A E R O S P A C E

# SAFETY

UNITED STATES AIR FORCE

MARCH 1965

SAFETY

AEROSPACE

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AFRP 62-1 MARCH 1965 VOLUME 21 NUMBER 3


# FALLOUT

### RADIALS vs. MAGNETIC HEADING

*(Quoted here are excerpts from letters to Colonel James G. Fussell, author of a letter titled "Radials vs. Magnetic Headings" which appeared in the January issue.)*

I know you not, but God bless you and yours for a very succinct and accurate description of a situation that's been near and dear to my heart for a long time . . .

**Col Archie M. Burke**
**Commander, Sioux City ADS (SAGE) (ADC), Sioux City Air Base, Iowa**

—

Your letter, subject above, in January AEROSPACE SAFETY was outstanding. I agree with you completely. Most of the people I have flown with have trouble transposing the term radial into a reciprocal magnetic track. A phraseology like track inbound 247 degrees to the Podunk VOR would be a vast improvement . . .

**Maj Charles G. Maynard**
**ACSC, AU, Maxwell AFB, Ala**

—

Have just read your letter in Fallout (January 1964) and agree with you completely. In addition to the "gut gripers" you point out is the type who slips you a clearance change and asks for immediate acknowledgment while you are all elbows and eyeballs trying to locate the new route and hastily computing within 10 seconds if you can hack the new course. The different fixes and intersections are easily garbled and if you don't clutter the ether, you may find yourself in the "You can't get there from here" situation . . . Before I pass I will mention one more item and this is right in your back yard. Did you read the new feature "The IPIS Approach" on the next page to your article? As fine an example of military gobble-dy-gook written by a highly specialized professional on a subject which is a full-time job in itself, yet we mere deskbound mortals are supposed to read and understand in our limited way what is easily understood by the author(s) of "IPIS." It does point up the need, and a terrifically crying need at that, for a complete revision of our instrument rules of flight to where they can be understood, remembered and practiced. (A prime example is your quoting the holding pattern entry—how many times has this procedure changed in the last seven years?)

**Lt Col W. J. Amos**
**CAP-Great Lakes Region**
**Wright-Patterson AFB, Ohio**

### INVERTED AT ZERO FEET

Note your article "Wintersfullofhazards" in the November issue. The last sentence on page 19 of the section titled "Inverted at Zero Feet" is partially in error and should not be blamed entirely on Air Traffic Controllers.

The controllers should have relayed observed runway conditions and/or hazards, especially the centerline snow ridge stretching the full length of the runway.

After the first flight landed without mishap the flight leader's comment "Just about bought the farm," could mean nothing or several things. The pilot shouldn't have dropped it there.

continued on page 28

***The accident prevented is rarely as spectacular as the one caused . . .***

# *WHERE CREDIT IS DUE*

When the fire goes out, restart attempts are unsuccessful, the pilot ejects and the bird is lost forever in 400 fathoms of ocean, or disintegrates in a smoking hole in a bean field, what really happened? Was it pure materiel failure, or was it possibly operator or maintenance induced? Did someone fail to lubricate a part because the fitting was difficult to see? Were improper stall clearing procedures used by the pilot? Had some previous pilots failed to write up the hot starts or overboosts?

Last year an engine blew up in flight, a fire resulted and finally the wing failed as the pilot dove his aircraft in an attempt to blow out the fire. The report carried the recommendation that the case be written up in AEROSPACE SAFETY magazine. Investigators contended that the accident may have stemmed initially from forced engine starts with a hydraulicked condition.

Here are a couple of examples from the December 1964 files. An airman, after having been told not to touch anything until the sergeant returned, attempted to duplicate an inflight malfunction. He managed to cause the gear to retract, letting the aircraft settle on a wingtip and engine nacelle. In another case a jet engine dome assembly separated from its attachment as the aircraft was climbing through 25,000 feet. Washers had not been installed, bolts could thus dig into the attaching plate, making grooves and weakening the plate to the extent that the dome assembly separated in flight.

The cases we've recalled serve to illustrate the fact that failures, because they can be so spectacular, are easier to recall than accomplishments.

Possibly, in the publicity glare of a few startling accidents the contribution of the vast majority of support personnel is overlooked. Let the maintenance man put in 20 years in the proper care and feeding of Air Force birds. Only with the highest personal standards of integrity, discipline and responsibility can men provide such service. However he is more likely to be remembered as a nameless "sarge" who inserts the chocks, holds the ladder, shows the pilot where to sign the services requests, stands fire guard on start and signals all clear for taxi.

A pilot who faces and solves an inflight emergency will often receive widespread recognition—maybe even a "Well Done" in this magazine. The maintenance specialist who sees a spot of hydraulic fluid on a line, takes the time to wipe it off, pressurize the system, find the leak, make repairs as spelled out in the tech order and then has the system tested and inspected is merely doing his usual good job. It is highly unlikely that anyone will come by and pat him on the back. But if he is careless, and if his supervision is lax, someday some pilot may have to eject and an aircraft may be lost.

Fortunately the vast majority of Air Force men know their jobs and can be counted upon to do them. This is of growing importance. Each new weapon system introduces new and frequently complicated components. These technological improvements add up to greater capability—and greater reliance on maintenance. ☆

*Catching the barrier*

# ON THE APPROACH END

*gives pilots one more safety trick*

When a small group of engineers at Edwards Air Force Base complete the tests they are presently conducting, pilots of century series fighters will have a new item to add to their bag of tricks. This new trick is the approach-end barrier arrestment.

Arresting barriers are nothing new, but arrestment on the approach end is a little used technique that to the Air Force is new. Tests now being conducted were requested by the commands using century series aircraft, and it is anticipated that when they are complete there will be a handbook procedure for each of these aircraft.

The tests are being conducted in two phases, the first at Wright-Patterson Air Force Base, the second at Edwards. Phase One objectives are:

- Develop techniques for approach-end engagements.
- Determine the distance required to get the nose gear on the ground after main gear touchdown.
- Determine how near a pilot can land to a given point.
- Determine the distance required to become airborne after a missed barrier engagement.

Phase Two consists of tests of the procedures developed in Phase One.

Present plans do not call for the approach-end arrestment to be a routine procedure. Rather it is designed for known inflight emergencies such as a blown main gear tire, or an unsafe main gear. And it offers certain advantages over present barrier arrestment procedures. The primary advantage of the approach-end arrestment is that the barrier will maintain the directional control of the aircraft. Other advantages are a short ground run of approximately 1000 feet after the aircraft has hooked the cable, more precise placing of crash rescue crews because of the known stopping distance, time saving in foaming—only 1000 feet beyond the barrier needs to be foamed. In addition, if the aircraft misses the barrier, the situation is probably no worse than if the pilot had made no engagement attempt.

While tests are being made for all century series aircraft, as of this writing only the F-100 had been completed, and the F-102 and F-101 were in process. Consequently, the following conclusions and pilots' comments apply *only to the F-100.*

#### CONCLUSIONS

- Final approach and touchdown speeds should be about 10 knots faster than those recommended in the flight manual.
- The hook should be deployed prior to landing unless there are obstacles that could be engaged on a lower than normal approach. Hook deployment should then occur between the obstruction and touchdown.
- Main gear touchdown should occur approximately 450 feet in front of the barrier.
- When directional control is a problem, no attempt should be made to take off again.

Phase One tests consisted of a series of touch-and-go landings. A mark was placed on the runway for the desired main gear touchdown point. The pilot then varied approach and touchdown speeds to determine the optimum procedure for touching down as near as possible to the desired point on the runway. The nose gear was lowered in the shortest possible distance after main gear touchdown.

#### PILOT COMMENTS

Approaches varied from steep to extremely flat, drag-in approaches at different speeds. The tests disclosed that faster than normal approach and landing speeds offer several advantages: Aircraft control and handling characteristics improved; visibility over the nose and to the side is better due to the lower angle of attack; the reduced pitch angle required to rotate through, coupled with better pitch control and response, more than compensates for the increased speed to reduce the distance required to lower the nosewheel to the runway. Directional control, particularly rudder and aileron during the period from touchdown to engagement, improves with speed. Also, more margin is provided to insure against misjudgment, gusts, etc., which might result in premature touchdown in an unprepared area.

The 10-knot increase in approach and touchdown speeds is recommended for approach-end barrier engagements only and then only at reasonable gross weights where hook and barrier limits are not approached. A further increase in speed does not appear warranted. Normal approach angles are recommended. The two most significant points are accurate touchdown control and rapid preparation for engagement. The nose should be started down immediately on touchdown and retarded at the last moment with aft stick. Tests indicate that if the barrier were engaged with the nosewheel descending, just barely off the runway, but with aft stick coming in for smooth nosewheel impact, damage will be less probable than if the nose were slammed down.

The time between touchdown and engagement is very short—a couple of seconds—so the number of tasks to be performed during this interval should be kept to a minimum. Hence, hook deployment in flight! (There is less chance of hook-bounce if it is down before touchdown.) Speed brakes are optional but should be ignored after touchdown; wing flaps may be raised at touchdown. Raising the flaps is not considered necessary, but may reduce float, inadvertent bounce and help control the touchdown point. The stick should be held with the nosewheel steering button depressed for landing. Use of the drag chute is recommended just in case the hook misses the barrier.

Here is the ideal landing sequence revealed by the tests:

• Perform normal before-landing checks during slightly extended pattern. Lock and tighten shoulder harness.

• Deploy hook unless obstacles are present.

• Fly final approach at normal angle, 10 knots faster than Dash One figures.

• At predetermined point before intended touchdown, make normal flare and deceleration to touchdown speed (10 knots high), extend speed brakes if desired while throttle is retarded.

• Depress nosewheel steering button and move left hand to flap handle if flap retraction is desired.

• Immediately after touchdown, lower nose rapidly but do not slam it down. Simultaneously, deploy hook (if not previously deployed) and reach for drag chute handle. If serious directional problems warrant, the drag chute handle may be pulled as the nose is being lowered.

• Immediately after barrier engagement is positively determined, continue with barrier engagement procedure — steps 9, 10 and 11 (secure engine). Remember that, if barrier is missed, nosewheel steering may be a benefit during rollout and it may be necessary to delay securing the engine until leaving the runway becomes unavoidable.

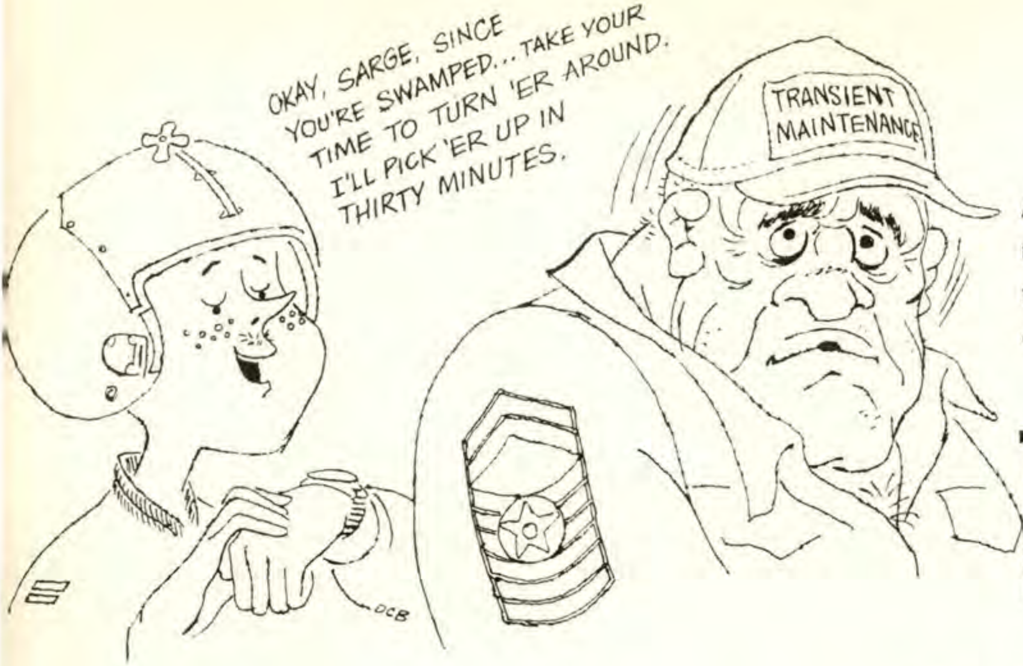
The essential steps are to land so as to lower the nose prior to engagement and to deploy the hook. All other steps are secondary but should be planned well in advance. Go-around after a missed engagement is not recommended for any but the most simple malfunctions such as known brake failure. Afterburner go-around is not recommended because of the rapid actions required at high speed where control is already difficult, the AB may light just prior to nosewheel lift-off which may cause difficulty in accomplishing accurate rotation, and the possibility of AB malfunction.

### KEEP WEIGHT DOWN

Another important point to remember is that the approach-end arrestment should be attempted at the lowest possible weight. For some aircraft up to one-third of the aircraft weight can be disposed of by dropping stores. To lighten the aircraft, tanks, if not empty, should be dropped and stores jettisoned.

Normally, an approach-end arrestment, because it is an emergency procedure, can be planned and there will be time to plan for it. The pilot can burn off fuel and make some low approaches to get a feel for the impending landing. Ground crews can foam the runway beyond the barrier and place crash rescue units. If there is an MA-1A barrier it should be removed, and the flight test engineers are recommending that tire sections be inserted to replace the rubber doughnuts supporting the cable. Incidentally, these should be auto tire sections, not aircraft tires. Auto tires are soft and will not deflect the hook, whereas aircraft tire sections are extremely hard and the hook will bounce off of them.

This, then, briefly, is the approach-end arrestment. Experience to date has been encouraging. Of the nine actual emergency preplanned approach-end arrestments, only one resulted in major damage and two in minor damage. With the experience gained from the tests now being conducted, pilots will have a better understanding of this procedure and one more safety factor on their side of the scale. ☆




A transient maintenance specialist tells how pilots, too, can help the transient service situation in an article titled . . .

# THE OTHER SIDE

**By CMSgt L. Pitts, Transient Maintenance, Andrews AFB**

In the past year, we've provided transient services for an average of 2150 aircraft per month. This included 55 different types and models. We're not experts on them all, but we have the ability to turn out a quality product on anything that comes our way. We're not interested in taking chances or cutting corners to get the job done. It's safety first, all the way. We never sacrifice quality for quantity.

Often our job is made more difficult by individuals who expect better service here than they can be afforded at their home base. Take the T-39 jockey who was in last week—his aircraft had a landing light out. A check of the forms indicated he'd had one on order back home for over a week, yet he was infuriated because we couldn't produce the same item in the six hours he was on the ground at Andrews.

Then there's the pilot who drives up, writes several discrepancies on the AFTO Form 781A, walks off, leaves no place of contact, then returns the next day to find his airplane still broke, or NORS, (not operationally ready, supply) and asks, "Why wasn't I notified?"

There are also the people who seldom read NOTAMS. Last May, we sent out a NOTAM, "Official Business, prior permission only." You guessed it, we had 146 aircraft arrive on the first day, an all-time record for transients, and 136 aircraft per day for the remaining two days of the NOTAM! It might be noted here that any one of these days represents more aircraft handled by the Transient Alert Branch of Andrews Air Force Base than are handled in an entire month by some of the bases which continue to be on the "Rex Recommends" list. We've seen the time when our parking areas were saturated to the point that we were forced to regretfully ask arriving aircrews to leave rather than RON.

You always have the pilot with a proposed 1400 departure, who gets highly indignant when told at 1600 hours that his aircraft has to be moved from in front of base operations because another Code must be in his parking place! The wasted manpower and tied-up equipment constitute an unnecessary drain on limited resources.

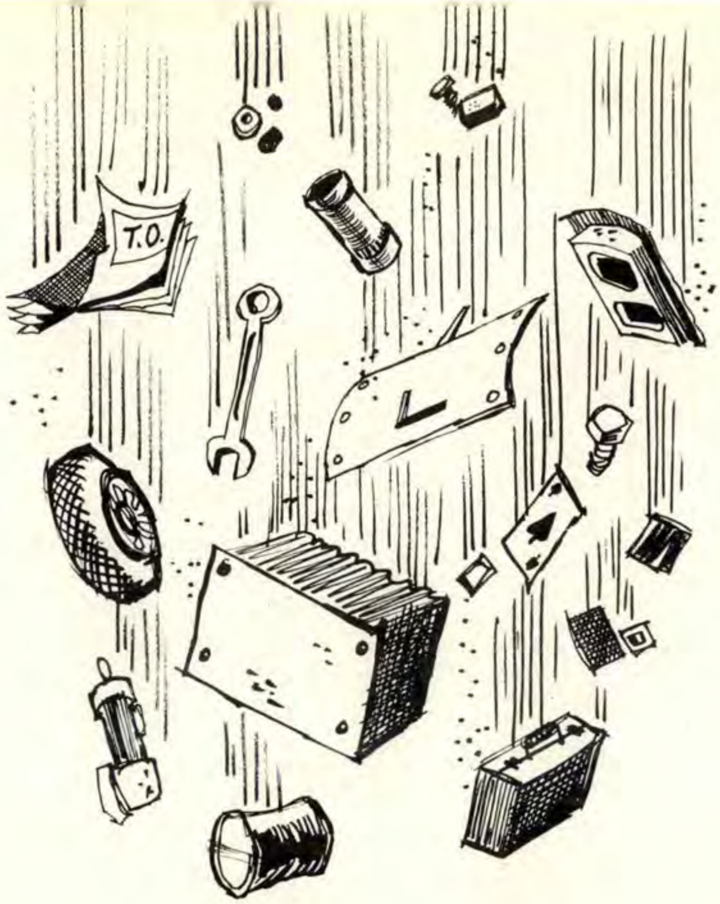
There was a T-29 in one morning with a double nose tire change. When the job was completed, the aircraft departed and returned the same day with two more old unserviceable nose tires that required replacement. So you can see, we're a supply depot too.

The best compliment we've ever had was in a Complaint Sheet turned in by a C-131 pilot who was disgusted because it took 66 minutes to change a main tire. This 66 minutes included the entire ground time from landing until takeoff. Could his home base do better?

Winter is here and we can well remember some of the incidents we were involved in last year. It costs lots of money to defrost an aircraft, yet some crews don't make their block time and the aircraft must be defrosted again. This doesn't sound like much but when you have an average of 30 RON aircraft per day, it adds up fast.

Our primary aim here at Andrews is to provide quality transient services in the most efficient, courteous and rapid manner possible. This is why we feel, Mr. Pilot, that the above-mentioned incidents, which are only a few of many, should be brought to your attention. We've been directly associated with transient maintenance for many years. We have observed transient operations on many bases. The problems here are no different from those at any other base except that they grow in proportion to the number of aircraft serviced.

The next time you visit any transient facility, remember some of the things we've mentioned. Be patient, make your block time, keep in contact, and above all, remember that you are only one of many. I'm sure with these things in mind, transiting will be more pleasant for you and every transient aircrew. Help others to help you and you will enjoy better transient services throughout the Air Force. ☆




# LOOK OUT BELOW

Anything that becomes detached from a plane in flight will fall and falling objects create hazards. How much of a problem this is depends on several things: how much falls off, what it hits, and flight characteristics of aircraft after parts come off. Falling objects vary from such fragile items as people to virtually indestructible gear pins and, in size, from metal screws to wing sections. Sometimes these objects fall directly to the ground, occasionally they become entagled with the aircraft structure, at other times they merely flap in the slipstream to cause weird control experiences for the pilot. Here's what's been happening during the past few months:

**C-130**

During climbout the forward crew door blew open. An airman near the door was sucked out and fell to his death. The door hit the No. 1 and 2 props and damaged hydraulic lines. Through outstanding airmanship the crew was able to land the aircraft.

Inbound to a drop area a loadmaster untied a 450-pound parabundle and, when his attention was distracted for a moment, this bundle and one next to it rolled aft on the roller conveyors and fell out.

**C-124**

On takeoff roll the left life raft hatch fell to the runway. Loss was not noticed by the crew. A few minutes later, at 2500 feet, two "backfire" type noises were heard. Then a scanner reported loss of the left overhead, six-man life raft. Cause: Maintenance malpractice and supervisory factor in that the security of the life raft compartment door was not assured.

**B-52**

The left tip gear door was lost in flight. Cause: A cotter pin had worn which allowed the retainer pin to vibrate out. The unsecured forward hinge pin shifted rearward until the leading edge corner of the door dropped. Air pressures then forced the door off as the rear hinge shear bolt failed. The forward hinge pin, retainer pin and cotter pin were examined by the crew chief on walk-around preflight.

Both upper and lower engine cowling on one nacelle lost in flight. Probable cause: Air duct ruptured at takeoff, causing fire light to come on momentarily and at the same time blowing out the area on top of the nacelle. Subsequent wind pressure and oil canning caused the failure of the upper and lower cowling.

The navigator's hatch left the aircraft when turn was made over the IP.

At 16,000 feet an aircraft momentarily yawed and pitched as if passing through moderate turbulence. Post flight inspection showed minor skin damage and the ammunition access door to be missing.

At 16,000 feet, the navigator of another aircraft reported loss of the forward entry door.

**C-133**

Sometime between departure at Travis and arrival at Hickam the left life raft fillet and raft were lost from the aircraft. Possible improper installation.

**F-100**

During flight a sway brace from a drop tank pulled loose and was lost from the aircraft. Suspected cause factors: Insufficient design strength to withstand acceleration forces applied during close ground

support missions, possible installation damage (cross threading during installation, over-tightening of bolt), improper or lack of frequent inspection.

After 50 minutes of solo flight, another pilot reported that the drag chute and cable were missing. The pilot remembered a small jolt, but since he was passing a mountain range at the time he attributed it to be from turbulence. Most probable cause: Drag chute doors were not fully locked, with the locking mechanism not being in the overcenter locked position; vibration and pressure from the drag chute forced the latch open allowing the drag chute to jettison.

During Dart launch the cable broke. Cause: Cable wedged between cable strands causing backlash and snapping of the cable. Cure: Closer supervision of cable winding, particularly cross winding.

A pilot felt a "thump" during a check flight for correction of a gear malfunction which had caused loss of the left outer fairing door. Postflight revealed the door was again missing. Cause: Thought to be due to improper adjustment of the left main gear uplock mechanism allowing the outer fairing door to be exposed to the airstream.

A battery access panel separated in flight. Cause: Personnel error—preflight was conducted before daylight and pilot and crew chief failed to insure that the panel was properly installed and fastened.

### KC-135

Shortly after rotation the pilot detected a lateral control problem requiring the application of five units of left rudder trim and approximately three units of left aileron to maintain level flight. After the mission, inspection revealed the upper wing beaver tail assembly was missing. Cause: Suspect fairing was not adequately secured after previous inspection.

### F-84

Ground crewman pulled nose pin, but not main gear pins. Main gear would not retract. Pins fell out in flight.

Three F-84's lost drag chutes in flight. Suspect: Drag chute assembly components, adjustment and wiring.

During climbout one rocket launcher and one rocket fell from lead aircraft. Suspect: bolt broke on rocket tube front pylon.

### T-33

During climbout, passing 13,000, both tip tanks separated from the aircraft. The pilot had placed the tip tank jettison switch in the auto drop position prior to takeoff, but had failed to turn it off at 5000 feet. The wing tip switch on the right wing had failed internally and was shorting through the auto drop circuit. Failure of the switch erroneously indicated to the system that the right tip tank had separated from the aircraft. This caused the left tank to be jettisoned automatically. When the left tank separated the system functioned normally and the right tank jettisoned.

In another case tree tops were struck during an IFR departure. The strike occurred one mile from the runway, 100 feet above runway elevation. Impact ruptured the left tip tank and damaged the leading

edge of the left wing. The copilot jettisoned the tip tanks.

Approximately two minutes after takeoff the inside aft section of the left tip tank fairing separated from the aircraft. This was the first flight following removal and replacement of the fairing.

### F-104

The entire right wing outboard of the flap broke off soon after climb attitude was established. Cause: Structural failure.

### B-47

When the bomb doors were opened for bomb release several articles being carried in the bomb bay fell out. Articles included two B-4 bags, one piece of molded luggage, one B-47 brake chute and emergency water rations. These articles had been secured with 1/8 inch cotton rope. (B-4 bags were recovered intact and virtually undamaged, molded luggage disintegrated and other items not found.)

A drop tank was lost in flight, cause not given.

### F-105

On an air-ground rocketry mission the rocket launcher forward fitting loosened, allowing the launcher to swing toward the fuselage and when the rocket was fired it passed through the pylon, struck the fuselage and lodged inside an aircraft panel.

Less than 10 minutes after takeoff the pilot heard a sharp snapping sound and then a short duration airframe vibration. The pilot returned to home base, burned fuel down to landing weight and landed. Three access doors had separated in flight and FOD had occurred to the engine requiring an engine change.

**B-66**

At 1000 feet, 300 KIAS, the rudder pedals started a severe chatter and were oscillating approximately one-half travel. The pilot could not overpower them. Yawing occurred approximately one degree each side of center. Yaw oscillation was so rapid it resembled a severe vibration. Chatter and vibration stopped after five to ten seconds. Pilot tested the rudder pedals and could get full travel both directions without affect on the aircraft. Pilot was able to land, using differential throttle and aileron for directional control. The rudder was missing from the aircraft.

**F-102**

In four cases F-102's lost one or both pylon tanks in flight. Possible causes: Fitting failures, tanks not positively locked, excessive G's. Also, four access doors were lost. Possible causes: Failure to secure doors, inadequate preflight.

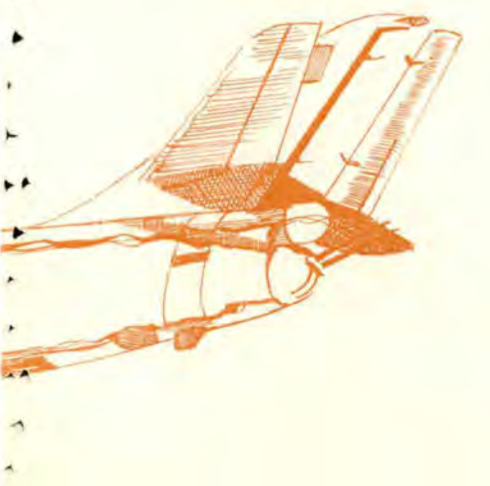
**F-106**

Pylon tank and pylons separated from aircraft during climb. Cause: Undetermined.

**F-86**

Tower reported a "bright, flaming object" fell from the aircraft just after it crossed the field boundary on a night takeoff. A precautionary landing was made and the missing part was discovered to be a part of the flame dome of the afterburner assembly. Cause: metal fatigue, cracking due to age.

After landing, a pilot noticed that a practice bomb had been



dropped inadvertently. Cause: Cocking handle had blown back through the air channel of No. 2 bomb rack and rested on the manual release lever of this rack. It was thought the air pressure funneling through this channel applied pressure on the handle causing the handle to trip the manual release lever.

**F-101**

Prior to takeoff the pilot checked that he had a drag chute. When he landed he did not have a drag chute. No inflight indications of the loss were apparent.

The left main gear door was lost (no adverse flight characteristics resulted). Most probable cause: Overtorqueing of bolts causing inserts to pull out of the wheel rim.

Another left gear door loss was attributed to loss of the attaching bolt, indicating that it had either sheared or had not been installed properly.

**KB-50**

Two KB-50's lost refueling hoses, one when the hose unreeled after the pilot ordered the doors opened as a means of increasing drag during formation join up, and the other thought to be due to failure of the reel brake. A third aircraft lost an inspection plate when latching snaps malfunctioned, allowing the inspection plate to open into the slipstream and subsequently fail.

**C-123**

The forward emergency bailout outside hatch cover was lost during a high speed test run. Wind pressure on a hatch that was not completely flush appeared to be the cause.

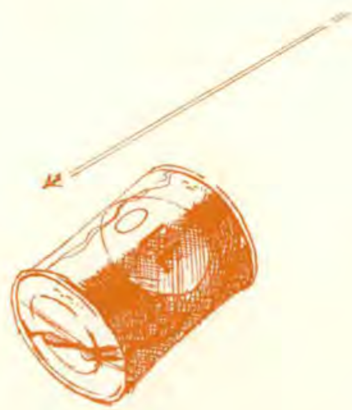
**UNKNOWN**

A quart-size oil can was found on a lawn in the on-base housing area of a Far East base. The size of the hole in the lawn, the way in which the can was ruptured and the spray of oil that covered the side of the adjacent house indicated that the can had fallen from a considerable altitude.

**SUMMARY**

This is but a sampling. From it we can draw several conclusions.

- No aircraft is immune from the losing-pieces-in-flight hazard.
- Aircraft that carry objects slung under wings are most susceptible to inflight losses.
- Proper positioning and securing of external stores, hatches and doors is essential if inflight losses are to be reduced.
- If doors and hatches are improperly faired they should be repaired, and replaced if necessary, to prevent inflight loss from slipstream forces.
- Maintenance men and pilots must perform thorough preflight inspections.
- The man who closes the door or hatch must insure that the pins are in place.
- If it doesn't fit, fix it. Don't force it.
- If the aircraft has recently come out of inspection or IRAN, be particularly suspicious. Someone may have failed to put it back together properly—and someone else may have been careless during inspection. ☆



The loss of an aircraft canopy in flight is generally treated as an annoying incident rather than a serious hazard. Repairs are made, the canopy is replaced and, after testing, the aircraft is put back in service.

During the past year there have been many fighter and trainer aircraft canopy losses in flight. In most cases there were no injuries, the canopy didn't fall on anyone or damage any property and the matter was reported as an incident. There were other cases, however, which were much more serious. One of these involved the loss of an F-104. And there was a T-33 which crashed and one member of the crew was killed. Perhaps, therefore, a look at the canopy loss problem is in order.

How serious a canopy loss can be depends upon many factors: type of aircraft, altitude, airspeed, time of day (daylight or dark), what happened to the canopy after it departed. The problems encountered subsequently may range from practically none to serious FOD that could cause a flameout and loss of an aircraft — possibly crewmembers, too.

*Annoying Incident? Serious Hazard? Regardless—*

# CANOPY LOSSES Must Be Prevented

This misplaced canopy didn't do any damage, but how about the next one that falls?

The F-104 mentioned above crashed after the engine flamed out as a result of swallowing parts of the canopy. The T-33 accident occurred at night after the front seat occupant apparently jettisoned the canopy as the result of a misunderstanding. The pilot in the rear seat eventually ejected safely. ("Out in the Breeze," AEROSPACE SAFETY, Sept 1964.)

Other incidents have not been as dramatic, but they nevertheless subjected both crew and people on the ground to serious hazards. For example: some pieces of plexiglass entered the cockpit of a T-33 breaking the IP's visor cover and inflicting facial cuts; pilots reported rapid decompression; extreme discomfort on the part of the rear seat pilot, confusion and disorientation, vision impaired, pilots' visors shattered (rear pilot severely cut), cold, windblast.

Reasons for canopy separation in flight vary from design and manufacturing deficiencies to poor maintenance to crew or passenger error. In some cases the canopy simply was not locked prior to flight. In one case, a non-rated passenger accidentally jettisoned a canopy; fortunately he didn't squeeze the ejection trigger. There have been several losses from one type aircraft in which it appeared that pilots inadvertently struck the canopy control lever with their arms. Other causes include locking device out of tolerance, latch not completely locked, defective O-ring seal, canopy thruster failed, glass failed, cement failed.

On the ground, canopies have been lost because of carelessness and lack of knowledge on the part of maintenance personnel, indicating inadequate training.

Many reports of inflight losses, however, monotonously contain the statement, "cause undetermined." Some of these list a suspect, such as several regarding canopy damage in flight on the T-33. Most of these have contained a statement to the effect that the instrument hood was binding on the canopy. In these cases the entire canopy was not lost, only portions of the rear canopy.

A review of a number of Unsatisfactory Reports reveals:

- Slippage of laminated shims installed between canopy lock housing and upper longeron on 23 aircraft.
- 27 frayed canopy control cables were found during a one-time inspection.
- During closing cycle of canopy, the canopy lanyard cable extends too far into the terminal. The kinks in the cable bind on the terminal when the canopy is opened. The binding could cause the seat arming initiator to fire.
- Canopy received as serviceable from Supply was one-half inch narrower at forward end than replaced canopy and three other canopies measured.
- Canopy actuator received from Supply and installed on aircraft. When actuator clutch was disengaged and canopy raised manually, the remover housing separated from the actuator assembly. Caused by retainer being installed 90 degrees off in removed housing.

Considering the sums we are accustomed to dealing with today, canopy losses may seem trivial. But canopies do cost money, in materiel and manhours to replace; a lost aircraft costs a lot of money and jeopardizes the lives of crewmembers; anything falling from an aircraft in flight is a threat to people and property on the ground.

While there have been a few instances of canopies being jettisoned in flight by persons aboard the aircraft, most losses have been due to deficiencies in design of the product or maintenance. How can we prevent such losses? For one thing, quality control in manufacture and overhaul can be improved. If a manufacturer doesn't produce a quality product it only makes sense to get another source. When the product is a good one, its integrity should not be jeopardized by sloppy maintenance or the assignment of inadequately trained personnel to work on it. Pilots can assist by paying more attention to detail during preflight and by improving the quality of their 781 write-ups. ☆

*Lack of discipline made this a...*

# Short Flight To Nowhere!

Excellent crew discipline has often spelled the difference between disaster and success when a critical incident hazardous to flight has occurred. On the contrary, lack of crew discipline has resulted in a fair share of catastrophes. But when the hazard exists only in the mind of the copilot, and consequently he takes action contrary to that of the pilot, well — the result may not be inevitable but it surely is to be expected.

The picture above illustrates the "to-be-expected" result of the following mishap. The flight was to be a cross-country from a northern base. Takeoff weather was as follows: 14-knot wind from the right, visibility one-half mile, light snow and blowing snow. The runway was wet and puddled. According to the accident investigation board, all briefings were performed, preflight completed, instrument readings normal, line speed 10 knots above minimum—in other words, everything normal until. . . .

The aircraft became airborne at 115 knots. The attitude was not to the liking of the copilot in the rear seat, however, so he pushed forward on the stick. The pilot up front reacted with back pressure to maintain the attitude.

Now the rear seat occupant really took over by retarding the throttle to idle and extending the speed brakes. When the pilot felt the throttle go to idle he reapplied power but by then the damage had been done. That airplane wasn't about to fly and it reacted to these schizophrenic manipulations in the only way it knew. It came back down on the runway with a thump. The nose gear sheared followed by the travel pod, left speed brake and left main gear door.

The T-Bird continued down the runway leaving landing light glass, pitot tube and part of the nose gear in its wake. The pilot blew the canopy and the aircraft finally stopped off to the left and near the end of the runway. The crew exited safely, however, a fire began in the tailpipe and had to be extinguished by the fire department.

Thus ended a two-minute flight. ☆

*The following article is recommended reading for all Air Force pilots. Since Mr. Braznell is writing for civilian pilots, some of the terminology does not agree with USAF standardized instrument terminology, and there are some minor procedural differences. Nevertheless, the article so coincides with concepts taught for many years by the USAF Instrument Pilot Instructor School that the school endorses its publication in AEROSPACE SAFETY. The article is presented here in the interest of flight safety; however, it should be pointed out that it does not replace in any way the appropriate Air Force manuals, regulations and tech orders.*

# WATCH YOUR ATTITUDE, BUB

**W. W. Braznell, Asst Vice President—Flying**
**American Airlines, Flushing, New York**

In 1938, I wrote a paper on "attitude flying." In recent years, people have occasionally suggested that I bring this paper up to date or, in any event, once again treat the subject of attitude instrument flying in an attempt to refocus pilot attention on the merits of these concepts. Looking back on the events of the past 18 months leads me to believe some useful purpose may be served through renewing some interest in the subject.

It was back in the late 30's that I first started covering up the airspeed and rate-of-climb instruments on instrument checks. I was a new Chief Pilot, and my pilots were making me sick – literally – chasing the sensitive pressure instruments on proficiency checks. Particularly if the air was choppy, many pilots would fly up and down the radio range making procedure turns in a series of undulations punctuated by stomach retching "G bumps" as they attempted to arrest a plummeting vertical speed needle or, even worse, checked a rapidly decaying airspeed by a sudden forward thrust of the wheel—with a consequent excursion into weightlessness.

One day, when I thought I could stand it no longer, I wet two pieces of paper, plastered one over the Air Speed Indicator and the other over the Vertical Speed Indicator. The result was dramatic – the airplane immediately settled down and life once again became beautiful.

There followed a series of experiments leading to certain obvious disclosures. These disclosures became flying axioms insofar as my work as a Chief Pilot was concerned, and they have served me well over the years. Their application to the flying of jets has safety implications far beyond those of the DC-3 era simply because of the great speed range of the jet, its many configurations and, of course, the larger payoff for staying out of trouble.

Here are the basic axioms followed by a short elaboration on each.

1. Thrust (power) + Attitude + Weight + Configuration = Flyability. I shall refer to this as the safety equation. If the thrust is right for the attitude, weight and configuration, the airspeed will be within a few knots of target airspeed. Should the speed be more than a few knots off target, the airspeed system should be suspect and attention to proven thrust/attitude/weight/configuration combinations redoubled.

2. Thrust is the great compensator in the safety equation. Changes in attitude, weight or configuration in most instances mean a change in thrust. Every time an airplane is placed in climb or descent, flaps extended or retracted, gear raised or lowered, the question, "What happens to the thrust factor?" must be immediately answered and prompt action initiated by the attitude pilot.

There are, of course, those situations where configuration changes and attitude changes are effected without thrust changes, i.e., when losing altitude in the landing or ILS maneuvers. Here, the pilot may couple configuration changes with descent attitudes and rates, skillfully maintaining his target speeds without adjustments in thrust.

3. The basic instrument for measuring attitude is the gyro-horizon. Pressure instruments supplement the horizon, and under reasonably stable flight conditions are helpful for pegging the degree of precision in the horizon gyro. However, the airspeed or vertical speed instruments never take the place of the horizon for attitude fixing—unless, of course, the gyro tumbles.

4. Never fail to make a horizon erection and stability check as soon as possible after takeoff rotation. Check lateral indications by noting if the ball-bank is centered while holding pitch indications against airspeed and vertical speed.

Axiom No. 1. This past winter, a captain had a hair-raising experience. The aircraft's static airspeed ports were clogged with ice. Airspeed indications during takeoff and climb were subtly and deadly inaccurate. In his report, the captain stated that if ceilings and visibility had not been good he would have lost his ship.

We all know of a number of accidents caused by flying airspeeds, and I suspect some of the unexplained ones may also have been triggered by this most insidious of system malfunctions.

In the 1930's, a series of DC-3 faulty airspeed incidents and accidents gave birth to axiom No. 1. It was then that Fred Bailey, the Assistant Chief at Chicago, and I reasoned that if you placed a flying object in a given configuration at some attitude and supplied it with sufficient and constant thrust, it would fly at a fixed speed indefinitely once speed was stabilized—give or take a few knots (mph). And, it would continue at such a speed regardless of any variations on a speed indicator that may be attached to the flying object. (An accumulation of ice is considered a change in configuration and dealt with by adding thrust.)

Captain Bailey and I then proceeded to prove the point by covering the airspeed and vertical speed on training and instrument checks. Pilots were required to operate their aircraft completely by thrust/attitude/configuration combinations. We found that even landings and takeoffs on the airplanes of those days posed no problem to the properly "attitude"-oriented pilot. At any time he could call his airspeed within 5 mph (mph was in use at the time), and many a Chicago pilot on a proficiency check landed his airplane without benefit of airspeed or vertical speed readings with Fred Bailey or me adding realism by energetically handpumping nice milky alcohol over the windshield.

I do not advocate training a jet pilot to make takeoffs or landings without the aid of his full complement of instruments, but I would hope that the pilot who experiences a static system foul-up climbing out of some airport on a dark and stormy night will have conditioned his thinking and reflexes to the point that, knowing his thrust, configuration, and deck angle add up to a big fat and comfortable flyability factor, he can ignore an obviously improper airspeed value and equally ignore a wildly fluctuating vertical speed or altimeter. The same fervent hope applies to the thunderstorm or turbulent air situation. As we have heard so much about in the past few months, the control problem is solved if we can mentally pull down a curtain over the pressure instruments, set the thrust at the proper value and maximum flyability/minimum stress, and maintain the attitude of the aircraft within reasonable tolerances by reference to the gyro-horizon instruments.

Axiom No. 2. I was observing a training session in a simulator recently when the captain (obviously an exponent of attitude flying) asked the instructor for a thrust value to put into the simulator to produce approximately the target speed for the maneuver contemplated. I almost fell off my chair when the instructor replied, "Use whatever you need." Here was an instructor telling a captain to fly airspeed and only airspeed; advocating the substitution of a question mark in the flyability equation. According to this view, ? + Attitude + Weight + Configuration = Flyability. From an attitude flying point of view, this is as patently improper as a mathematician taking the position that $4 = 2 + ?$ "Flying by airspeed only" could well explain some of the industry's headlines of the past 18 months.

The first thing an "attitude pilot" does to become acquainted with a new airplane is to determine the margins above the buffet for certain basic key airspeed/configuration combinations. In our 123B and 720B Boeings, I would say that these "keys" are: (1) 200-210 kts., clean; (2) 150/160 kts., at 30-degree flaps; (3) V ref at 50-degree flaps.

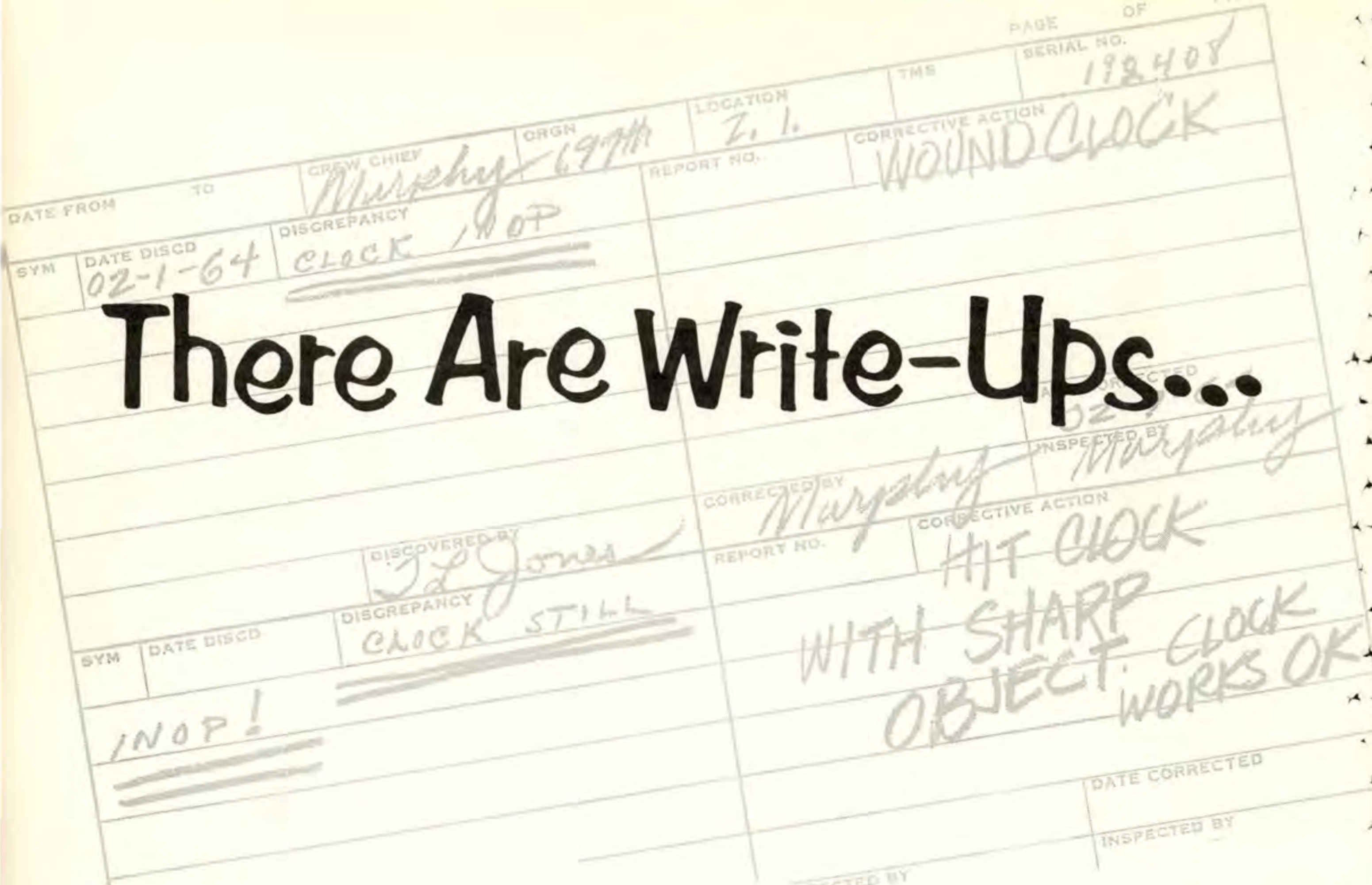
Having in mind his "margins," the next step is to find out how much thrust is needed to produce these key airspeeds in level flight at good average takeoff gross weight, for maximum landing weight, for typical climb-out paths in terminal areas, and for a stabilized 2½ degree to 3 degree glide slope descent. Armed with this knowledge, the attitude pilot constantly and forever insists on a balancing of the safety equation. The speed he reads on his indicator must check with the speed he knows his airplane should be making good.

Axiom No. 3. For the precise fixing of attitude, full use of the horizon's trim knob is recommended. The target airplane should be zeroed to the horizon (1) before the start of each takeoff; (2) for cruise; (3) for flying a holding pattern; (4) for level flight at maneuvering speed. Using the trim feature in this manner, the pitch angles for climb and descent maneuvers at the lower flight levels will become apparent. Also, the progressively reduced pitch angles (with altitude) for maintaining climb airspeed and Mach will become reasonably fixed pitch increments.

Axiom No. 4. Horizons are not immune to failure. To perform accurately they must be properly erected and up to speed. Acceleration affects accuracy during the takeoff run and can develop 4 to 5 degree pitch errors. Precession errors develop in turns, and can account for as much as 4 degrees of pitch or 3 degrees of bank. There have even been cases where the electrical circuits have been reversed in maintenance, causing the instrument to indicate pitch down instead of pitch up—and vice versa. The most probable time for malfunction is during and soon after takeoff. So, as soon as possible after takeoff, the horizons should be checked out.

The recommended procedure is to use every means available: check one horizon against the other; check pitch indications against airspeed and vertical speed; check the bank indication by flying straightaway with the ball-bank centered. There are more sophisticated ways of making this latter check on late model airplanes, such as using the steer computer in HDG Mode; however, the most fool-proof method is to hold a heading and center the ball-bank.

We all know that flying has become quite safe; we haven't paid extra risk insurance premiums for years. It would be foolish to deny that a large measure of the progress aviation safety has made is due to the advantages a continuously improving technology has brought us. However, in the final analysis, a man at the controls who is well prepared to meet all situations with proven techniques is the ultimate safety factor. I feel sure that by diligently applying these attitude flying concepts that have stood up so well over the years, we can add just one more measure of safety to our daily job. ☆




# There Are Write-Ups...

Believe it or not, the above writeups are true. (They're too strange to be fiction.) The write-ups were made by a U-3 pilot, the corrective action by a U-3 "mechanic."

Frankly, they are used here to get your attention. They made us curious; we hope you will react similarly and read on. We talked to several people in the fixing business and they have suggestions they say will help them and, in turn, help you.

Did you know that all bases with like aircraft do not have the same test and repair equipment? If you have a dozen T-39's you have equipment not authorized on a base with less than five T-39's. A component that can be quickly tested and adjusted on the aircraft at your base may have to be removed and worked on in the shop at another.

A T-Bird was written up for nose wheel shimmy. The tire and wheel balance were checked. The same write-up was repeated. The assembly was changed. Again the write-up was made and again the assembly was changed. Nose wheel shimmy was again reported. Maintenance people did quite a bit of head-scratching on this one. What else could they try? They studied the write-ups again and someone noted that every one had been made by the same pilot. Other pilots had flown the bird, but none had reported nose wheel shimmy. Aid of the T-Bird training section was solicited and the cause was discovered and the problem resolved —the pilot had the habit of holding the nose gear on the runway too long during takeoff roll.

Here's a *don't* recommendation. The phone rings in maintenance, the maintenance officer answers and hears, "Uh, say, a couple of days ago I flew 943 and I noticed it seemed to want to turn to the right on the runway. At the time I thought it probably wasn't too bad, and maybe there was a little wind. But it did it during taxi too. I didn't bother to write it up, but I got to thinking about it some more; might be a dragging brake, or something binding. I thought maybe I'd better call and let you know. Probably doesn't mean anything, but . . . Yeah, you're welcome." Then the maintenance officer learns that 943 left this morning on an 11-day trip. He would much rather check it out than sweat it out; best of all, if the pilot had written it up the discrepancy would have been on the record and would have been checked for certain.

Along the same line, don't depend upon the crew chief to make the write-ups. Pilots, make your own and make them specific. Any descriptive information you can provide will help the maintenance technician. Over the years there have been some classics in the vague write-up category — and some deserved corrective comments:

No. 4 engine missing—No. 4 engine located.

Something loose in tail—Something loose in tail tightened.

Just imagine the wasted man-hours that could be expended trying to locate:

Large connector broken on split line.

Panel on left side of aft section cracked.

How about this for a sure cure: Tail hook deployed due to unknown cause — tail hook bolted secure in up position.

Please, maintenance officers plead, make detailed write-ups, including all symptomatic indications you think might help the man who will be expected to troubleshoot and correct the squawk. If malfunction is intermittent, so state, along with readings of associated gages, if possible. If the IFF or TACAN works below 20,000 but not above, or intermittently above, be sure and include the altitude information. The repairman will be assisted considerably to know that a pressure problem exists. Does precipitation have any effect? This can be a lead.

Another thing, not all maintenance technicians are graphologists—though they may all have to come to this in time—so print, don't write, and make your printing legible.

Try to refrain from telling the doctor how to operate. List all the symptoms, let him make the analysis and the fix. Checking the length of the pushrods on No. 7 cylinder might be the first step, but likely not. All the technician needs is a clear understanding of how the system acts, in the air and on the ground; he can take it from there.

*"...And write-ups, and write-ups!"*

And pilots, the best way in the world to get clean, safe aircraft is to not accept those with discrepancies. Turn them down when they have write-ups like these:

1. Yaw damper inoperative, APG-30 inoperative, A-4 gunsight inoperative, external hydraulic line disconnect has slight hydraulic leak, anti "G" system inoperative and line capped off, heat and vent system went full hot—smoke entered cockpit (ram and dump cleared it out), fuel quantity intermittent, (drops from 7000 lbs to 4000 lbs. at times), canopy seal check valve missing, drag chute doors dented, drag chute cocking mechanism hard to operate, utility hydraulic reservoir leaks around cap (new cap does not correct leak).

2. Left hand flap seal retainer broken, right hand emergency ejection seat decal not legible, engine mount engagement screw rounded off, TACAN DME will not lock on at all (aircraft antenna bad), no sight reticle with airstart switch on, TR pack is not putting power to secondary bus, T-270 inflight control box removed for 780 equipment and fuel leak in dive brake area.

Hazardous as it may have been, two century series fighters were flown with these write-ups.

One more thing. A discrepancy that always gets written up is one that has to do with the pilot's comfort. If the cockpit heater won't work and the pilot is cold, or if it malfunctions and the pilot feels like he is in an oven, there'll be a write-up—in a very firm hand. But consider, if you will, the plight of the maintenance man. It's never too hot, too cold, too windy, too wet or too late to work on the engine. Chat with him when you can, especially right after you land. He may have questions to ask that are very pertinent to troubleshooting. You can help him help you. If nothing else, a kind word for the man who keeps your bird flying is a mighty reasonable insurance premium. ☆

# TRI-SERVICE STANDARDIZATION

Cooperation and a lot of hard work over the past year have resulted in the Army, Navy and Air Force adopting identical criteria and definitions for aircraft accidents. Each of the services has changed its regulations and the standardized definitions became effective 1 January.

Historically, each service has gone its own way so no accurate comparison of accident experience was possible, even for like aircraft. Standardization of definitions and criteria is expected to benefit the entire military establishment by

- providing uniformity of accident data;
- increasing the validity of research efforts;
- allowing for full use of the mishap experience trends of all services for preventive measures—particularly for aircraft common to more than one service, such as the F-4 and F-111.

In order to achieve stability, there will be no unilateral changes in the criteria unless concurred in by all the services.

So far as can be determined, the standardized definitions may raise the USAF accident rate somewhat.

Regardless, standardization should benefit each of the services through the exchange of meaningful information. The gains to be realized are expected to more than offset any artificial increase in the rate that may occur. ☆

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***Firemen are taught firefighting and rescue techniques, but what if YOU should find yourself in a situation where only you can save a life? Could you remove a 200-pound victim from a fire-swept room?***

# TO SAVE A LIFE

**Alfred S. Hastings, Fire Inspector, Norton AFB, Calif**

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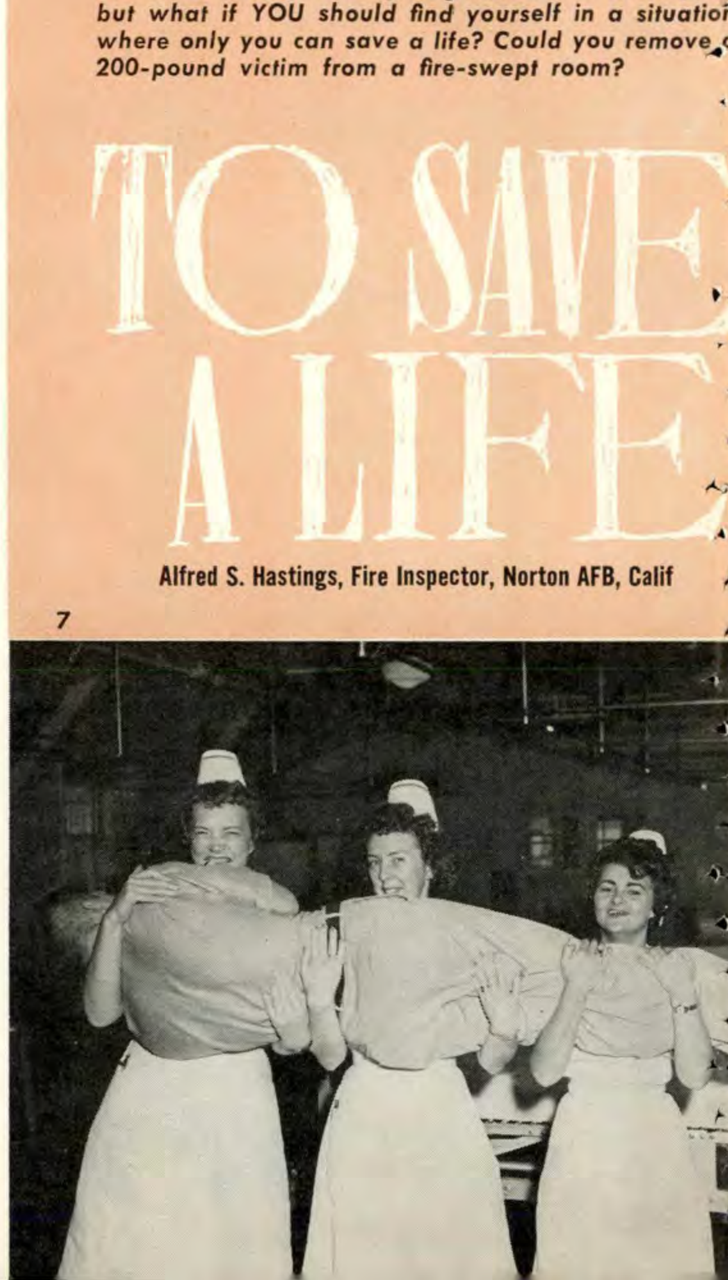

Fire is a frightening thing, whether it occurs in an aircraft, a missile, dormitory, dining hall or hospital. It's expensive, too. Air Force dollar fire loss for FY 1964 amounted to $17,000,000. In addition, 16 lives were lost and 142 persons were injured.

The above figures indicate the reason for the huge Air Force fire prevention program and why fire is one of those threats about which we cannot afford to be complacent. This article considers not the problems of fire prevention and fire fighting, but a more narrow question—that of saving lives in the event a fire breaks out in an inhabited area. More specifically, concern is centered on structure fires in such places as hospitals, dormitories, homes and like buildings.

Although the Air Force has been fortunate in that there have been no major hospital fires for several years, the same is not true of the rest of the nation's hospitals. Every six hours there is a hospital fire. More than 1400 times a year hospital personnel in this country find themselves turning in alarms, using first aid fire fighting equipment and removing patients from the danger area.

The investment in equipment and systems to guard against fires is considerable. There are automatic sprinkler systems, detection and alarm equipment, explosive proof electrical equipment and devices to control static electricity. These are needed in an environment that includes products such as ether, acetone, oxygen, ethylene, alcohol and other potential "bombs."

Homes and dormitories sometimes contain some of these products or other combustibles that can quickly turn a flicker of flame or a spark into an inferno. But even when no such materials are present danger still lurks: nearly one-fourth of the fires the Air Force experienced in the U.S. during FY 1964 were caused by matches and smoking materials. Electric wiring systems and electric appliances were also heavy contributors.

It is obvious then that Air Force personnel may at any time find themselves on the firing line, that they must rescue a friend, relative or, in a hospital, a patient.

During the day there may be many people about, some of them highly trained in fire fighting and rescue. At night it's different, particularly in hospitals where the staff is down to a bare minimum. Then each person has a grave responsibility in case of fire.

For several years the Norton Air Force Base Fire Department has conducted training for base hospital personnel. At the request of the hospital administrator and chief nurse, the author prepared a program which includes lectures in fire prevention and demonstrations in fire fighting and rescue procedures.

The pictures on these pages illustrate rescue practice. They show how a 110 pound woman might remove a 200 pound man from a bed. While the pictures were made in the hospital, the same techniques can be used by anyone, whether the subject is a patient or an airman in a dormitory overcome by smoke or flames. There were 283 fires in Air Force dormitories and quarters and 379 in family housing units during FY 1964. Therefore, these techniques can be equally handy in home, hospital or dorm. Take a good look—you might save a life. ☆

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BLANKET DRAG (Photo 1)—No lifting is necessary as nurse pulls patient from bed with both hands and pushes with her knee. As patient leaves bed, nurse must drop to left knee. Cradle formed by knee and arm protects patient's back (Photo 2). Nurse lets patient slide gently to blanket and pulls blanket from room.

While one nurse operates hand fire extinguisher (Photo 3), another uses HIP CARRY (Photo 4). Nurse approaches from left side and slides her left arm under patient's right armpit. With knee slightly bent, she reaches back with left hand and grasps patient's legs behind knees. Nurse then draws patient across her hips before leaving bedside (Photo 5). She stands erect and straightens knees, then walks with chest out and shoulders back.

SWING CARRY (Photo 6)—Nurses flank patient facing same direction. Each takes a wrist and pulls patient's arm around neck and across her chest. Nurses then reach under patient's knees and grasp other's wrist. Patient holds shoulders of nurses.

THREE-MAN CARRY (Photo 7)—Nurses slide patient to edge of bed, lift together and turn patient to face them. Then they carry him from room. "Sliding" and "lifting" should be continuous action.

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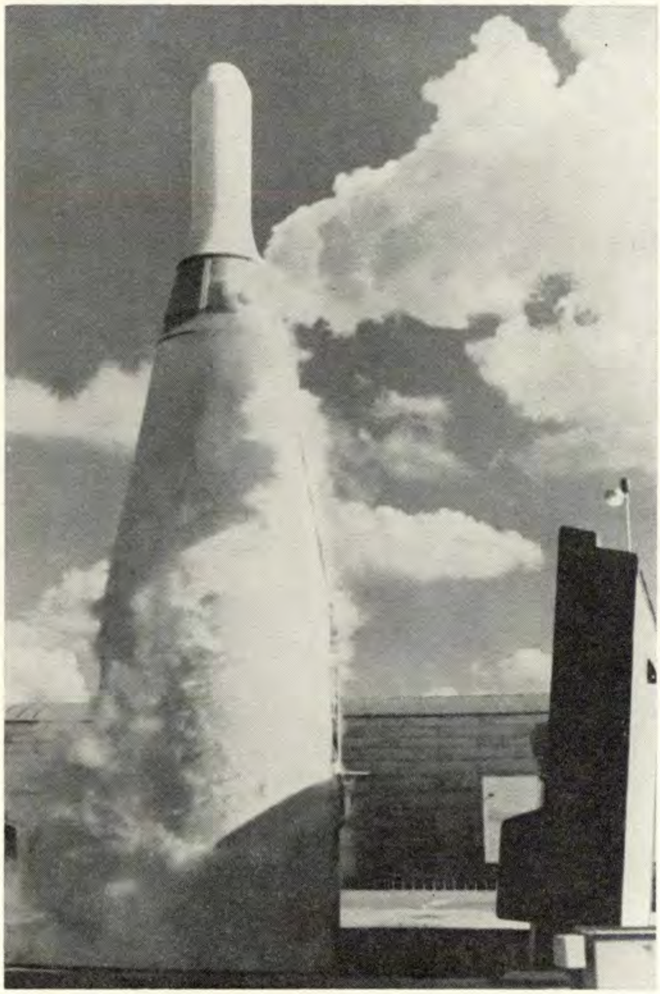
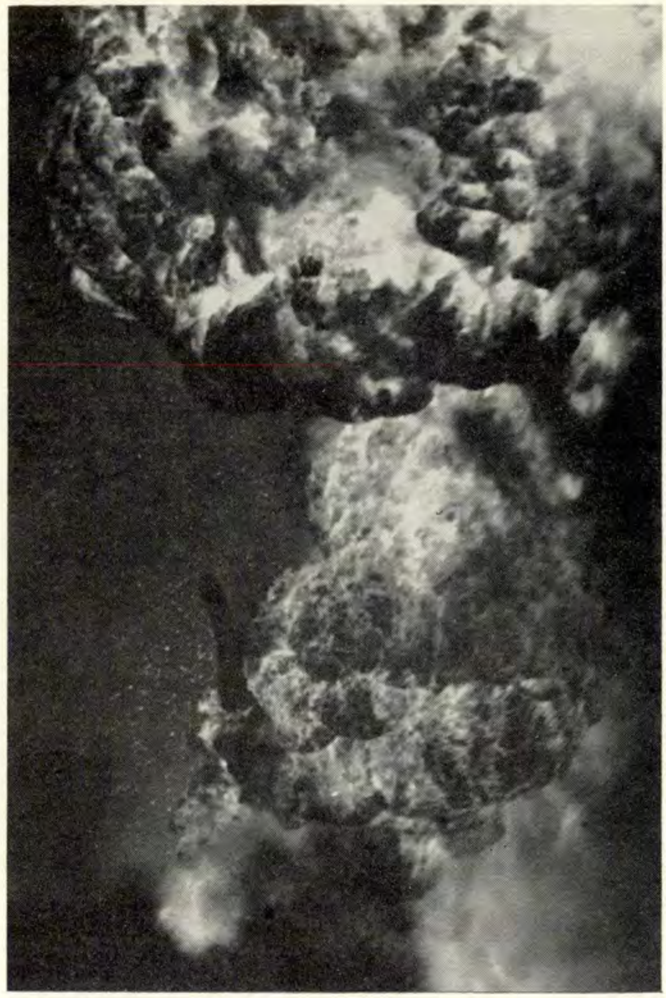
# PREPARE





# PREVENT

E. R. Roth, Directorate of Aerospace Safety

The cliche, "the bigger they are the harder they fall," fits strategic liquid propellant systems. When an accident occurs during a propellant loading exercise (PLX) and it results in fire and explosion, the launch facility (silo) will usually be completely destroyed. This has been confirmed by inspection of several Atlas F sites after such mishaps. Fortunately no injuries or loss of life resulted in the Atlas F accidents, but there were some close calls. In most cases the lapse in time from the first emergency indication to the actual explosion was more than an hour.

Why did the accidents occur? Why couldn't they be prevented? One answer is lack of system and personnel preparation. If both the system hardware and the personnel were adequately prepared for the job, some of the past accidents might have been prevented. This article discusses system and personnel preparation and their significance to safety and accident prevention.

## SYSTEM PREPARATION

In at least two incidents there was a history of critical system malfunctions in the missile lift systems and propellant transfer system. In the former the discrepancies involved launcher platform (L/P) movement with jerky action, intermittent stopping and seizing of the drive brakes. In the latter there were liquid oxygen (LOX) leaks. The reasons for some of these malfunctions were never adequately explained or corrected. Conducting a potentially hazardous operation without performance verification of the status of these subsystems does not constitute preparedness. In both cases, a complete functional checkout of the L/P lift system and an investigation of transfer loading system leaks should have been accomplished.

The proper operation of Real Property Installed Equipment (RPIE) is necessary. Facility equipment, such as ventilation and air conditioning, water and power distribution, detection and warning, communications, fire protection system and blast door interlocks, is just as significant as the Aerospace Ground Equipment (AGE) hardware. Malfunctions in the RPIE have contributed to catastrophic accidents.

Failure of a missile enclosure exhaust fan to stop in response to a gaseous oxygen alarm signal caused $O_2$ concentrations to be drawn into a diesel engine exhaust plenum. This condition resulted in the outbreak of a flash fire.

In several of these mishaps the water fog system had failed to operate when needed. If this system had functioned, the accident might have been prevented. In this situation and in the preceding example, the malfunctions could be attributed to *not* performing a functional check of these systems prior to a PLX.

Another case of lack of preparation was the existence of hydrocarbon contamination during a PLX. Small amounts of diesel fuel and hydraulic fluid had contaminated an area of critical components (LOX transfer system). Although some action was taken to clean up the fluid that had leaked, there was no verification that the sources of the leaks were located or corrected.

Mechanical interlocks are installed on blast doors to insure that they are closed at all times. The doors are designed to protect the Launch Control Center (LCC) from the overpressures of an in-silo explosion. PLXs have been conducted with mechanical interlocks inoperative or removed.

## PERSONNEL PREPARATION

It is significantly important that operational crewmembers be prepared to fulfill their job responsibilities. A strategic missile system is too complex for any one individual to know the total system details, therefore the applicable crewmember must be prepared to advise missile combat crew commanders (MCCC) on his specialty. Several accidents have occurred because crewmembers did not do a task, were not knowledgeable or lacked training in details which affected the safe operation of the system.

An L/P was being raised with a loaded missile during a PLX. An RP-1 fuel leak in the L/P side of the fuel disconnect was observed on TV. The RP-1 fuel spill occurred because a specified manual line drain operation had been overlooked! The L/P was kept up and locked during cleanup of the spill. At the same time, the non-essential bus was shut down on the recommendation of a standardization crewmember, who thought that removing power from electrical outlets in the silo would preclude an ignition hazard. This action was *not* specified in technical data. Shutting off the power de-energized water pumps which circulate condenser water to diesel generators, water chillers, exhaust fans, and other RPIE. This caused overheating of the diesels which, in turn, generated explosive vapors that contributed to the initial explosions.

When an emergency malfunction occurs during a countdown, safety and crew personnel should be prepared to investigate the situation when the MCCC gives the word. They should be prepared to put on self-contained breathing apparatus and the necessary protective clothing and use available safety equipment (such as portable oxygen or fuel detectors). Accident investigations have indicated that personnel have been sent into silos to investigate emergencies (location of a LOX leak for example) 30 minutes or so after the first warning. This action, if necessary, should be done as specified in tech data (assuming other conditions remain the same). There have been some very close calls because the decision to dispatch personnel to the silo was delayed until there was no longer time to investigate, but just enough time to get out before the blast.

Adequate preparation includes a complete understanding of who has overall responsibility for operations at all times. Regulations point out that the MCCC is in full charge at all times unless relieved by proper authority. For example, a standardization MCCC (and his crew) may take over if he feels such action is required to preclude loss of life or major damage to equipment. This action should be announced and acknowledged. In one accident, an MCCC bypassed a step in the checklist because he was so advised by a standardization MCCC. The standardization MCCC, however, had not officially relieved the MCCC of his command.

Missile teams for diagnosing potential hazards must be on call to decide on the emergency action required to avoid a catastrophe. These teams have been rendered ineffective because of the lack, or malfunction, of communications, poor amplification, reproduction, and because the required experts were not on the net to resolve the problem.

The above examples point out that one of the keys to safety is preparation.

System preparation means proper functioning of all subsystems, including RPIE and communication networks. To assure safe performance during critical operations, a complete system checkout is mandatory. Crewmembers must also be periodically tested to determine if they have retained their proficiency. A prepared individual knows his job (electrical power production, missile facilities, etc.) and the responsibilities that go with it. These include his capability to perform specific jobs in accordance with authorized technical data. He must also function as a team member. Testing of crews as to what actions they would take when given specified emergencies during a simulated countdown is an excellent approach. Emergency procedure training with written examinations must be a continuing program. Crew preparation must always include an understanding of each crewmember's responsibility and authority. This is particularly important during countdowns, critical operations and emergency conditions. ☆

*Chumley and friend barely make it on a trip...*

# SOUTH OF THE BORDER

The T-Bird made three quick bobs to the left, then rolled on by the first taxiway. Seconds later Captain C. Z. Chumley struggled out of his hard hat to the accompaniment of the dying whine of the engine. He rubbed his hands together and called over his shoulder, "Lieutenant, get that travel pod open and dig out the laugh and play clothes. Fella doesn't want to waste time—don't get to these border towns very often anymore."

"Uh, sir, what about the write-ups; those surges, tendency to roll to the left, I have an intermittent reception problem with my headset, there's a vibration in the—"

"HOLD IT!" Chumley cut him off with a wave of his hand and clambered out of the driver's seat. "That's all trivial stuff. I'll tell the transient guy to give her a look. We'll write it up when we get home."

"But, sir," the lieutenant was persistent, "about those fumes I noticed, I—"

"C'MON!" Chumley jumped to the ground. "I lit the filter end of a cancer stick a while back; that's probably what you noticed." He glanced at the clipboard the white coveralled transient maintenance man handed him, scrawled his name across the bottom and instructed, "You fill in the squares, Sarge, just fill 'er up. We plan to have wheels in the wells by oh eight hundred."

"No maintenance necessary? I thought I heard the lieutenant say . . ."

"Minor stuff, don't want to trouble you."

"Sir," it was the lieutenant again. He came out from under the wing holding two clothing bags, "that radio would only take a few minutes."

"I think we can have a man look at it right away," the sergeant said. "As you know, our transient maintenance hours are from eight to five, as shown in the Enroute Supplement, but," he looked at his watch, "there's 30 minutes left. He can probably change the interphone box."

"That's O.K., Sarge, we won't need it." He turned to the lieutenant. "I'll take the back seat tomorrow—you can hear fine up front." He looked around, "Where's crew trans . . . oh, there it is." He whistled shrilly at the driver of a yellow van. "We're ready," he called.

Stripped to their shorts, Chumley and the lieutenant shaved in front of the small mirrors in the men's latrine. "Ya know," Chum mumbled through the lather, "I gotta put the pr's're on Rex Riley – gotta get better facilities 'specially at these border towns." Later, while enroute to the border in the rear seat of a rickety taxi, he added, "Gotta talk to Rex about this transport situation, too. For safety's sake should have staff cars, with seat belts, to provide off-base transportation."

The lieutenant maintained his grip on the left arm rest. He could use one of those drinks Chumley had raved about, and he had to admit he was curious about the anatomical exercise demonstration. Later, after three margaritas and watching, bug-eyed, as the belly dancer did torso gyrations that completely defied all engineering parameters he had learned about in college, he began to share Chum's love for the Latins. "Y'sir," he said at one point, "I w'rry too much, Shaunce, ole pal, I believe we can fly back in the mornin', ev'n without thas 'old T-Bird if nec—ness—necs'ry."

Came the dawn. At first the lieutenant tried to figure out where that groaning was coming from. He shuddered when he realized he was making it. He sat up, and his head tried to explode.

He blinked his eyes and the blurred figure moving around on the other side of the room became Captain Chumley. He looked around the room. It was a complete shambles. "What happened?" he asked, nursing his head in both hands.

"Oh, the room," Chum laughed. "This, my friend, is the arena. This is where, shortly after midnight, 'ze great bull fight' was put on."

The lieutenant slid one hand up to the top of his head, touched the knot there and groaned again.

"That's the way it ended," Chum explained. "You insisted on being 'El Toro, ze buull'. You stood over by the door, pawed the floor, and when I cried 'Ole' you charged across the room, tripped over your new pair of cowboy boots, went headfirst through the red shorts I was holding and drove your head into the wall."

"Oh . . h . . h," the lieutenant groaned. Suddenly he belched, then grabbed his midsection in agony. "Don't tell me I tried to do that belly dancer act, too."

Chum leaned against the door-jamb and wiped tears from his eyes. "No," he laughed, "that was the 'El Grande Combination Plate'. Remember? You poured hot sauce over the whole thing."

"Oh..h..h." The lieutenant struggled over to the sink and gulped three glasses of water. "Got any aspirin?" he asked. "Maybe a small fire extinguisher?"

"Here," Chumley dug into his shaving kit and came up with some pills. "Here's some APC's and seltzer." He looked into the kit again and shook his head. "Sorry, no fire extinguisher. Wait, maybe this will do." He held up a can of shaving cream.

"If it's mentholated, I'll take it," the lieutenant groaned again. He looked out the window, then turned away as the bright light seared his eyes. "Aren't we supposed to have the wheels up at eight?" He began hunting around for his watch. "What time is it?"

"Almost noon. No sweat. I cancelled out. They've found some troubles with our bird. Can't go until tomorrow. C'mon, get dressed, will ya. We gotta go out. I understand the Base Ops officer wants to see me." The lieutenant went from immobility to slow motion, then speeded up when Chumley said, "Hurry it up. We'll get you a big vanilla milk shake."

At the field Chumley said, "You go get the milk shake and see if it will help put out the fire. I'll see what the Ops Officer wants." He went down a hallway, climbed a set of stairs and knocked on a door with the words OPERATIONS OFFICER on the glass.

"Come in," a gruff voice said.

"Sir, Captain Chumley. I understand you wanted to see me?"

"Chumley, oh, yes," the Lt Colonel said. "You the pilot of that T-Bird out there?" Chum walked over, looked out the window and saw a T-33 parked in front of the hangar. Cowling was scattered about; there were jacks under both wings, a fire truck was parked just beyond it and mechanics were crawling all over it like kids with a new toy. Chum checked the number on the tail.

"Yes, sir. What's going on anyway. Looks like you guys are dismantling it. Put it back together. I'm on a tight schedule."

"Captain, sit down!"

Chumley did. The Lt Colonel pushed a button on his squawk box and said, "Send Major Lea in."

A sharp-looking major appeared almost instantly. "Lea, this is Captain Chumley. He's the pilot of that T-Bird. Want to tell him what we found?"

"Yes, sir," Lea said, then turned to Chumley. "Captain, our transient alert people take special pride in providing prompt, dependable service. They always make a walk-around. We've found that some pilots hit the ramp running for the border and we'd have a lot of bashed birds off the end of our runways if we let 'em out the way they came in. Your case is classic. The first thing they found was a tire with cord showing in three spots. Got a bad left brake or a pilot with a ham foot. They were going to try and get it changed last night so you could make good your, ahem, eight o'clock wheels up, but soon noticed hydraulic fluid in the left wheel-well area. When they put pressure on the system, whoosh —a cracked line. One thing led to another and, in accordance with the T.O., they had to pull a retraction test. They decided to taxi your bird up here to the hangar area and that's when they found they had *real* troubles. The mech in the back couldn't call for taxi clearance— bad interphone. They noticed fumes, shut it down and got a tug. The fumes came from a cracked hydraulic tank cap. The engine had a tendency to surge so they pulled a power check. Sure enough, the fuel control valve had to be changed. On the retraction test it was discovered that the left main gear door was warped way out of shape. Sheet metal people are working on it now. I'd think you'd have noticed a tendency for the bird to roll left. Also, there was a broken linkage rod on the right speed brake and we couldn't get it to close flush. I'd think that would have given you a vibration." The flying safety officer looked at the Ops Officer. "Those are about all the major items I think of off-hand."

The Operations Officer scowled at Chumley. "Captain," he said, "all I have to add is this. If you persist in flying airplanes in such a condition, then not bothering to make write-ups, I have a suggestion that will probably save your life. I suggest you become the most proficient pilot in the Air Force in flameout landings as well as the fastest man on the ejection triggers."

Chum's head hurt, his eyes burned, and the last thing in the world he was in the mood for was a chewin' by people not even in his own command. He decided to play it meek, to get out of there.

"Yes, sir," he said. "Thank you for all the extra service. Maybe I can do a favor for you sometime."

"Yes," the Lt Colonel nodded. "Yes, possibly you can. I would consider it a great personal favor. Please, never land here again." ☆

# *MISSILANEA*

FOR OR AGAINST? Probably, at least once, every car owner has had that horrible experience of locking his car keys inside the vehicle. Such carelessness often creates considerable inconvenience and some embarrassment, but is seldom a hazard. The same conditions are not true with a missile weapon system.

Recently, a helpful missile maintenance technician (MMT) opened a Minuteman launch facility for a contractor-installed modification. The accommodating MMT was so eager to assist that he rushed through the prescribed sequence of operations. Apparently, the checklist was a retardant, so he placed it in a secure place and relied on memory! The checklist was so unimportant to this MMT that he inadvertently left it within the launch facility. He then secured the silo without mishap, fortunately. Alas! Another entry was required. The MMT possessed great skill and confidence. He reopened the launcher — without benefit of checklist or technical data (even though a technical order was in a nearby vehicle).

This MMT is a skilled but careless workman. Does he work for you? Or, does he work against you?

The austere appearance of the Minuteman launch facility is deceiving. The adage "Familiarity breeds contempt" is worth considering. Check your people for use of checklists!

**Lt Col Valdean Watson**
**Directorate of Aerospace Safety**

WHO EVALUATES THE EVALUATOR?—The Command Evaluation Crew conducted an evaluation of a Missile Combat Crew during a propellant loading exercise. The countdown proceeded successfully and without incident to completion. When the Crew Commander pressed the Lower Launcher Button, the console indications appeared normal; however, after normal timing out of the logic, the launcher failed to move. The missile was, in effect, "stuck above ground." Technical data emergency procedures called for boiloff of the missile.

While the duty crew researched tech data, and before initiation of missile and facility safing and boiloff procedures, members of the evaluation crew departed the Control Center. They proceeded topside, entered the hazard area, approached the launcher, and finally, from the lip of the silo, looked over the edge to see if they could ascertain the malfunction that had disabled the launcher. This activity was accomplished without any coordination or approval of the duty Crew Commander or Site Commander and despite a pre-countdown safety briefing which specifically prohibited such action. Suffice to say, had these actions been accomplished by a crew being rated, they probably would—and should—have been assessed with a major error and therefore would have failed the evaluation.

The violation or deviation from procedures is serious enough; the unnecessary hazardous exposure of personnel is unforgivable.

**Major K. H. Hinchman**
**Directorate of Aerospace Safety**

CONTAINMENT. While maintenance personnel were assembling and checking out an air-launched missile, inadvertent ignition resulted in the missile going propulsive. Three fatalities resulted.

The team included not only local maintenance personnel, but also an assistance team from the responsible AMA. The nonpropulsive attachment (NPA) is a standard item of equipment for these missiles but was not available during assembly and checkout. They should have known better, but . . .

The press of time prevented the operation from being delayed until the NPA was available. But, was the time involved worth the risk? The training mission was delayed by the loss of the missiles involved. Had the NPA been used, injury to the technicians would probably have been limited to burns.

At another base, a missile had been loaded on the aircraft but the umbilical cable was not connected. The missile ignited, left the rail and hit the ground 30 feet away, skipped along the ground and hit two bicycles and a fence. Members of the loading crew and a bystander were injured. This is another example of the inadvertent initiation of an igniter. Had the aircraft been aligned with an inhabited area, more serious damage than two bicycles and minor personnel injury could have resulted.

In a solid missile, the igniter is often cast in the propellant grain. If the missile is in a propulsive configuration and the igniter accidentally initiates during assembly, maintenance or checkout, accidents such as the two above will occur. Electro-explosive devices, similar to the igniter mechanism used on solid missiles, have been used for years by earth-moving companies, mining, and petroleum industries. These industries have achieved an excellent safety record by continually emphasizing the necessity of care and caution in the handling of pyrotechnic devices.

Missile propellants fall into the category of explosive components. We can profit by industry's example. You, the technician, must use care and caution with explosives; you the supervisor, must instruct your people on safe operations, and everyone must exercise a healthy respect for these explosive components. This includes using containment devices such as the NPA, barricades in shop areas, and impaling devices for large solid missiles which will prevent a missile from going propulsive and destroying a housing area or anything else in its path.

**Maj Moses R. Box**
**Directorate of Aerospace Safety**

# Rex Riley's CROSS COUNTRY NOTES

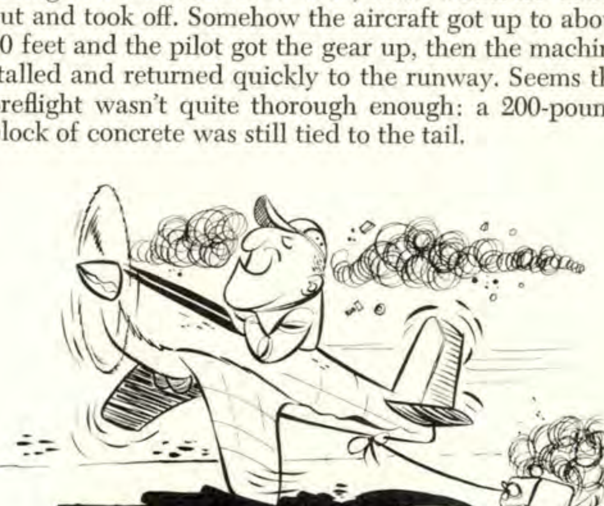
THERE'S ALWAYS A DITCH. Rex remembers "there's always a ditch" as a favorite expression of a command chief of safety. He would come in, accident TWX in hand and shaking his head, and make the remark. Actually, it is quite surprising, when a guy goes off the far end, how often his bird bounds along in the boondocks with little or no damage until it comes to the inevitable ditch. Here's the topper. These transport troops, inbound to a non-ZI base, received landing instructions when 30 miles out. Two subsequent contacts were made with the tower, one at 10 miles, another at seven. The aircraft was cleared to land. After landing the crew spotted a ditch across the runway about 500 feet ahead. They got on the binders, but still hit the ditch at 30 to 40 knots. At about this time the tower controller advised that the aircraft had landed in a construction area. Now he tells 'em! Miraculously, the report says, damage was limited to three changes (tires) and one nicked and bent prop.

TEMPORARY INSANITY? One of the first traits Rex ever felt called upon to publicize was the exercise of self-discipline. Years ago it was necessary to point out the tragic price that a few young tigers paid for unauthorized buzzing. It required a complete disregard of orders, trust and common sense for a pilot to attempt low altitude acrobatics to try and impress a girl friend or relatives. Enough young Air Force officers were killed in this manner, and enough publicity given to the hazards, and enough teeth put into disciplinary action against surviving offenders that this problem gradually faded.

But it has not been eliminated. Information recently received tells of a pilot, flying a target mission, who took unauthorized evasive action, close to the ground. This unauthorized maneuvering was not required for mission success, was extremely hazardous, and terminated when the pilot allowed his aircraft to crash. During the holidays, one of our vacationing safety types reported driving through a flat area of "ETO" and seeing a century series jock come busting along at grass top level, then pull up across a busy highway. Off in the distance, in the direction from which the jet had come, was a small town.

Any pilot who suffers temporary insanity of this kind, and subjects innocent citizenry, his equipment and himself to extreme danger, does not deserve to be trusted with the responsibility incumbent for an officer of the United States Air Force.

DRAG OVER THRUST—This is kind of hard to believe, but it happened. The pilot is supposed to have preflighted an Aero Club T-34, after which he taxied out and took off. Somehow the aircraft got up to about 50 feet and the pilot got the gear up, then the machine stalled and returned quickly to the runway. Seems the preflight wasn't quite thorough enough: a 200-pound block of concrete was still tied to the tail.



CHAPEAU. Because weapon system humanus was designed with a frangible head, safety hats have been designed to protect this area from falling or flying objects. From ATC we gleaned the tips that these safety hats are water resistant, non-conductors of electricity and fire resistant. They are available in several types and, as any one who has been around a missile site knows, come in a variety of colors. If you are issued a hat because of your working environment, take time to fit it properly. Proper adjustment provides for at least one and one-fourth inch of space between the top of the head and the inside crown of the hat. This space provides a cushioning effect should an object fall and strike the hat. Some other tips: never wear a metal type hard hat around electrical hazards—use the non-conductor type, never drill air holes in your hard hat—drilling may cause the material to crack, wear your hat in designated areas—like the seatbelt, the hard hat is worthless unless worn. ☆

# THE DEAD HERO

From the F-100 cockpit, 42,000 feet up, the night sky was a ceiling painted with India Ink and decorated with glittering white jewels. Because of the clarity of space, the stars actually appeared to be closer than the man-made lights imbedded in the haze eight miles below. The air here was smooth, and the fighter that sped through it was disturbed only by the faint vibrations from its turbine. The chalklike contrail the plane left in the thin air slowly dissipated as it spread and dissolved into the night.

For the pilot this was a busman's holiday. This supersonic fighter was designed to perform a variety of exacting missions from ground level into the stratosphere. Tonight's mission was a simple cross-country flight to deliver the aircraft for IRAN. Routine monitoring of engine instruments and navigation from one TACAN station to the next was all that was required. ARTC was following the progress of the beacon return and had eliminated the requirement even for routine position reports.

Duck soup.

**Whoof!**

The lieutenant felt and heard the sound at the same time. Instantaneously his body tensed and his eyes flicked from one engine instrument to the other. His reaction was so quick that he was able to catch the first movement of the engine RPM gage as the needle began to unwind. Tailpipe temperature was falling and he caught that. But these gages merely confirmed what the seat of his pants had already told him. That awful coasting feeling had replaced the steady pressure that had been boosting him along. He tried to catch the flame. Nothing.

"MAYDAY, MAYDAY, AIR FORCE JET 38246, FLAME-OUT!"

"Air Force jet 38246, Kansas City Center. Copied your Mayday. Understand you have flamed out. Recommend you squawk emergency. What service can . . . we note you are now squawking emergency . . . what service can we provide?"

"Rog, Center, will let you know."

Most every emergency triggers a series of reactions. Not all of these are always correct. The lieutenant now took an action which might prove to be the first in a series that could later be construed as possibly being incorrect. Some ingrained instinct for survival caused him to bank left and point the nose of his fighter toward a glow of lights south of his course. He lowered the nose as he did so to maintain best glide speed.

His eyes flashed from one strument to another, then he forced himself to take time as he realized panic was making him scan at a pace that would not permit interpretation. Fuel pressure was down, oil temperature dropping — confirmation of what he already knew —flameout! He checked his fuel quantity and selector. That wasn't it. Icing? Couldn't be, in a clear sky, but he turned on his deicing switch anyway. Emergency fuel— the checklist items, one by one. He had time to do it right. Now an airstart attempt. It failed.

"Air Force 38246, we observe you turning south. We will keep other known traffic clear and provide vector service and other assistance as desired. What are your intentions?"

He had to tell them something. But his plan wasn't firm yet. Get an airstart if he could. If not, punch out, probably, though he hadn't given that any conscious thought as yet. Something had told him to turn toward the lights of the city though. He didn't have any better plan. He would stay with it for now.

"I'll try another airstart. Will orbit in the vicinity of the city coming up ahead. Will keep you advised."

"Roger, Air Force 38246. We will clear the area of known traffic. Will Rogers Airport is seven two miles from your position. We can provide vectors."

"Rog. Thanks. Not now."

Altitude 28,000. He tried another airstart. Nothing. He would try again at 25,000. The city was coming under the left wing now. He banked left, eyes searching, and picked out the beacon and then the slender rectangle of lights outlining a runway. He checked the beacon again and caught the flash of green. He would keep the field in sight.

"Kansas City, Air Force jet 38246, request surface winds, my vicinity."

"Air Force jet 38246, stand by. Neosho altimeter three zero zero six."

"Rog. Three zero zero six."

"Roger altimeter. Winds one four zero, eight knots. What are your intentions?"

"I'll try for more airstarts." He glanced at his altimeter and widened his turn. "I'll set up a flameout pattern in case I can't get a light. If it looks good I'll consider landing. If not, I'll aim away from the city and punch out."

"Roger, Air Force jet 38246. Joplin Radio is 255.4."

"I'll stay with you. I'm pretty busy and don't want to fool around changing radio frequencies."

He ran through the airstart procedures again. Nothing. Altitude 18,000. He picked up the field and tightened his turn. The dryness in his throat was more pronounced. He ran his tongue across his lips and hooked the zero lanyard. Another airstart try; deliberate. Making sure he didn't miss a thing. RAT on. Check shoulder harness locked.

"Kansas City, Air Force jet 38246. Request field elevation."

"Air Force jet 38246, field elevation at Joplin niner eight zero."

"Rog," he said. Center was really on the ball. He tried another airstart and started his turn from high key. There was a call on the radio. He didn't catch it but did catch the reply by Center.

"All aircraft—make no calls on 322.4. There is an emergency this frequency."

of metal on the runway. His nose gear had collapsed. He braced himself on the brakes, trying to keep it straight.

The entire emergency had been one series of exacting tests after another. He'd done all right so far. If he could just get it stopped. One more break, that's all he asked.

The lieutenant's last mortal sensation was the flash that signaled the explosion.

Later, the accident investigators pinpointed the explosion at the 2100-foot point on the 5500-foot strip. They estimated that the aircraft had nearly stopped at the time. He had *almost* gotten away with it.

Analysis of the wreckage disclosed the cause of the explosion. Fuel from a broken line had puddled in the belly of the fighter and, possibly ignited by a vibration spark, had exploded to scatter

flameout landings should not be attempted at night."

"The irony is," another board member interjected, "his flameout landing was almost perfect. He missed clearing the utility pole with his nose gear by less than two feet. Otherwise he had it hacked—I'm convinced he would have been able to stop—then, blooey! There's a mighty slim chance of pulling off a night flameout landing on a 5500-foot strip. He came close, awfully close, then died when he probably figured he had it made."

"Gentlemen," the president of the board spoke up, "we have to wrap this up. Let's recommend that this accident be publicized in the safety magazines. It's a little more dramatic than some when we realize how close he came to making it. But the end result tends to substantiate the Dash One procedure against attempting night flameout landings. The Air Force has paid a high price

Low key now. No more airstarts. Concentrate on pattern. Should get out. But pattern looks perfect. Just a little longer. Airspeed 220. Still looks perfect. Gear . . . now! On final, speed 200. Just a little high. Full flaps. Committed! Dropping low now, THUMP! What was that?

The lieutenant added back pressure as, peripherally, he caught the first runway lights. He reached for the drag chute handle and felt the gear hit as he came even with the lights. He jerked the handle. The nose dipped much lower than normal and he heard the screech

plane and pilot parts all over the runway. A few seconds more and the lieutenant could have climbed over the side and stood waiting for the police car, fire truck and ambulance that, alerted by a call from FAA, raced onto the field and down the runway to the smoking wreckage.

When the evidence had been examined, and as the investigators sat around the table in the accident board room, one said, "If we are to benefit from this accident, it must be that we are to again emphasize the Dash One instruction that says

for this lesson—a pilot and his plane. If we are to benefit, it may be that some other pilot faced with a similar emergency, will remember this accident, eject and live. Also, we have a little more ammunition to use in the battle for better quality control."

The recorder wrote the recommendation down, then read it back.

The board president tapped the eraser end of his pencil on the table. "You know," he said, "because this guy came so close, if I were writing this story I know what I'd title it: *The Dead Hero*." ☆

*A sucker hole,*
*three engines out.*
*That's when I discovered . . .*

# THE REAL GOAL

**By A USC-FSO Student**

When I think of accident prevention, a personal experience always comes to mind.

One morning last January I was scheduled to conduct a C-97 acceptance test flight at an IRAN facility. Acceptance flight test of multi-recip aircraft is my business and my present way of life.

The day started out on the wrong foot. The weather was foggy, rainy, cold and it was Monday. After arriving at the office I was told that all aircraft deliveries were behind schedule. Although the weather was below that required for flight test, we scheduled our crewmembers to the aircraft that were supposed to be ready for flight this day. Each crew had two aircraft on which to complete a green preflight and test flight. This usually takes a full day even when the weather is good.

I decided to take my crew to the aircraft and start a preflight. After arriving at the bird it looked like the last thing it wanted to do was fly. We climbed aboard and the first thing I saw was a cockpit which looked as of it had been cleaned with a water hose; practically everything was soaked.

Our preflight was satisfactory except for some minor discrepancies and inoperative VHF and UHF radios. The radios had to be repaired before flight, so we returned to the flight building to recheck weather and await repairs.

The aircraft was ready for flight just after lunch. A quick check of the weather showed a multi-layered, scattered to broken condition from 2500 feet to 18,000 feet with an occasional scattered layer at 1000 feet. The rain had stopped and visibility was eight miles on the ground. Everything considered, I decided to go. All I needed was 2500 feet and a clear area in which I could pick my way to VFR on top and also another hole through which I could descend.

In my desire to try and get this aircraft ready for delivery I decided to push a little harder than normal. We taxied out and completed a normal test flight runup. This included a complete check of all systems. No major discrepancies existed so we taxied to takeoff position.

Takeoff in this aircraft was a very interesting experience. The gross weight was only 104,000 lbs., compared to 153,000 lbs. when ready for departure from a line organization. As a result of the light gross weight, its acceleration and rate of climb were refreshing to a lumbering transport jockey.

Takeoff was uneventful and climbout was excellent. We could not go to our flight test area because of weather so I turned south. I found a small clear area and started a 2500 foot per minute climb to 20,000 feet.

As we passed through 9000 feet No. 1 engine failed so the propeller was feathered. With emergency procedures completed we were still climbing at 1000 feet per minute. Since the aircraft was so light I decided to continue the flight.

At 20,000 feet the aircraft was performing very well. The functional checks progressed rapidly and then without warning both the VHF and UHF radios became inoperative. I could still see some clear areas, so the loss didn't concern me too much.

Finally we came to the last thing on our test flight work sheets, prop feathering. No. 1 was already feathered so I feathered No. 2. It checked out so we brought it in and feathered No. 3. It too was good and it was brought back into operation. No. 4 was then feathered but when we tried to bring it in, it would not unfeather. We tried everything. The aircraft could not maintain cabin pressure on two engines nor could we maintain altitude with less than maximum power. That not being desirable, I reduced power, found a clear area and started a slow descent. Meanwhile my crew was trying to find the reason why we could not unfeather No. 4.

As we were descending all of our present problems took a back seat when No. 3 prop started hunting 200 rpm. The engineer tried changing RPM to correct the condition but that just aggravated the problem. The prop began hunting between 400 and 500 rpm and suddenly increased through 2800 rpm. I quickly moved for the feathering button and held my breath. The pump took hold and slowly moved the prop to the streamline position.

Let's see now, three engines out, VHF-UHF radios inoperative, weather and an aircraft which had been light suddenly became very heavy. I and my crew, but I most of all, finally began to see the light. Now I had to continue descending; I had no choice.

I attempted to gather my thoughts. If we descended VFR in the small clear area we were in, we would break out just 2500 feet above the terrain 40 miles south of the airport. Should I order the crew to abandon the aircraft now? What a nut, why didn't I return when the first engine failed?

There was a lot to think about; in fact, I barely heard the electronics technician say he had found a loose wire in the No. 4 prop feather motor timer plug. I pulled out on the button to unfeather the prop. It seemed like an eternity but then the prop began to rotate. We now had two engines running, enough to get us home.

Later I realized that I foolishly thought I was helping my organization fulfill its mission. I now know that fulfillment of the mission with maximum safety is really the goal. ☆

# THE IPIS APPROACH

By the USAF Instrument Pilot Instructor School, (ATC)) Randolph AFB, Texas

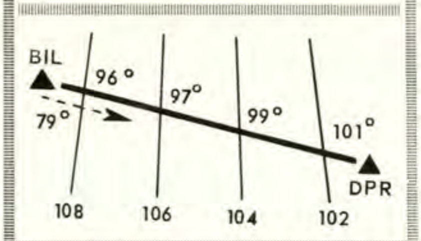
**Q. One would expect reciprocal headings on enroute navigation charts to be nearly 180 degrees apart, plus or minus a few degrees for the variation difference between two navigational aids. However, the difference is sometimes five degrees or more after taking into consideration the variation change. Example: Enroute High Altitude Chart (H-1 Northwest) from Billings to Dupree, the variation differential is four degrees, yet the reciprocal headings vary nine degrees. Please clarify.**

*Colonel R. C. Franklin, Jr., 4520 Combat Crew Training Wing, Nellis AFB, Nevada.*

A. The nine degrees variance between the published reciprocal radials at Billings (BIL) and Dupree (DPR) is correct. A four degrees variance is due to magnetic variation. The remaining five degrees are the result of the charts, "Lambert Conformal Conic Projection." Although all VOR radiated signals are oriented to magnetic north at the station site, each radial is measured or extends from the station in a straight line. A straight line, on the Lambert Conformal Projection, approximates a great circle (the shortest distance between two points on a sphere). This line crosses each meridian at a different angle due to the convergence of the longitudinal lines. The accompanying illustration represents the route in question.

You can observe from this illustration that the five degrees variance between the true course at the 108th meridian and the 102d meridian plus the four degrees of magnetic variation equal the cumulative total of nine degrees. These apparent discrepancies in reciprocal radials between facilities on the enroute charts are most prominent on east and west headings at the higher latitudes. From the pilot's standpoint, flying the published radials will maintain a position on a direct line between the two stations. Additional information on these features of Air Navigation may be found in Chapter 2 of AFM 51-40.

| MERIDIAN | 108 | 106 | 104 | 102 |
|---|---|---|---|---|
| TRUE COURSE | 96 | 97 | 99 | 101 |
| VARIATION | 16 | 15 | 14 | 13 |
| MAG COURSE | 80 | 82 | 85 | 88 |




**Q. Does AFM 51-37 require that a standard rate turn always be used during the traffic pattern phase of a Gyro-Out radar Approach?**

*Major George Aubry, Jr., 3560 PTW, Webb AFB, Texas.*

A. No, standard rate turns should not be used in all instances. The rate of turn in the traffic pattern phase should be three degrees per second, if this is possible without exceeding 30 degrees of bank. Circumstances may dictate deviation from this procedure, e.g., attitude indicator failure, partial loss of available engine power, or very small heading changes where the angle of bank should not exceed the number of degrees to be turned. Except for these, or other circumstances of an unusual nature, the turn rate or angle of bank during a "gyro-out" approach is the same as that for a full panel approach.

POINT TO PONDER. The jet enroute penetration has "come into its own" in the past year. It is being used by Air Force pilots more and more, not only because it saves the pilot time, but because it saves the controller time,

The Air Force pilot should always bear in mind two things regarding enroute penetrations: First, the procedure is an additional service provided by Air Traffic Control and it is not mandatory that the controller honor your request for an enroute penetration. Second, the pilot should in his preflight planning, expect to make the published approach. Then, if his request for enroute penetration is honored, it's just frosting on the cake.

Now, let's look at the enroute penetration and see what's involved.

First, you will be given a clearance limit which will be navigational aid or fix depicted on the FLIP Enroute High Altitude Charts *or* depicted in the appropriate FLIP Terminal High Altitude Charts from which a letdown can be made in case of two-way communication failure.

Second, you will be assigned an altitude to which you are cleared to descend. The descent is based on a rate of 4000 to 6000 feet per minute. The controller determines the distance from the airport where descent clearance should be issued by adding 10 to the first two digits of the flight level. For example, if you are at FL 300 descent will normally begin when you are 40 miles out.

This clearance limit and altitude assignment are the keys to your safe transition from cruising altitude to a point where you can successfully make an approach and landing at your destination. If you can maintain two-way communication in the radar environment, you should have no problem.

Next month we will discuss radio failure during a jet enroute penetration. ☆

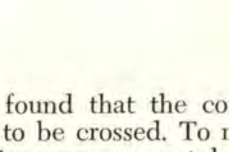
# Aerobits

NOT LUCK—At McChord AFB the safety office presents an inscribed plaque, called the Lucky Horseshoe award because of the gold horseshoe superimposed on the front of the plaque. It goes to drivers who were saved from death or serious injury by seat belts. Here's a case in which an Air Force officer and his wife ought to have twin horseshoes, not for luck but for good judgment.

They were driving along in their pickup when suddenly an out-of-control automobile came skidding at them in their lane of traffic. The officer was unable to avoid a collision and crashed broadside into the other car. Result: The officer and his wife received minor injuries; they were wearing seat belts. The driver of the other car was thrown into the windshield and received a severe skull fracture; he was not wearing a seat belt.

THAT ANNOYING SOUND—Before deployment, crews involved were given a briefing which included an audible demonstration of the sound characteristics of the URT-21 personal locator beacon. Later on, the pilots of the flight of fighters were appreciative of this, because one accidentally actuated his beacon. Upon rendezvous the fighter flight lead asked the tanker crew if they had taken a bearing on the guard transmission. The reply was that they had heard the transmission, didn't know what it was, became annoyed with the noise and had turned the receiver off . . . Not a comforting thought, had one of the pilots actually had an emergency, had to eject, and count upon the beacon to lead searchers to him.

Included in the report was the recommendation that crews be briefed on the sound of the beacon and what actions to take. Ever heard the pulsating tone of the URT-21? If not, call your flying safety officer, ask him to locate a tape and play it at the next flying safety meeting. YOU might be the guy waiting hopefully for searchers to locate you.



ONE HUNDRED DOLLARS AN OUNCE—The big, many-motored bird was grounded awaiting a new elevator assembly. (Seems that the one that came on the craft originally had been damaged by a fork lift operator who thought he could drive under the tail section, but couldn't.) Wasn't long tho' before the Supply troops located an elevator and everyone thought that it wouldn't be long before the C-54 would be airworthy again. However, just prior to installation, a real sharp maintenance type was giving the trim tab mechanism a good going over and found that the control cables appeared to be crossed. To make sure his observations were correct, he got out the books and some assistance from a couple of QC inspectors. Sure enough, the tab control cable was wound on the drum so that applied nose-up trim would have resulted in the opposite effect. The drum was removed, rewound, and installed properly. The bird has been making its scheduled missions ever since.

It's sure good to have conscientious maintenance troops like this one around. They're worth their weight in gold!

**Hq ATC, Safety Directorate**

PASS THE $O_2$—During flight at 31,000 feet, cabin pressure 25,000 feet, a crewmember attempted to adjust his mask because of blow-by when he exhaled. Unable to make the proper adjustment with the mask attached to his helmet, he removed the mask. Shortly he began to detect symptoms of hypoxia but was unable to get the mask back on before passing out. Fortunately a fellow crewmember noticed his condition and placed the man on 100 per cent oxygen. The pilot made an emergency descent. The man recovered and was later examined by the flight surgeon who determined there were no adverse after-effects.

ERRATIC B-66—The pilot of a B-66 had what appeared to be normal approach and landing until the nosewheel contacted the runway. The aircraft then began a gradual turn to the right, left the runway then began to parallel it. After knocking down several thousand-foot markers the pilot got the machine stopped 5200 feet from touchdown. Drag chute, left rudder and brake were used in an attempt to control the aircraft, but to no avail.

Later it was determined that three different pilots had reported directional control problems on landing roll during four out of 10 flights. They reported the trouble but attributed it to anti-skid, dragging brake, crosswind, but no entry was made in regard to nosewheel steering as the problem. Maintenance inspected the brake, changed a tire and an anti-skid control valve. Because of some reports of intermittent nosewheel steering problems, a microswitch was adjusted and a cannon plug cleaned. Following the incident related, there was a complete teardown of the steering mechanism which revealed frayed and broken wires that control the engagement of the hydraulic clutch connecting the nosewheel steering control to the rudder pedals. This was the primary cause of the incident, but other findings included inadequate pilot writeups and insufficient corrective action during trouble-shooting.

USAF WEATHER WARNING SERVICE. Recent aircraft accident investigation reports indicate confusion among some pilots concerning the USAF weather warning system. Remember, Air Weather Service products are designed to meet U.S. Military requirements both in detailed criteria and timeliness. United States Weather Bureau (USWB) warnings are produced by the Severe Local Storm Center (SELS) and distributed over FAA channels. Air Weather Service warnings are no longer produced jointly with the USWB, although the AWS Weather Warning Central Forecast Facility is still located at Kansas City, Mo.

All CONUS Air Force weather detachments receive graphic weather warnings for the contiguous U.S. four times daily on teletype circuit COMET II. These warnings are amended as required. Spot warnings are issued by the Kansas City unit for approximately 500 locations. Your weather forecaster uses these forecasts unless local weather conditions dictate otherwise. He is required to brief you on any advisory within 100 miles of your proposed flight plan.

Our weather warning facility has compiled an excellent verification record. The service provided is the best available. Here is a word to the wise. If you are clearing from a base field with limited weather facilities and have any doubts about the weather, don't hesitate to obtain the full weather treatment by using the telephone weather briefing procedure shown in the Enroute Supplement.

In summary, remember the term SELS now applies only to the U.S. Weather Bureau. Also notice that I have not used the word "severe." That term is now used by SELS only. We use the terms: Weather Warnings (a specific forecast) and Weather Warning Advisories (a probable occurrence which serves as an alert that a specific warning will probably be issued at a later time). Lastly, if in doubt, use the telephone. Reference Air Weather Service Manual 55-8.



**Lt Col Jerry Creedon**
**AWS Liaison Officer**
**Directorate of Aerospace Safety**

# Aerobits

CLOSED MEANS CLOSED — Two aero club members, one with a private ticket and the other a student, were seriously injured when their light aircraft caught a wire with the gear during an attempted landing. No, this was not a low drag-in approach into the wires. The runway was closed and contained obstructions. (Incidentally, this landing was a violation of AFR 34-14 which sets criteria for airports at which an aero club aircraft may land.)

IMPROPER PROPPING—There are several ways to prop an engine: the right way and all of the wrong ways that can be devised. For example, an aero club member received serious injuries when he placed one hand on one blade, the other on the remaining blade and spun the prop. The engine fired and one of the blades struck the man in the leg.

We're not going into the proper way of propping an engine here because we don't believe this procedure is really necessary. The mishap related occurred because the lad tried to prop an aircraft that had a dead battery. Change the battery or hook up to some external power. No aero club flight is so urgent that hand propping is necessary. ☆

## FALLOUT continued

The Base Operations Officer should have evaluated the serviceability and condition of the runway. Air Traffic Controllers disseminate the Base Ops officer's reports to aircraft intending to land or take off. The Base Operations Officer—not Air Traffic Controllers—has the authority to close and open runways.

**MSgt Rudolph H. Stamm**
**2052 Comm. Sq, AFCS**
**Keesler AFB, Miss.**

*Thank you for the suggestion. As stated in the article, this case occurred in Canada; their procedures may differ.*

### ROUND TABLE ON GUARD

I must take my hat off to you gentlemen. The September 1964 issue of AEROSPACE SAFETY prompted me to write and I hope you'll bear with me if I've cluttered your IN basket.

These comments are directed to the Round Table discussion on Guard Channel misuse (pages 8 and 9, Sept. 1964). I consider myself fortunate in having flown daily in the old Chicago-Indianapolis Pathfinder area and growing with them. Apparently, that area was chosen to implement positive control because of its dense traffic. I personally feel that the FAA has gone completely overboard to assist and give service to the buck pilots. With the exception of certain geographical areas, FAA's capability is only hampered by cockpit short circuits (between headset).

I am convinced that in this area, major misuse of Guard frequency exists and, further, there is little change whether the sky condition is VFR or IFR. I have submitted OHR's against the Fort Worth Center plus military aircraft and some other ground stations. My flying is confined to target aircraft for pilots undergoing F-102 training. I will be the first to admit that I do not continuously monitor Guard frequency. I cannot afford to, since I must break off the fighter or take evasive action at his 15- or 20-second-to-fire transmission when he has an improper setup. Many times I have switched to T/R position in order to hear the fighters' 15/20 second transmission, and I am the one who must take evasive action as the fighter is monitoring Guard. Note taking during flight as target aircraft shows an average of 10 Guard transmissions per two hours of flight.

Our FLIP, AFR's, FAA-FAR's, ATC, etc., very clearly define procedures for lost communications. Aircraft equipped with transponders really have no emergency, should they lose their transmitter. The FAA can, on second call, ask for an "IDENT" acknowledgment; it can assign another frequency in the same manner, asking for an "IDENT" acknowledgment, etc., on each change. If the pilot(s) have turned down their volume then centers, radios, etc., transmitting on Guard is rather useless. Should ATC receive no acknowledgment to "IDENT," then one Guard transmission assigning a frequency and requesting an "IDENT" acknowledgment would suffice. VOR/TAC radios are another means of relaying to the pilot. I have used the above procedures under cruddy IFR conditions in the NE and north and they work very well. Of 17 years rated duty I have yet to make my first Guard transmission. If it's a case of an aircraft with complete electrical failure, well — best of luck!

With the gate hold, positive airspace, and lost communications procedures there are really no problems. In addition to these procedures, four things that could go a long way toward streamlining military/civilian air traffic would be:

- Lower the positive control airspace to 16,000 feet for the entire United States and the continental control zone down to 10,000.
- Require all military pilots to attend instrument academic refresher courses every six months and revise the written examination to cover more on IFR emergency procedures, departure, en route and arrivals and administer written examinations every six months with a minimum acceptable score of 90 per cent. This score is high; however, if the pilot does not know what to do then best we do not expose him.
- Implement procedures for "IDENT" for apparent transmitter problems.
- If repeated calls on assigned frequency plus a Guard call do not give contact with the pilot, then a call to the Watch Supervisor or an RBI, might be in order, especially if the pilot finally comes in out of the blue as if nothing had happened.

This letter might seem a little on the negative side and I'm afraid it is, but it's certainly disgusting to sail along listening to Guard chatter when we have procedures to employ, except for flameout or complete electrical failure and for the latter who can help. Best of luck as you pursue to solve this problem; in the meantime I'll be listening on T/R + G.

**Maj Thurman B. Sykes**
**4780 Orgl Maint Sq**
**Perrin AFB, Texas**

# WELL DONE

## Flt Lt DAVID W. PARSONS

**314 TROOP CARRIER WING, SEWART AIR FORCE BASE, TENN.**

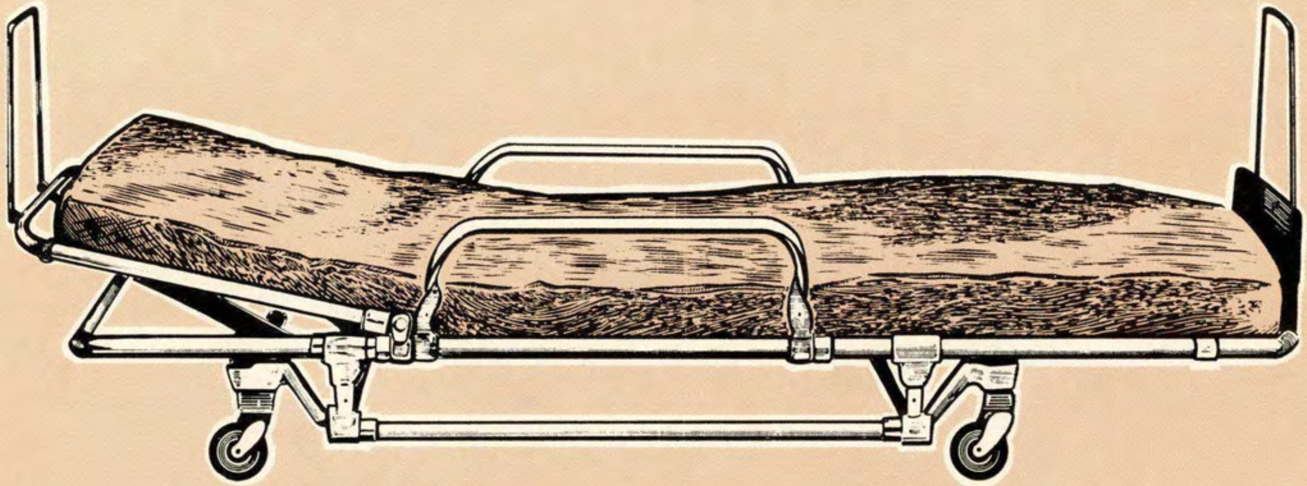
Flight Lieutenant David W. Parsons, RAF, has received the USAF Well Done Award for the manner in which he handled the following emergency. He was flying a C-130 at 19,000 feet when the forward cargo door blew out, causing explosive decompression, loss of the major oxygen systems and a large portion of the fuselage. An airman, seated near the blown door, was sucked out and fell to his death. The door and large pieces of the torn fuselage struck the number one and number two propellers, the right horizontal stabilizer, and caused grave damage to the number two engine.

Flight Lieutenant Parsons immediately feathered the propeller on this engine but only three of the four blades went into the feathered position, thus causing violent vibration. Several hydraulic lines were torn loose, filling the aircraft with hydraulic fumes and fluid, and rendering the normal braking, landing gear, and flap extension systems inoperative. Flight Lieutenant Parsons immediately took the prescribed action for an explosive decompression. The copilot, in addition to helping fly the aircraft, notified Air Traffic Control of the emergency and coordinated the radio calls.

The first navigator accurately fixed the position of the aircraft, which later greatly assisted in recovering the airman's body and the missing aircraft parts. He then directed the aircraft to the nearest safe emergency airfield. Additionally, he monitored terrain clearance throughout the descent and greatly assisted the pilot in flying the traffic pattern with the airborne radar. The second navigator and the loadmaster, at considerable risk, crawled past the gaping hole to the rear of the aircraft and passed parachutes forward for the rest of the crew. The flight mechanic and the crew chief also went aft, diagnosed the damage to the hydraulic system and manually extended the main landing gear and the flaps.

Flight Lieutenant Parsons determined that the aircraft was controllable above 150 knots airspeed and flew it to a safe landing. His decision not to abandon the aircraft near heavily populated areas and his crew's subsequent handling of this emergency reflect great credit upon him, the Royal Air Force, the United Kingdom and the United States Air Force. WELL DONE! ☆

# DON'T GET CARRIED AWAY *



*BY CARELESSNESS

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