AEROSPACE

SAFETY • MAGAZINE FOR AIRCREWS JULY 1979

The Director of Aerospace Safety Special Achievement Award 1978

IS PRESENTED TO

LIEUTENANT COLONEL

Ernest R. Perkins

■ Lieutenant Colonel Ernest R. Perkins has distinguished himself as Chief of Safety, 366th Tactical Fighter Wing, in the development of an outstanding safety program. Lieutenant Colonel Perkins' reorientation of the wing safety office to concentrate on systemic-caused or supported mishaps reduced the incidence of these controllable events throughout the year. His personal investigations, innovations and suggestions brought significant safety improvements to the F-111 weapons system and to safety reporting and dissemination procedures. The wing converted from the F-111F to the F-111A, and from a centralized maintenance concept to the Production Oriented Maintenance Organization (POMO). In addition, there were numerous exercises and deployments overseas. Nevertheless, the wing had no Class A flight mishaps, no fatalities and no explosives mishaps. The Director of Aerospace Safety Special Achievement Award is presented each year to one individual or one organization for outstanding safety contributions or achievements. Lieutenant Colonel Perkins is the first recipient. ■

UNITED STATES AIR FORCE

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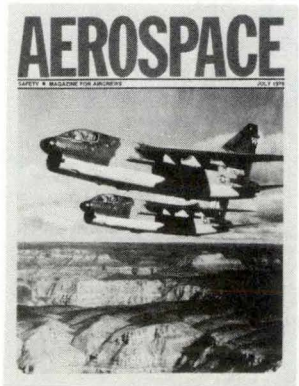

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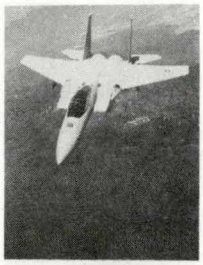

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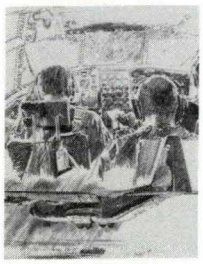

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DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

Then & NOW

ANCHARD F. ZELLER, PhD
Directorate of Aerospace Safety

■ It was 1943. The buildup for World War II was in full swing. The losses were enormous. That year the Air Force lost over 5,000 aircraft totally destroyed in over 20,000 major accidents. Needless to say, there was much concern.

The time is 1979. Last year there were 90 aircraft destroyed in 98 major accidents (currently called Class A's). Now, in the middle of 1979, there is also great concern. Why, with this spectacular improvement, is there concern? The reason is quite easy to explain: The long downward trend from 1943 until the early seventies has reversed. There is every possibility, even probability, that the 1979 record will represent an increase in losses which the Air Force can ill afford. While the numbers are much smaller than those in earlier years, the dollar costs are much, much higher, and the relative portion of the total force that one trained crew and airframe represent is greater.

To fix almost anything, it is first necessary to determine what the problem is. In-depth analysis of recent accident experience shows, as would be expected, that some are due to materiel failure, a few are due to various forms of inadequate support, but that the predominant factor is human failure.

Failures come in many forms, but two of the descriptive terms which appear most frequently in the current analyses are "lack of situational awareness" and "inadequate event proficiency." There are others too, such as "pressing" and "overcommitment," which imply that the individual has exceeded his capabilities in the context in which the loss occurs. These terms are not new, but the frequency with which they are appearing in board deliberations or in higher command review strongly suggests that something's changed. It is apparent that many things have changed: Aircraft are capable of higher performance, mission requirements are in a constant state of flux, support efforts are modified with time, and certainly all of these have an impact.

One other subtle change which is not as readily noted is that the average pilot of today is different from his average predecessor of a few years ago. This difference is not of his making but is a result of a system which requires higher performance at a lower level of experience, with less current practice to hone the skills required of the combat-ready crewman. One might suggest that this isn't really very important and that with increased effort (pressing) this deficiency may well be compensated for. While motivation is certainly important in performance, it must be on top of skill to be a truly effective factor.

As far back as the middle of the last century, it was observed that learning to do anything follows a constant pattern. Initially, the effort is associated with a high number of errors. With time, the number of errors decreases, and finally a state of near perfection is developed. The constant relationship of errors to time is so universal that the term "learning curve" was applied to this pattern. It is readily apparent from examining this curve that if the average of experience is greater, the probability of errors is less than if the average experience is less, in which case the probability of errors is greater.

If one looks at average pilot experience today, whether in terms of total hours, hours in unit equipment, or experience as measured by events, it is apparent that, on the average, for the rated force the experience is lower. Those of you in the active inventory are well aware that your line flying days are numbered and that, unless there are major changes, you will shortly be a part of the rated supplement. When this happens, a newer and less experienced individual will take your place, so that the average of the entire force may become even further reduced.

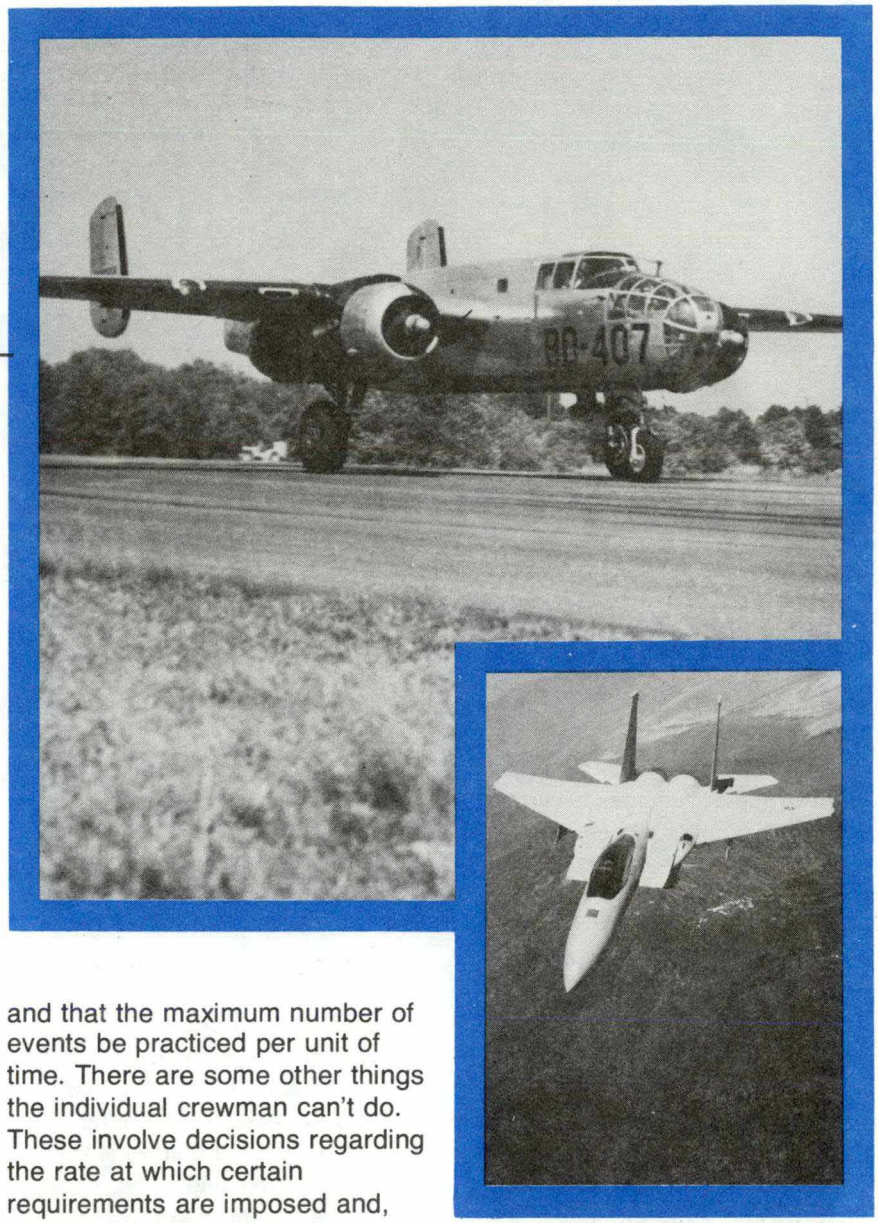
This same basic learning curve applies to another factor of experience, and that is *current* flying. There have been a number of studies which support the theoretical expectation which says that if you get more current flying, your accident rate goes down. By implication then, less current flying means that the accident rate is probably going up. It is going up because with less current flying, the expectation of error is higher on

the learning curve. If it can be anticipated that with lower average experience there is an increase in the probability of error and with lower current flying there is an increase in the probability of error, it stands to reason that if both decrease, the probability is additive in some way. The current increased accident experience should not come as a surprise when these cold and objective statistical measures of ability are applied. If, in conjunction with the increased propensity for error, the demands on the individual are increased, the probabilities of making a mistake become even greater.

Certainly the situation of increased demand and decreased competence will highlight deficiences in such things as specific event proficiency or general situational awareness, even as our accidents document.

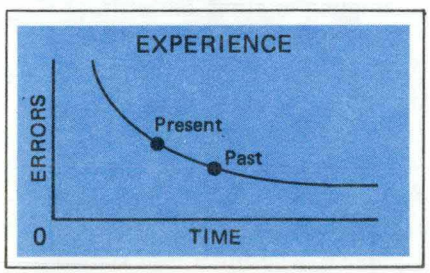
The question which will come immediately to the mind of those who are involved on a personal basis is, "What can I do about this?" The answers are not as easy as the question, but there are some. There are training aids, simulators, for example, which may not be much fun to fly, but they do serve a purpose. This purpose is particularly well served if a program is well considered and developed to achieve a specific objective in terms of some proficiencies which directly relate to the flying to be accomplished. Another approach is to accept that every hour of flying is indeed an hour of training and that the maximum number of events be practiced per unit of time. There are some other things the individual crewman can't do. These involve decisions regarding the rate at which certain requirements are imposed and, perhaps, modification of the requirements themselves.

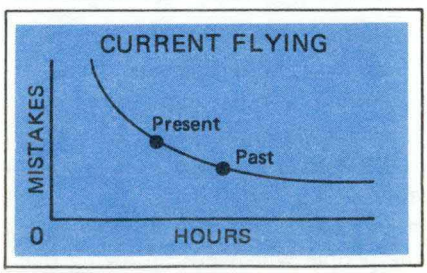
Unfortunately, things may get worse before they get better. Knowledge, however, is power. With a clear understanding of some of the things that are happening, effective change becomes more probable. ■



World War II, 1943. The Air Force lost more than 5,000 aircraft destroyed in more than 20,000 major accidents.

Now the numbers are much smaller but the dollar costs are much higher.





BLUE NEWSLETTER

No Way Out

ROGER G. CREWSE
Directorate of Aerospace Safety

■ In the past 18 months we have had seven weather-related mishaps in which an aircraft was destroyed. In all of these, fatalities occurred. The basic problem which set up each of these seven mishaps concerned weather – unexpected, unforecasted, for the most part – which existed on a VFR route that made VFR flight not possible. These mishaps all have one thing in common. In the attempt to complete the mission as scheduled and as briefed, the pilot pressed on until he painted himself into a corner. VFR flight was no longer possible and there was no VFR way out of the situation in which he found himself.

The flight lead started a descent in an open area and as he proceeded, the bottoms of the clouds were found to be much lower than he thought.

In two of these mishaps, both involving fighters, other pilots on the same mission, flying the same route, had also experienced the same conditions. They aborted the mission because of weather, but failed to tell the people who were following that they had done so. The system which was controlling the mission also failed to pass the word that the weather made the mission, as briefed, impossible to complete. The mishap pilots then, as far as they knew, were flying a mission which had been successfully completed by those who had gone immediately before them.

In one of the mishaps, a helicopter crew attempted a cross-country flight VFR, with a marginal weather forecast. Shortly after takeoff they found that VFR flight was not possible and advised that they were returning to their departure base. The approach controller, in an effort to be helpful, indicated to the crew that it might be possible to maintain VFR conditions following a slightly different route. The helicopter crew attempted to fly the alternate route, ended up between layers, trapped in an IFR situation, and crashed attempting to climb out of it.

Two fighters in formation on a VFR mission, found when they arrived at their low-level entry area that the weather was considerably worse than forecast and that unless they could descend through a hole, the mission would be impossible to complete. The flight lead started a descent in an open area. As he proceeded, the bottoms of the clouds were found to be much lower than he thought. While trying to maintain VFR in the hole, he hit a hill buried in a cloud. Both aircraft were lost.

One reconnaissance aircraft, at night, let down into what was supposed to be VMC, was observed on radar maneuvering left and right while descending, and struck the ground. VMC conditions did not exist.

. . . the pilot has not yet been born who will not be trapped by weather at some point during his flying career.

A transport crew was attempting a recovery at a nonstandard airfield in snow showers. They were not VFR

at minimums, but continued the approach from which a go-around was not possible, once committed, because of terrain. Control was lost for undetermined reasons and all were killed on short final.

There is no question about the findings of the various accident boards that sifted through the wreckages.

The pilots of all aircraft failed to maintain VFR flight, pressed on until they were trapped in IFR conditions. Most attempted to salvage the whole mess without anybody knowing they were violating anything.

Command and control elements in several of these mishaps, as well as their own buddies, failed to advise them that the weather was such that the flight could not be continued as scheduled.

Another point, and not quite as clearly defined by the accident boards, is the fact that when they had arrived in that corner where further VFR flight was inpossible, the action they took in attempting to avoid any kind of a violation was the action which guaranteed disaster. Pilots will continue to find themselves in situations where unexpected weather is encountered. Weather forecasting is not an exact science and our method of passing the word still has serious gaps. A few pilots this year will find themselves, for whatever reason, pressing on in an attempt to salvage the mission and trap themselves. In fact, the pilot has not yet been born who will not be trapped by weather at some point during his flying career. This is not sufficient justification to die.

A helicopter has all sorts of advantages over the rest of us. He can stop, call for help, and get directions out of his particular mess. Even so, success is not guaranteed.

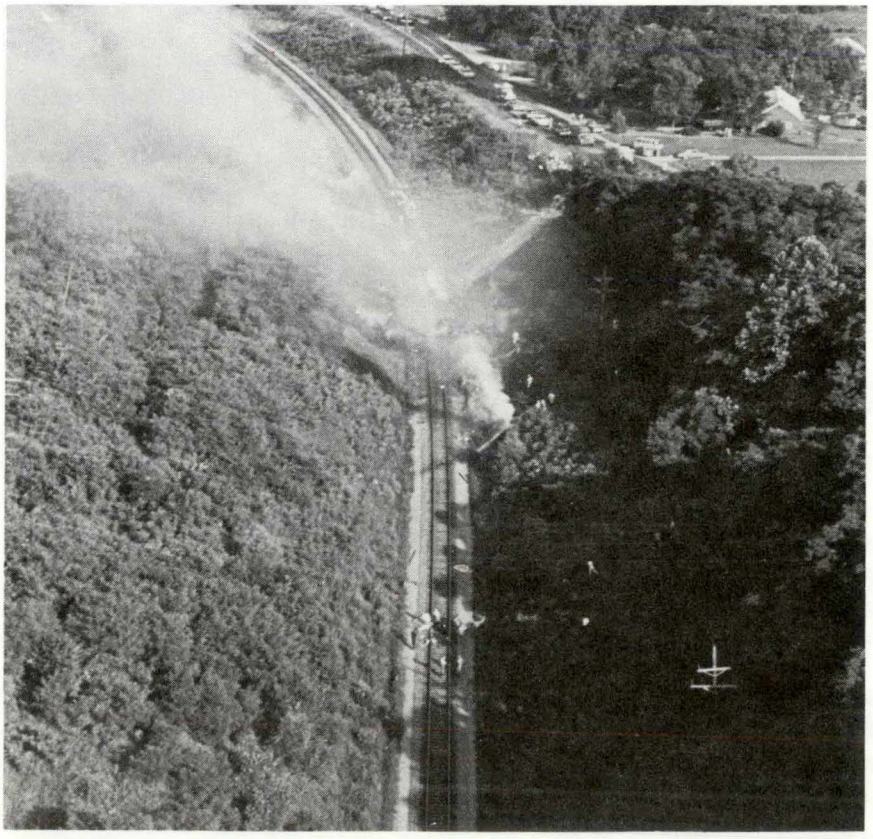
At 480 knots and 500 feet the problems become just a little different. Altitude is what's required. There is only one way to get it and that's pulling smoothly aft on the stick and doing it now!

Those who have crashed were trying to do a one-eighty at 500 or 600 feet above the ground in weather, or attempting to stay in a hole while they did their one-eighty and didn't, or pressed on, blindly hoping to luck out on the other side and didn't.

Pressing beyond minimums on final is always chancey if you have a choice. If destination fixation is the driver, she is a demanding mistress and extremely fickle.

The avoidance of these kinds of mishaps is so obvious that it hardly needs to be said, but we will:

When the mission parameters cannot be followed because of weather, you have but one option and that is to abort the mission for weather. ■



FARMS for sale

R.C. DELGADO
Directorate of Aerospace Safety

■ An apt subtitle for this article could be, "If You Don't Eject Above 10,000 Feet When You Are Out of Control, You Are Liable to Buy the Farm." The reason for this is that so many pilots, when they depart an aircraft from controlled flight, lose their lives trying to recover it.

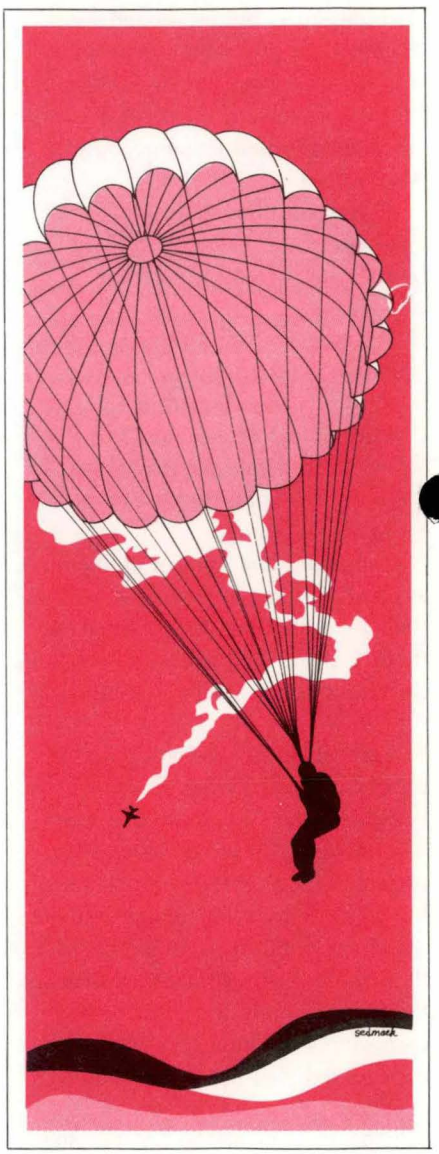
The laws of physics have already decreed that this aircraft is going to have a violent collision with this planet.

All ejection-seat-equipped aircraft flight manuals have a warning about ejecting 10,000 feet (15,000 for some aircraft) above the ground when out of control. These figures take into account the recovery characteristics of the aircraft and the safe escape envelope of the ejection system. This warning, though, is too often ignored.

Pilots sometimes stay with a departed aircraft until it's too late. If they were more aware of their aircraft's recovery envelope, they might pay more heed to this warning and not stay with it until they reach the no-recovery point. At that point, the aircraft is destined to be fragmented into hundreds of small pieces. Even if the pilot stays with it, "attempting to overcome the problem," nothing he does is going to change the outcome. The laws of physics have already decreed that this aircraft is going to have a violent collision with this planet. If the pilot, for whatever reason, be it ego, stigma, lack of situational awareness, machismo, etc., continues to attempt to regain control even beyond the limits of his escape system, he, like his aircraft, is also going to be fragmented into hundreds of pieces. One of two things, both bad, are going to occur. He will become another number in the "out-of-envelope ejection fatality" column of mishap statistics, or he will be listed in the "did not eject– fatal" column. The results are the same. The Air Force has lost another asset and some family has lost a son, a husband, or a father.

The aircraft recovery envelope and the escape system envelope are not easily definable. Neither one is marked by a clear red boundary. This is why the 10,000/15,000 feet out-of-control ejection minimums are so important. These are not marked by red lines either, but there is at least an altimeter. Since it reads altitude above mean sea level and not above the ground, it behooves pilots to know the terrain altitude over which they are flying.

This era of realistic combat training involves a lot of low level flying. This makes the foregoing



paragraphs even more relevant. You might ask, "What if I'm already below 10,000/15,000 feet above the ground when I lose control?" A simple extension of the same logic we have been discussing would suggest you then eject as soon as you recognize you are in a departure. Nobody should fault you for this.

The following is a quote from a recent aircraft mishap report: "The wing rocking is characteristic of an approach stall, suggesting the pilot was attempting to recover the aircraft from the dive. Therefore, the pilot did not perform boldface procedures and attempted to recover an out-of-control aircraft below 10,000 feet. Analysis of the ejection system indicates the mishap pilot initiated ejection approximately .6 seconds prior to impact." There isn't an escape system in the world that can save a pilot under those conditions. In the findings of such a mishap there is usually one that says, "The pilot departed the aircraft from controlled flight for an undetermined reason. (Cause)" There is usually another finding which says, "The pilot delayed ejection until outside the safe ejection envelope. (Cause)" This happens far too often.

Below 10,000 feet, if uncontrolled flight is entered, don't hesitate; eject!

Table I shows the results of the 20 pilot-induced loss-of-control aircraft mishaps in the USAF in 1978. Of the 26 crewmen involved, only 10 survived. Six were ejection fatalities and 10 died because they did not eject. Four of the six ejection fatalities were due to out-of-envelope ejections. Fourteen of the crewmen involved died because of late ejection or no ejection attempt. Table II shows the engine failure mishap results for comparison purposes. Note that in these mishaps 18 of the 24 crewmen involved survived.

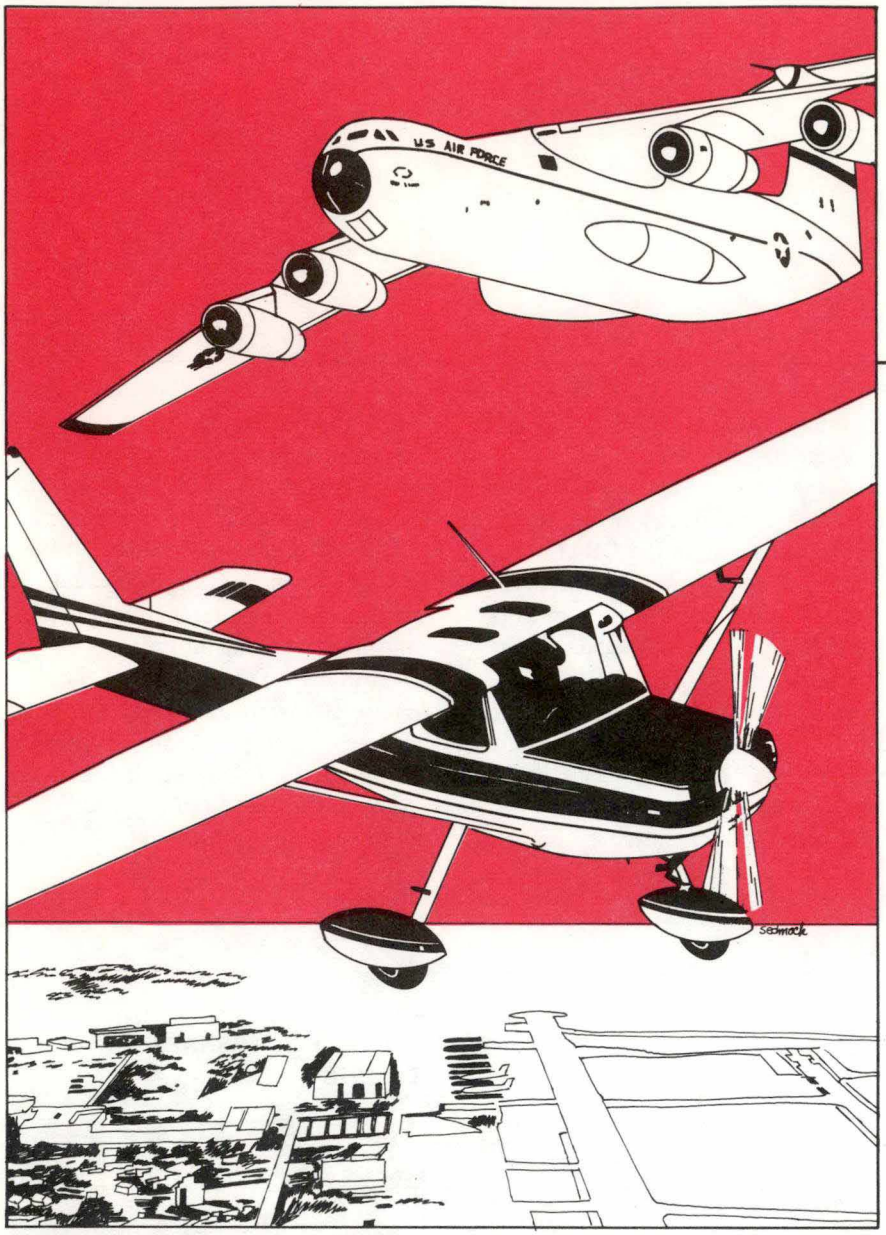
The message is quite clear. In the words of an aircraft flight manual: "If the aircraft is descending out of control, eject at an altitude not lower than 10,000 feet above the terrain. Below 10,000 feet, if uncontrolled flight is entered, don't hesitate; EJECT!" Heed this, and you may well get to put in your 20/30 years and retire. ■

TABLE I
PILOT–INDUCED LOSS–OF–CONTROL MISHAPS
1 JAN - 31 DEC 1978

Type Aircraft	NUMBER		EJECTED		DID NOT EJECT	
	Aircraft	Crewmen	Survived	Fatal	Survived	Fatal
Attack	4	4	2	1	0	1
Bomber	0	0	0	0	0	0
Fighter	13	18	7	4	0	7
Observation	1	1	1	0	0	0
Trainer	2	3	0	1	0	2
TOTALS	20	26	10	6	0	10

TABLE II
ENGINE FAILURE MISHAPS
1 JAN - 31 DEC 1978

Type Aircraft	NUMBER		EJECTED		DID NOT EJECT	
	Aircraft	Crewmen	Survived	Fatal	Survived	Fatal
Attack	3	3	3	0	0	0
Bomber	1	5	0	0	0	5
Fighter	9	12	10	0	2	0
Observation	1	1	0	1	0	0
Trainer	2	3	2	0	1	0
TOTALS	16	24	15	1	3	5



Close Encounters

■ A KC-135 reports a near miss of 350 feet from a Cessna 210.

A C-141 turning to intercept the localizer. Pilot increases turn rate to avoid a light aircraft by 200 to 250 feet.

A T-38 on final is advised by the final controller of traffic. The targets merged on both azimuth and elevation. Fortunately, the T-38 avoided a collision by approximately 200 feet.

A T-37 pulled up and rolled over the top of a light plane, missing by 200-300 feet.

Seems like the beginning of a late night horror movie. Well, it's not; it is the real thing. One base had five reported near misses in 90 days. Most of the reports read about the same as the others. ". . . light plane pilot took no evasive action. . . ." Frequently, the other aircraft has not appeared on radar. Just as often, the other aircraft is never identified.

From this it may seem that nothing can be done. Not so. At McConnell AFB where the KC almost collided with the Cessna, the base sponsored an airmen meeting to which 3,000 invitations were issued. Held in the base theatre, the meeting gave the base and the FAA an opportunity to discuss safety with local fliers.

McGuire AFB is in a heavy traffic area because of its location in the Eastern corridor between New York City, Atlantic City and Philadelphia. They are trying to get a TCA for the McGuire area with Stage III radar as an alternative. They have submitted an update to the IFR Supplement stressing the high near miss potential and published a NOTAM on the subject. They, too, are meeting with general aviation pilots to stress the need for extreme vigilance and caution.

Presumably, all aircrew members respect the presence of another aircraft no matter what the classification. For those who don't, consider: no matter how small, how slow or how frail a light plane; no matter how big, how fast and how strong you are, a collision can destroy both. ■

The TEN COMMANDMENTS For Aviation Survival

MAJOR DAVID V. FROEHLICH
Directorate of Aerospace Safety

■ Heard it all before? Read on, because you may have heard it all before, but so had a lot of other good aviators and they are now dead! Thus far this year we are still bashing our bodies into each other and the ground. Basically, the machine technology has improved, procedures have been refined and many of them combat tested, and separation equipment and rules have been upgraded. Unfortunately, that leaves the ball squarely in the court of the operator. For that reason (and because I recently lost another good friend), let me pass on ten ways to drastically increase the odds of you remaining a survivor in the aviation business.

THOU SHALT . . .

1 Know thy machine– The lack of aircraft knowledge has done in some otherwise excellent aviators. This knowledge extends from basic systems operation (and emergency operation) to machine limitations (Gs and stuff). Not only can systems ignorance cause excessive panic during an emergency situation, but the operator may even worsen the problem. Knowing and understanding your machinery can lengthen equipment life as well as your own! Case in point– the intrepid aviator and crew were wending their way through the low-level route at night. They began to have fuel balance problems. The symptoms didn't match any of the exact dash one emergencies, so they began trying various fuel switch combinations. Engines began flaming out, it was soon very dark and quiet and the crew jumped out. They survived but the machine didn't. Monday morning quarterbacks like me say "if they had only known the system, they might have. . . ." Maybe, maybe not! Regardless, the knowledge of your equipment is essential to your *safe* and successful mission accomplishment.

2 Treat thy machine with respect— Definitely related to number one above, but an added necessity for survival. Once you know the systems and limits of your aircraft, you must operate that machine with respect. This proper treatment includes judgment and restraint. In other words, if the mission or maneuver calls for 480 knots, 4 Gs or a certain altitude– follow the parameters. If you only need to pull 4, pull 4, not 6! The main reason is equipment life and wear. Those of us who have flown the T-Bird "subsonics" were acutely aware of

the relationship of lengthy time-to-climb, full throttle, low airspeed and subsequent high EGT. This combination is hard on the internal machinery. The principle is the same for most engines and the more air you can keep coming in the front end, the less strain you are putting on those aging blades and buckets. It also goes without saying that respecting the machinery includes observing warm-up times and operating limitations. They are there for a purpose and the statement "Why, I've been overtemping engines for years and never had one blow up yet," does not belong in the vocabulary of a professional aviator.

3 **Know thy rules** – In these days of high speed machines, high density military and civilian traffic and complex missions, the rules are the edge between safely accomplished training and airborne chaos. The first problem most aviators face is coping with the volumes and volumes of rules, procedures and guidelines which are continually published, updated and changed. Units can ease the process and enhance the aircrew information retention level by some supervisory sorting, but the responsibility for rules compliance still rests squarely on the shoulders of the individual operators. You've got to keep up! If you don't, the results could at best be an FEB, or at worst, the conversion of you into a fatality statistic. Neither is worth the price.

4 **Know thine own limitations** – Closely akin to the knowledge of the rules is the appraisal which individual operators place on their own abilities. Minimums and maximums are just that – they are figures at each end of the spectrum with the operation of the machine falling somewhere in between. An aviator must use judgment and experience to adjust minimums up or maximums down if conditions dictate. Example – cracking a hundred and a quarter is a whole different ballgame toward the end of a 14-hour crew day than after a single hour and a half sortie. Temper those mins and maxes with conditions and don't be hesitant to add a safety margin because of your own reduced capabilities. Pride has ridden it in with some pretty good sticks.

5 **Keep thy body fit** – Generally speaking, flying is a physically and mentally demanding business. I think no one will argue that most aviators are better able to cope with those demands if they are in reasonable physical shape and well fed and rested. Ancient saying – They who burn the candle at both ends may soon be only an ash! Nuff said!

6 **Respect mother nature** – The commercial about "not being nice to fool mother nature" couldn't be more accurate. The best plan for an aviator is to have a basic working knowledge of weather phenomena. Vacuum out all the available preflight weather data the local weather shop can offer and then be ready for the worst. Religiously avoid thunderstorms and all of the associated surprises. Be wary of the fickle crosswind, be skeptical of RCR figures. Simply stated – protect thy assets, for the weather gods are rarely on the side of the aviator.

7 **Know thine enemy** – This relates to the entire flying environment but obviously primarily to combat weapons systems. Once you have the machine and bod in tune, the rules and limits firmly in mind – it is now time for some

realistic training. Part of the success of recent training has been the close simulation of the forces and threats of the opposition. Knowledge of the enemy's capabilities will bring the training and operations of a combat unit into focus.

THOU SHALT . . .

8 **Not press** – Tie all of the factors together and take the crew that knows and operates the machinery properly 98 percent of the time – the other 2 percent will kill them. This may be a result of the tendency to "press." Call it overzealousness, overenthusiasm, over competitiveness or oversensitivity to command pressure, but for some reason that crew feels the need to stretch or bend the rules "for the sake of the mission." Note that the four descriptive terms contain the prefix "over." That is exactly the problem! Some competition and enthusiasm for mission and unit are absolute necessities, but they have to be under control. This is the toughest nut to crack!

Commanders and supervisors must be the impetus for mission accomplishment as well as the warning detector for "press-itis." As a supervisor, you constantly need to watch the troops for the signs of beginning to bend the rules. For a bomber crew it could be taking a shaky machine on a special post-alert sortie or pushing bad weather to get into a low level route on a "high priority mission." For an airlift crew it could be overloading the machine or stretching crew day for "a priority mission." For the fighters, it may show as going lower or closer before pullout, trying to hang on longer during engagements or again, taking shaky machines on "high priority" missions. Regardless of symptoms, the disease may still be terminal!

9 **Honor thy wingman/crew** – Only the single-seat, single-ship flier need not worry about this one. This is an unusual situation, however, as most USAF crew members spend the majority of their time either in multi-place machines or in formation. The name of the game is empathy! As a crew member, you need to be aware of the capabilities, limitations and *responsibilities* of the other folks in your aircraft or formation. If you don't have that awareness, the result could range from wasted time or sorties to inflight confusion and disaster. Know and understand the folks you fly with!

10 **Remember the first nine!** – Sounds dumb, huh! Not really – because as I mentioned, almost every aviator has heard the story before, but we continue to bash perfectly good people and machines into each other and the ground. We have heard it before, but maybe through mental lapses, outside pressures, stress or some other factor, we neglect a commandment and it kills us. Needless waste – sure! Tragedy – you bet! Is there an answer? I think so.

The answer to the prevention of needless flight mishaps lies locked in the brain of the operator. It is called attitude! It relates to all those time-worn but appropriate terms like crew coordination, conscientiousness and professionalism. Survival in aviation today takes conscious thought and effort to accomplish the mission *safely*! You have to force yourself to think about every move, every action, every maneuver and change. You have to have alternatives to every action which includes knowing the right way, the emergency way and keeping an ace in the hole! I submit when an aviation process becomes automatic, it is edging toward becoming dangerous. Reflex flying is a thing of the past and leaves too much to chance. If you're not thinking every second when you're flying, you shouldn't be flying! Fly smart. ■

FORMATION Do's and Don'ts

LT COL HELMUT OBERBRINKMANN, GAF
Directorate of Aerospace Safety

■ Formation flight training is a requirement for readiness. But peacetime training does not necessarily require loss of lives, blood or high performance aircraft. When we read the Do's and Don'ts in the following mishap summaries, it doesn't look like a statement of professionalism, but rather how we sometimes do our flying job.

■ **Number 4 went lost wingman and hit number 3 when looking for the flight. . . .**

FINDINGS: The pilot did not follow the aircrew operating procedures of maintaining altitude separation when he lost his leader, but instead climbed to his flight's known altitude to try to acquire them visually.

■ **Number 4 hit number 3 while taking movies with his personal movie camera. . . .**

FINDINGS: In violation of TAC Supplement 1 to AFR 60-16, the pilot, operating his private movie camera, flew into his element leader.

■ **Number 2 and 3 collided while in a 180-degree cross-over turn. . . .**

FINDINGS: The flight briefing was deficient in formation procedures and abort contingencies. The formation leader did not take control of the situation before calling for another left 180-degree in-place turn. In this turn, numbers 2 and 3 failed to properly clear their flight path and collided.

■ **Number 2 hit lead during join-up. . . .**

FINDINGS: The instructor pilot in the number 2 aircraft allowed the student pilot to reach a position near the forward edge of the attack cone with high closure. When lead started to roll out of the turn, the student pilot erroneously perceived increasing horizontal separation and reversed abruptly from right to left bank toward lead without releasing back pressure. When the instructor pilot assumed control, it was too late to avoid the collision.

■ **Number 2 hit lead while level at FL290. . . .**

FINDINGS: Due to inattention to formation flying, number 2 failed to maintain separation and collided with the flight leader.

These are but a few examples which demonstrate why there is reason for concern with that which pilots do and which they don't do. All these mishaps were avoidable. They don't occur if the operator follows basic formation rules and procedures. I always thought and very often read: "Jet pilots do it better," but do they really?

The above examples make it hard to believe. I think we must learn our lessons from these catastrophic mishaps. Guidelines on how briefings should be conducted and how to perform formation flying are contained in the aircrew operational procedures of the command regulations. Undoubtedly, formation flying needs more than just keeping the aircraft upright. It requires teamwork, good leadership and thinking ahead by each member of the formation. Flight leads be aware – your wingmen are flying on

Formation flying requires teamwork, good leadership and thinking ahead by each member of the formation.

your wing, using your aircraft as an artificial horizon. Give them a chance to stay with you, especially when weather conditions are deteriorating. Successful teamwork requires professionalism and discipline.

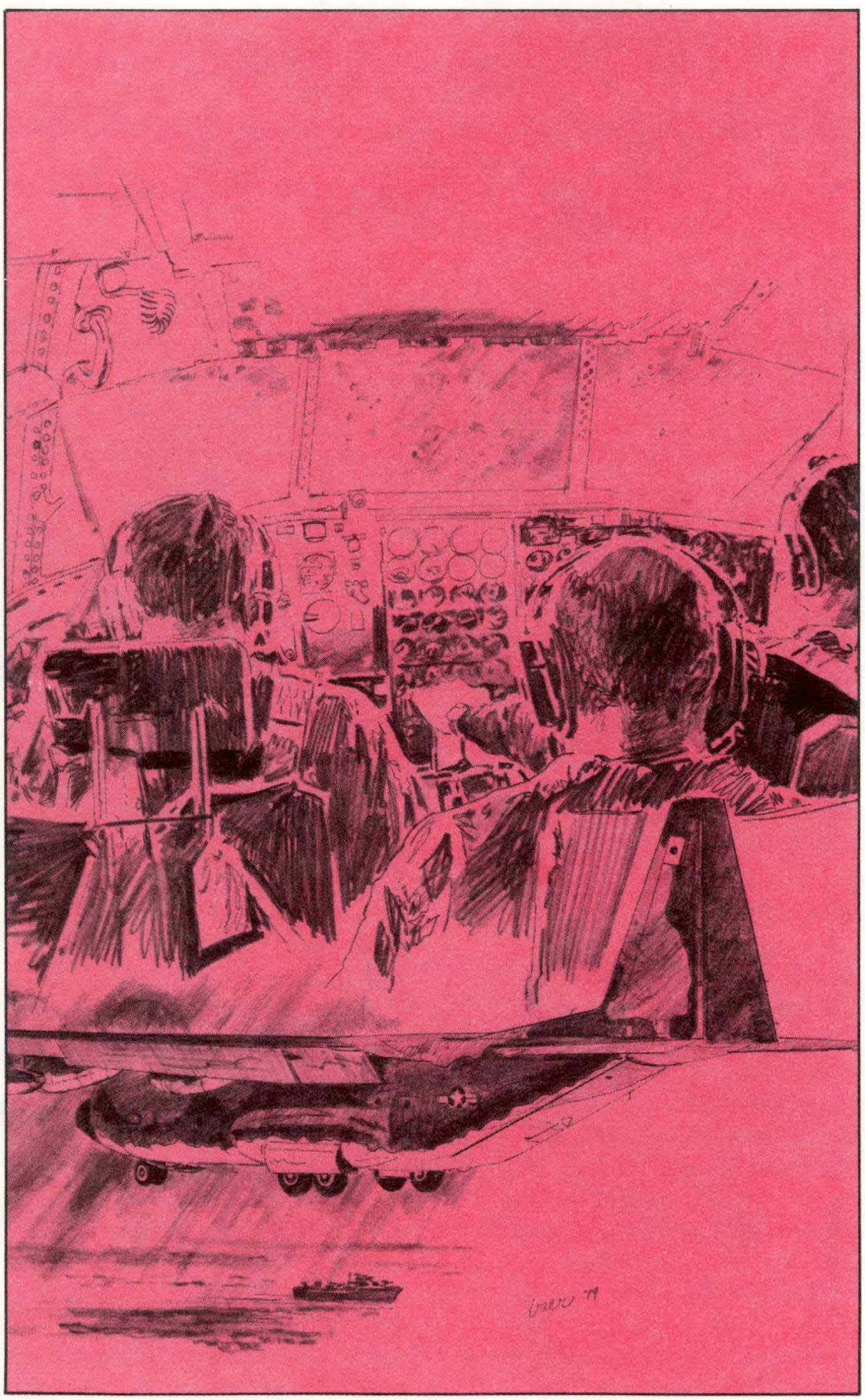
- Wingmen must know and use correct lost wingman procedures!
- The USAF cannot tolerate willful violation of directives!
- Procedures are already written – we must make sure they are followed!
- Instructors should let the student pilot make mistakes – only if it is still a learning situation and if it is not compromising safety! (The IP must not permit a student to jeopardize safety by allowing his mistakes to go too far.)

A successful formation begins with the flight leader. Does he really know his formation members? their capabilities and limits? their attitude and discipline level? And the formation briefing: Does it in fact highlight the Do's and Don'ts in accordance with the briefing guide? Does he make sure that each member exactly knows his task? Formation members must not hesitate to ask questions when in doubt. There is no room for assumptions, doubts or uncertainties. There is no "routine" in a formation mission. There are many variables such as the task, the weather, the environment, the operating altitude, the target, and the physical and psychological postures of each flight member. Think of all these items for a couple of minutes and delete personal traits like pressing, overmotivation, distraction and disobedience.

Let's eliminate the so-called "bold pilot's" briefing – you know – "kick the tire, light the fire, first one in the air is lead, briefing on guard!" etc., etc., etc. ■

The Last Milk Run

MAJOR BOB HAYDEN
Air Traffic Evaluation Staff
FAA



■ It was a milk run. An absolute milk run and, although they never knew it, I almost killed 91 people. After two and one-half years of flying the C-130 Hercules in Vietnam as a copilot, then aircraft commander, and now as an instructor pilot, I obviously knew just about all there was to know about flying the four-engine tactical transport. After all, we could put 30,000 pounds of ammo or equipment on board and go charging into short, unimproved airstrips with 50 foot rubber trees at the far end of the 3,000 foot runway. That's tough (!) and you have to be really proficient in your flying. They said I was good enough to teach the new guys how to do all that stuff. Hadn't I flown 90 hours so far that month so my proficiency level would be right up there at the top? Or had I been instructing other pilots and this was going to be my first landing in several weeks?

The scheduling people had been working us pretty hard with lots of short field landings and long crew days, so today, for a little relaxation, we'd play the airliner game, Vietnam style. This meant our loadmaster would rig up the canvas seats in the rear of the airplane and we would

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Norton AFB, CA 92409

READER SURVEY

Aerospace Safety is published for aircrews, their commanders and supervisors, and support personnel in such fields as operations, air traffic control and life support.

If you are assigned in one of these career fields, *Aerospace Safety* is for you. We would like for you to tell us how we are doing so that we can publish a magazine that best meets your needs. Please take a few minutes to complete the attached survey. It is pre-addressed and the postage is paid.

We also welcome letters and articles for publication. Please write to:

Editor, *Aerospace Safety* Magazine
AFISC/SEDA
Norton AFB CA 92409

In accordance with paragraph 30, AFR 12-35, Air Force Privacy Act Program, the following information about this survey is provided: (a) Authority: 10 USC 8012, Secy of the Air Force: Powers and duties; delegation by; (b) Principal Use: To collect a sampling of opinions on *Aerospace Safety* magazine; (C) Routine Use: To present resulting grouped data for use by decision makers in evaluating the effectiveness of the periodical; (d) Participation is voluntary, and no adverse action may be taken against non-respondents, although honest responses are needed and appreciated.

Thank you for participating in this survey.

USAF SCN 79-86
(Expires 31 Oct 79)

SURVEY QUESTIONS

1. How often do you see the monthly *Aerospace Safety* magazine?
   ( ) a. every issue ( ) d. have never seen it
   ( ) b. most issues ( ) e. have never heard of it
   ( ) c. some issues
2. When you see *Aerospace Safety* magazine, how much of it do you read?
   ( ) a. all of it ( ) c. some of it
   ( ) b. most of it ( ) d. never read it
3. Are the articles interesting to you?
   ( ) a. often ( ) c. seldom
   ( ) b. sometimes ( ) d. never
4. Are the articles of value to you?
   ( ) a. often ( ) c. seldom
   ( ) b. sometimes ( ) d. never
5. Are you currently an aircrew member? No_____
   Yes_____
   What position?
6. What is your rank? _____
7. What is your AFSC? _____
8. What type of subject matter do you prefer to see in this magazine? _____
9. Please tell us how you would improve *Aerospace Safety*.

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USAF SCN 79-86 (Expires 31 Oct 79)

haul various and sundry military people plus wives, kids, and a few animals around the southern half of Vietnam. This also meant we would go into only the larger (longer) airfields and not have to work as hard to earn our salaries. We still had to worry about helicopters, reduced aircraft performance due to the 100+ degree temperatures, weather, fighters, other transports, possible ground firing, but the landings were gonna be easy.

Several of the fields on our itinerary that day had some nice low ceilings and rain upon arrival, so I'd been able to give my student, an experienced copilot upgrading to aircraft commander, a good workout on his instrument procedures. He'd done so well, in fact, that I decided to give him a rest and I'd fly this leg into Tuy Hoa, a twin runway fighter base located on the coast of the South China Sea. The weather was surprisingly good considering how bad it had been earlier in the day. We had the field in sight from 20 miles out and a good TACAN lock on, so we signed off with the tactical radar people to start a visual approach.

Descending through 5,000, as was my usual custom for visual approaches, I requested the navigator to come forward from his normal crew position to stand near the front window to give us an extra pair of eyes looking for helicopters. I gave a quick briefing to our 86 passengers over the PA to make sure everyone was fastened up and smokes put out and turned my attention to the approach for landing.

We were instructed to set up a left base entry for runway 21 left. There was a light shower moving in from the north and the tower confirmed we'd have a tailwind for landing but only about 10 knots, so that wouldn't be any problem, and would save us about 5 minutes of flying time.

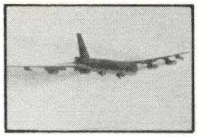
As we were on a wide left base leg and starting our turn to final, we entered the shower. "Okay, kid" I started to think myself through to the landing, "you're at 150 knots, 25° of bank and looking good. The copilot turned on the windshield wipers before you could ask for them. Guess he's even more ahead of the plane than I am. Better make this a good one, since you've been preaching techniques to the copilot, so it's either put up or shut up. You're rolling out on final, reducing airspeed to 132 knots and looking good. Okay, you have the airspeed pegged and a good glide-path. The runway is kind of hard to see with this rain, but I have the field and we'll break out of the shower at about a mile on final to make any last minute minor corrections. Now, what have you been preaching that needs practicing? Let's see, airspeed 132 knots, TACAN with a correction for its position on the field has us 3 miles on final, ADF is pointing the right direction, gear is down, altitude a hundred feet, flaps set, checklist is all compl . . . ONE HUNDRED FEET!"

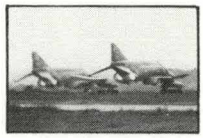
I went on the gauges, increased power, set up a slight climb and, when we broke out of the rain at 1 mile on final, I was up to a normal glidepath. The landing was uneventful. As we shut down engines, I tested to see if my voice was back to normal and then asked the crew if they had noticed anything abnormal about the approach. The copilot, flight engineer and navigator all answered in the negative. At 3 miles final with only slightly restricted (we thought) visibility, we were 800 feet below a normal glideslope, 100 feet above the water and everything looked completely normal to four experienced aviators. At the time I initiated power application, we were in a 500 fpm descent meaning we were 12 seconds from striking the water.

How many accidents under the classification of "landed short" have been caused by just this same phenomenon of improper/apparent glideslope perception due to reduced visibility? For once, my preaching about using all available instruments for information had paid off. I do not quibble over the fact that I should have avoided the shower visually or requested an instrument approach. My complacency concerning tactical flying was instantly dissolved as well as the assumption that I couldn't make a mistake while on a simple VFR landing. There are no longer any milk runs. Some approaches and landings will be easier than others, but there will never again be a milk run for me. ■

OPS topics





MOVE OVER, RUDOLPH

■ Finding from a Mishap Report on a collision between a landing aircraft and a deer: "Shortly after touch down, a deer ran into the mishap aircraft." Move over, Rudolph, you've competition.

RWY XING—LOOK OUT FOR THE PLANES

■ Investigation of a near miss between a truck and an RF-4C on takeoff revealed some holes in the system that needed to be plugged. The tower controller cleared a barrier maintenance truck to enter the runway. He then went to the tape room to check a recorder but forgot to place the "VEHICLE ON RUNWAY" sign on the console. When the controller returned, the aircraft called ready for takeoff and was cleared. While the aircraft was rolling, the truck reentered the runway. The aircraft went by the truck just as the truck was leaving the runway. The policy was that once a vehicle was cleared onto the runway it could enter and exit at will. Now all vehicles must get clearance every time the driver wants to enter the runway. Also, the smart driver would look both ways—just as at a RR crossing.

HUMAN ERROR

■ With the number of 'dromes that have parallel/multi runway operations, this is an appropriate topic. The left runway had been closed for an emergency, one aircraft was cleared to land and then the SOF was cleared on to make a runway FOD check. About the same time, a flight of two pitched and lead was cleared to land on the right. Number two called gear checked and was then cleared to land on the *left*. The controller was sure he had cleared Two to land on the right behind number one, but the tapes confirmed that the clearance had actually been for the left. The number two aircraft landed and missed the SOF truck by about 20 feet! Double lesson—controllers need to take extra care with landing and takeoff clearances to multiple runways. Crews—don't restrict the eyeball searches to the sky; clear the runway visually in the final turn for aircraft, vehicles, animals, etc..

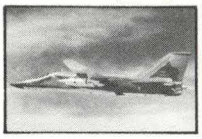
CONFUSION MUST NOT REIGN

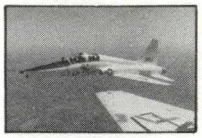
■ One can understand how a controller might confuse two aircraft in flight of two, numbered, of course, one and two. In this case Alpha 2 was a few miles ahead of Alpha 1 and both were being vectored. One of the pilots realized something was wrong when he saw the airpatch passing off his wing and that he was crossing the TACAN radial. After some conversation, the controller realized he had confused the aircraft and issued new vectors. Meanwhile, however, Alpha 2 found himself on a collision course with a nearby mountain. Glad the WX wasn't IMC. Who knows?

LESSON RELEARNED

■ Many years ago we were losing T-33s and didn't know why. A typical scenario went like this: Night, weather maybe, but not always, turn out of traffic after takeoff, aircraft crashes and burns. Pilot does not escape. Finally, someone figured out that about the time the pilot was making his initial turn after takeoff he had to make a frequency change. That required him to look back and down which sometimes led to dis-








orientation and a crash. Recognition of the problem helped solve it, but the potential still exists, and we must be aware of it from drawing board, through test, and into operational use. Here's why. Shortly after takeoff, departure asked a flight of four to turn off their IFFs except for lead. Departure was having radar trouble. The flight entered clouds and nr 4 went lost wingman followed shortly by nr 3. Once the flight leveled in the clear, nr 3 rejoined, but there was no further word from nr 4. The aircraft had crashed with the pilot in his seat. A possible cause was that the pilot, in clouds, became disoriented when he moved his head to check the IFF switch.

WRONG BUTTON

■ Not the first, and probably not the last, but bears reemphasis. The F-4 jock was on a tactical qual check and hit the "panic" button instead of the nuclear jettison button while backing up the release. The bags landed on the range with no further damage. Take care with the magic buttons and switches.

MENTAL OVERLOAD

■ This jock was being vectored around low-altitude for an approach and full stop at a joint use field. During the course of vectoring, a requested speed reduction, and some instrument problems, the pilot extended and retracted the gear several times. After the last retraction the pilot punched off the gear horn and then flew the approach to a "smooth" gear-up landing. RSU had been unable to see the landing aircraft gear position due to water spray cloud created by a departing airliner. Another case of pure and simple distraction by intra- and extra- cockpit happenings. Also, *when landing,* you turn that obnoxious horn off with the gear handle!

COULD HAVE BLOWN HIS WHOLE DAY

■ The crew member was unloading his gear and had stowed an equipment bag along the side of the ejection seat. As he removed the bag, the integrated harness release lever was contacted, the zero delay initiator fired and the man seat separator was actuated. Only replacement of charges was required, but the point is – take care in the stowage of gear, pins, checklists and other junk. It could foul up the machinery and work when you don't need it or *not* work when you do.

A BUS AND A POST

■ Once upon a time, one Murphy uttered a profound statement which was immediately proclaimed by the King to be an irrefutable law. There are many versions as to what Murphy really said. Here's one translation: *If there is an object on an airfield that can be struck by an airplane – it will be.* For example, a C-141 was taxiing to a parking spot. As the aircraft made the last of three 90° turns, the left wing struck a parked bus. There was a marshaller, no wing walkers, the light was poor and the A/C and scanner *thought* there was enough clearance. There wasn't.

Fighters, too, blunder into things on the airpatch. An F-15 managed to ding a wing on a fence post. The aircraft was turning into a quick turn spot. The pilot didn't see the post and the marshaller had moved from

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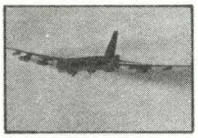
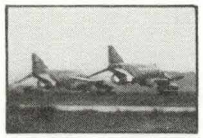




the pilot's one o'clock to his 11 o'clock position. This put the aircraft between the marshaller and the post. There must be a better way.

LEAKER

■ Passengers on aircraft sometimes carry strange things. But an automobile battery?? The battery was in a box, but when the passenger changed planes at an intermediate stop, the crew of the next aircraft discovered the box was wet from electrolyte. Also, fluid was found on the floor of the forward baggage compartment. The A/C of the C-9A then refused to allow the battery aboard. Crews must be vigilant because pax don't all realize what happens to fluids in closed containers at altitude.

BELTIN' BUZZARD

■ Here's what happened when an F-4 and a buzzard collided. The canopy plexiglas shattered leaving a hole approximately 2 feet long (front to back) and 2½ feet wide (top to bottom). An immediate climb and throttle back was accomplished and an emergency declared. The aircraft was led back to base for a straight-in approach and uneventful landing. Both crewmen were unhurt.

LIGHTNING STRIKE

■ What's it like when your aircraft takes a lightning strike? The aircraft was struck just after entering a heavy rain shower at 9,000 msl. According to the pilot, the flash appeared to go over his head and he was aware of a tingly feeling. Both aircraft altitude indicators tumbled, accompanied by loss of directional gyros. The radar scope remained on and the stable platform continued to operate normally. The pilot used the radar artificial horizon, pitot instruments and the turn-and-slip indicator to maintain aircraft control. The pilot informed RAPCON of the lightning strike and requested a no-gyro ASR approach. The attitude and directional gyros started erection cycles approximately 30 seconds after the lightning strike and were completely erected in two minutes. Recovery and landing were accomplished with all systems functioning normally. At no time prior to or after the lightning strike did the pilot encounter any turbulence associated with the weather conditions.

A HAIL OF A PROBLEM

■ July is right in the middle of the hail season in the northern hemisphere. The season starts in late spring and is just about over by the end of September. When we were flying lower and slower in recips, we picked up a lot of hail damage. Now, such damage is fairly rare. However, that can lead to complacency and/or a lack of appreciation as to what those balls of ice can do to an airplane – any airplane. The answer, of course, is *avoid hail locations*. Pay close attention to the WX briefing; approaching Cu, use radar if you have it; otherwise, call metro. Sometimes nothing seems to work and you find yourself facing a line of T storms. Don't go for the sucker hole. Best bet is to do a 360 to gain altitude and top the weather. Try a trough and, if hail is present, expect it both in the cloud and downwind in the clear. S'no fun explaining all those dents. ■

THE PROFESSIONAL APPROACH

AIR FORCE COMMUNICATIONS SERVICE
SCOTT AFB, IL

X OR Y

■ Have you ever tried to listen to several people who are talking at once? That's what has been happening to some of the black boxes in your aircraft. Proliferation of ground navigational aids has completely saturated the authorized frequency band and created mutual interference problems. Basically three factors combine to create this problem: (1) the limited space available in the frequency spectrum (2) the inability of transmitting equipment to confine emissions in a very narrow band, and (3) inability of avionic receivers to reject all unwanted signals. Nothing can be done about the crowded frequency spectrum; however, technology and a lot of dollars have greatly reduced the impacts of factors 2 and 3.

By using more sophisticated electronic equipment, many of the adjacent frequency interference problems have been eliminated. This has permitted the insertion, in the same frequency band, of additional channels of authorized operating frequencies. You will soon see VOR and ILS frequencies published with an additional digit, such as 109.35. Of course, your avionics will have to be capable of being tuned to the published frequency. In the TACAN/DME band, juggling of the reply frequencies and pulse spacing has allowed the insertion of an additional 126 channels in the same frequency band. These additional channels will operate in the "Y" mode and will be identified by channel number and the "Y" suffix.

For you, the pilot, the only difference between "Y" mode and the "X" mode which has been the standard mode since DME/TACAN inception, will be the DME/TACAN mode selector switch in the cockpit. All newer generation airborne DME/TACAN systems will have an "X-Y" select switch on the control head. The mode selector switch must be placed to the correct mode for the DME/TACAN system to operate correctly.

As with the present "X" mode, the 126 new "Y" mode channels will be frequency paired with the VHF VOR/LOC frequencies when the facilities are colocated. This is done for users who have VOR/DME; the correct DME channel will be automatically tuned when the VOR frequency is selected just as the glide slope frequency will be automatically selected when the localizer is tuned. If DME is installed with a localizer facility, tuning of the localizer receiver will automatically select the paired glide slope frequency as well as the correctly paired DME channel.

Most USAF aircraft have separate control heads for DME/TACAN and VOR/ILS. The frequency/channel selection is made by tuning the individual control heads. Preliminary implementation of the "Y" mode DME/TACAN will be limited to some tactical military situations. Full implementation will require retrofit of ground stations as well as avionics and will not take place for some time. Operation of the newly available VOR/ILS frequencies is contingent only on avionics capability and limited implementation can be expected shortly. There may be a possibility of military only using the "Y" mode paired ILS frequencies. The new total system implementation will be keyed on general aviation use. The following chart shows a sample of some of the ILS frequency pairings and use. Note that the new VHF frequencies, which all end with the digit 5, are paired with DME/TACAN "Y" channels.

Thanks to CMSgt Tony Haus of HQ AFCS/FFOO for this article. If there are questions about X and Y modes, you should direct them to the Chief at AUTOVON 638-4451 or to Flight Standards at AUTOVON 638-5479. ■

VHF/UHF NAVAID FREQUENCY CHANNELING AND PAIRING

Channel	VOR mHz	DME/TACAN				ILS	
		Airborne		Ground			
		Int. Freq. mHz	Pulse Code usec	Reply Freq. mHz	Pulse Code usec	Localizer mHz	Glide Slope mHz
26X		1050	12	987	12	108.9	329.30
26Y		1050	36	1113	30	108.95	329.15
27X	109.00	1051	12	988	12		
27Y	109.05	1051	36	1114	30		
28X		1052	12	989	12	109.1	331.40
28Y		1052	36	1115	30	109.15	331.25
29X	109.2	1053	12	990	12		
29Y	109.25	1053	36	1116	30		
30X		1054	12	991	12	109.3	332.00
30Y		1054	36	1117	30	109.35	331.85
31X	109.4	1055	12	992	12		
31Y	109.45	1055	36	1118	30		
32X		1056	12	993	12		
32Y		1056	36	1119	30	109.50	332.60
33X	109.6	1057	12	994	12	109.55	332.45

NEWS FOR CREWS

Career information and tips from the folks at Air Force Manpower and Personnel Center, Randolph AFB, TX.

COLONEL HENRY VICCELLIO, JR.
Chief, Rated Officer Career Management

ENHANCING THE RATED OFFICER'S ROLE IN THE ASSIGNMENT PROCESS

■ The centralized assignment mode we operate under today at AFMPC offers lots of benefits that can't be attained in any other way. These benefits become increasingly important as our rated inventory – both pilots and navs – falls below our total requirement. While UPT/UNT rate increases are programmed downstream and will help somewhat, the shortages are real and are here today. Finding the right person for the job is much easier when one agency that's both familiar with and responsible for filling the requirements of *all* users can look at the total resource to select and assign. All classic jokes about the "big picture" aside, it really works well when things get tight, as they are now.

At the same time, however, centralized assignments don't come without costs. While a few perceived problems still stem from a more traditional view of decentralized resource management, a more individually oriented set of concerns is the central topic of this article. In essence, many rated officers today feel that their role in the assignment process is unsatisfactory. If serving for nothing else, I hope this article convinces you that changing that perception currently has not only my top priority, but the dedicated support of the officers, airmen, and civilians who work with me here at AFMPC.

The perception that things aren't right is expressed in many ways. In the year and a half that I've been here at MPC, I've heard the most common complaints many times over:

■ "I don't understand how you guys operate – my assignment just doesn't make any sense!"

■ "Doesn't anybody read my Form 90? I don't want a staff job!"

■ "I can't ever talk to anyone at MPC – the phones are always busy."

■ "You guys will never convince me that the computer didn't make my assignment!"

In trying to cut through the emotionalism that often clouds real reasons for dissatisfaction, several points stand clear. First, rated officers need and want to know more about the assignment process – what the requirement structure really looks like, what jobs are available, and how assignments are made. Second, communication between rated officers and their resource managers needs to be improved – the Form 90 will be revised to make it more compatible with our new procedure, its use by officers should be improved, and we see more written or telephone contact during the assignment cycle as essential. Finally, the immediate commander's role in assignments could stand some improvement. Often he could or should provide a decisive input, but has no institutional way of doing so.

We've implemented several key initiatives over the last 18 months to help combat these problems, and they've proven productive. First, we've expanded our "spread-the-word" effort, which is primarily aimed at the education and communication shortfalls I mentioned above. From 34 trips to the field in '77 we increased to 176 in '78, and are on the same fast track in '79. If you haven't seen one of us in the last year or so, you're in a decided minority, since we've looked over 20,000 rated officers in the eye during that period. While there will always be come disgruntled souls and B.S. flags, the feedback from these trips has been overwhelmingly positive. I hope the USAFE officer who complained to the *AF Times* last year about MPC's "sunshine briefings" caught our act, because our money is made by telling it like it is – and most people appreciate it.

The second major change in the way we do business is the institution of the Rated Officer Review Board (RORB) – the forum by which we systematically review the records, assignment preferences, and correspondence folders of both the "availables" (officers on the move due to controlled tour completion) and "eligibles" (officers with the first gate met who are PCS-eligible). This forum, which starts off the assignment cycle, has really driven home the point about communication problems – over half of *all* rated officers have a Form 90 that's over 2 years old, and a much higher percentage are unusable due to outdated or unrealistic assignment preferences. We've got to change that picture if the RORB or any other improvements are to realize their full potential.

Although these two initiatives have helped us to recognize and often overcome the problems of education and communication, they've also convinced us that there's lots of room for further improvement. Toward that end,

we're instituting some major revisions to the assignment process that are aimed at enhancing the role of both the rated officer and his immediate commander. As with the spread-the-word and RORB efforts, our basic goals are education, communication, and participation. We don't feel that we're shooting in the dark, either. Our ideas come from some very solid successes we've had when events, timing, and resources allow us to really concentrate on a relatively small group of rated officers. Assignments made during recent fighter squadron conversions, in preparation for unit deactivation, or as a part of the SAC northern tier program have been worked more on a face-to-face basis, with resource managers visiting the units or calling individuals one or more times to outline what jobs are realistically available and discuss – one-on-one – assignment preferences and other career development considerations. Higher volunteer rates, more satisfied customers, and fewer separations from such assignment efforts tell us that dramatic improvements in our day-to-day operations are possible. With these successes in mind, our basic game plan is to apply this enhanced approach on a worldwide basis to the maximum extent possible – recognizing that a field trip for a face-to-face discussion on every assignment isn't really feasible.

There are five key elements in our plan for revision. The following is a brief description of these, together with how they will play in the assignment cycle itself:

■ We're developing a document known as the Assignment Information Directory (AID), which will be located at each CBPO and with every flying squadron commander. This document will be updated semiannually and will outline career patterns and assignment options/probabilities for various groups of rated officers. The type of job, geographical locations involved, and required qualifications will be included. What's happening in the Rated Supplement and Departmental/Joint arenas will also be included. The AID is the cornerstone of what we hope to accomplish. It should provide a common point of departure for the individual, commander, and resource managers. We hope it will form the basis for improved and useful communication, be it through message, letter, phone call, or Form 90. Our first attempts may be somewhat rough and wide of the mark. Based on experience and feedback, however, we feel that this document can be made to function as we all need it to.

■ Ten months prior to an individual's available date, or at the point when his/her eligible-for-overseas status indicates potential reassignment, or when he/she becomes among the most eligible volunteers for a projected requirement, we'll send out a letter requesting Form 90 update. This letter will also suggest commander/supervisor involvement and indicate the current edition of the AID as a major source of information on available options. An AFMPC point-of-contact for any discussion during Form 90 completion will also be included. We'll expect an updated Form 90 during the month following notification.

■ A simultaneous letter to the individual's commander or immediate supervisor will advise that the individual is entering the assignment cycle, suggest the commander's participation in Form 90 deliberations, and request a voluntary parallel input on suggested assignment.

■ Although the current Form 90 lends itself to these concepts and procedures, proposed revisions are underway which will enhance the form's utility and adaptability to the Personnel Data System. We sincerely want to overcome the perceived "lip service" or "dream sheet" image of the Form 90 and make it something meaningful. The first few hundred rated officers who get their forms returned due to lack of currency, realism, or utility will hopefully convince the rest that we're serious!

■ If the individual's desires for reassignment as expressed on the Form 90 can't be met, follow-up communication involving the resource manager, the individual, and the commander will ensue so as to either negotiate an alternative or explain the necessity of the mismatch. This is going to be our toughest step. First, we'll have to contact thousands of folks on whom we'd simply lay an assignment under past practices. The "best interests of the Air Force" may still be our bottom line, but we're taking on an expanded responsibility to explain – hopefully to your satisfaction – the "whys" and alternatives when your desires can't be matched. How well we meet this challenge remains to be seen, but I guarantee our very best shot.

Realizing that this revision represents a major change in the way we do business, a few preparatory steps are currently underway. First, we plan on adding a few more resource managers and NCOs to handle the increased administrative load. We're expanding our telephone capability to include priority overseas AUTOVON lines to enhance communication prospects. Most importantly – at least from our view – we're going to ease into the program. We're going to start working all European returnees and the worldwide FAC/ALO force in June. Since the program has a 10-month lead time, we're talking about April 1980 DEROS or FAC/ALO tour completions. Our test group will involve rated officers of all backgrounds and in all jobs, rated or supplement. If the ideas prove practical, we plan to expand the new approach to all rated officer assignments by September of this year.

In summary, we feel we're setting off on a rather ambitious project, but one that offers a good chance for success – from everybody's viewpoint. The feedback from our numerous visits to your units and the successes we've had in particular circumstances convince us there is both need and room for improvement. We're hoping that the elements of our game plan will provide what's needed: more information about slots you qualify for (the AID), notification to you and your commander when

continued on page 22

MAIL & MISCELLANEOUS

CHAIN TO DEATH (AEROSPACE SAFETY, MAR 79)

■ Although I agree with Maj Harvell's thesis in the subject article, he makes a statement which caught my attention as being invalid. In his story, the aircraft was below minimum control speed at the time of loss of two engines. This made the accident "inevitable."

In my opinion the accident was inevitable, only in that the pilot was not trained or self-conditioned to realize directional control problems can be corrected with power as well as conventional control surfaces. Time and time again, we read of accidents very similar to this where the reduction of power would have permitted the pilot to maintain control. Admittedly it would not always avoid an accident, but the pilot could at least execute a controlled crash which would improve the probability of survival.

As in any emergency, one fares much better if the mind has been conditioned to respond. It behooves all multi-pilots to train themselves to think in terms of throttles for directional control when "full everything else" doesn't get it.

RICHARD E. NADIG, Lt Col, USAF
Sacramento Air Logistics Center
McClellan AFB, CA

Lt Col Nadig makes an excellent point when he states "It behooves all multiengine pilots to train themselves to think in terms of throttles for directional control when 'full everything else' doesn't get it." You have to fly the airplane until it stops; then you must get "the heck" out of there in the most expeditious manner. However, the conclusion that this accident was inevitable at the time of loss of two engines, along with the facts of this mishap, was taken directly from the Air Force mishap investigation report reflecting the opinion of the experts on the mishap investigation board.

I appreciate his response to the article, and I'm going to incorporate his ideas in my emergency response training.

KENNETH S. HARVELL, Major, USAF
20th Bomb Squadron
Carswell AFB, TX

FREE PEN AND PENCIL SETS

Aerospace Safety magazine is produced for aircrews and the people supporting them in such fields as air traffic control, life support and flight operations, and commanders and supervisors of aircrew personnel.

We attempt to print educational material of value to our readers in the prevention of aircraft mishaps. Some articles are short and simple; occasionally, because of the subject, an article will be fairly long and somewhat complicated. Harder to read and comprehend. We offer these because military air operations are not always short and simple. Sometimes intense concentration and study are required to master the nuances of a technical article. But we firmly believe that the more one knows about the many facets of aircraft operation, the better equipped to safely complete the mission – every time.

We invite you to comment on the magazine contents, and solicit your ideas for subjects you'd like to see covered. We also invite you to write for *Aerospace Safety*. We can't pay for articles but we will send a high quality pen and pencil set to authors of published articles. For more info write or call AUTOVON 876-2633. Thanks. ■

News For Crews continued from page 21

you're coming up for likely reassignment, a revised Form 90 to help you better frame your desires, and, finally, as much direct communication as needed between you and the guy here at MPC that'll make your next assignment. It's not so important that we reduce the number of witty comments or complaints about our services. What is important is that only through active involvement among you, us, and your commander can we all work toward increasing your understanding of and satisfaction with that next assignment. Let's get and stay in touch. ■

ABOUT THE AUTHOR

Colonel Viccellio is currently Chief of Rated Officer Career Management at AF MPC, and is the key driver behind the institution of this new assignment process. 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.

Laghtnin' Straaks

■ During the recent penetration of the Venusian atmosphere by NASA probes, lightning seems to have been detected. If so, Venus and Earth have something in common.

Let's imagine what it's like on our neighboring planet where the weather is IMC 100 percent of the time. Joe Smud'lipl, Capitan Venusian Air Force, faghter palot, 1st Class, is on a terrain following practice mission. The aircraft leaps over volcanoes and dips down into valleys covered with smoldering boulders. Suddenly the aircraft pitchs up and gains 1,000 feet before Smud'lipl can override and level out. Then it encounters a shower of liquid sulfur and sulfuric acid. As the aircraft exits the shower, there is a tremendous flash and a loud bang.

Capitan Smud'lipl immediately aborts the mission and RTB, where the maintenance and safety folks gather around, look at some holes burned at the base of the pitot probe and sagely agree: laghtnin' straak.

Meanwhile, a crew on Earth was climbing in IMC when they broke out and saw a buildup straight ahead. The IP immediately began a turn and advised Center. Just then the crew saw a flash at 12 o'clock and heard a bang. The right engine rolled back and flamed out.

After declaring an emergency and restarting the engine, the aircraft returned to home base. No engine damage could be found, and it was theorized that the combination of the turn and lightning strike disrupted the air flow and caused the flameout.

What probably happened to both these aircraft was that they became links in the connecting channels between cloud and ground. Lightning is just a long electrical spark between centers of opposite polarity (figure 1). If the aircraft is near the charge center or an advancing leader (the traveling spark), the aircraft may become a part of the conductive path. When the current reaches an opposite charge, there is a return stroke which is responsible for the bright flash and loud bang.

Most strikes occur in clouds, but sometimes they happen in the clear, miles from a cloud. Most strikes occur between 5,000 and 15,000 feet, but they also have been reported from 1,000 feet to over 37,000 feet. Usually the outside air temperature is within a few degrees of 0°C.

The best way to avoid a strike is *avoid thunderstorms.* Give them a wide berth; otherwise, you may take a strike miles from the nearest cloud. Another technique is to stay away from the 0° level in weather. However, that is no guarantee, since the second example given above (the one on Earth) occurred when the aircraft was 10,000 feet above the freezing level.

Think of the typical aircraft lightning strike:

> Aircraft flying at 10,000 to 15,000 feet, within a cloud, experiencing light rain and light turbulence and the OAT is near 0°C.

Don't be disappointed if your aircraft has never been struck. Sometime, someplace when you least expect it, it will! ■

Fig. 2. Altitude where most strikes occur

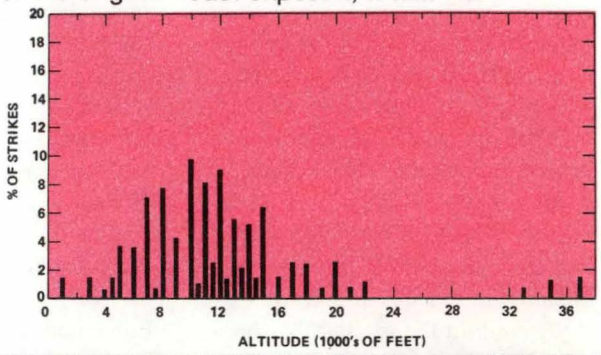
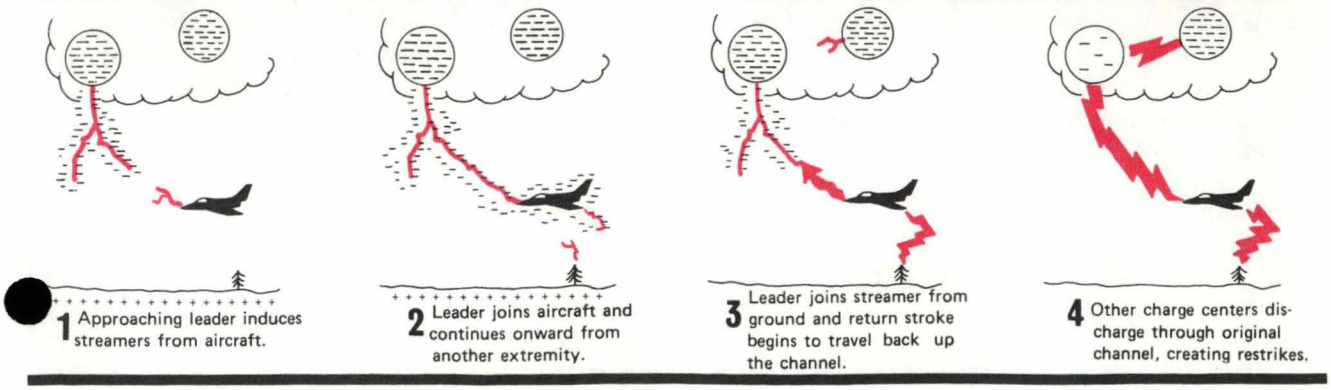


Fig. 1. Strike sequence.



SURVIVAL

The Sea and Thee

SSGT ALFREDO VARGAS
Operations and Requirements Branch
3636th Combat Crew Training Wing
Fairchild AFB, WA

■ The impact and the cold water took Captain Salvo's breath away, but before he was completely submerged he released both sides of his parachute and waited to surface – waited – and waited. Just before panic set in, he realized that he had not inflated his LPUs. He instantly started looking for those little black knobs. It was only seconds until he found them, but to Captain Salvo it seemed like an eon. Once he activated them he popped to the surface. All he could think of was how good it was to breathe.

Although he was pleased to have landed and have his head above water, he was in shock. He made no effort to organize his predicament. He just stared at the horizon. The blending of the ocean and the dark sky gave him the feeling that he was in a dark blue bottle. This feeling was so intense that his parachute harness, LPU, vest, and helmet seemed to crowd and confine him. In an attempt to relieve this anxiety, he removed his helmet. The cold wind which chilled his soaked head brought him back to reality, but once again he looked at the dark clouds which were still as ominous as they were when he first entered them in his Dart.

Captain Salvo had experienced Saint Elmo's fire, but getting hit by lightning was something else! Every instrument in the cockpit went out which left him completely disoriented. He ejected.

He landed in front of the storm, but he knew it wouldn't be long before it would sweep over him. His raft was nearby so he started to swim toward it. After numerous unsuccessful attempts, he remembered the lanyard tying him to the raft. After that, it was easy – that is, until he attempted to climb into the thing. Every time he pushed the small end of the raft down into the water, the wind which was now gusting would blow it into him and eventually over his head. In the pool during continuation training he had no trouble. This was different. Frustrated, he pulled the raft toward him and was about to try to board it again when he spotted his open J-1's (quick releases). The closing of the J-1's was like a proverbial "light bulb" for he remembered that the wind had to be at his back when boarding a raft.

Once in his raft, he let out the sea anchor and attempted to make radio contact, but to no avail. He brought in the rucksack containing the survival gear and inventoried the equipment in both his vest and the rucksack (see list on next page).

The wind and the waves increased and the cold was beginning to reach his bones; therefore, he tucked all the gear between his legs and proceeded to inflate the floor and was working on the spray shield when the world fell out from under him. From out of nowhere came huge waves. One moment he was at the crest of a wave and then he was in the trough, landing with a slap so hard that he almost swallowed the oral inflation tube. Before he could recover he was engulfed by a wall of water which pushed him down and under. Ten gallons later he surfaced, no longer in his raft.

Just as he pulled the raft to him and was at the top of another wave, the raft was jerked out of his hands. Had he held on, it would have been an instant replay. As he crested the next wave he spotted the culprit. When his raft was at the crest of a wave, the anchor was on the crest of the following wave and in the trough when the raft was in the trough. This caused the anchor to pull the raft through the wave. After some effort, he pulled in the anchor and boarded the raft. He didn't want to drift with the storm so he let the anchor out, adjusting it so it would be in the crest when he was in the

trough and vice versa.

With the inflation of the spray shield complete he began to feel better. He bailed most of the water out of the raft with his helmet, which seemed to make the raft bounce more, so he let some of the air out of the raft. More comfortable, he settled back and he pulled in his rucksack, only to find it empty. He'd left the zipper open! All he could do was to console himself by knowing he still had all his signaling equipment in his vest. He kept looking and listening for help to arrive, but could see only dark angry clouds being twisted and turned by cold wind. The rain, which had been hard to differentiate from the ocean spray, was now a driving rain that smarted on every exposed part of his body.

He could feel the raft bottom fall out from under him from time-to-time so he knew it was time to readjust the sea anchor. However, the wind, rain, and periodic thunder convinced him to postpone it for a while and instead, try to conserve what little heat his body could produce. He completely enclosed himself within the spray shield.

Just as he started to feel warmer, his stomach began to rebel and he anxiously pulled on the velcro which held the shield closed. While flailing around trying to get his head out, he overturned the raft and found himself trying to vomit underwater. The wind, blasting spray and rain on his face, accompanied by what now seemed extremely loud thunder, nearly drove him to panic. Turning downwind, he spotted his raft and proceeded to pull it towards him. The cold made every part of his body stiff and painful. Captain Salvo's efforts to get into the raft were in slow motion when compared to the movement of the raging sea, but somehow he managed and again adjusted the anchor. Cold and weak from frequent vomiting, all he could do was huddle inside the raft.

Although dazed and weak, he realized he needed water to drink; however, the thought that he would not be out there long cancelled any effort to procure rain water. By nightfall, he was only semiconscious but he could sense and feel that the storm was beginning to subside and this increased his hope of being rescued. As the storm decreased to a soft rain, Captain Salvo tried to relieve the burning in his throat by drinking water which collected in the indentations of the spray shield, but ceased when the salty taste irritated his swollen throat and tongue. He realized how swollen it was when he tried to transmit on the radio and could barely speak. He did the next best thing and that was transmit a beeper tone every few minutes.

The search aircraft which first located Captain Salvo did so because they picked up a weak beeper tone which was barely audible. They figured it had been on all night.

Captain Salvo made some serious mistakes – but he did some things right, too. The closing of the J-1's prevented the puncture of his raft and possibly his LPU's. His failure to close his rucksack, combined with the initial maladjustment of the sea anchor, caused the loss of his equipment (primarily his 2 cans of water). In spite of all this, things didn't get serious until he failed to prepare for an extended survival situation by replenishing his lost body fluids. The lower the fluid level in the body, the more difficult it is to replace. Therefore, it is important to take small drinks continuously, especially if you're vomiting.

We all must realize that not only does it behoove us to maintain ourselves in excellent physical and mental condition to do our job, but to know the operation of those things we have to do our job with. Should we ever find ourselves in a true survival situation, the maintenance of these ideals (physical and mental capabilities) can easily mean success or failure. Now's the time to prepare for that thing that only happens to "the other guy." ■

SURVIVAL CHECKLISTS

SURVIVAL KIT	VEST
Life Raft	PRC 90
Sleeping Bag	Gyro Jet Flares
Matches	Mark 13 Flares
Raft Repair Plug	Compass
Sea Dye Marker	Tourniquet
AFM 64-5	Two Fire Starters (N-2)
Desalter Kit	Matches
Wool Socks	Whistle
Space Blanket	Strobe Light
Snow Goggles	Mirror
5″ Knife	MC-1 Knife
File	(Switch Blade)
Fishing Kit	2 Quart Water Bag
URT-33C	
Water Can	

Off-base crash response
FOR WANT OF A NAIL

LT COL CLEVELAND SIMPSON
Directorate of Aerospace Safety

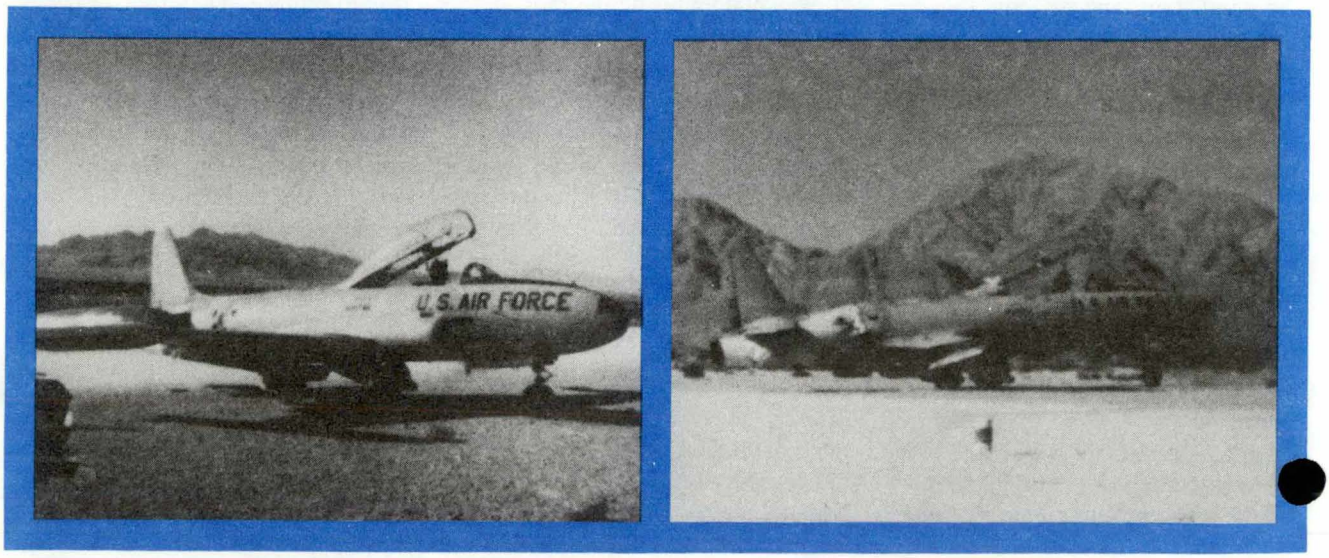
■ Everyone knows the old, proverbial story about the events that transpired when the horse lost a shoe for want of a nail. While this may seem far removed from the business of aerospace safety, a recent aircraft mishap was disturbingly similar and sharply illustrated the moral of the story.

The mishap involved a T-33 on a cross-country navigation proficiency flight which suffered an engine failure in flight. The aircraft had just departed on the first leg of the flight and was passing through 28,000 feet at full throttle when the pilot heard a loud explosion. This was followed immediately by several aircraft vibrations and a rollback in engine rpm. The pilot moved the throttle to idle, engaged the gang-start switch, and lowered the nose of the aircraft to obtain glide speed.

Although there was no fire or overheat light illuminated at the time, an emergency was declared with the controlling center as airstart procedures were continued without success. Unable to restart the engine, the pilot left the throttle at idle and flew a flameout pattern to a successful landing on a dirt runway at a small civilian airport.

This would normally mark the end to most in-flight emergencies, since getting the aircraft on the ground successfully is the most important part of the battle. However, that was not to be the case in this instance as, unknown to the pilot, an internal engine fire had developed while the aircraft was still in flight. The fire apparently started from engine oil escaping into the hot section through a crushed number 4 bearing. It was subsequently determined that the bearing was crushed as the result of a failed turbine wheel. The failed turbine wheel also released three turbine blades which tore a hole in the right side of the fuselage.

The first indication of an aircraft fire had come via a citizens band (CB) radio transmission from an unidentified motorist who observed the aircraft during the flameout landing. The CB transmission was noted by a volunteer fireman living approximately 7 miles from the civilian airfield, and crash response procedures were initiated in accordance with an agreement for mutual aid in fire protection between the nearest Air Force base and county fire department authorities. The pilot became aware of the fire when smoke billowed forward into the cockpit as he opened the canopy. In addition, while egressing, he noticed small flames in the



turbine seciton of the engine through the hole in the side of the aircraft.

Firefighting equipment was dispatched to the mishap scene from two civilian units, one located 7 miles away and one located 25 miles away, with the first equipment arriving shortly after the aircraft landed. From this point on confusion set in, and the situation rapidly deteriorated.

First, the pilot contacted the nearest Air Force installation (40 miles away) and informed the command post that he had landed safely and needed firefighting equipment, since the civilian field had none and the aircraft was still smoldering. The command post informed the pilot that firefighting assistance was on the way, and that a rescue helicopter was on its way to pick him up.

Second, the first civilian firefighting unit to arrive on the scene discovered that their equipment was not adequate to contain an aircraft fire. This information was relayed to the base command post; however, civilian authorities stated that there should be no problem once equipment from the second unit arrived.

In the meantime, the initial, oil-fed engine fire gained in intensity and gradually spread, feeding on fuel and magnesium components in the aircraft structure.

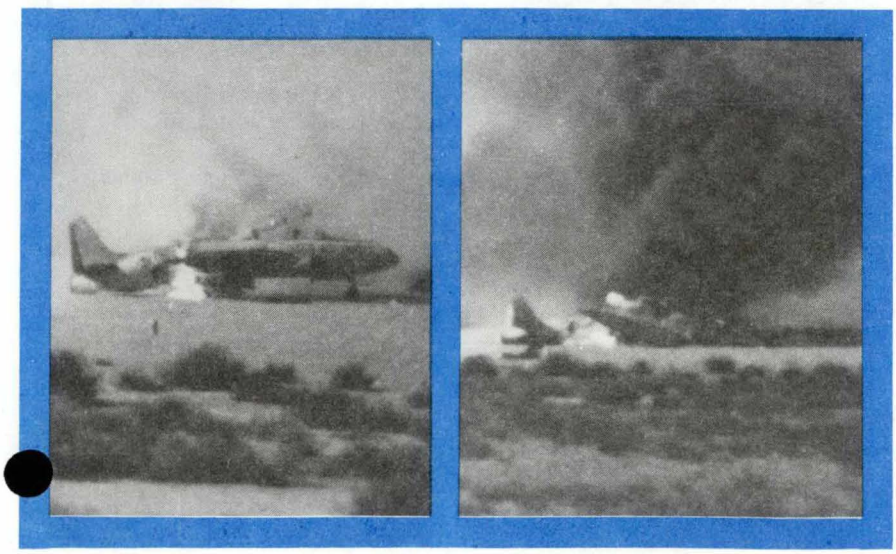
Equipment from the second civilian firefighting unit finally arrived; however, it was discovered that it, like the first, was also inadequate to contain an aircraft fire. As a result, no attempt was made to extinguish the fire and the aircraft became totally engulfed in flames. Civilian authorities subsequently contacted base authorities via the civil defense net and requested equipment to fight a magnesium fire. By this time, the aircraft was 70 to 90 percent destroyed.

Military firefighting equipment with aircraft fire suppression capability was then dispatched from the base — more than 2½ hours after the command post received initial notification! Unfortunately, the aircraft was totally destroyed before the base equipment arrived on the scene.

This mishap is an unfortunate example where a fairly minor inflight emergency was allowed to develop into a major mishap because of inadequate crash response. The pilot did an outstanding job of handling the in-flight emergency and getting the aircraft on the ground. From that point on, it should have been routine for military and civilian firefighting authorities to control the engine fire and limit aircraft damage. Adequate plans/mutual aid agreements had been established to handle contingencies such as this; however, they were not executed properly by either the base or civilian authorities.

Early in the mishap sequence, no attempt was made to determine the type equipment required or that such equipment had, in fact, been dispatched. As a result of this incomplete coordination/communication, equipment dispatched to the scene was not adequate to suppress an aircraft fire. Although civilian authorities responded to the emergency in accordance with the intent of a mutual aid agreement, they failed to first determine the type equipment required. For their part, base officials not only failed to verify the adequacy of the dispatched civilian equipment, they also failed to dispatch necessary equipment from the base until too late to save the aircraft.

The lessons of this mishap are obvious. Units must not only ensure that adequate plans for mutual aid in fire protection and off-base crash response are established, they must also ensure that these plans are executed properly and expeditiously once an emergency occurs. Had this been done in the case of this mishap, damage could have been minimized and a valuable aircraft could have been saved. ■



For want of communication and coordination, confusion set in. Here are the dramatic and frustrating consequences.

Letters To Rex

Neat Preflight Planning Technique

■ Walking through the Flight Planning Room the other day, I noticed a transient aviator taking an extra step in his preflight planning. He said it was an old trick, but I thought I'd share it with you. He had taken the SID he was planning to use and was comparing it with an instrument approach chart for the airfield. Obstructions for the field were not on the SID, but they are on the approach plate. The approach plate also shows minimum and emergency safe altitudes as well as bearing and distance to local NAVAIDS. He was also getting a quick familiarization with the approaches available in case a landing became necessary immediately after takeoff. He stated that this step took only a couple of minutes and was well worth the effort.

Chief Airfield Management

Dear Chief,

You bet! Any extra info that aviators can obtain and digest prior to takeoff is super insurance!

VIP Flights Advance Notices

On occasion, many of your readers transport VIPs around and might, therefore, profit from the following saga: A T-39, Code 4 aboard, was inbound to Zippo AFB with an ETA of 1000L. When the aircraft was approximately 150 miles away, somewhere near Snart, WV (which is near Zummie AFB, WV), the pilot contacted Zummie Base Ops on pilot-to-dispatcher and requested that they advise Zippo that the aircraft would be 35 minutes early. The word Zippo got, however, was that the aircraft would be 5 minutes early. An aircraft that is 5 minutes early is nothing to get excited about but one 35 minutes early, especially carrying a Code 4, does create excitement. Anyway, the aircraft sure enough arrived 35 minutes early and nobody, save one captain from Base Ops, was out to meet the Code 4. Well, in short, the VIP was upset because he was on a tight schedule and Base Ops spent the next 2 hours trying to figure out what happened. The pilot was on the right track when he called Zummie Base Ops. If, however, he had advised Zippo 15 or 20 minutes out, Zippo would have been ready. This same situation can occur on flights of short duration, i.e., Kelly to Randolph or Norton to Las Vegas. In this situation, ask the Base Operations personnel to advise the inbound base on the AUTOVON that you are inbound carrying a VIP. The destination base will certainly appreciate the advance notice and, of course, the VIP will see what a super planner the pilot is.

Scarred Protocol Type

Dear Scarred,

Good point!

Tip of the Hat to Grissom AFB

Just wanted to pass on some good words about the TA folks at Grissom AFB, IN. One of my crews recently diverted their T-39 into Grissom with hydraulic problems. Even tho a transient aircraft, the crew (and broken machine) received superb assistance in getting back on the road again. If you can pass on my thanks, please do!

T-39 Det CO

Dear CO,

Done, and thanx. ■

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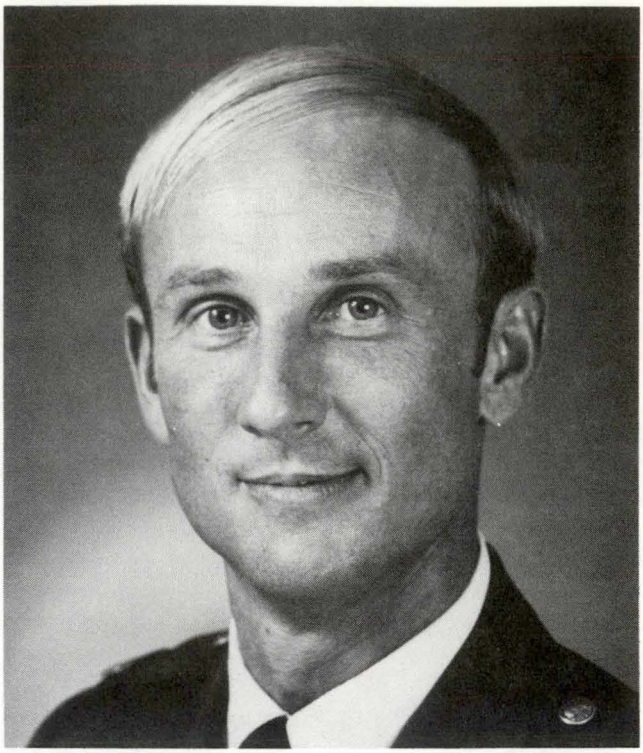

CAPTAIN

Robert D. Williams

461st Tactical Fighter Training Squadron (TAC)
Luke Air Force Base, Arizona

■ On 3 August 1978, after a normal runup, takeoff and climb to approximately 100 feet in an F-15A, Captain Williams' aircraft developed a critical loss of thrust and began settling toward the ground. The rpm gauges revealed both engines winding down. Suspecting double engine stagnation, Captain Williams rapidly retarded both throttles to idle and readvanced them to check for any response. The left engine had stagnated and, therefore, did not respond; the right engine accelerated to 85 percent and began surging violently. To further complicate matters, the control augmentation system had disengaged, and attempts at resetting it were unsuccessful. By this time, his aircraft had settled to an altitude of 50 feet above the ground. He retarded the right throttle once again and by carefully advancing it was able to coax 83 percent power from that engine without the accompanying surges. Resisting the urge to pull the nose up, Captain Williams played his pitch attitude to maintain 160-165 KIAS. Once achieving 83 percent on the right engine, he was able to level the aircraft by reference to the heads up display and accelerate to 170-175 KIAS. He then initiated a slight climb and a right turn to downwind. After locating a clear area, he jettisoned the centerline fuel tank. The right engine again began surging and was cleared by cycling the right throttle. The reduction in weight enabled Captain Williams to accelerate to 190 KIAS and climb still farther to 200 feet AGL where he initiated fuel dump procedures. As he turned to final approach, Captain Williams lowered his landing gear and terminated fuel dump procedures. His landing was uneventful. The superior airmanship, prompt reaction to a critical emergency, and professional competence demonstrated by Captain Williams resulted in the saving of a valuable aircraft and averted possible injury or loss of life. WELL DONE! ■

A LIFE SCIENCES SPECIAL REPORT

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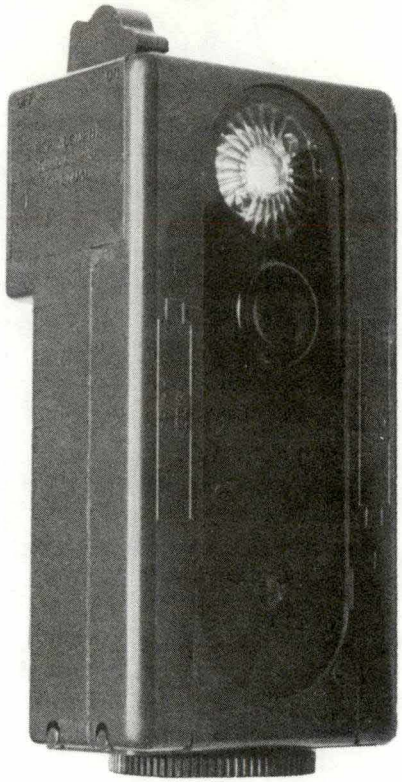
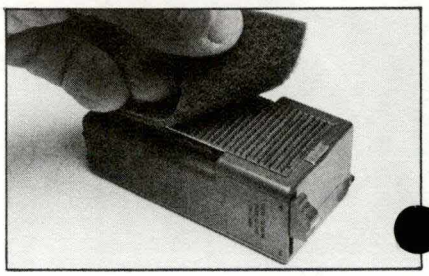
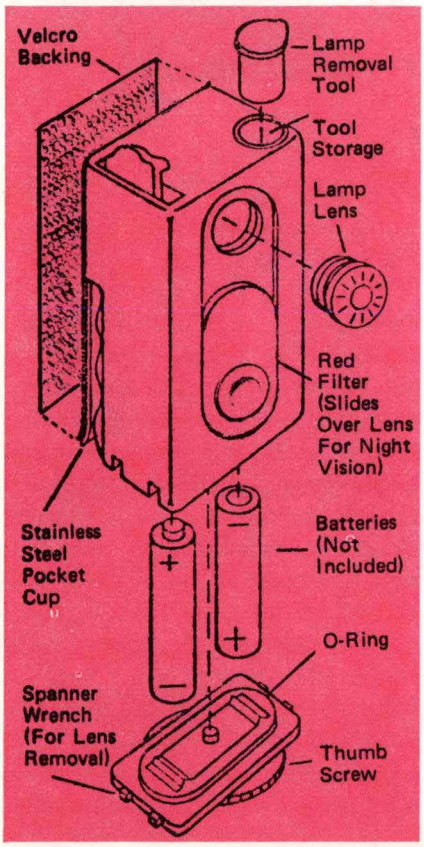


CREW LIGHT





Announcing the light designed especially for aircrew members

If you're a USAF flight crew member that is really in the dark, here's a super little item that will easily brighten your entire outlook. It's the NEW personal crew light now available through the Federal Supply Catalog. It won't light up the whole world, but it's a handy dandy in a confined cockpit. It will fit into the palm of your hand and has a Velcro backed steel pocket clip for convenient portability.

To highlight some of the outstanding features of this truly utilitarian crew light we'd like to spotlight some of these shining points:

Velcro backing strip for attachment to crew member's chest for hands-free operation.

- Stainless steel clip fastener for attaching to pocket.
- Light weight convenience—4.6 oz (130 grams) including batteries)
- Compact size (3⅝ x 1⅝ x 1 5/16) for easy handling and storage.
- Sliding red filter for maintenance of night vision.
- Waterproof.

USAF LIFE SCIENCES APPROVED

THIS PRODUCT HAS THE OFFICIAL USAF LIFE SCIENCES SEAL OF APPROVAL

Another Fine Product From Your AIR FORCE PROCUREMENT SYSTEM

A WHOLLY OWNED SUBSIDIARY OF THE UNITED STATES GOVERNMENT