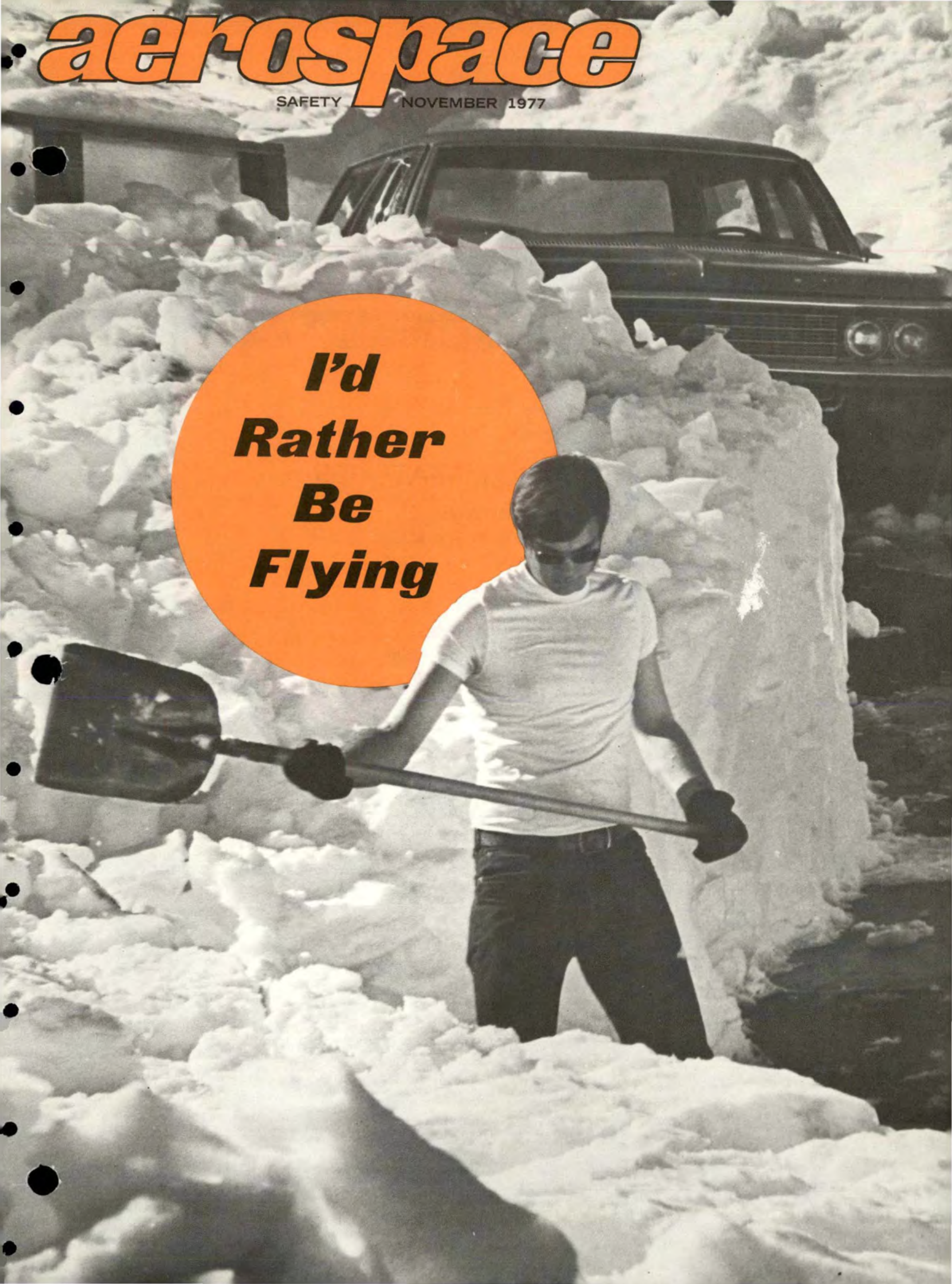
aerospace

SAFETY NOVEMBER 1977

I'd Rather Be Flying



NOVEMBER 1977

UNITED STATES AIR FORCE
aerospace
SAFETY

THE MISSION - - - - - - SAFELY!

SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

SUBSCRIPTION—AEROSPACE SAFETY is available on subscription for $12.00 per year domestic; $15.00 foreign; $1.00 per copy, domestic; $1.30 per copy, foreign, through the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Changes in subscription mailings should be sent to the above address. No back copies of the magazine can be furnished. Use of funds for printing this publication has been approved by Headquarters, United States Air Force, Department of Defense, Washington, D.C. Facts, testimony and conclusions of aircraft mishaps printed herein may not be construed as incriminating under Article 31 of the Uniform Code of Military Justice. All names used in accident stories are fictitious. No payment can be made for manuscripts submitted for publication in the Aerospace Safety Magazine. Contributions are welcome as are comments and criticism. Address all correspondence to Editor, Aerospace Safety Magazine, Air Force Inspection and Safety Center, Norton Air Force Base, California, 92409. The Editor reserves the right to make any editorial change in manuscripts which he believes will improve the material without altering the intended meaning. Air Force organizations may reprint articles from AEROSPACE SAFETY without further authorization. Prior to reprinting by non-Air Force organizations, it is requested that the Editor be queried, advising the intended use of material. Such action will insure complete accuracy of material, amended in light of most recent developments. The contents of this magazine are informative and should not be construed as regulations, technical orders or directives unless so stated.

NEWS FOR CREWS

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

CAPTAIN DONALD E. MORSE
MAJOR MAX M. MAROSKO • Rated Officer Career Management Branch, AFMPC

PILOT MANNING OF NEW FIGHTER WEAPONS SYSTEMS

There are many factors which must be considered in manning our new fighter weapons systems. However, two distinct objectives stand out when establishing a sound personnel management plan. Foremost are: force stability and assignment equity.

Aircrew manning programs for new and future weapon systems must have as a goal maximum return on personnel costs invested. To attain this goal, the management plan calls for force stability which reduces PCS costs and builds expertise in the new system. By definition, force stability also reduces cross-training out of the system and in turn, training costs. To meet the objectives, personnel selection criteria are structured so that only proven performers with maximum retainability (regular or career reserve officers only) are chosen. As with most formal training, active duty service commitments associated with formal training guarantee short term retainability. Long term stability will be achieved by selecting individuals from across the experience scale (UPTS to OLD heads), thus providing for leadership and growth potential within the system.

Assignment equity requires drawing from the entire worldwide fighter resource. Under current rated management philosophy, all fighter aircraft must share in producing aircrews for a new system. If the source to man new systems were limited to a particular fighter aircraft, the training requirement and flow of pilots through that system would severely affect the combat potential of a segment of the force. This adverse impact on combat readiness is an unacceptable risk. At the same time cross-training into the new fighters from a non-fighter weapon system is not feasible. Fiscal constraints and the experience demands of all systems mitigate against cross flow, i.e., B-52 to F-15. As a result, new fighter pilot inputs are limited to UPT graduates, first assignments IPs (FAIPS) and other pilots who do not have any major weapon system identity, e.g., T-33, T-39, non-fighter qualified FAC, etc.

In summary, the overall goal in manning a new weapons system is to ensure the optimum return to the Air Force for its investment in training/personnel costs while concurrently maintaining overall mission readiness capability. These objectives can be achieved only by adhering to a manning plan which is based on force stability and equitable selection criteria. ★

ABOUT THE AUTHORS

Major Max M. Marosko is the F-15 Resource Manager with background experience in F-4 (SEA, TAC) and F-101 (ADCOM).

Captain Donald E. Morse is the A-7, A-10, F-16 Resource Manager with background experience in the F-100 (USAFE), A-1 (Sandy—SEA) and the A-7 (TAC).

If you can picture yourself landing on a wet runway this winter, maybe you should keep in mind that...

Wet Runways Shrink

CAPT J. J. LAWRENCE
Directorate of
Aerospace Safety

GCA: "This is your final controller—How do you read me?"

PILOT: "Loud and clear."

GCA: "Roger, read you loud and clear, also. Special weather observation: 1522 zulu, sky condition 800 feet broken, visibility ¾ mile in rain showers. Runway is wet. Winds 250 degrees at 12 knots, weather service reports peak gusts to 20 knots."

PILOT: "Roger GCA, we copy."

"Okay," the pilot thinks to himself, "wet runway procedures. Firm touchdown. Five knots below normal approach speed. Land on the upwind side. Careful braking. Final approach speed is below main gear hydroplaning range. Watch the rubber deposits. I've done this many times before. SOP."

Three minutes later the crew accomplishes emergency ground egress procedures. As the pilot sits on the damp ground, waiting for help to arrive, he ponders why his aircraft came to a stop off the end of the runway, 6 inches deep in mud. Firm touchdown? Yes. On airspeed? Sure. Careful braking? He thought so. Landing zone? Where he normally puts it down.

First there was very little deceleration. Then the feeling of loss of control. The skid. Seeing the runway moving to the right on the windscreen, with inadequate response from the aerodynamic controls to keep it straight. Then it felt like he got some traction—and a loud bang sounded from the left side. Sharp veer—nose wheel steering engaged. Still sliding. The departure end of the runway growing larger in the windscreen. Off the end. The sudden stop in the mud. WHAT HAPPENED? He did everything by the book.

Unfortunately, the book does not tell the whole story. It cannot tell the whole story because this situation, heck, every situation is different. Let's go back and see some of the factors that attributed to this incident.

It started way back during the pilot's exterior inspection before

Avoid standing water and brake with extreme caution. Watch out for the lower RCR's on painted surfaces and heavy rubber deposits.

the flight. When he checked the left wheel well area, he noticed that the main gear tire tread was worn down quite low. He even pointed this out to the resident crew chief but what he got in response was a verbatim tech order definition of when a tire must be changed. This tire was still within limits, although just barely. The weatherman indicated a possibility of rain showers at destination. Well, tech orders are tech orders, he didn't want to push the issue.

Next, the aircraft's speed. Five knots below the normal speed. Right, that's Dash One procedure. That computes to well below the dynamic hydroplaning speed listed. Fine and dandy. However, he should not have let this fact build his confidence. The computed speed may well have been below the dynamic hydroplaning speed range indicated in the tech order. This speed range, however, was based on the well known formula of speed equals 9 times the square root of

Slush is as hazardous as water. Severe hydroplaning on landing roll was followed by an uncontrolled departure from the landing surface and extensive aircraft damage.

the tire pressure, or $9\sqrt{PT}$. In pilot talk, that formula translated to a certain numerical speed. However, that speed is based on computations from a tire already in motion. If the tire is not already spinning, as is the case just prior to touchdown, the formula becomes $7\sqrt{PT}$. Add to this the condition of the tread on the left main gear tire and you have a hydroplaning airspeed which closely resembled the speed at which he was landing.

Continuing, let's examine his touchdown. First, the distance at which he touched down. Command regulations often require a certain threshold crossing height. Such rules are there because supervisors hate having to explain why aircraft consistently land in the overruns. The rules by themselves are all right; however, pilots, while complying with these rules, build a perspective which encourages glide paths that lead to touchdown a good distance down the runway. These habits and their associated visual references, may result in landings with a lot of runway (braking surface) wasted behind you.

Now, I am not proposing you break the rules. What I am saying is that the goal is to cross the threshold at the required altitude and still land as close to the end of the runway as possible, staying within the aircraft's descent rate limitations. This is what the pilot in this example should have concerned himself with.

The next aspect of the aircraft's touchdown is positioning on the runway. Usually the Dash One will tell you to pick the upwind side when landing in a crosswind. Most of the time, this is good advice. It gives you more room on the downwind side to counteract drift. This general rule is not always the best course of action on a wet runway.

In this case, the runway crown was in the center of the runway, therefore, water drain off was to both sides. The high crosswind kept the water standing on the upwind side. Touchdown was in the deepest area of standing water, thus, substantially increasing the probability of uncontrolled hydroplaning.

The answer is not in always landing in the center on a wet runway either; it is in determining the

A T-39 victim of hydroplaning. A wet runway and a crosswind resulted in a skid, a blown tire, and a departure from the runway surface.

Wet Runways Shrink continued

area with the least amount of standing water.

Do this as best you can visually or by checking with tower personnel and other aircraft that have made the approach before you. The condition of a worn main gear tire might also affect your decision on where to put the aircraft down.

All things considered, including a visual confirmation of the water drainage situation and the condition of the left tire, a landing on the crown of the runway would have offered the best course of action in this situation.

Another item that should have concerned the pilot during the special weather observation was that of the effect of first rain on a landing surface. Just like a highway, a runway has a great deal of oil, rubber particles, and grime on it. When a rain first begins to fall, these deposits mix with the water to create a very slick surface.

Although this initial slickness will eventually wash off, the remaining rubber deposits or painted surfaces, combined with a water film, will foster a second type of hydroplaning called *viscous*. This form is just as serious as dynamic hydroplaning in that braking friction and cornering capability are completely lost. It is more insidious than dynamic because it occurs at much lower speeds, even as low as 30 or 40 knots.

During landing roll, the last type of hydroplaning this pilot may have encountered is called *reverted rubber* hydroplaning. If you lock your brakes and the aircraft begins a skid, steam is generated between the runway and the tires. The heat from this steam causes the tire to actually melt and the molten state lubricates the area between the tire and the runway, resulting in loss of braking friction and aircraft control. This type of hydroplaning can occur down to zero knots of airspeed and will continue until you unlock the brakes and get the wheels rolling again.

Which type hydroplaning was the culprit for this embarrassed pilot? A, B, C, or all the above? The answer is not really relevant. One or all three could have occurred and the results could have been the same.

A classic example of reverted rubber hydroplaning. A locked wheel brake on a wet runway causes a skid and steam is generated between the tire and the runway surface. The tire rubber actually melts from the heat generated.

Loss of directional control, the sk the blown tire, running off the runway end. It has happened with and without anti skid brakes. It has happened on long runways and on short runways. It happened yesterday and most likely it will happen again tomorrow.

What's a pilot to do? As the BMWIIC (Big Man What Is In Charge) of your aircraft, you can expect conditions which foster hydroplaning sometime in the near future. First of all, admit to a slight fear of wet runways. This is healthy, even for a fearless fighter pilot. Out of fear comes respect, and a wet runway is not a normal condition; therefore, it should be treated with respect.

Next, think about the situations which cause hydroplaning. Apply these situations to what you can expect in your aircraft. Go past that which the Dash One says can happen. Plan your response based what may occur.

Have an acceptable deceleration rate for your aircraft in mind. For example, if by the _____ runway remaining marker, the speed is _____ or above, don't brake harder, initiate a go-around. If you have a copilot, let him call the runway remaining markers to key you to how well you are doing.

Mentally compute as much available information to determine your best course of action. Consider the runway characteristics, the effect of the crosswind, when it started raining, how heavily it has rained, gross weight, touchdown point, rubber deposits; the inputs go on and on. You cannot rely solely on the information available in the tech order. Judgment is the key word and the safe operation of that aerospace vehicle is both your goal and your responsibility. ★

GO JUMP IN BISCAYNE BAY

LT COL STANLEY J. BODNER
USAFRES, 3613 CCTS, Homestead AFB FL

Air Force Water Survival training includes instruction in proper drag position in case wind catches chute after landing.

Training includes two parasail "flights" to simulate actual descents and water landings. Students "walk-off" training vessel and are towed to approximately 500' altitude over Biscayne Bay prior to release.

Water Survival student receives instruction in mirror signaling.

Student at Homestead AFB inflates one-man life raft after surviving parasail descent into Biscayne Bay. He will spend approximately 1 hour afloat before partial helicopter lift-off and final recovery by boat.

Students are taught proper post-ejection procedures on descent from 45' training tower.

That's the word from hundreds of flyers who have had water survival training before experiencing an emergency over-water bailout.

They've learned first-hand that safety training pays. And the payout is priceless—their own lives.

These survivors are testimony to the effectiveness of that old Air Force flying safety adage (and Boy Scout motto), "Be Prepared."

Know your procedures. Know your equipment. Know what to expect.

And that's exactly what aircrews learn at the Air Force's only water survival school, conducted by the 3613 CCTS, at Homestead AFB, in Florida.

The course is an intensive, 3-day indoctrination in survival/life support principles, procedures, equipment and techniques. Its purpose is to train aircrews *before an emergency,* helping them survive an actual over-water bailout, ejection or ditching and assisting them in their safe recovery and return to duty.

It includes 3 days of classwork and field training in bailout procedures, raft familiarization and handling, signaling and communications, first aid, survival techniques and basic water and food procedures. In addition to the classroom instruction, students are given actual experience in parachute letdown via a cable descent from a 45-foot tower and a parasail ride (using a specially designed parachute) with an actual descent into Biscayne Bay. Other in-the-water training includes demonstrations on parachute drag, raft entry and housekeeping, signaling and helicopter pickup.

The course (S-V86-A, PDS Code V8D) is mandatory for all aircrews including the Air Force Reserve and Air National Guard. AFR 50-3 and AFM 50-5 provide information on policies, procedures, attendance requirement and course content. ★

"I'll just change the procedure this one time"...or...

YOU BET YOUR LIFE

MAJOR JOHN D. WOODRUFF
Directorate of Aerospace Safety

KITTY HAWK 01

Orville and Wilbur Wright are sitting around their workshop preparing for their historical flight. Orville dozes off to sleep after a long discussion of procedures. He begins to dream as the first flight passes through his mind. A man with a megaphone screams over the noise of erratic engines readying for takeoff, "Kitty Hawk 01, cleared as filed, after departure turn right to 350, climb and maintain 2000, contact departure control on . . ." Orville suddenly awakens; "What was that all about?"

I'm sure the Wrights would be shocked at the volume of procedures used in aviation today. The procedures they planned for their first flight would appear ridiculously simple to us today; but for the intrepid brothers, they were complicated and extremely critical. However, the Wrights would probably be the first to tell you how critical procedures are for any type of operation. A few recent mishaps might point out the importance of procedures to increase your longevity.

YOU BET YOUR LIFE

An eight engine bomber flying transition at a base in the US was cleared for takeoff after a taxi back landing. The aircraft alignment appeared normal and takeoff roll was initiated.

Approximately 2500 feet from the end of the runway the aircraft veered abruptly to the right, left the runway with fire trailing, exploded and burned. What happened?

Approximately 2500 feet from the end of the runway the aircraft veered abruptly to the right, left the runway with fire trailing, exploded and burned. What happened?

Standard Dash One procedures were not followed in that the copilot failed to set, and the pilot failed to check, the fuel crossfeed valve switches open for takeoff. The combination of closed crossfeed valves, relatively low fuel tank levels, and rapid takeoff acceleration at light gross weights resulted in complete or partial power loss on two engines during takeoff roll. A simple procedure, violated, cost the crew's lives.

A tanker aircraft was scheduled to depart one base, refuel two flights of fighters and proceed to a second base for a night recovery. The enroute and air-refueling portions of the flight were completed routinely except for a reduction in the number of fighters and the planned fuel off load (thus, the tanker weight exceeded the normal by roughly 5000 pounds). Radio contact with GCA was established and the controller issued a frequency change to approach control's channel. The crew's acknowledgement was the last transmission received. A short time later, radar contact was lost and another pilot sighted a fireball off final.

The weather in the immediate area was worse than forecast at the flight plan weather briefing. How were procedures involved in this mishap? The aircraft commander failed to comply with checklist and procedures in numerous cases. He did not obtain the current weather prior to commencing the penetration; the planned overweight landing was not coordinated with the command post; the crew failed to reset altimeters to field barometric pressure at or prior to transition altitude; and the pilot descended below minimum approach segment altitude. Procedures tell the story again.

A fighter aircraft was the leader of a two-ship flight on an air refueling and RBS mission. After air refueling and enroute to the RBS, the wingman discovered that his outboard fuel tank would not feed. The wingman was to be given the lead of the flight in order to deal with his fuel problem. As the lead change was affected, the aircraft moving to the wing position pulled nose up with about 70 degrees of right bank, crossed over and then rolled in the opposite direction to settle into position. Witnesses described the maneuver as a "barrel roll" around the other aircraft. The aircraft went out of control and crashed. (Note: The aircraft was too low for safe ejection.) What procedures were violated in this mishap? Only a few, but they were fatal. The pilot deviated from his 55 series manual and the Dash One in the cross-over maneuver during lead change. Procedures cost the lives of two more crew members.

The crew's acknowledgement was the last transmission received. A short time later, radar contact was lost and another pilot sighted a fireball off final.

We see through these three examples that when procedures are violated, no matter what the reason, the results can be fatal. Do you ever bet your life by modifying procedures? Let's turn now to the reasons why we do things just one way.

WHY ONE WAY?

From a learning standpoint, it would be impossible to train people if we all did our own thing. Procedures give us a sequence of events to follow and psychologists say that sequencing is most important to the learning process. The human mind works best when things are ordered and structured. Our procedures provide that necessary degree of continuity for safe air operations. It would be impossible to fly formation, instruments, or tactical operations without some form of standardized procedures. Our tech order, 51, 55, and 60 series regulations, and instrument manuals all provide those desired elements of sequence and continuity.

Of course, safety is another reason why we have standardized procedures. If you have ever incorrectly executed a procedure, you've seen the element of safety dash into the picture. It happens suddenly and points out the necessity for having one way to do things. Obviously, safety in procedures emerges through controlled evaluation. Procedures are proven ways of doing things with our aircraft

YOU BET YOUR LIFE

continued

based on aircraft performance and human abilities.

Economics also enter every picture these days. Standardized procedures lead us to efficiency of operations. Thorough and efficient procedures practiced by all people streamline the work effort. They provide interface, continuity, and time savings.

So we are back to the obvious. We must have procedures for reasons of standardization, safety, and efficiency of operations. This leads us to our next question. Where do (what some of us have called ridiculous) procedures come from? Have you ever asked yourself, "Who thought up this asinine way of doing things?"

WHO DREAMED THIS UP?

It would be impractical in a subject of this magnitude to cover all the tech orders, manuals, and regulations, and define how they are prepared. However, an analysis of how tech orders are developed might increase our understanding of who has inputs to our procedures.

TO OO-5-1, Section III addresses review, validation and verification of tech orders (TOs). The purpose of the document is to ensure that TOs meet specified requirements. Air Force policy says that TOs must not be delivered unless quality assurance has been met in their preparation. Planning for TOs begins during the early "validation" and "full scale development" phases of a system and its associated equipment. The TO Management Agency (TOMA) ensures that TOs are being prepared in accordance with the contractual requirements and provides the Air Force an opportunity to provide additional detailed guidance. Although the TOMA is responsible for conducting in-process reviews, it is important to note that AFLC, ATC, and the using command participate to ensure reviews are complete and the requirements of using commands are considered in the reviews.

In validation, the contractor tests a TO for technical accuracy and it is evaluated by the blue suiters for adequacy of operation and maintenance. Verification consists of actual test by the using command of selected operating and maintenance procedures and associated checklist. The using command is an integral part of the review, validation, and verification process. Users assist the TOMA to ensure that the arrangement of material, method of presentation, and style and level of writing are commensurate with the established maintenance concept, and skills and training of personnel who will operate and maintain the equipment. Review team members have the experience to make objective and logical decisions based on all factors. More importantly, they are aware of USAF and major command policies.

So, as we can see, a lot of people are involved in the review, validation, and verification of tech orders. No one just dreamed them up. So if this much effort went into their planning, why do we violate them?

WHY DO WE VIOLATE THEM?

When we take it upon ourselves to modify established procedures,

When we take it upon ourselves to modify established procedures, we are courting disaster.

we are courting disaster. Why do we ignore proven methods? Why are we so convinced our way is better? Does doing it our way really save that much time or eliminate extra work?

Let's consider several reasons why we might violate procedures:

• Maybe we never learned them in the first place.

• Possibly, we have forgotten the procedure.

• Perhaps, we really think we can do it better.

• Sometimes, we have a basic resentment of authority (at a relatively unconscious level).

• In rare instances, we may just revolt against authority (on a conscious level).

• More commonly, the spur of the moment violation (i.e., let me show you how we did it in the war).

Training will help us in the first two instances. If we never learned the procedure, our training procedures need an indepth review for adequacy. If we forgot the procedures, then we need to identify the areas of deficiency and emphasize them in our recurring training and standardization/evaluation program.

On some occasions, we may think we can do it better. Maybe we just don't understand the background or the procedure. A little research on its history might just enlighten us to the fact that our way has already been evaluated and just wasn't quite that hot. Also, how do we handle a basic resentment of authority on an unconscious level? If resentment of authority is your hang up, maybe you need to go back to the basics of standards and discipline. Discipline is the key to safe and successful air operations, and without it you are betting your life and the lives of others each and every time you fly. An outward (conscious) revolt must be handled immediately through discipline and re-education. Lastly, the key to the "spur of the moment" violation is ingrained self-discipline. To paraphrase Gen Patton, discipline must be a habit so engrained that it is stronger than the excitement of battle, or the fear of death. If you're unsuccessful in these endeavors, then you really have a problem.

Discipline is the key to safe and successful air operations, and without it you are betting your life and the lives of others each and every time you fly.

HOW CAN WE CHANGE THEM?

Rather than alter the procedure on your own, get the procedure evaluated and changed through the proper channels before "you bet your life" that your way is better. Start by talking to the standardization/evaluation people or your unit suggestion monitor. They can help you initiate your suggestion through the proper channels. More importantly, they can help you prepare the paperwork. How many times have you had a good suggestion snuffed out because you just couldn't find the right avenue of approach and didn't know how or what forms to fill out? Here are a few of the ways you can have a voice in procedures.

• Try an AF Form 847 to review the tech order or ops directives.

• An AFTO Form 22 will initiate a revision to any maintenance tech order.

• If it's a regulation, like the 55 series, submit an AF Form 847 to the office of primary responsibility.

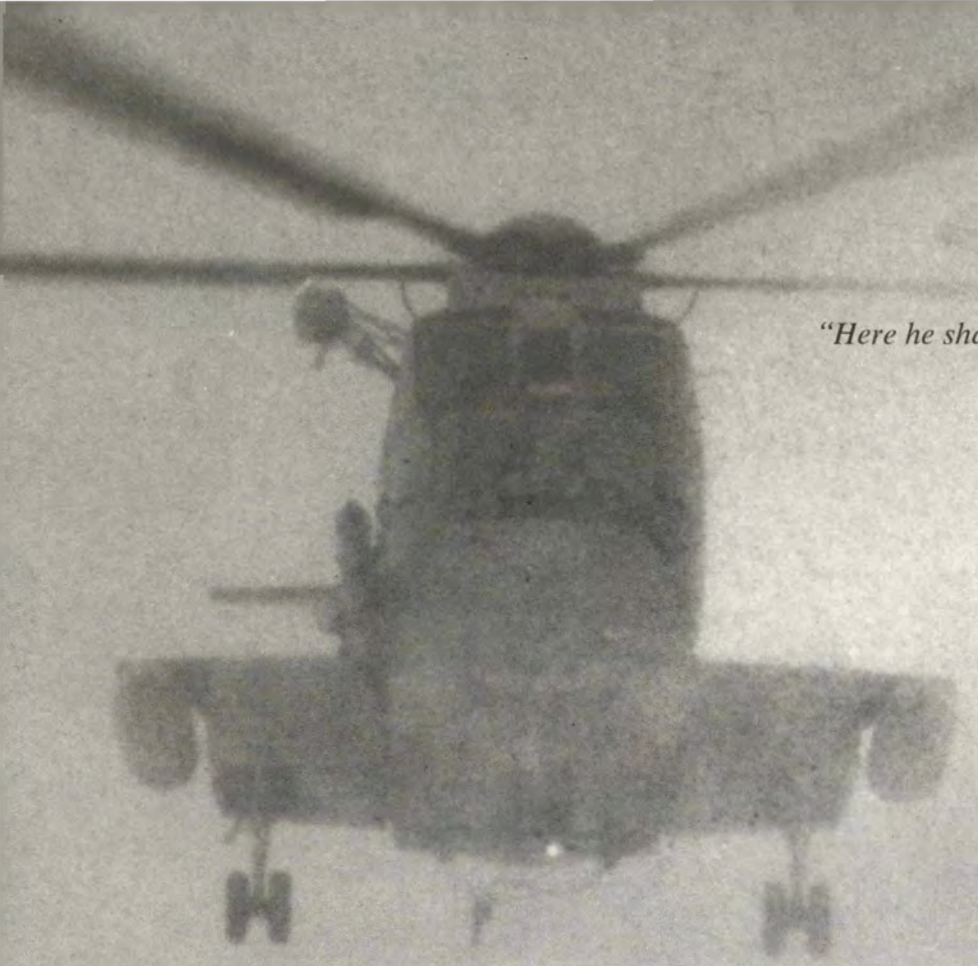
• A hazardous situation will receive immediate attention when reported through a Hazard Report, AF Form 457.

• If you feel that your suggestion has economic advantages, then try an AF Form 1000 through the Air Force Suggestion Program. You might just make a little money for your interest.

Safety in your job is based upon procedures that are current and complete. If you don't believe they're adequate, then use the established channels of communication to change them.

LET'S USE THEM!

We have seen numerous ways that you can play "you bet your life." We all agree that for reasons of standardization, safety, and efficiency there is just one way for all of us to do something. Also, we know that procedures aren't just dreamed up. Many qualified people have spent a lot of time reviewing, validating, and verifying the correct way to do things. We have educated ourselves on why we violate procedures in hopes that we will be more conscious of why we should do things the right way. Furthermore, if we are really convinced our way is better, we have discussed numerous ways to change the procedure through channels or have them evaluated. The bottom line is that procedures are necessary so . . . let's use them! GOOD AIRMEN DO IT PROCEDURALLY! ★



"Here he shall see no enemy

but winter and rough weather."

William Shakespeare
As You Like It

WINTER WEATHER

MAJOR JOHN E. RICHARDSON
Directorate of Aerospace Safety

Winter and rough weather are truly the enemies of pilots and aircrews. But they can be held at bay by those who follow sensible precautions.

PLANNING

Like so many things, a flight goes so much better if you are well prepared. Planning is especially important during the winter.

Winter weather can change rapidly. Large areas of low ceilings and marginal flying conditions make careful flight planning even more important than during the summer. Without prior planning, a diversion for weather can quickly turn into a low fuel emergency or even an accident.

PREFLIGHT

In winter, there are some special precautions one should take during preflight. Snow, ice and frost should be removed from control surfaces, wings and wind screens. Check static ports, AOA vanes or probes, and hydraulic actuators for accumulations of snow, slush or ice. Sometimes snow is blown into a warm engine, melts and later freezes in the compressor section. Inlet plugs can prevent this but if they are not used, check the rotation of the compressor. If deicing fluid is used, be sure that all control surfaces operate freely after deicing. Observe any TO restrictions on deicing operations. Also, check to be sure the tires are not frozen to the ground as a result of ice freezing around them.

TAXI

Be very cautious during power applications. Slick ramps and taxiways require small, careful power applications. Another factor in power application is the effect of jet blast. Icy runways and taxiways are often treated with sand to increase RCR. The exhaust from an operating engine can kick up this sand and cause damage to people and equipment.

When taxiing, be especially alert for snowplows and other vehicles. Additionally, heavy accumulations of snow usually obscure most of the taxiway markings and

lights. Running over a taxi light can cause severe tire damage. Snowplow operators engaged in snow removal activities often are not able to see you.

Taking corners on a slick taxiway can turn into a sporty proposition. Not only are nosewheel steering and braking less effective but, because of obscured markings, the pilot must be especially alert and anticipate clearances and route idiosyncrasies.

TAKEOFF

Most Dash 1's have restrictions on the amount of slush or snow

allowable for takeoff as well as minimum acceptable RCR's. Another common problem is the increased thrust available due to low temperatures. While the additional power is welcome from a takeoff roll point of view, sometimes this extra thrust makes it difficult to hold the brakes for a static engine check. Slush on the runway may also be thrown up into the gear wells. Once the aircraft is airborne, this slush can freeze and interfere with the operation of squat switches and gear cycles.

CRUISE

During winter everyone thinks of icing as a major problem. While icing is dangerous and has caused innumerable accidents, it is not as serious a problem for jets as for the lower flying recip aircraft. The jet's major wintertime problem is wind.

The jet stream is farther south in winter and most of the high altitude structure is covered by very strong winds. Not only do these winds make a major difference in fuel consumption, but they also can cause severe turbulence. In mountainous areas, high winds create mountain wave activity.

A thorough briefing on winds aloft and on possible turbulence is mandatory.

APPROACH AND LANDING

Low visibility is a very serious problem in winter aviation. The best defense in this case is a good offense. Now is the time to get your instrument proficiency up to speed. It will make your next 100 and ¼ approach a bit less hair-raising.

Of course, being on the ground does not mean that your troubles are over—hydroplaning and slippery runways are everywhere. The subject of hydroplaning is covered in an article beginning on page 2, but slippery runways are always an insidious danger. Runway condition reports are often vague or incomplete. Last winter an Air Force aircraft landed at a field with a fairly reasonable RCR for the touchdown zone. However, at the other end of the runway was sheet ice for 3,000 feet. The aircraft ran off the runway into a

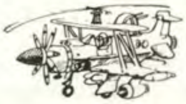
snow bank. The best precaution against such an occurrence is foreknowledge. Try to learn as much as possible about conditions before you get there. A call to base ops can pay big dividends in knowledge of conditions, obstructions, etc. Ask for braking conditions reported by aircraft similar to your own.

SURVIVAL

One last thought—for those of us lucky enough to spend the winter in California, Arizona, or other places where summer-like flying prevails year round, winter is often something that happens to "the other guy." But what about that cross-country? Even if you stay south, you will cross some very high, very rugged, very cold terrain. The chance may be remote that you will have to abandon your aircraft over such terrain, but if you do, you need to be prepared. Also, if you have ever had to divert to Albuquerque when you planned to land at Tucson, you know how cold you can get with just a summer flight suit.

Knowledge and preparation are the keys to a safe, successful winter flying season. Every one of us involved in flying must make it our responsibility to be really ready for winter. ★

Name That Plane



World War II movie buffs should recognize this single-engine fighter. Picture John Wayne as flight lead in this three ship flight of "JUGGERNAUTS," nicknamed the "JUG." A highly versatile fighter, it piled up an impressive combat record during the war years. For answer see page 25.

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
KOREN KOLLIGIAN, JR., TROPHY

Captain Jeffrey L. Moddle
401st Tactical Fighter Wing

During Captain Moddle's first ride as an IP in an F-4C, he had demonstrated a minimum-time turn and was about to ask his student to practice the maneuver. However, the nose of the aircraft continued to rise and the stick froze near the aft position. Check list actions failed to remedy the malfunction, and control was maintained with afterburner and rudder. Both pilots prepared for ejection. First, however, they made a last maximum joint effort to free the stick before ejecting. The stick broke partially loose and Captain Moddle was able to return to base and make a successful landing. Later, maintenance found an AIM-7 cable dust cover lodged in the stick bellcrank. Captain Moddle's handling of this emergency perhaps saved an aircraft and possibly one or more lives. He is a credit to the US Air Force.

NOMINATED FOR THE
COLOMBIAN TROPHY

Air Forces Iceland

During 1976 the Air Forces Iceland (AFI) received a number of awards attesting to its outstanding service as an Operational Combat Force responsible to the Commander, Iceland Defense Force. Among its achievements were Outstanding Unit Award, outstanding rating during Command Equipment Management Team Utilization Survey, 1st General Royal N. Baker Award for Logistics Excellence (Supply and Aircraft), 57 Fighter Interceptor Squadron selected winner of Hughes Trophy and USAF Flight Safety Certificate. The 57 FIS Munitions Branch performed more than 8300 missile maintenance and handling operations involving 135 tons of explosives without a single mishap. In ground safety there were no private or government motor vehicle accidents. These achievements indicate the outstanding performance of AFI.

NOMINATED FOR THE CHIEF OF STAFF INDIVIDUAL SAFETY AWARD

Major William R. Casey
432d Tactical Drone Group
Davis-Monthan AFB, Arizona

Despite the complexity of his squadron's equipment—DC-130 and CH-3 aircraft and five different models of remotely piloted vehicles—and the many different tasks associated with launch, remote control and aerial retrieval of the RPVs, there were no reportable mishaps in the 350 Strategic Reconnaissance Squadron (SAC) during the first six months of 1976. Then on 1 July, the squadron became the 22d Drone Squadron and was incorporated into the 432d Tactical Drone Group (TAC). Major Casey continued to act as the squadron safety chief. Only one minor boating mishap marred a perfect safety record, and Major Casey was assigned Chief of Safety for the 432d on 13 October. Under his leadership, mishaps were greatly reduced in all areas, and during the last two months of the year the Group had no reportable mishaps. ★

That Others May Live

A look at the Air Rescue Service and how they meet your needs today and plan for tomorrow

We are given a lot of information about new safety and survival equipment. We gain confidence in our equipment and ourselves through increased knowledge. In a survival situation, lack of knowledge and fear of the unknown can reduce our chances of recovery to zero. In combat, if you should find yourself on the ground after an unscheduled landing or a ride on the nylon elevator, you can take comfort in the knowledge that the people who will be coming to your aid are members of the Aerospace Rescue and Recovery Service (ARRS). The primary mission of ARRS is combat Search and Rescue (SAR). The people who carry out the combat rescue mission are experienced, well trained professionals. They are ready whenever you may need them.

To carry out the combat rescue mission, ARRS uses both fixed and rotary wing aircraft.

The HC-130 provides fixed wing support for combat rescue. Its primary functions involve: long range search and rescue capability, communications for command and control, pararescue deployment platform, and tanker support for helicopter refueling.

Of the more than 200 aircraft ARRS possesses, 140 are helicopters. At present, ARRS has three types of helicopters: The HH-53 Super Jolly Green Giant, the HH-3 Jolly Green Giant, and the UH-1.

The HH-53 is the largest, fastest, and most powerful helicopter in the Air Force. The HH-53 was developed to complement the HH-3E in combat aircrew rescue, and to perform the Apollo spacecraft and astronaut recovery mission. The HH-53 is capable of attaining a speed of 195 mph and cruises at 172 mph. Its service ceiling is 16,000 feet and it can lift more than 18,000 pounds. It features jettisonable auxiliary fuel tanks and can be refueled in flight. It is equipped with a rescue hoist and 240 feet of cable with a forest penetrator seat. The HH-53 has self-sealing fuel tanks, armor plating, and all-weather capability.

The second largest ARRS helicopter is the HH-3E. The HH-3E is a twin-turbine helicopter which served as the primary rescue helicopter in Southeast Asia (SEA) for five years and accounted for 567 lives saved. With a top speed of 162 mph, the HH-3E has armor plating, jettisonable fuel tanks and a rescue hoist with 240 feet of cable and a forest penetrator seat. Auxiliary fuel tanks on its sponsons enable it to carry a 2,400-pound load 600 miles.

The third type of ARRS helicopter is the UH-1. The H-1 is the replacement helicopter for the HH-43, long the ARRS helicopter mainstay. Three H-1 series aircraft are currently in the ARRS active and reserve inventories. They are the HH-1H, UH-1N, and UH-1F. The UH-1N and HH-1H are hoist and cargo equipped for the ARRS rescue mission. The UH-1F is used primarily for missile support and is not rescue configured. These three different types of helicopters give ARRS a wide variety of capabilities.

While the HC-130 may be used to locate your position and deploy pararescue personnel to assist you, if a recovery by aircraft is attempted, it will probably be accomplished by one of Rescue's helicopters.

During the past few years, ARRS has greatly improved its ability to use helicopters in accomplishing combat rescues. As you may recall, the basic concept developed in Southeast Asia for the recovery of downed airmen was a mission profile that involved the use of a high altitude and low altitude helicopter. The high and low helicopters were

CAPTAIN EDWARD F. WITTEL
Aircrew Training Officer
HQ Aerospace Rescue and
Recovery Service
Scott AFB, Illinois

escorted to the rescue area by A-1 or A-7 fighter escorts. The survivor would be located by the escort aircraft, the threat assessed, and the low helicopter committed to the recovery. During hoist recovery, the escort aircraft provided protective cover. The high helicopter would remain in reserve at a safe close-in orbit point. An HC-130 would provide command and control, plus serve as an air refueling platform for the helicopters. This concept of rescue and recovery was limited to day, visual flight rules conditions, thereby giving the enemy a distinct advantage. Towards the end of the conflict in Southeast Asia, a Night Recovery System (NRS) was developed for the HH-53 (*Aerospace Safety*, May 1977). This limited night helicopter rescue capability, when coupled with the AC-130 gunship, proved feasible in a low-threat environment.

We have learned that the SEA-era helicopter tactics may not be acceptable for use in a future high threat environment. We know, for example, that we must develop new helicopter tactics such as terrain masking, which is low altitude flying using the available terrain as camouflage, and improved night recovery procedures and equipment. To these ends, we have initiated concentrated efforts to develop new tactics and procedures to meet our future challenges.

To meet future challenges and to be able to conduct operations in a high threat environment, our helicopter night recovery concept was further expanded in a desire to provide totally covert operations that would allow low altitude terrain masking penetration at night, in adverse weather, to avoid detection in an electronic warfare environment. The result of this development effort was the Pave Low III HH-53

HH-3C saw much war service in SEA. AARS people and aircraft perform heroic service in any climate, any terrain, day or night.

HH-53 helicopter, modified for the Pave Low III mission; above, in flight.

helicopter, which will feature terrain following and terrain avoidance radar, doppler-inertial navigation systems, projected map display, forward looking infrared electro-optical sensor, an electronic location finder, and hover coupler, all interfaced with a central avionics computer.

Although the time and place of future combat SAR efforts cannot be predicted, we can examine possible mission scenarios to better prepare ourselves for this role. Past experience has identified various problems that include deficiencies of avionics, personal survival equipment and operational equipment. Of prime concern has been the total time and effort spent in completing a rescue. We know that the probability of an aircrew member's survival decreases rapidly after approximately two hours. Successful missions in SEA required an average of nine sorties to complete the rescue.

To analyze that part of the SAR mission relative to pinpointing a survivor's location and to project future survival avionics requirements, a computer simulation model and a computer program known as Combat Rescue Mission Analysis (CRMA) were developed.

One important aspect of the CRMA program is that it will be able to take, as an input, a combat rescue scenario that includes variables such as: The length of the war, tactical aircraft sortie rates, attrition rates, and crew sizes, downed crew member location and survival times, rescue vehicle concept of operation, and maintenance data. For a specified time interval such as every twelve hours during the war, it will output the expected number of rescue vehicles available and assigned to missions, the expected number of downed crew members rescued and assigned to be rescued, and the expected number of sorties to be flown and rescue vehicles lost.

The CRMA Program may also be used as an aid in evaluating future force structure proposals, training requirements, and life support equipment. CRMA could be used to examine mixtures of types of rescue vehicles in the force, positioning of rescue forces, and deployment plans in an effort to obtain optimum rescue capability for the expenditure required. A study of training requirements and life support equipment would help ascertain their effect on success of the rescue mission.

The CRMA Program will not provide the solutions for all combat rescue problems but it will give us additional insight into the effectiveness of proposed solutions and will help us to identify areas which need to be examined more closely.

For improved individual survival equipment, research is being conducted to develop an improved SAR beacon which will have the capabilities to indicate both the downed crew member's position and authentication. Research and Development is also being conducted with recovery systems and equipment which will use satellites, advanced laser technology and improved infrared capabilities.

Programs such as these will allow us to more effectively accomplish our future missions in support of combat rescue.

As we resolve the problems that we predict will be facing us in the future, you can rest assured that if you need us, Rescue will be there, doing our best "That Others May Live." ★

OPS TOPICS

ENGINES

Engine related incidents continue to be the single largest cause factor in Class A and Class B+ (over $50,000) mishaps. The percentage of these mishaps that are FOD related is very high. As aircrew members, you can help. First, be especially careful during preflights. Spend some extra time examining the engine intakes, and carefully check all panels for loose screws and Zeus fasteners. Secondly, avoid taxiing through or near areas with debris and stones. Third, stay away from the jet blast of other aircraft.

HELP

Support your local safety officer. Without you, his program is a big zero. The FSO has the tools and the influence to change things. Tell him about the mission or aircraft problems you encounter. Contribute your expertise during his safety meetings. Give him your ideas on how he can do his job more efficiently and effectively.

GROUND ACCIDENTS

• A B-52 sustained damage in the area of its external power receptacle when the crew misinterpreted maintenance personnel instructions. The pilot thought the aircraft was free of obstructions when the crew chief walked clear of the left wing. He observed the maintenance supervisor to be giving him a signal to taxi. The maintenance supervisor, however, had noticed the APU power cord was still attached to the aircraft. He began running toward the aircraft to stop it, repeatedly crossing his hands rapidly over his head. The aircraft moved forward, damaging the aircraft's fuselage and the auxiliary power unit.

• A DC-8 captain observed a ground attendant approaching the aircraft with wheel chocks in his hand. He assumed the aircraft would be chocked. The ground attendant held the chocks up to the pilot but received no signal from the captain that he desired the chocks to be used. With the aircraft unchocked, when the captain released the brakes, the aircraft started to roll and struck a passenger loading stand.

The moral—military and civilians alike can fall prey to that age-old predator "a failure to communicate." Marshalling instructions must be standardized and used properly. As a pilot, if you are not sure what the situation is—don't move until you are sure. Taxi accidents are embarrassing and costly.

HIGH AND HEAVY

The first practice approach for the T-37 was planned as a no-flap ASR at Peterson AFB. The approach proceeded normally until the flare, when the pilot reduced power to idle and increased his pitch attitude for landing. Airspeed decreased rapidly, and at approximately 100 knots, stall buffeting began. The throttles were advanced to 100 percent rpm and flaps were lowered, but neither action was initiated in time. The T-37 touched down tail first, just past the approach end of the runway. The aircraft sustained tail cone damage and a jammed rudder. The reasons—failure to recognize the power requirements for a heavyweight approach, coupled with higher stall speeds for the no-flap configuration and the engines' inability to accelerate quickly enough in that high pressure altitude environment. You must be familiar with the early stall warnings of your aircraft and, when necessary, be able to make a timely decision to get the power in and go-around. ★

USAF IFC APPROACH

The USAF Instrument Flight Center welcomes your inquiries regarding instrument flying. We feel that no question should be left unanswered and encourage your letters, phone calls, and visits. The following are some of the questions that we have received from the field which we would like to pass on for the benefit of all pilots.

GENERAL

Q: Does the emergency safe altitude published on an Instrument Approach Procedure give me 2,000' above the highest obstacle in designated mountainous terrain?

A: Yes. However, remember that designated mountainous terrain includes only those areas shown in the FLIP Area Planning (AP/1, 2, & 3) designated mountainous area depictions.

Q: What are minimum and Emergency Safe Altitude measured from?

A: For **Minimum Safe Altitude,** a 25-mile radius from the navigational facility, e.g., NDB, VOR, TACAN, except in the case where the facility is more than 25 miles from the airport. Then the minimum safe altitude may be based on a radius of 30 miles from the airport. When the procedure does not use an omnidirectional facility, e.g., LOC BC with a fix for the FAF, the primary omnidirectional facility in the area will be used. **Emergency Safe Altitude** is established within a 100-mile radius of the navigation facility.

Q: Why do the High Altitude Enroute—US Charts have low altitude VORTACs depicted in both light and dark blue?

A: The (L) VORTACs depicted in dark blue comprise a portion of the high altitude enroute structure and have been flight checked for the expanded service volume necessary for high altitude facilities. The low altitude facilities shown in light blue are for information purposes only.

PRE-FLIGHT

Q: What does a fuel reserve include and how do you compute the fuel reserve with an alternate required?

A: The fuel reserve specified in AFR 60-16 is the

By the USAF Instrument Flight Center
Randolph AFB, Texas 78148

required fuel to increase the total planned flight by 10% or 20 minutes, whichever is greater. This total planned flight time includes the approach and landing. When computing the fuel reserve with an alternate required, the computations are based on the manner in which you filed.

a. If **Visibility Only** criteria are used for filing to the destination, fuel computations will be based on total time to alternate including penetration/approach/missed approach at the original destination.

b. If **Ceiling and Visibility** criteria are used for filing to a destination, fuel computations will be based on total time to the alternate, **not including** penetration/approach/missed approach at the original destination.

Q: With only one VOR in the aircraft, where should the VOR receiver check be accomplished? Can part of the check be accomplished in the chocks?

A: VOR receiver checks should be accomplished at a designated ground check point, if one is available. Normally, the entire check should be accomplished at this point; however, only those items requiring specific course/DME information are required to be checked here.

DEPARTURE

Q: When established on a SID, the controller states, "Cleared to FLXXX." Does this delete the published altitude restrictions on the SID or the altitude restrictions previously issued by the controller?

A: Yes. According to FAA Handbook 7110.65, if the controller desires to make an altitude restriction still applicable when issuing a new altitude clearance, he must restate the applicable altitude restriction(s) in the new clearance.

ENROUTE

Q: If my clearance limit fix has a charted holding pattern, but it is on the opposite side of the fix from my arrival side, should I hold on the course from which I arrive or in the charted holding pattern?

A: ATC should issue holding instructions five minutes prior to arrival regardless of whether or not a holding pattern is charted. Without holding instructions, hold in the charted holding pattern, regardless of which side the holding fix is on. If one is not charted, hold in a standard pattern on the course which the aircraft approached the fix.

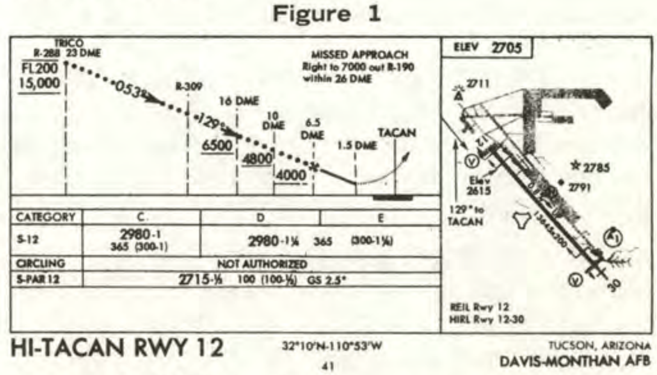
Q: Can I file and use a TACAN facility not in the high structure when flying in the high structure and going to the entry point of a low level training route that is located near the low facility?
A: Yes. FLIP General Planning authorizes the use of low facilities when navigating to and from the Jet Route System.

Q: After initial entry to the holding pattern at a TACAN holding fix, can I proceed direct to the holding fix on my initial turn inbound, using fix-to-fix navigation?
A: Yes, but if your aircraft has no wind drift detection equipment, then a good technique is to intercept the course inbound to determine the wind effect as soon as possible.

Q: A VOR approach has a stepdown fix on final which is formed by a VORTAC radial and dual VOR minimums are published. Can a pilot use the TACAN portion of the VORTAC to identify the stepdown fix?
A: Yes, as long as the IFR Supplement or the approach plate list no restrictions to the use of the TACAN.

Q: An approach depicts the altitude at the IAF as $\frac{\overline{FL200}}{15000'}$ as shown in Figure 1. If I am holding at $\overline{18000}$ and I am cleared for the approach, can I descend to 15000?

Figure 1



A: Since there is no minimum holding altitude published, you cannot descend prior to reaching the IAF without an Air Traffic Control (ATC) authorization to do so. If you desire, request approval from ATC.

IFC Approach continued

ARRIVAL

Q: New USAF procedures (AFM 51-37) state you may circle either direction unless otherwise directed by a controller or stated on the Instrument Approach Procedure (IAP). Is this in conflict with the Federal Aviation Regulations (FARs)?

A: No. Maneuvering to left base, as directed in the FARs, was intended for VFR entry to the visual traffic pattern.

Q: What adjustments to minima should a pilot make when notified that the approach lights are out at his destination?

Figure 2

CATEGORY	A	B	C	D
S-7 *	400/24 391 (400-½)		400/40 391 (400-¾)	400/50 391 (400-1)
CIRCLING	520-1 510 (600-1)	560-1 550 (600-1)	560-1½ 550 (600-1½)	560-2 550 (600-2)

* The following applies without ALS, Cat ABC RVR 50 visibility 1. Cat D visibility 1½.

A: Pilots should make no adjustment to published minima unless directed to do so, e.g., TACAN Rwy 7, Langley AFB, VA, Figure 2, by NOTAM, or informed of a change to minima by ATC.

Q: AFM 51-37 states that when executing a missed approach, pilots should wait for a positive climb indication before retracting flaps. The flight manual for my aircraft says to retract flaps immediately. Which is right?

A: AFM 51-37 provides general guidance. In this case, the Flight Manual would prevail.

Q: If assigned an altitude of 3000' and the approach begins with an altitude of 3000', do I still call vacating 3000' when cleared for the approach?

A: Yes. Report when vacating an assigned altitude when cleared for an approach as required by FLIP General Planning.

Q: Should I fly a heading on a DR segment of an IAP or apply a wind drift correction and attempt to fly the depicted track?

A: Apply the best known wind to obtain a wind drift correction whenever possible. Your objective should be to fly the ground track as closely as possible to assure yourself of maximum obstacle clearance.

Q: Does the procedure of timing 15 seconds for each 1000 feet below recommended altitude apply to all penetrations?

A: No. Normally, timing a "fly-off" applies only to NON-DME teardrop procedures where no means of fixing your position is available after departing the IAF. By using the "fly-off" procedure of timing 15 seconds for every 1000 feet you are below the IAF altitude, you are approximating the distance outbound you would have been had your descent started from the published IAF altitude. When DME is available, as in Figure 3, there is no need to time a "fly-off." Using DME, you can accurately determine your position and compute the needed rate of descent to comply with the published procedure.

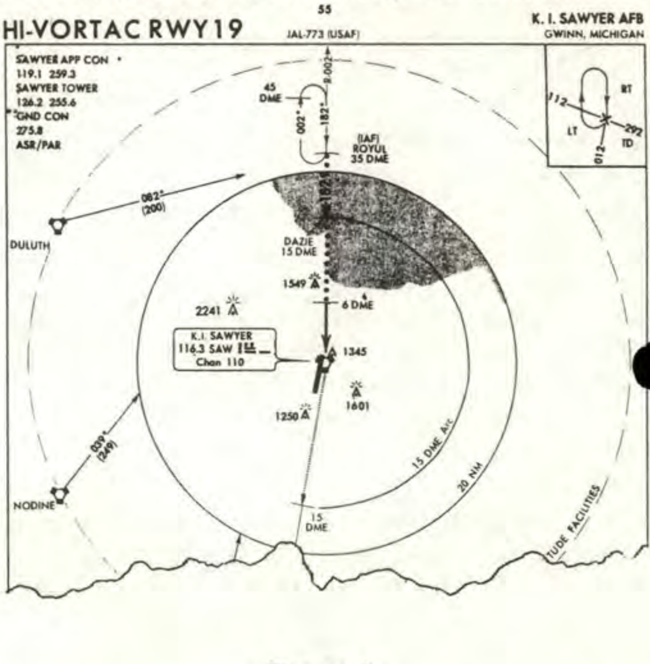
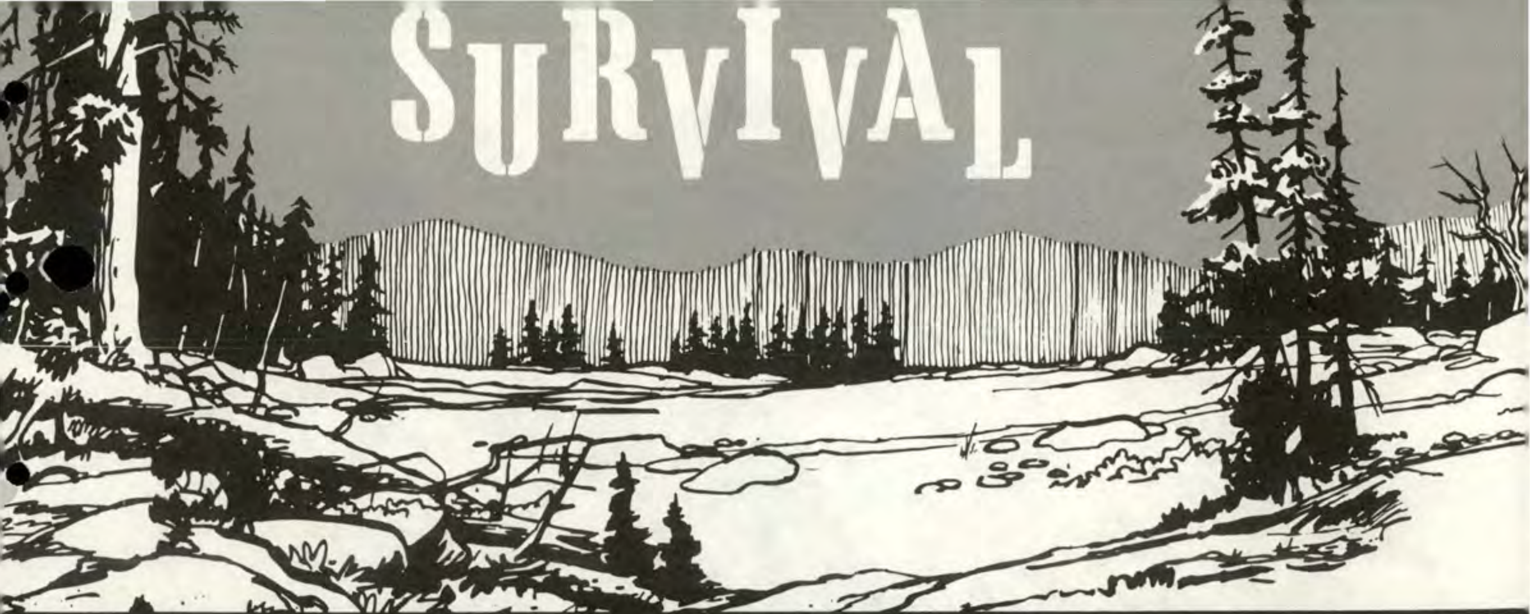


Figure 3

Q: If circling for landing and I lose sight of the runway, should I proceed directly to intercept the missed approach course?

A: No. An initial climbing turn should be made toward the runway until intercepting the missed approach course. If the initial turn were away from the runway, you could transit airspace not cleared for obstacles. ★



Invitation To Survive

SSGT ALFREDO VARGAS
Operations and Requirements Branch
3636 Combat Crew Training Wing (ATC)
Fairchild AFB WA

It was a crisp arctic Monday morning when Survival Instructor, SSgt Tom Lutyens reported for work. He was eager and ready for the day's events because today was his scheduled ride in an O-2.

Nothing seemed out of the ordinary as Chief Master Sergeant Dustin, the NCOIC of the Det 1, 3636 CCTW (ATC), Arctic Survival School, called him in and asked him if he was ready to go. Then Tom was handed "THE LETTER." It read, "On this day, while flying in an O-2, you encountered emergency conditions which forced you to crash land. The aircraft burned after crash." The letter also included a list of occurrences clearly establishing a scenario for a survival episode.

Things happened fast! Two of his fellow instructors escorted him to a remote area of the Yukon for the exercise. Suddenly he was alone, and the 15 degree temperature, pushed by a gentle breeze, drove home the full impact of his situation. Here he was, knee deep in the snow, holding an A-3 bag containing a parka, winter flying suit, and an O-2 Survival Kit; and he had to survive.

Realizing the weather called for immediate action, Tom traveled until he came to a root buttress near an open area. The spot was an ideal shelter site and the root

buttress could serve as one of the walls for the shelter. The nearby clearing also provided a good spot to set out a signal that could be seen from the air. Knowing an aircraft could fly over at any time, Tom immediately prepared two of his Mark 13 flares by cracking the seals and then replacing the plastic caps. His next priority was the construction of a shelter. Using only natural material, Tom built his survival house in four hours, complete with a six-inch thick bough bed.

By midafternoon, the sun broke through the heavy overcast. Tom opened his sleeping bag container, shook the bag vigorously, and laid it on a dry stump in the sun. Tom knew, if he was going to sleep warm, the down-filled bag needed to be fluffed and dried before he used it.

Dehydration was now becoming a problem, as Tom answered a call of nature and observed the color of his urine. Cold acts in subtle ways as it draws moisture from the body, and Tom responded to it by gathering the necessary materials and starting a fire. Having no suspension line, he took

A natural shelter against a root buttress.

the tourniquet from the medical kit and made a loop around three poles about six feet long, creating a tripod from which to suspend a snow-melting bag. This was fashioned from his T-shirt by stitching the lower hem together with a needle and thread from the part 1 medical kit. The bag was filled with hard-packed snow and hung by the fire to melt. Water created from the melting snow was caught in one of the cans from his general purpose rations. Having solved the water problem, Tom began preparing a meal from his rations.

He improvised a cook pot from another of his ration cans, and then cooked and ate three tins of soup. This, together with a cereal bar, helped to restore the energy that had been depleted during the day's strenuous activities.

All day, Tom had consciously tried to conserve energy, but the number of necessary tasks to be accomplished made it difficult to do. Now with a fire crackling, he sat down to relax and dry out his clothing and equipment—but not before he piled some boughs next to the fire, just in case an aircraft appeared unexpectedly. This way he would be able to pile the green boughs on the fire and send up spiraling clouds of white smoke to alert someone to his plight as quickly as possible.

As the fire dried the last of his garments, a light snow began to filter through the trees. A marked drop in temperature brought on by the setting sun inspired Tom to finish his business and crawl into his shelter for the night. Once inside, he wedged a snow-filled A-3 bag into the entrance and was able to raise the temperature from 10 to 26 degrees Fahrenheit with two candles, combined with his own body heat.

Even though the outside temperature never fell below 10 degrees, Tom experienced a very cold and totally uncomfortable night. He tossed and turned continuously, trying to warm his hips, shoulders and feet. He was wearing "long handles," wool socks, and a wool toque that covered his head and neck. He placed a mitten under his hips and shoulders to help pad them and provide insulation. To warm his feet he added another pair of wool socks, making sure they were loose enough to permit adequate circulation. He finally got warm enough to fall asleep when he placed his parka under his upper body, covered his body with his winter flying suit, and performed some isometric exercises.

He awoke at 0615 with his toes feeling like ice. He got dressed, crawled out of his shelter and started a fire to warm his hands and feet. Breakfast consisted of hot cocoa, a cereal bar, and a fruitcake bar. He then settled back and began to make a mental checklist of things that had to be done. At the top of his list was to build an even thicker bough bed. The other priorities were necessarily vague because he had no idea how long he would be in this situation. He knew he had to take care of his immediate needs, and planned his day accordingly.

It was approximately 0830 when the sound of a helicopter broke his train of thought. He took out his PRC-90 Survival Radio from its warm storage in the pocket of his flight suit and simultaneously placed boughs on the campfire producing a column of smoke. While Tom's initial radio transmission was not answered, the aircraft did respond by coming into the area. Spotters in the aircraft located Tom easily as the orange smoke from the ignited Mark 13 flare drifted skyward.

Persistent attempts to communicate via the radio finally resulted in garbled acknowledgements. All Tom could understand was "800 feet," but from that information he figured they wanted him to move 800 feet in the direction the chopper was flying — northwest. His role as a downed aircrew member reached its emotional peak as he started to run in the knee deep snow toward the area indicated by the chopper. He quickly tired. and finally reduced his pace to a walk; in a few minutes he was in a small clearing. The aircraft came to a hover, and again its sound drowned out radio communications; however, hand signals by the pilot and the subsequent movement of the helicopter affected communications resulting in a lowering of the pick-up device for SSgt Lutyens to use.

After getting the "come ahead" signal, Tom approached and kicked the penetrator to ensure that it was grounded. Being a strapping lad, (6 feet 7 inches tall) Tom had some difficulty getting the strap over his head and shoulders, but he clearly proved it can be done. He mounted the seat, keyed the radio and told the aircrew to hoist away, and then shook the cable vigorously to make sure they got the message.

After the helicopter deposited SSgt Lutyens at the Arctic Survival School Command Post, he reflected on his experience and made the following comments:

a. Training in cold weather survival being provided by the "Cool School" is sufficient in every aspect.

b. The equipment carried by an O-2 pilot is good with the exception of the SRU-15/P (compressed sleeping bag). It did not keep his feet warm and it is much too short for anyone over six feet tall.

c. Improvement of the sleeping bag by adding a foot sack or booties from the walk-around sleeping bag would provide the necessary insulation to keep a survivor's feet warm.

d. Use of the earphone with the radio is a must, especially during the recovery phase.

e. Operation of the survival radio should be kept to a minimum while underneath the rescue helicopter during hoist recovery, because it interferes with radio communications on board the aircraft.

The experiences and comments of SSgt Lutyens reflect the current state of the art in survival training. It is a constant striving to test the equipment, the procedures, the techniques, and ultimately, the person, as we improve the chances of every aircrew returning from an emergency bailout or crash landing. More information on similar survival episodes will be forthcoming in future articles.

Information or comments concerning these articles should be referred to 3636 Combat Crew Training Wing/DOTO, Fairchild AFB WA 99011, or AUTOVON 352-5470. ★

Smoke and signal in clearing make rescuers' job much easier.

Survival radio, smoke from previously prepared fire assist rescuers. Photo is out-of-date but the principles remain the same.

WHEN YOU GOTTA GO

CAPTAIN MICHAEL T. FARSON, Directorate of Aerospace Safety

The current USAF ejection survival rate is alarmingly low. Coupled with the poor figures for 1976, ejection survival is a cause for considerable concern. This article will briefly cover what you, as crew members, can do to improve your chances of surviving an ejection.

To cover a few of the important areas that are involved in the ejection decision we will use EJECT as an acronym. Education, Judgment, Envelope, Crew involvement, and Timing.

EDUCATION is the basic ingredient in any successful ejection. Education and training provide you with the information you need to properly use your aircraft's ejection system. There are several things you can do to keep the odds of survival in your favor:

- Know your aircraft's performance limits.
- Know your egress system's performance limits.
- Know your own limitations.
- Review emergency egress procedures frequently.
- Get your money's worth out of refresher training.

Armed with this information you should be able to determine some valid ejection decision points for you, your aircraft and your egress system. These decision points will be the guidelines you need to make a sound ejection decision if the need ever arises.

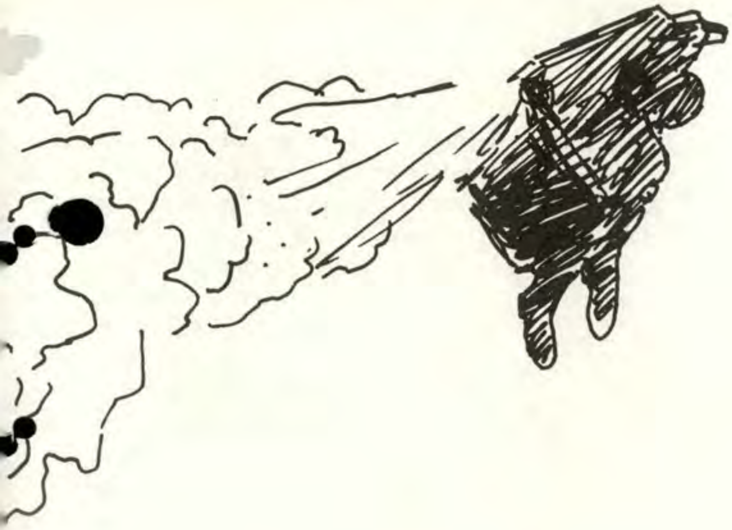
JUDGMENT is usually used as an all encompassing term, and that's how we'll use it here. It involves how well you use the equipment, knowledge, and skill you have at your disposal. Perhaps a cold, calculating look at several areas is in order:

- What are the high risk areas for your weapon system?
- Are you ready for some of the more demanding regimes?
- Are you ready to act on your ejection decision points?

The above list is by no means complete, and I'm sure with some thought you can expand it greatly. However, thinking about the items covered may help you to make your decision while you are still in the safe ejection envelope.

ENVELOPE is an area that is very important to you. Out-of-the-envelope (O/E) ejections have historically accounted for most ejection fatalities; in fact, 54% of the ejection fatalities in the last five years have been O/E. Your training should make you aware of your egress system's limitations. This along with your judgment and ejection decision points should allow you to avoid becoming an O/E ejection fatality. In the last five years 115 crew members who could have survived died because they waited too long or didn't pull the handle. Thus O/E ejections are the area you can do something about. Don't become an O/E ejection statistic.

CREW involvement may be one of the reasons that the individuals mentioned above stayed with the aircraft past the point of no return. When the crew is involved as the cause of a mishap, the chances for an O/E ejection increase greatly. This contrasts sharply with logistics caused mishaps which have the low-

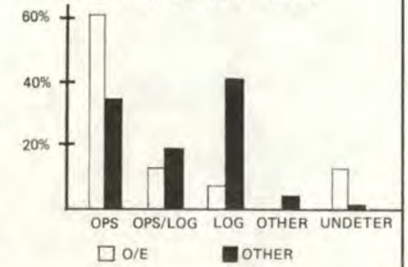


. . . . KNOW!

est O/E ejection experience. Put another way, if the aircraft enters uncontrolled flight due to pilot error, then the crew is more likely to stay with the aircraft longer, and thus more likely to eject O/E. The crew has a tendency to try just one more thing before punching out; and that one more thing can be fatal. Logistics caused mishaps are a different story. The crew is much less likely to stay with an aircraft with a serious material failure. They can't save it—so they get the hell out instead of trying one more thing. This leads naturally to the next point. (Table 1)

TIMING is also essential to ejection survival; it involves a combination of the topics discussed earlier. However, the bottom line is—it doesn't do any good to decide to eject after you've hit the ground. Thus you must combine all the things we discussed earlier plus your analysis of your present situation to make a timely decision. Since we touched on delays earlier, let's look at their effect. A review of the last five years O/E ejection history revealed:

TABLE 1.
EJECTION VS CAUSE FACTOR



• Accident boards were able to determine the delay interval about two-thirds of the time.

• Delay intervals were in excess of reasonable reaction time (3 seconds) more than half the time. (Table 2)

TABLE 2.
OE/EJECTION VS DELAY INTERVAL
1972-1976

DELAY	NO.	%
3 SECONDS OR LESS	5	11
4 SECONDS OR MORE	23	52
UNKNOWN	16	36
TOTALS	44	99

• Accident boards had a harder time determining the reason for the delay.

• "Trying to overcome the problem" i.e., regain aircraft control, was the reason for a significant number of delays. (Table 3)

TABLE 3.
O/E EJECTION DELAY VS REASON
1972-1976

REASON	NO.	%
TRYING TO OVERCOME PROBLEM	15	34
DID NOT RECOGNIZE EMERGENCY	2	5
UNKNOWN	22	50
N/A	5	11
TOTALS	44	100

Another analysis indicates that of 181 crew members who didn't eject, 71 had sufficient time to initiate egress. (Table 4)

TABLE 4.
FATALITIES WHO DIDN'T EJECT
VS
TIME AVAILABLE FOR DECISION

	TIME FOR EJECTION DECISION			
YEAR	SUFFICIENT	INSUFFICIENT	UNKNOWN	TOT
1972	29	26	3	5
1973	5	21	5	3
1974	16	25	0	4
1975	10	13	0	2
1976	11	17	0	2
TOTALS	71	102	8	18

I hope you have found this brief discussion interesting. It was intended to make you aware of recent ejection trends, and increase your interest in this area. We realize that aircraft will at times be flown outside of safe ejection envelopes because of mission requirements. However, with awareness and forethought you can be ready to cope with an ejection situation. You are the ones who must become believers in the timely use of escape systems if the USAF ejection survival record is to improve. ★

NAME THAT PLANE ANSWER

REPUBLIC P-47

The P-47 was the direct descendant of the Seversky P-35. A technically superior, state-of-the art aircraft, the "JUG" was twice as heavy as any single-engine fighter built to that time. It had the reputation of being the toughest fighter of the war, with the ability to take a tremendous amount of punishment.

"CONVERTIBLE" CHOPPER OR HOW TO ACQUIRE AN "OPEN COCKPIT"

LT COL ROBERT L. GARDNER • Directorate of Aerospace Safety

On those sweltering summer afternoons when the mercury has climbed to the century mark how many of you helo drivers have wished for a nice cool air conditioned cockpit? Gee, I sure can recall crawling into a helicopter's green house with the inside temperature near 120°F, the perspiration quickly soaking my flying suit, and thinking "wouldn't it be more comfortable if that big fan overhead were directing its downwash on me."

Well, we rotary-wingers better not wish too seriously for an "open" or "air conditioned" cockpit, 'cause it could very well happen quite unexpectedly, much to our dismay. Here are a couple of examples which actually occurred to our fellow helo drivers of a sister service.

Mishap #1

The big CH-53 was pre-flighted by the copilot, crew chief and first mechanic in preparation for Search and Rescue (SAR) standby. Some four hours later the crew was alerted for a flight and a normal predeparture crew briefing was conducted. The operations officer conducted the mission and weather briefing. The crew then proceeded to the helicopter for start, run-up and taxi. All checks and operations were normal except: (1) While adjusting the CG trim, the aircraft commander noted that to adjust the number 1 and number 2 pitch indicators two increments below center on the AFCS flight director, the notches on the trim wheels were further aft than normal; therefore, the aircraft commander elected to reset the number 1 and 2 pitch indicators to the center of the AFCS flight director; (2) While performing the stick jump check, the aircraft commander noted the cyclic jumped forward when he turned off the number 2 AFCS servo, rather than aft, to which he was accustomed. However, since the stick jump was within limits he did not consider this forward stick jump significant; (3) Later, following this mishap, neither the aircraft commander nor the copilot could state positively that the cyclic stick trim switch was turned back on following the AFCS stick jump check.

As the helicopter left the chocks, the aircraft commander was at the controls and the first mechanic was acting as marshaller. Just prior to reaching the taxiway the helicopter was stopped for a final walk around inspection. Due to the thoroughness of previous inspections, the crew chief motioned for the mechanic to come aboard the aircraft rather than complete the walk around.

As the first mechanic approached the helicopter from the right side, the main rotor blades chopped into the top forward portion of the fuselage.

At the time of impact the helicopter was stopped, heading 320 degrees, and the winds were 220 to 240 degrees with a velocity of 11

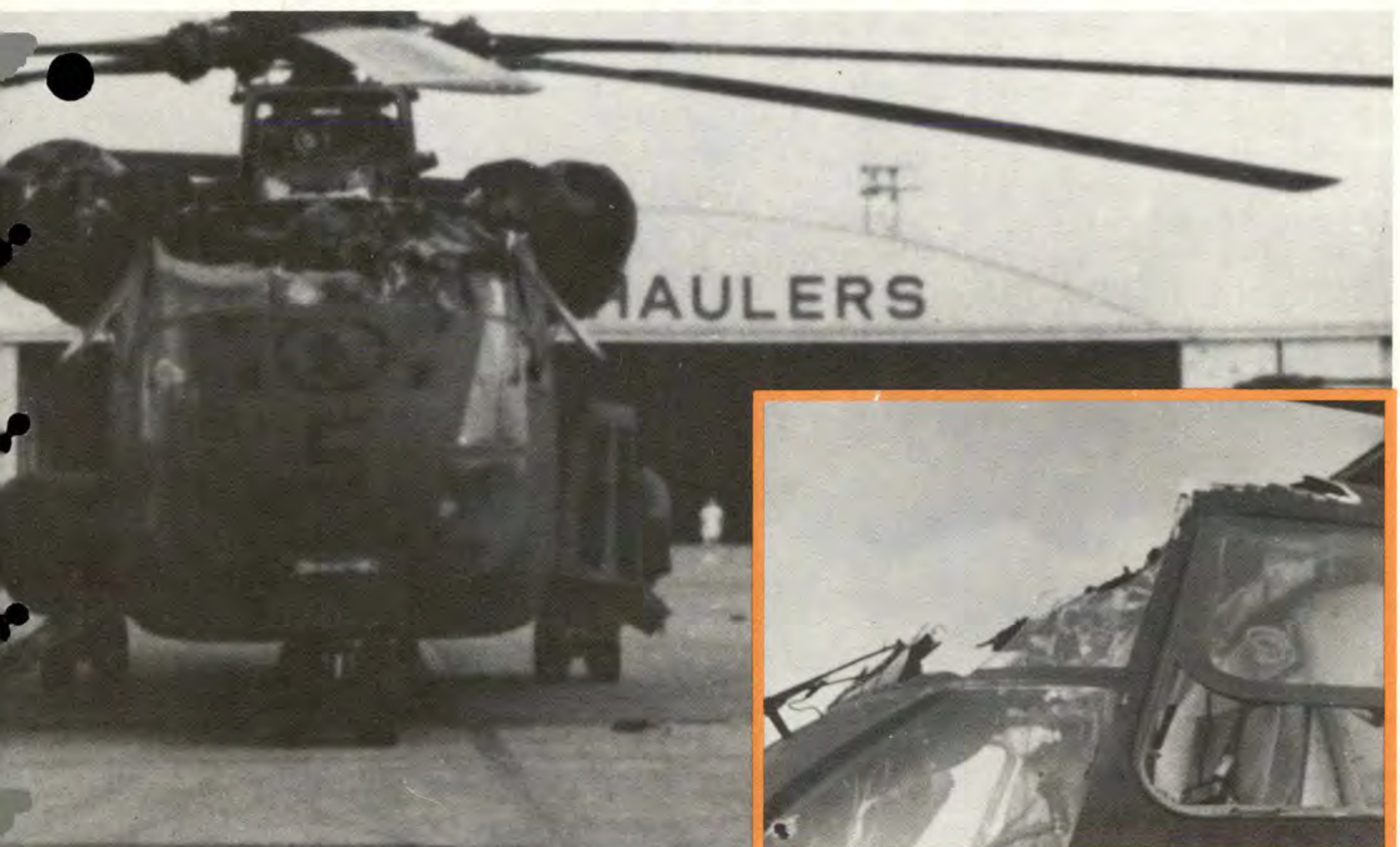
knots variable to 24 knots. Just prior to the mishap the copilot was looking left to clear the aircraft on the taxiway, and the aircraft commander was looking right observing the first mechanic approach the aircraft. As the copilot's eyes returned to the cockpit he observed what he felt to be excessive forward cyclic and the cyclic still moving forward. Before he could react to the situation the rotor blades struck the number 2 EAPS, continued through the forward doghouse and cockpit, destroying the overhead control panel and knocking the number 1 EAPS barrel completely off the engine. The windshields were cut off evenly above the instrument panel with the lowest point of the cut at approximately the middle of the center windshield. The copilot was pushed to his left by debris and sustained minor cuts to the right side of his face. The pilot also sustained minor facial cuts on the right side.

Following the impact, the aircraft commander pulled the cyclic stick aft abruptly and both pilots held the stick in the neutral position. With the overhead control panel destroyed, the aircraft commander attempted to secure the engines by pulling the remaining cables, but without success. The pilot then instructed the crew chief to shut the engines off manually, which he did by turning off the fuel shutoff valves in the cabin.

Although material failure was suspected, a thorough check of the entire flight control system disclosed no malfunctions. After extensive investigation, the board concluded that the following events, combined with the wind, resulted in the mishap.

On entering the helicopter, the pilot in command did not adjust his seat from the full forward position, and thus his observation of neutral cyclic stick, upon which the CG trim wheel adjustment is made, was altered, possibly forward of neutral. In this case, the cyclic stick being too far forward caused the triangle and the bar on the flight director to be higher than normal. Thus, when the pilot attempted to trim his normal two increments below neutral, he found that a full aft trim wheel adjustment was required. Feeling uncomfortable with this setting, he then advanced the trim wheels until the triangle and the bar were in the neutral position. This would have had the effect of lowering the tip path plane.

At the time of the accident, the copilot was looking left to clear the taxiway, the pilot and crew chief were looking right, observing the mechanic come aboard. The aircraft commander may have inadvertently pushed the cyclic forward thus creating a dangerous situation without anyone realizing it until it was too late. In addition, neither pilot could positively remember putting the stick trim back on after the AFCS stick jump check. If the pilot as-



sumed that the stick trim was on, he may very well have depressed the stick trim release button on the cyclic prior to moving the cyclic stick each time, and thereby not realized that the stick trim was off. Thus, just prior to the mishap, he may have held the stick more loosely than normal, perhaps allowing it to slide forward. Upon turning back into the cockpit, he would have grabbed for the moving stick. A slight forward motion would, coupled with the variable wind, have been the aggravating factor which caused the damage.

Mishap #2

A CH-53 was scheduled for VIP backup and logistics flight. Briefing, pre-flight, turnup, and launch were described as normal by the crew. Following delivery of an externally slung load, the helicopter departed the drop zone with the external pendant remaining attached and hanging below the aircraft. At this time the crew chief requested that the helicopter be landed to make it easier to pull the pendant into the aircraft. The pilot and copilot discussed where they should land and decided on a hilltop at their 11 o'clock position. The copilot, at the controls, executed the approach coming to a hover approximately 10 feet from the top of the hill.

The landing was commenced with the nose of the helicopter pointing up an approximate 9 degree slope. The touchdown was smooth and deliberate, brakes off, with either the main landing gear alighting first or a three point landing. At this time, the copilot stated, he lowered the collective and felt the aircraft start to roll backward. He simultaneously applied brakes and forward cyclic when a loud crack or bang was heard and the cockpit filled with flying debris. Both the pilot and the copilot attempted to cover their faces with their hands. The pilot then grabbed the controls and applied brakes regaining control of the aircraft which had started a rocking motion. With the overhead quadrant inoperative, the crew decided that the crew chief would disconnect the fuel line leading to each engine fuel control to shut down the helicopter. This was done and the crew egressed once the rotors coasted to a stop.

In this mishap the aircrew selected an adequate landing zone, but then selected a poor touchdown site within the zone, not recognizing the degree of slope in that area. The pilots landed with the brakes unlocked to an up slope site and lowered the collective allowing the big helicopter to start rolling backwards. The copilot's reaction was simultaneous application of the brakes and forward cyclic combined with the lowered collective contributed to low flapping blades over the nose of the aircraft resulting in the blades striking the forward pylon and cockpit.

Both of these mishaps illustra[te] how a combination of factors, each by itself not serious, can take the top out of your helo and ruin your whole day. In both of these cases the pilots involved failed to recognize a potentially dangerous situation. The lesson to be learned is that aircrews must know the limitations of their air machine and then be aware and cautious of the factors and situations which may cause those limitations to be exceeded.

Our Air Force H-53 flight manual contains several warnings and cautions concerning the hazards of excessive cyclic and low collective settings and instructions not to release the cyclic stick with rotors turning. Although the slope landing data is limited, our dash one alerts us to the possible rotor blade-to-fuselage contact. Unfortunately, those warning and caution notes are probably the result of our experience o[f] "chopping the top" on some H-[…] helicopters in the past. Although we fling-wingers are one of the few in the Air Force who can still boast of legally flying low and slow, going for the "open cockpit" is carrying things a little too far. ★

☆U.S. GOVERNMENT PRINTING OFFICE 1977 789/855/51

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.

MAJOR ALEXANDER H. MURCHISON, III

27th Tactical Fighter Squadron • 1st Tactical Fighter Wing
Langley Air Force Base, Virginia

On 4 February 1977, Major Murchison, flying as number two on a four-ship F-15 training mission over the Atlantic Ocean, was scheduled to conduct air combat tactics involving multiple engagements. During the first engagement, while accelerating in full afterburner, Major Murchison heard a loud explosion from the right aft section of the aircraft. He immediately came out of afterburner, checked the cockpit instruments and noticed the right engine fire warning light was on. Major Murchison terminated the engagement and headed the aircraft toward the nearest suitable airfield, Langley AFB. As he began emergency procedure for an in-flight fire, the fuel hot and bleed air overtemperature warning lights illuminated, and the aircraft began an uncommanded nose-up roll to the right. As the roll continued, the nose dropped, and the aircraft entered a nose low out-of-control spiral. After two uncontrollable rolls, Major Murchison recovered the aircraft and was able to maintain level flight by using hard left rudder and right aft stick. High frequency vibrations continued as he completed the emergency procedure for an engine fire. The flight lead visually confirmed the aircraft was on fire and notified Major Murchison that the tail hook was down. Attempts by Major Murchison to raise the tail hook were unsuccessful. Then the environmental control system warning light illuminated. To prevent it from overheating and a possible fire from the aircraft electrical components, he turned off the radar and other high drain electrical systems and requested that a SAR mission be activated since the probability of ejection appeared imminent. After several minutes, the fire warning light began flashing indicating that the fire had been reduced to an overheat condition, which was confirmed by the chase aircraft. Next, the flight control augmentation system dropped off of the line and would not reset. After doing a controllability check, Major Murchison decided he would be able to land the aircraft with the degraded flight controls available. An uneventful single engine, straight-in approach landing was made. The outstanding flying skill and good judgment displayed by Major Murchison during this serious in-flight emergency were responsible for the successful recovery of a valuable aircraft. WELL DONE! ★

THE TROOP WHO RODE ONE IN

We should all bear one thing
in mind when we talk about
a troop who rode one in.

He called upon the sum of all his
knowledge and made a judgment.

He believed in it so strongly that he
knowingly bet his life on it.

That he was mistaken in his judgment is
a tragedy . . . . . not stupidity.

Every supervisor and contemporary
who ever spoke to him had
an opportunity to influence his judgment,

. . . . . so a little bit of all of us goes
in with every troop we lose.

(Author unknown)