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SAFETY JANUARY 1976

THE UNITED STATES OF AMERICA

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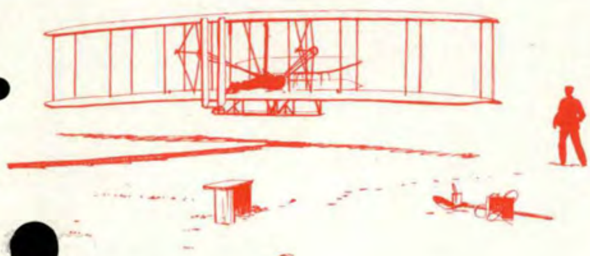

UNITED STATES AIR FORCE JANUARY 1976

aerospace SAFETY

THE MISSION - - - - - - SAFELY!

SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

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JANUARY 1976 AFRP 127-2 VOLUME 32 NUMBER 1

a "coke"™ and a candy bar

LT COL DANER R. REIDER, USAF, MC
Directorate of Aerospace Safety

The fighter pilot's lunch. If you or your friends have had such a "meal" before an afternoon flight, then you are continuing the tradition of "press-on," "hack-it," and "get-on-with-it." You are also eating "empty calories," compromising your overall health, and increasing your chances of having a physiological incident.

From January 1971 to September 1975, 36 physiological incidents occurred in which missed meals or poor eating habits were contributory. These incidents involved 39 crew members, of whom 22 were student pilots. In many cases, the crew members adopted their poor habits because of dieting, lack of time, or previous life style. However, such poor nutrition is not unique to crew members or the Air Force. We are part of a society that is fast-moving, tense, anxious, and just plain "hyper." We spend millions of dollars on antacids and diet books, and relatively little on tasty, beneficial meals.

If you are a pencil-pusher, a fighter pilot, or a motor pool grease monkey, you still need certain essential vitamins, protein, carbohydrates, and fat every day. Ask your self the following questions:

- How often do I have coffee and a fat pill for breakfast?
- How many times do I have popcorn and beer for supper?
- Do I really need that pizza while watching TV?

These questions lose their humor when you consider that the author has found these and similar entries in the 72-hour history of crew members involved in physiological incidents. As a flight surgeon, I cannot state that poor nutrition is a direct cause of incidents, but can be confident in saying it definitely contributes.

Poor nutrition increases your susceptibility to the stresses of flight. Hypoxia, hyperventilation and fatigue are just some of the stresses which missed meals can exaggerate or aggravate. The combination of these stresses with night refueling in weather creates a very dangerous situation requiring more than skill to resolve. You may never find yourself in that predicament if you have taken the time for proper rest and nourishing meals.

"But, Doc, I'm gaining weight and can't eat all that food." Baloney! There are many excellent diets based on low calories and low cholesterol that won't strain your nerves, your pocketbook, or your wife. Your flight surgeon can give you the best advice on a diet which will provide for weight reduction AND necessary nutrition.

My recommendation for you and your friends is take the time to eat three square meals a day. You need everything going for you when you fly your check ride, take a five-level test, or give a briefing to the general. Don't jeopardize your chance for success with a fighter pilot's lunch. ★

NO DICE WITH ICE

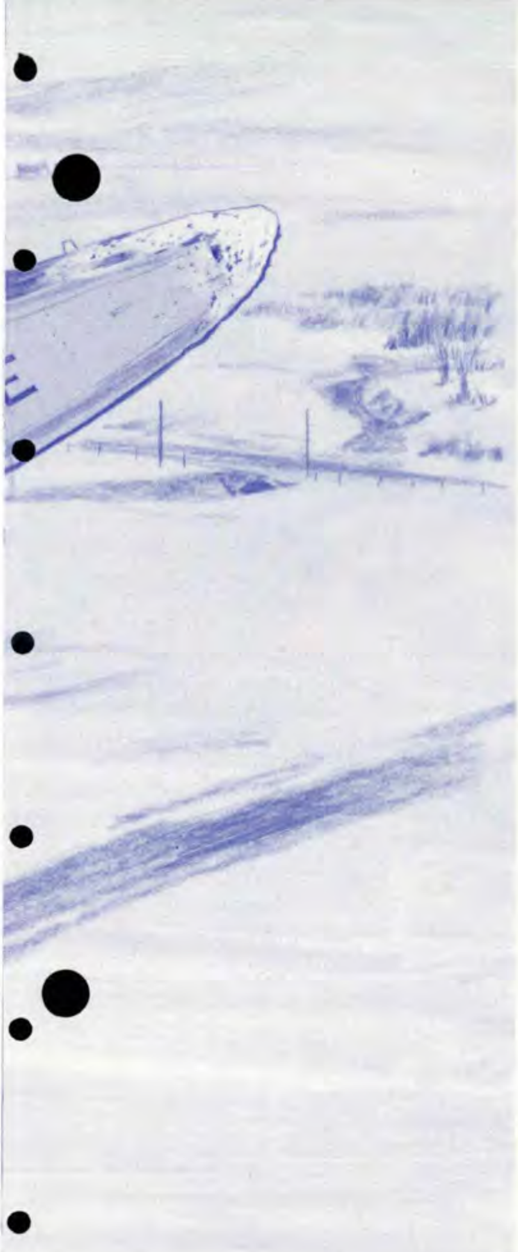
SQN LDR MARK PERRETT, RAAF
Directorate of Aerospace Safety

It is quite a relief to transition from summer to winter flight conditions, especially in those relatively dry areas of the United States. From October through May, the engines seem to gain new life, and the aircraft demonstrates a pleasantly surprising eagerness to fly. We quickly achieve cruising altitude. We've left behind the worries of the paper empire, the air is crisp, cool and clear—no more thunderstorms till next year! What clouds there are look just like the living room carpet—flat and smooth and comfortable—innocuous.

There are a thousand quotations associated with flying. One I like is "The expected rarely causes accidents—the unexpected invariably does." It is easy to slip into winter operations without conscious adjustment from summer techniques. So many accident reports, however, contain statements very similar to this. "I did not think much about it." A Sabreliner accident last winter exemplified that statement.

The flight was scheduled to a destination which was in the path of a cold front. Low ceilings, icing conditions, snow on the runway, snow flurries, 800 feet obscured, light to moderate icing up to 10,000 feet—all of these terms, among others, were mentioned in various forecasts received by the crew. A local USAF unit reported that they had suspended operations for the day in the face of these conditions. The crew decided to press on. They had planned a weekend off at the destination, and their wives were waiting at the airport to pick them up.

The pilot called approach control and requested a touch-and-go to test braking action, followed by a circling approach for a full stop. Following the touch-and-go, the aircraft turned right, the crew lost sight of the field and requested instructions for an ILS approach. The pilot's stated intention was a further



braking action check, and a diversion to his alternate, if a full stop could not be accomplished.

After touching down 1000 feet past the threshold (runway length 7000 feet), the aircraft ran along the ground for an estimated 2500-3000 feet, rotated and lifted off. It climbed to approximately 150 feet at an apparent low speed and in a high nose attitude. The right wing then dropped, and shortly afterward, the aircraft rolled inverted and disappeared from view. The five souls on board died in the crash.

The accident investigation determined that the cause of the accident was departure from controlled flight resulting from the effects of severe icing on aircraft performance. Prolonged operation of the aircraft in severe/moderate icing conditions was considered by an FAA technical icing report to have produced the following results:

- Minimum glaze ice build up would have exceeded a thickness of one inch on leading edge surfaces.
- Minimum weight increase—230 pounds.
- Minimum increase in stall speed—22 percent.
- Minimum increase in drag—48 percent.
- Minimum decrease in rate of climb at sea level—45 percent.
- The aircraft would have required a minimum runway length of 9500 feet under the existing conditions.

Modern aircraft design incorporates anti-icing systems vice the deicing systems of yesteryear. Modern aircraft, because of jet engine optimum performance characteristics, are not "expected" to operate for prolonged periods in icing conditions. Anti-icing systems are not perfect—there is a definite point beyond which they cannot cope with ambient icing conditions.

Air Force and command regulations are explicit regarding aircraft operations in icing conditions. They exist to close the gap between the capabilities of aircraft anti-icing systems and the severe meteorological phenomena which can be encountered in winter. These regulations must ultimately be applied by the operator—you. You must know the regulation as it applies to you and to your aircraft, and you must anticipate those flight conditions which are beyond the physical capabilities of your systems. Remember—"The expected rarely causes accidents." ★

Be Prepared!

SQN LDR MARK PERRETT
Royal Australian Air Force
Directorate of Aerospace Safety

A T-39 indulging in its usual summer bent of flirting with thunderstorms, climbed to FL410. Soon after leveling, moderate turbulence was encountered, and one engine flamed out. In an effort to remain clear of the storm, an immediate relight was attempted, but was unsuccessful. A relight was accomplished at FL 290.

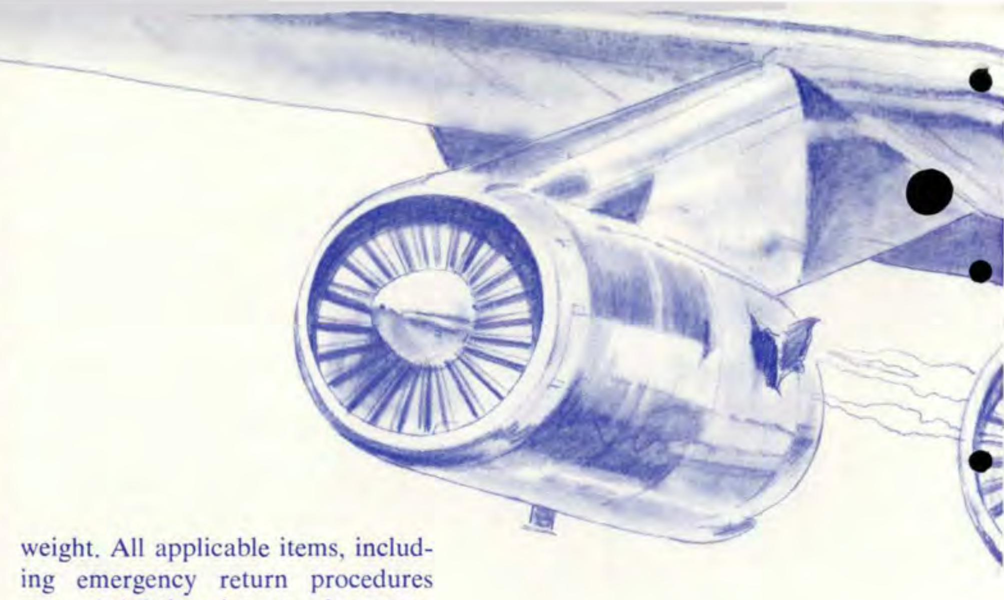
Another T-39 flamed out under similar circumstances and descended to FL 290 for relight. At the first attempt a fire warning light illuminated. After further descent, the engine was successfully relit.

Other instances of unsuccessful relight have indicated that the upper altitude limit of the airstart envelope has been too high. TO 1T-39A-1S-11 (T-39 operational supplement No 11), distributed in October 1975, reduced the upper limit to FL 260. This amendment was designed to accommodate atmospheric variations from the standard. (Some of the attempted relights at FL 290 actually were at a density altitude of over 31,000 feet.)

These departures from the norm are worth commenting on:

- A hot relight was attempted at FL 410—compare with Caution on page 3-11 of TO-1T-39A-1.
- The airspeed was allowed to decrease below 180 knots IAS—compare with page 5-6 of TO 1T-39A-1.
- The engine was restarted after previous shutdown for fire warning light during attempted airstart — compare with page 3-12 "Normal Restart" TO 1T-39A-1.

Jet engine handling is simple when compared to the piston engine, but it does require some thought. High altitude handling is particularly important, and T-39 pilots, just like the boy scouts, should know how to light those fires efficiently. ★



The following narrative was part of a Well Done nomination. Since space on the Well Done page did not permit printing the full story, and because we considered it interesting enough for better coverage, we are offering it here. The Well Done feature is on the inside back cover.—Ed.

Departure from Torrejon AB, Spain, for McGuire AFG, NJ, was scheduled for 0700L for Capt James R. Polizzo and his crew.

Their aircraft, a C-141A, was loaded with nine pallets and three sets of triple airline type seats to accommodate eight passengers. Checklists were run in normal sequence. No abnormalities were noted during engine start, and the aircraft blocked out at 0632L and taxied to runway 23.

The aircraft commander, Capt Polizzo, was in the copilot's seat, Capt Mario Cinquino occupied the pilot's seat, and Capt Edmund Rossnagel was in the flight check seat. The primary navigator, Maj Francis Dugan, was in the navigator's seat, and the auxiliary navigator, Maj Jerald Davis, in the right auxiliary crew seat. TSgt John Finley was seated at the flight engineer's station and the scanner, TSgt Pervious Close, was seated on the crew bunk. The primary loadmaster, SMSgt David Moskowitz, was seated in the cargo compartment with the eight passengers while the other two loadmasters, SSgt John Blackley and Sgt Robert Parillo, were in the crew compartment occupying the left auxiliary crew seat and crew bunk seat respectively.

Weather for takeoff was VFR with scattered clouds at 8000 and 20,000 feet, visibility ten miles, smoke and haze east through south, and winds from 050° at 3 knots. The aircraft maintained VMC throughout the flight.

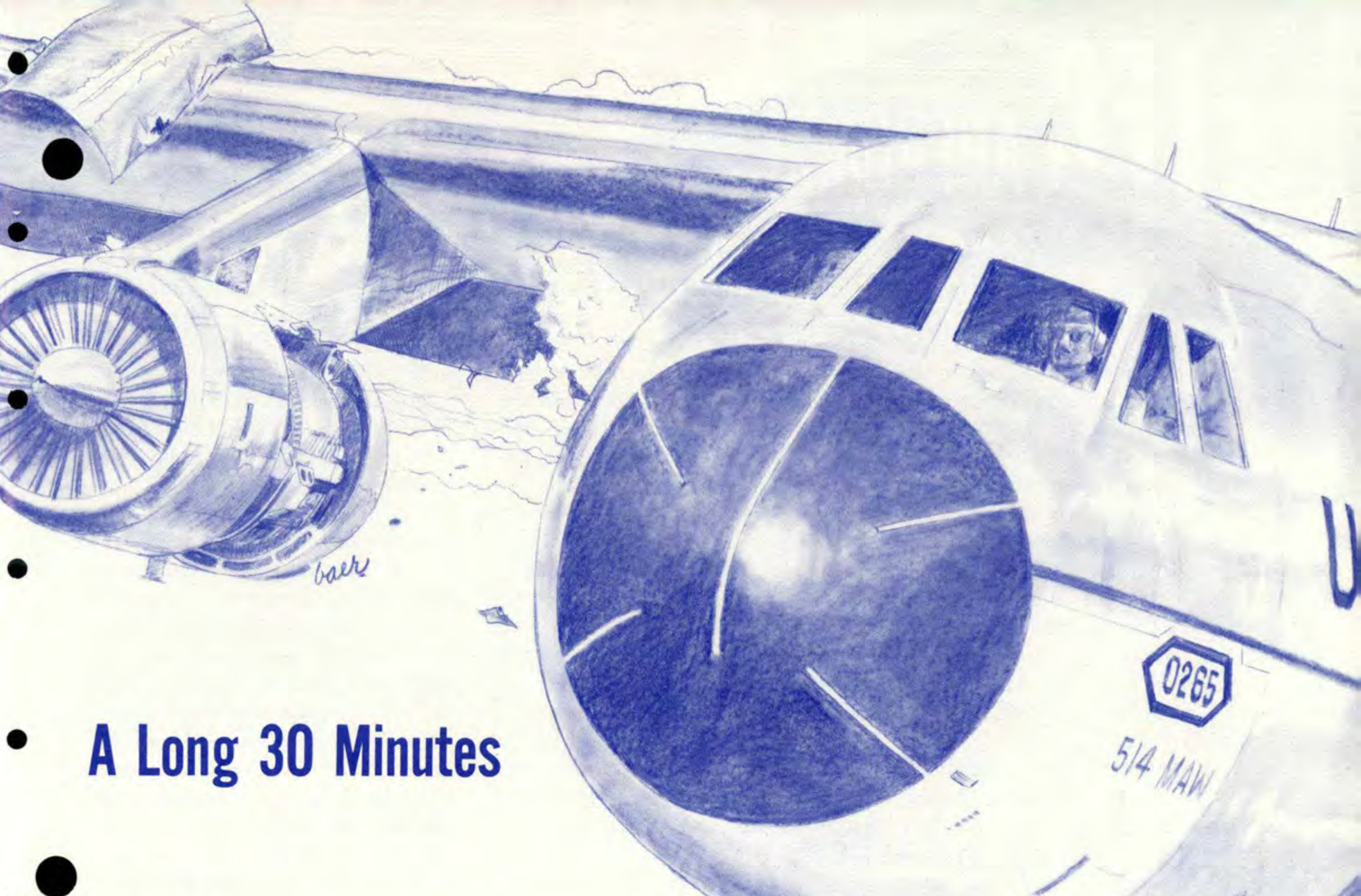
Captain Cinquino briefed a standing TRT takeoff and normal climbout because of the aircraft's gross weight. All applicable items, including emergency return procedures were briefed prior to departure. Takeoff roll was initiated at 0640L. The aircraft accelerated normally and rotated at 141 knots. Gear retraction was normal and the aircraft climbed out at 150 knots (minimum climb-out speed).

Approximately three minutes after brake release, at 1500 ft AGL (3500 ft MSL) as the aircraft was approaching 175 knots, a loud bang was heard by all crew members and the aircraft yawed to the right. The "nr 3 thrust rev not locked" light and "nr 3 low oil pressure" light illuminated. The nr 3 engine low oil quantity light illuminated on the flight engineer's panel. All nr 3 engine instruments fell toward zero. The copilot, initially believing that the nr 3 thrust reverser had opened, retarded the nr three throttle to idle. The aircraft commander directed the pilot to climb to 5000' at 175 knots (minimum flap retraction speed) and to leave the flaps in the takeoff/approach configuration. Seconds later, the nr 3 engine overheat warning light illuminated. The nr three engine fire handle was pulled and the engine failure checklist was accomplished. The right air conditioning pack sensed an overheat condition and automatically shut down.

Captain Polizzo declared an emergency with Madrid Departure Control, requested clearance to the Torrejon VOR at 5000 ft MSL to jettison fuel, and was so cleared. The pilot made a left turn to the VOR and noted that buffeting could be felt at speeds approaching 180 knots and at bank angles approaching 15 degrees. Throughout the remainder of the flight these parameters were not exceeded. The route for return to Torrejon was planned to avoid overflying populated areas. The aircraft commander directed Capt Rossnagel, in the flight check seat, to advise Torrejon Operations of their difficulties and intentions.

The scanner had gone to the rear of the aircraft to assess the damage. After establishing interphone contact, he observed the engine through the right side escape hatch window and advised the aircraft commander that black smoke and fuel mist were coming from the engine, that the cowling was missing from the engine and that there was damage to the inboard wing flap and the nr 4 engine. He observed additional fuel mist coming from the wing and was able to see a large fuel leak in the nr 3 main fuel tank area. The auxiliary navigator had installed the sextant and advised the aircraft commander that the right side of the cowling had lodged in the leading edge of the right wing and appeared to be stable in that position. He could detect no other damage to either the wing or the empennage.

Captain Polizzo assumed control of the aircraft as it approached the VOR and the pilot, Capt Cinquino, handled all subsequent calls to ATC.



A Long 30 Minutes

A further climb to 6000 ft MSL was made to assure 2500 ft terrain clearance during fuel jettison. The navigator provided the aircraft commander with minimum safe altitude information and distance to the airfield and updated at frequent intervals. The aircraft's flight path carried it over a plateau with a mean elevation of 3000 ft MSL; higher mountainous terrain was located to the west, well clear of the aircraft's flight path.

Fuel jettison was accomplished under radar vectors in the vicinity of the Torrejon VOR. The scanner and one loadmaster took positions in the cargo compartment to observe the fuel jettisoning, while the primary loadmaster and the remaining loadmaster stayed with the passengers to calm and reassure them.

During fuel jettison, the left air conditioning pack overheated and shut down. The scanner reported fuel fumes (probably from the fuel leak) in the rear of the cargo compartment. The left air conditioning pack was returned to operation using the appropriate checklists in order to dissipate the fumes. A controllability check was performed with no control problems noted. Sixty-three thousand pounds of fuel were jettisoned in approximately 13 minutes. This brought the aircraft landing weight down to 256,000 pounds. After the jettison, another controllability check was performed with gear down and flaps approach. The flaps had been left in takeoff/approach position due to the damage sustained by the flap at the time of engine failure.

The loadmaster briefed the passengers on evacuation procedures.

After another controllability check, the aircraft commander flew an approach flap PAR approach to runway 23 at Torrejon.

After touchdown, as the aircraft decelerated, the piece of cowling which had lodged in the right wing fell to the runway. The aircraft was taxiied clear of the runway, stopped, and the engines shut down with the engine fire handles. All passengers and crew members evacuated through the crew entrance door in less than 45 seconds. The fire department immediately began to apply agent to the number 3 engine and right wing area. The flight had lasted approximately 30 minutes, landing at 0720L. ★

By the USAF Instrument Flight Center
Randolph AFB, Texas 78148

THE IFC APPROACH

A new service has been initiated by Air Traffic Control to provide pilots with an added degree of safety. This service consists of a low altitude alert or warning given by the controller to pilots of radar identified aircraft that have Mode "C" altitude reporting capability.

The following warning will be given by the controller if he observes a Mode "C" readout which indicates the aircraft is at an altitude which, in his judgment, places the aircraft in unsafe proximity to terrain or obstructions. "RAMA ONE ZERO, LOW ALTITUDE ALERT, ADVISE YOU CLIMB IMMEDIATELY."

The provision of this service by a controller is not mandatory. It may be impossible, due to workload, traffic conditions, or quality of radar, to provide continuous altitude monitoring of all aircraft targets and insure a safe altitude is maintained by all aircraft. Nonetheless, awareness of significant or extreme deviations, in respect to terrain and obstructions, can be expected from controllers on a regular basis. It still remains the pilot's primary responsibility to insure terrain clearance and obstacle avoidance.

NAVAID TIPS

Are you in the habit of setting a channel or frequency in your NAVAID receiver and then accepting any signal that activates it? If you find yourself forgetting to identify and monitor the identification, consider this:

1. When maintenance is being performed on a NAVAID, the identifier may be deactivated. Without the identifier, the bearing and/or DME should be considered unreliable.
2. A garbled identifier, or even a mixture of identifiers, can indicate signals that will cause erroneous bearing and/or DME displays. A false TACAN lock-on may give the bearing and/or DME, and even the identifier of an unwanted station. Usually this station will be one which is supposed to transmit on a channel adjacent to the one selected.
3. It is also possible for the NAVAID receiver to malfunction internally. This occurs when the control head is set to the proper frequency but the receiver section fails to channelize properly. The only means available to insure you are receiving the proper information on your NAVAID display is to tune and properly *identify,* each time you select a new frequency, as outlined in AFM 51-37. Also, be sure to monitor the identifier at all times to insure you are receiving reliable information.

LOW ALTITUDE TRAINING ROUTES

When you fly VFR Low Altitude or All Weather Low Altitude training routes, don't forget to apply the "see and avoid" principle. A recent low altitude accident between a light aircraft and a military fighter emphasizes the necessity to keep your eyes scanning the skies at all times. Be especially alert in the vicinity of small airports. Pilots must always keep in mind their responsibility for continuously maintaining a vigilant lookout, regardless of the type of aircraft being flown or whether operating on an IFR flight plan or under visual flight rules.

LOCALIZER INTERCEPTION FROM DME ARC

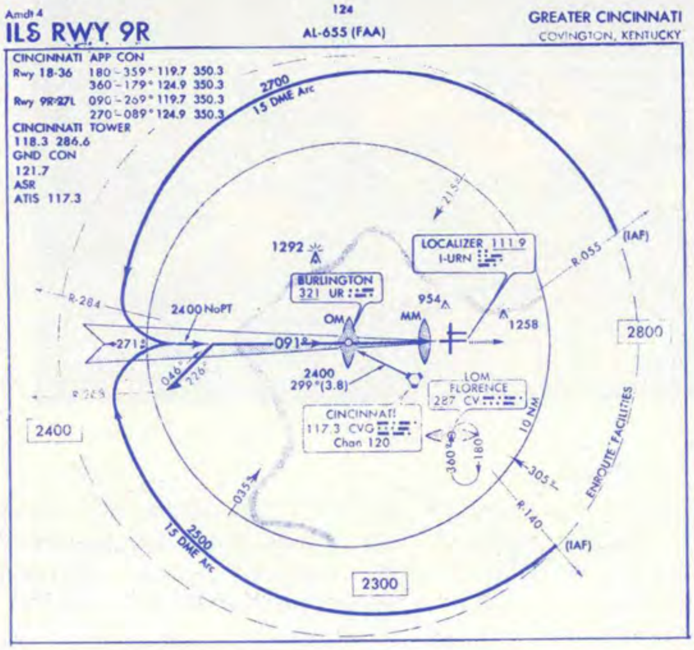
Anyone who has flown a TACAN/ILS in VOR/DME equipped aircraft has undoubtedly had the opportunity to intercept a localizer course from a DME arc. If the VORTAC is located at the airfield, pilots can determine and apply normal arc to radial leadpoints by using techniques offered in AFM 51-37. However, consider the situation (see illustration) where the VORTAC is located at some distance from the airfield. Although the arc-to-radial intercept is similar to that described in AFM 51-37, you will have to adjust your leadpoint to allow for VORTAC displacement.

On the other hand, this computation may be unnecessary since many arc to localizer approaches have lead radials depicted. These lead radials are normally derived from the TACAN associated with the DME arc. AFM 55-9, "U. S. Standard for Terminal Instrument Procedures," states "When the angle (interception of the arc and the course) exceeds 90 degrees, a radial which provides at least 2 miles of lead shall be identified to assist in leading the turns. . .". The FAA normally depicts lead radials on all arc to localizer approaches. This is necessary to provide a lead point for civil aircraft equipped with paired frequency VOR/DME receivers and still enable these aircraft to receive DME information until the aircraft turns inbound on the localizer.

As a technique, when established on the arc, set the published localizer front course in the course selector window. When at the lead radial, simultaneously begin your turn to intercept the final approach course and if you have a flight director system installed, select the desired mode of operation. Then fly the approach as published using normal LOC/ILS procedures.

REVISION OF "IFC APPROACH" ARTICLES

Each year the IFC reviews the "IFC Approach articles that were published during the past three years. This review identifies changed or incorrect information.



Articles considered current are those published after December 1972 excluding the following:

DELETE

August 1973, entire article.

May 1974, 3rd question, answer and figure.

August 1974, 1st question and answer.

December 1974, 2nd question and answer under Initial Approach Fixes (IAFs).

June 1975, 5th question and answer under Helicopter Pilots.

July 1975, 3rd and 4th questions and answers.

August 1975, 8th question and answer.

CHANGE

Change all references to "Flip Planning, Section I" or "Flip Planning, Section II" to read, "Flip General Planning" in the May 1973, July 1974, November 1974, December 1974 and January 1975. November 1973, 2nd column, 1st page, paragraph 4. Change "AFM 60-16" to read "AFR 60-16" and change the quote from AFR 60-16 to read, "the minimum altitude for IFR operations is governed. . .".

January 1975, Helicopter Pilots, 2nd answer, change to read, ". . . in FLIP, GP, under aircraft categories and holding procedures."

September 1975, change reference to "sectional charts" to read "Tactical Pilotage Charts."

November 1975 second column, line 21, change to read "approximately 900 feet" vice "approximately 180 feet."

Second column, line 26, change to read "4500 feet" vice "900 feet."

The USAFIFC will provide an answer to any question related to instrument flying. Is it an approach design or depiction? Call AUTOVON 487-4274. A question about flight regulations or directives? Call AUTOVON 487-4276. ★

CONSOLIDATED MAINTENANCE

Sgt Isiac T. Potter and A1C Francisco Cruz are now both members of the 4th Field Maintenance Squadron electric shop. The left pocket of Airman Cruz's fatigues shows where his SAC patch used to be.

SAC and TAC are testing a new way of organizing maintenance resources at Seymour Johnson AFB, SC. The consolidation which started in October combines the total maintenance resources of the 68th Bomb Wing (SAC) and the 8th Tactical Deployment Squadron (TDCS) with those of the 4th Tactical Fighter Wing (TAC).

This test is to determine whether such a consolidation is practical and if it works better than the old system of separate maintenance organizations. Under the old system, maintenance personnel who came to Seymour Johnson were assigned to either the 68th Bomb Wing, the 8th TDCS or the 4th TFW. Now all the maintenance organizations on the base are part of the 4th Tac Fighter Wing.

The chief of maintenance for the 4th TFW now has some 2200 people working for him and his troops have also "inherited" maintenance responsibilities for B-52's, KC-135's and EC-135's in addition to their F-4's. ★

MICHAEL GROST
Martin-Baker FSR
PACAF

FOD in the F-4 EGRESS SYSTEM

To the majority of people involved with the maintenance upkeep of USAF F-4 aircraft, the term FOD should be a pretty familiar one. On flightline areas, clearly marked receptacles for FOD generally abound and the subject is one which is constanly discussed or reviewed. However, despite rigorous attempts to eliminate *foreign object damage* the scourge continues to be a wily adversary and one which takes a lot of containing. Consequently it should never be underrated, because not only does it adversely affect fiscal budgets, through repeated equipment damage, but of far deeper concern—it can indeed destroy life itself!

While the FOD problem has understandably received a lot of attention over the years, much of its publicity would appear to have centered on its more dramatic side. Thus, when considering FOD results, images are more often conjured up of how engine compressor blades can be wrecked by some innocuous looking ½ inch bolt, than a gouge in some less interesting structure. Nevertheless it is pretty obvious that FOD can strike at just about any aircraft system or supporting activity, which in time may prove to be equally disastrous. So, for the purpose of this brief discussion let's talk about the "FOD Foe" within the context of its potential to the *egress system.*

Imagine for a moment the end results of an aircraft accident, wherein FOD prevented the correct operational sequence of an ejection seat. The term "lethal outcome" would probably sum up such an ejection—or an attempt! This depressing supposition is based upon the typical circumstances of many aircraft escapes, with limited time remaining for system operation and the inability of designers to provide extensive backup system capabilities. In short, any unplanned delay or induced system failure would normally have dire consequences for crew escape. Accordingly, whereas the affects of FOD in another system might force a crew to eject, in the case of egress equipment FOD damage the final chances for crew survival would probably be erased. This somber point should make it very clear that egress systems must be checked thoroughly, to ensure that they remain unhampered by FOD, to enable them to provide their optimum performance at time of need.

Although the aforementioned details would appear to be obvious, other associated problems make the task of checking for FOD in the egress system a difficult one. Unlike most systems, egress equipment cannot be test run before each flight to ensure that it will function correctly; therefore, determining whether FOD is present and whether it may affect the system will normally depend solely upon visual inspection. This action is of course time consuming and one which is complicated by the irregular shaped masses of most current egress assemblies, along with limited surrounding access areas. But, the job can be done, and judging from the past maintenance-related egress survival record, many technicians are not content to just tick off that final installation checklist or preflight card. They also provide that added (and extremely vital) visual check of the surrounding area. While such actions as this could be termed as "the professional approach to aircraft maintenance" or "dedicated efforts," such written kudos as these often draw varying feelings. However, to those individuals who do extend that extra effort, the personal realization of the importance of their job is very clear and they obviously appreciate the meaning of that word—responsibility. True, the task may take a few extra minutes, which may technically not be clearly defined as a requirement, but in egress work that additional effort may well save someone's life and that's what egress is all about.

To conclude this coverage of how FOD in the egress system can produce extremely serious consequences, the following report may be of interest. In this instance the FOD was found in time, but tomorrow's FOD problem still has to be eliminated . . . or again be found in time by someone else, and that takes the concerted effort of all of us.

> ". . . The mission was an (F-4) ACT sortie. When the crew chief attempted to install the seat pins after the flight, he noticed that the linkage above the FCP seat mounted initiator was partially extended and that the annular groove was exposed. The crew chief was also unable to install the FCP seat mounted canopy initiator pin. Egress specialists were called and after inspecting the ejection system found a foreign object lodged in the lower "D" ring ejection control linkage behind the FCP seat. They then safetied the seat by disconnecting the initiator's ballistic hose. Next, the linkage above the seat mounted initiator was disconnected. This allowed the mechanism inside the initiator to reseat to its normal position and the pin to be installed. External electrical power was then applied to the aircraft and the FCP seat was lowered. This allowed the foreign object to be extracted.

". . . The foreign object was the Armament Safety Override Button. It is probable that the button came loose in flight since the AC stated that he had engaged it during his before takeoff checks. Investigation also revealed that the set screw on the button was loose. The linkage on the top of the FCP seat mounted canopy initiator probably extended as the seat was raised following the AC's engine shutdown check.

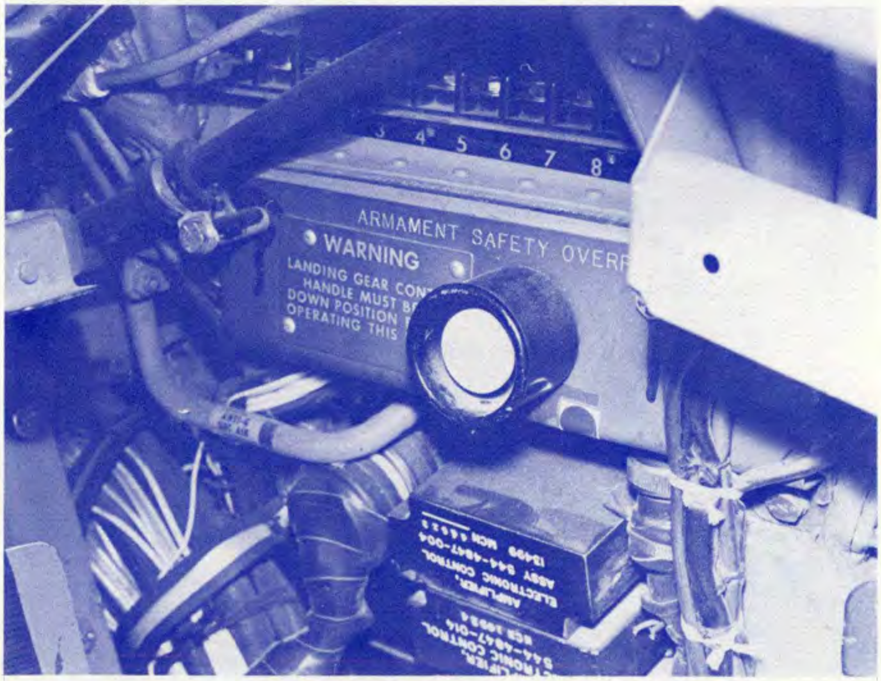
"The set screw on the Armament Safety Override Button was loose for some undetermined reason thus allowing the button to work its way loose.

"The involved TFW performed a one time inspection of its F-4 aircraft. Seventeen Phantoms had loose Armament Safety Override Buttons, due to either missing or loose set screws. Recommend other F-4 units conduct similar inspections.

"Aircrews, MMS and OMS personnel will be briefed on this incident. This briefing will emphasize the dangers associated with loose objects in the cockpit . . . ."

This article was written by Mr. Michael Grost, the Martin Baker Aircraft Co Ltd Field Service Representative to PACAF. Mike has been in SEA since 1968 and his experience and knowledge of egress systems make him an acknowledged expert in this field.

While this article is addressed primarily to the maintenance technician, there are some important points for aircrews. In particular: Why weren't the loose Armament Safety Override Buttons recognized and reported as hazards?—The Editor. ★



The armament safety override button has been the cause of at least one FOD incident.

No pilot can experience it all,
make all the mistakes himself,
learn all the lessons himself.

That's why we learn from others.

That's why experience is
one of the great teachers.

That's why we're all teachers
when we share the
experiences we've had.

From TWA Flite Facts Bulletin
October 1975

THE HIGH COST OF ACCIDENTS TODAY

MAJOR THOMAS R. ALLOCCA
Directorate of Aerospace Safety

"Modern accidents are expensive . . . prohibitively so!"

State-of-the-art technology and aerospace industry advancements have provided USAF with aircraft which, when compared with their predecessors of a short time ago, are truly impressive.

"One C-5 can airlift as much as 10 C-124's in less than half the time."

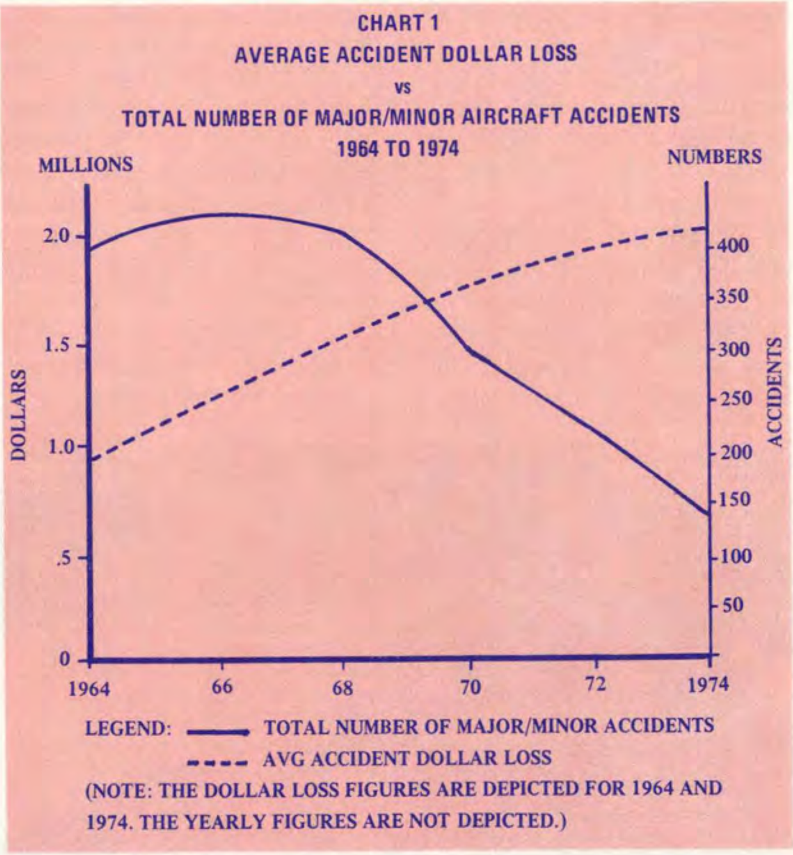
"The B-1 will be capable of carrying three times the internal payload of the B-52."

"An E-3A airborne warning and control system (AWACS) aircraft can perform its vital mission with far more accuracy and versatility than the EC-121."

If there's a common theme to be found in these and a host of other examples, it's simply this: American industry is producing aircraft with mission capabilities and performance which are indeed mind-boggling. But this increase in aircraft mission capability has been accompanied by another increase which is also growing at an unprecedented rate: The cost of a mishap.

The decade from 1964 to 1974 serves as a convenient basis for comparing accident costs. In 1964 USAF experienced a total of 391 major and minor aircraft accidents. Those accidents resulted in a loss of 368 million dollars, for an average of $940,000 per accident.

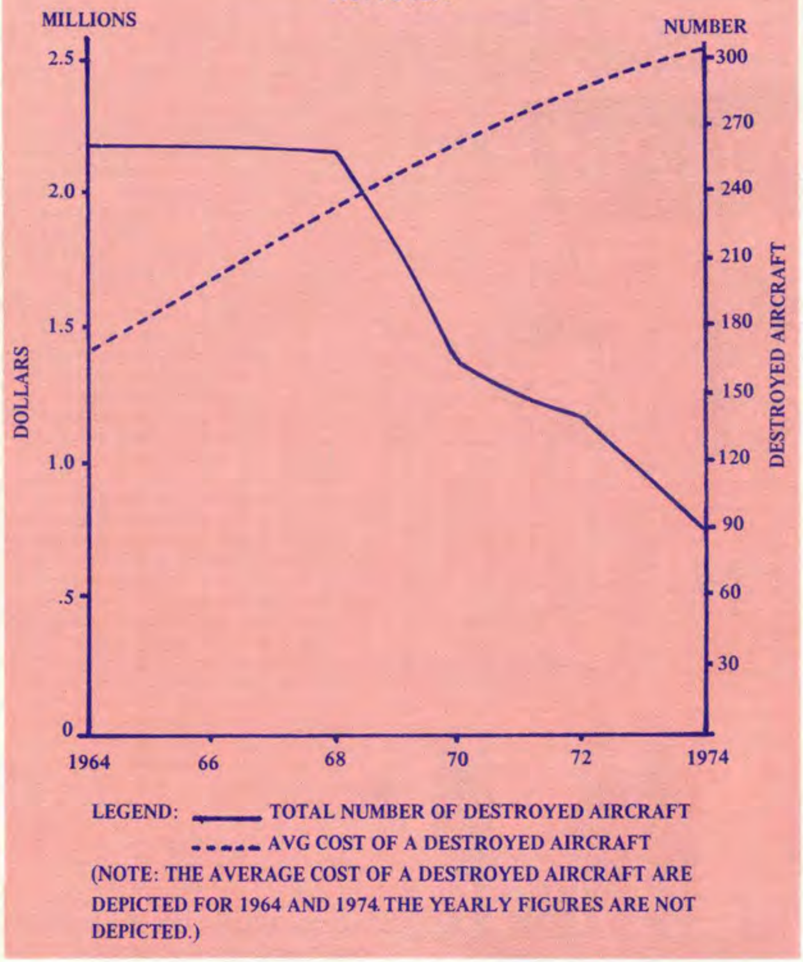
In 1974, 141 major and minor accidents occurred, resulting in a loss in excess of 312 million dollars —an average of $2,200,000 per accident. So while Air Force decreased the total number of accidents by 64 percent, the average dollar loss per accident increased by 144 percent.



A similar review of aircraft destroyed data reveals trends approximating those in Chart 1. In 1964, a total of 262 aircraft were destroyed, resulting in a dollar loss of 363 million dollars. In 1974, 90 aircraft were destroyed at a dollar loss in excess of 253 million dollars.

Chart 2 presents the contrast suggested by these statistics:

CHART 2
AVERAGE COST OF A DESTROYED AIRCRAFT
vs
TOTAL NUMBER OF DESTROYED AIRCRAFT
1964 TO 1974



Once again a decrease of 66 percent in the number of aircraft destroyed was accompanied by a 107 percent increase in the average cost of a destroyed aircraft.

Within the same decade referenced earlier, our national leaders have become increasingly aware of public demands for the restructuring of national priorities and objectives. Coincident with these demands, and given equal publicity, has been the fact that the resources with which these objectives will be achieved are limited. The result of this rhetoric has been that it is now imperative to derive maximum benefit from all resource consumption. And inflation has added another element to the problem of resource conservation.

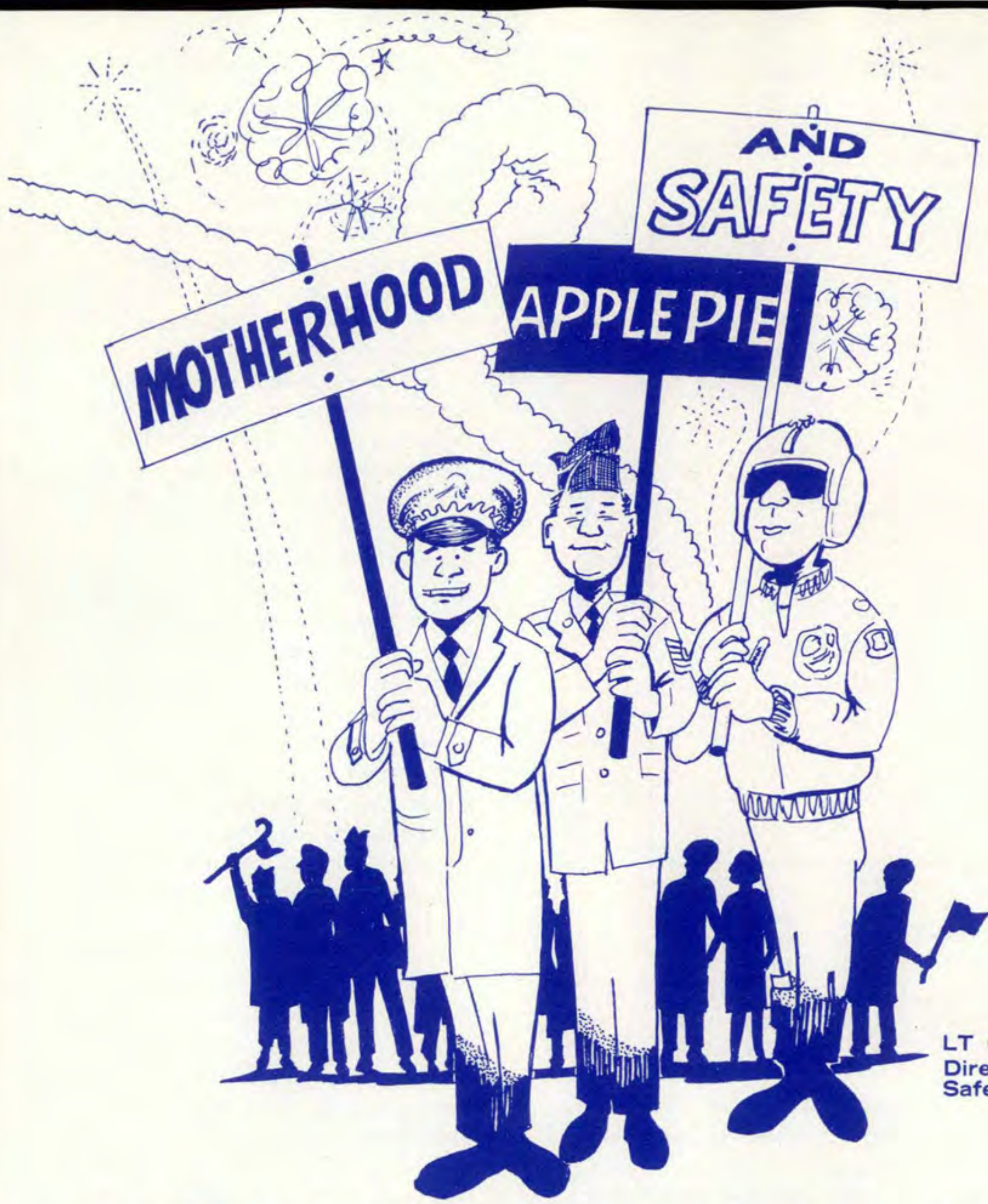
In 1964 the total defense budget was 50.5 billion dollars; in 1975 the figure was 92.4 billions. However, when corrected for inflationary increases, the actual increase in defense spending was 4.0 billions. Using 1964 as a base, that represents an eight percent increase from 1964 to 1975. It requires little in-depth analysis to realize how modest an increase the eight percent is; furthermore, it underscores the pressing need to conserve defense resources.

The statistics mentioned earlier and depicted in Charts 1 and 2 suggest that USAF safety efforts have resulted in significant improvements in our accident statistics. In the five-year interval from 1970 to 1974, the major accident rate has consistently fallen in the 2.3 to 3.0 (per 100,000 flying hours) range and this represents a substantial improvement over the same interval of a decade earlier. However, the statistics presented also indicate that these advancements may be more than offset by the prohibitive costs involved in the loss of a modern weapon system.

The significant mission capability represented in a single C-5 or B-1 or E-3A is balanced by the substantial national investment involved in each of these systems. And while one of these new or "developing" systems can do the job of ten of its predecessors it is imperative to recognize the fact that a loss of one can be roughly equated to losing three or five or some appropriate multiplier of its predecessors. And it is this loss in mission capability which USAF can ill afford.

The aircraft losses and mishaps which serve as the "data base" for the figures presented in Charts 1 and 2 do not, in large measure, include systems such as the C-5 and F-15. Rather these accident statistics include many aircraft now retired or "soon to be retired" from the active fleet. Many of these systems, such as the B-47, C-119, and F-84, were built at a fraction of the costs of their successors. It is, therefore, reasonable to assume that the "cost" trends indicated in Charts 1 and 2 will continue to be inversely related to USAF's safety statistics. The only acceptable answer to offsetting the effects of these trends is to continue to decrease our accident rates; but the slope of the "accident-rate" line must be steeper than that of "accident-cost" line.

As USAF accepts these developing systems from industry, we must insist that the same type of effort devoted to improving mission performance and capabilities will be devoted to enhancing the "safe operation" of the aircraft. It then becomes incumbent upon us, the user, to maintain and operate these systems as "accident-free" as possible. We cannot afford to do otherwise. ★



LT COL RICHARD B. DURANT
Directorate of Aerospace Safety

"Safety first;" "Safety will not be compromised;" "All personnel were briefed (rebriefed)." We all believe in motherhood, apple pie, and safety because they are—well, good.

We are told that no job is done well unless it is done safely. From that point on the water gets murky. How do we be safe? What is an acceptable risk? Unfortunately, these questions sometimes become lost in the pressure cooker of the real-world Air Force. Occasionally someone waves the flag, writes a letter, or even has a campaign, but little of substance is accomplished until a serious accident occurs. Then a very important element of the safety program is applied: the formal accident investigation. This is after-the-fact accident prevention, and it hurts.

An example: A supervisor drove two workers to a job that involved a hazardous operation. It was the beginning of the shift and after delivering the workers to the job, the "supervisor" returned to his office. Thirty minutes later a catastrophic explosion and fire occurred which resulted in the death of one employee and the total loss of a $40 million weapon system. The cause? Untrained workers performing a task with improper equipment. Avoidable? You bet!

The investigation revealed inadequate written procedures, poor to nonexistent supervision, and inadequate guidance and control from the upper levels of management. The corrective action was swift and effective—but too late.

That horror story illustrates that nothing will destroy an Air Force unit's capability and morale as quickly, devastatingly, and completely as a major accident. Since the success of a unit's mission is dependent on the adequacy of its resources, the conservation of those resources is as essential to a commander's attention as the mission itself. The safety program deserves much more than lip service.

Top management in the field—the wing and squadron commanders—are often faced with pressing and essential mission demands. An example is when the ORI team shows up in the middle of the lousiest weather the base has experienced in five years. The commander and his unit immediately go into high gear: recalls, last minute maintenance activity getting the birds ready and uploaded, briefings, and finally the moment of truth—launch. Usually the last words spoken by the leader are: ". . . and above all, safety is paramount."

Unfortunately, unless he has established a tradition of safety being an integral part of his operation, no one will take those words seriously. Maintenance people will take shortcuts to get aircraft turned around. Pilots will press their targets and minimums (just a little), and maybe someone won't be quite so careful of the parts they hang on airplanes. Most of the time the unit is lucky; occasionally a dead pilot, a badly injured crew chief, or an out-of-work wing commander attests to the fact that the unit's luck ran out.

There is a commonality in all Air Force safety programs which is based on written Air Force and major command directives. However, at some point the programs part company and vary vastly in their effectiveness. The key to the success of a field unit's safety program depends on the individuality, ingenuity, inventiveness, and energy of the people involved. If we accept the premise that people are the driving force in safety programs, it is worthwhile to take a look at how they contribute.

There are four "people" elements in any safety program. The cornerstone on which all else rests is the top manager—the commander. He is the one who establishes policy, provides the clout and sets the example. If he is content with lip service then the safety program ends right there. A commander who encourages, or even tacitly allows, shortcuts in his operations cannot hold his supervisors responsible for the resulting accident. If he believes that safety is an integral ingredient of mission accomplishment; his job is cut out for him, as we shall see.

The second people element is the safety manager. He is the one responsible for keeping his finger on the pulse of the safety program and keeping the commander up-to-date on the state of its health. His task is complex and involves administering the safety program, keeping the commander informed, making recommendations, and maintaining follow-up on action items.

The job cuts across all functional lines and into all functional areas. To do it properly the safety manager must have access up, down, and laterally. You can bet that any commander who puts filter layers of managers between himself and his safety manager will never know the true status of his safety program—until a catastrophic potential is realized. Safety managers have no command authority and can't be the action agency to get problems corrected. However, too often the safety manager is the only active participant in the unit safety program. In such a case, a commander could consider his program as operating at 25 percent efficiency.

The third "people" element is middle management—the functional managers and supervisors. Accidents due to unsafe acts (85 percent nationwide) are not caused by the safety officer, as some believe, but are caused by the people doing the work. The supervisors are the people with direct control over that work, so the importance of their link in the safety chain cannot be overstated.

The commander must make certain that when he establishes safety policy, his middle managers know that he means what he says. He must then give them direct responsibility for the safe conduct of their operations. Finally, they must be educated. Safety officers can never find all the procedural and physical hazards that exist in a unit. The supervisors must be trained to identify potential hazards in their areas and they must know what to do about them.

Because the supervisor provides the direct interface with the workers he must be responsible for their safety awareness and discipline. He must see to it that workers know the hazards of not only their particular tasks but the work environment. And the supervisor's most important—and difficult—task: he must be certain that the procedures for doing the job in his area of responsibility are adequate and that his people follow them.

The final people element of a safety program is the worker. In essence, it is toward him that the total safety effort is directed. It is his hazard awareness and discipline in following the proper procedures that ultimately prevents the accident. The entire safety effort is wasted if it does not impact the worker. How effectively it impacts him may well determine a commander's effectiveness as a manager.

One final thought: which "people" element would you consider to be the most important to a safety program? Conversely, which link in the safety chain could you most afford to eliminate? ★

Fly-In On Midairs

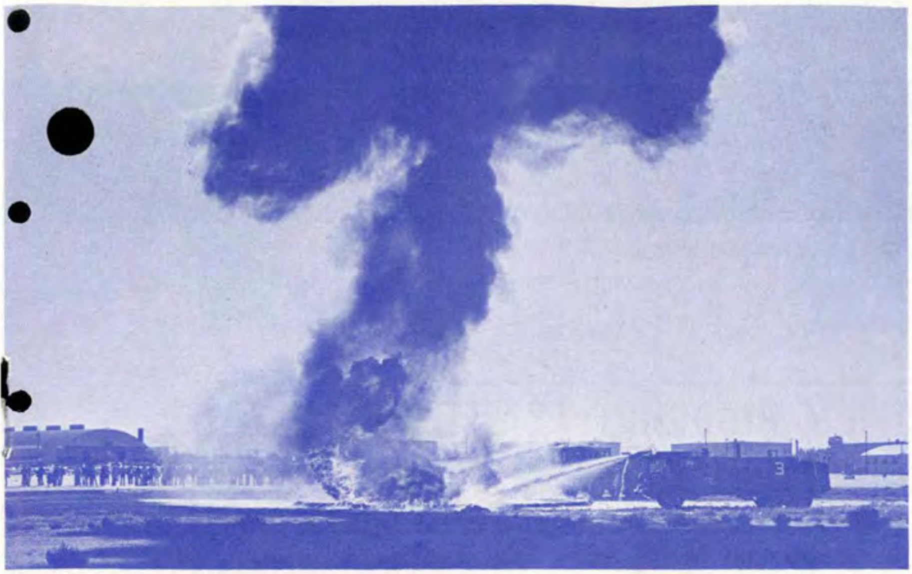
The photos on these pages may make you wonder what is going on. Is the Air Force converting to lightplanes? Hardly; those people and general aviation aircraft were guests of the 35th Tactical Fighter Wing at George Air Force Base.

The wing hosted flyers from the area for displays, films and a briefing on low-level training routes. The objective was the prevention of midair collisions through education of the flying public. A package containing maps of low-level routes, safety posters, and a pamphlet containing facts on low altitude military operations was sent to 29 airports in the area. Also included was an invitation to visit George Air Force Base on October 25. More than 800 people flew or drove to the base, and the count on airplanes was 217.

Meanwhile, on the other side of the country, Eglin Air Force Base has been conducting a continuing public education program with the same goal: prevention of midair collisions. The program includes letters discussing areas of potential for midair collisions and offering advice for general aviation pilots flying in the Eglin area, maps of low-level routes and posters for airport display.

There are no doubt many other similar efforts being conducted by other Air Force bases. A fly-in such as staged at George Air Force Base will require a certain amount of planning and work. But, if it prevents a midair, the return seems worth the effort.

The George AFB ramp took on a new look during the Fly-In. The response to the Fly-In by the civil aviation community was tremendous as shown in the view of the parking ramp. Despite the heavy traffic on the ground, things went well and if a pilot had problems he soon received help.



One of the most dramatic events was a demonstration of crash/rescue techniques by the George AFB Fire Department. The picture above shows the trucks moving in to fight a simulated aircraft fire.

The sequence of pictures to the right shows how the crew of an F-4 would be rescued in an emergency on the ground.

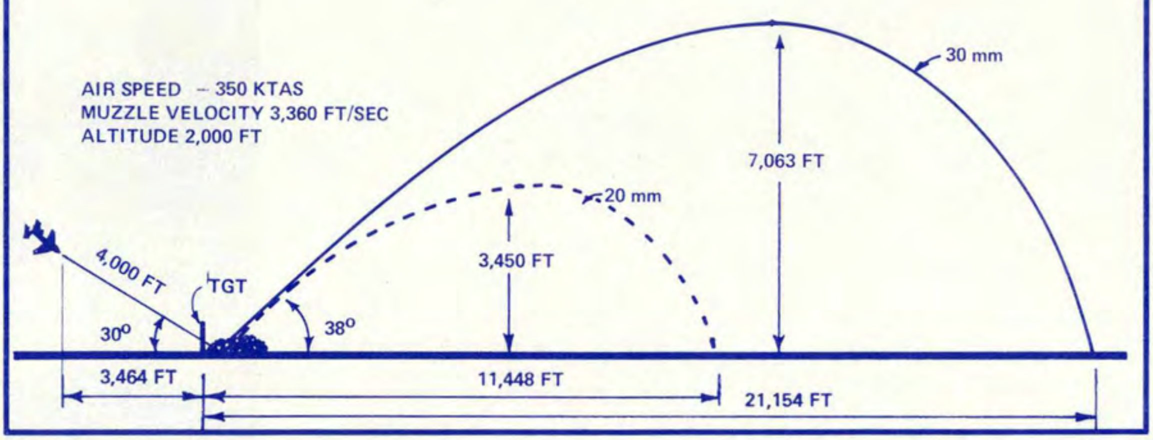
The day's activities included static displays of Air Force aircraft (left), a discussion of psysiological problems of flight in the altitude chamber (below), and a ride in the F-4 simulator (right).

Ricochets

LT COL JIM LEARMONTH, Directorate of Aerospace Safety

CALCULATED MAXIMUM RICOCHET TRAJECTORIES

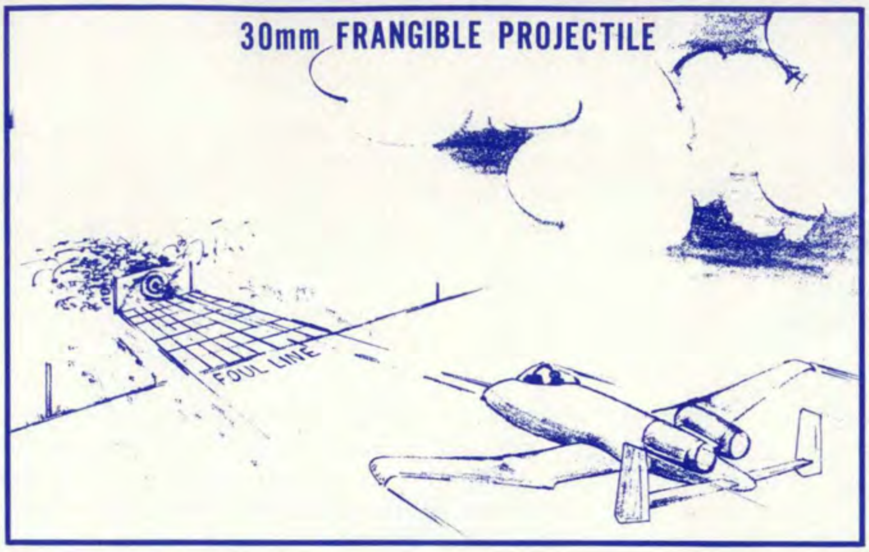
Figure 1



30mm GAU-8/A PLASTIC FRANGIBLE PROJECTILE

Figure 2

As a young lieutenant, my first contact with ricochets was through the experience of a friend. When the F-100 was the USAF mainstay in Europe, this friend returned from the range at Wheelus AB with a torn intake duct and minor damage to the turbo-jet due to 20mm ricochet. Although, (let's call the pilot Joe) didn't notice any vibrations or any change in engine performance, the local forces changed out the motor. As TDY tenants we were suspicious of the locally overhauled J57 which replaced our damaged item. Three days later the aircraft and pilot were lost at sea after an engine failure. The lieutenant continues to register mentally that the colonel died as a result of a 20mm ricochet.



That's certainly far from the truth, of course, but the truth is that we have, over the last 10 years, lost two fighters and officially recorded 271 such incidents (156 F-4s). In the last 3½ years, USAF has spent 1.3 million dollars on aircraft parts alone to repair ricochet damage incurred during routine practice strafing missions.

Positive action to eliminate the causal factors has included movement of the cease fire point to 2000' minimum slant range. (I remember it at 1000' and the old heads spoke warmly of the days when it was 600'.)

Plowing and cleaning of ranges at regular frequent intervals have reduced the instances of ricochet damage but have not eliminated it.

Currently, the USAF has a limited number of strafing ranges for 20mm cannon. This is largely because of the safety "fan" required behind the target to contain long ricochets. With the development of 25mm and 30mm aircraft cannon with larger projectiles and higher velocities, the size of the safety zone required will increase. Additionally, these weapons represent a considerably more serious ricochet damage potential (See Figure 1).

Recognizing the increasing seriousness of this problem, a program was established to produce a nonricocheting target practice projectile for aerial cannons. To meet this objective, the frangible projectile was conceived, embodying a new and radical design of target practice projectiles (Figure 2). The outer body was made of molded plastic while the inner body was made up of steel washers or platelets. This design was established after considering the applied loads, as well as economy and simplicity.

During initial acceleration, the bullet is subjected to an axial compressive setback force of about 120,000g. As it travels through the barrel, it attains a high spin velocity (120,000 rpm) with an attendant centrifugal force applied to the sides of the projectile. The design of the bullet permits it to easily handle these loads; however, upon impact, the relatively weak plastic skin, in conjunction with an instantaneous unbalanced loading at impact, causes the skin to rupture and scatter the washers. The washers, because of their relatively low energy (available kinetic energy divided by the number of washers per projectile) and their low sectional density and high drag factor, cannot travel as far as an intact deflected bullet.

It may be some years before we see this type of ordnance in air-to-ground practice munitions; however, the technology is being advanced. The round has performed satisfactorily in preliminary tests. This may just be the answer to the ricochet problems of the future. During the interim, let's make the pullouts brisk and, if anything at all, early. Let's all be around when the frangible projectile arrives.

Written in cooperation with Major Stephen J. Bilsbury, formerly with Air Force Armament Test Laboratory, Eglin AFB, FL. ★

OPS TOPICS

CORRECTION

In the October 1975 Ops Topics item entitled *Over-G* the instructor was a weapons system operator, not an instructor pilot.

OOPS

The B-52 was taxiing back to parking after an aborted takeoff at a transient base. The marshaller directed the pilot to swing left in order to complete a 180 degree right turn. During the left turn the left main gear trucks ran over a raised taxiway light destroying it and requiring tire changes on three tires.

ATC PROCEDURE CHANGE

A new ATC change revises the procedures used for clearing an aircraft for an instrument approach when operating on an unpublished route. (An unpublished route is defined as a route for which no minimum altitude has been published or charted for pilot use.) This may be a direct route between navaids, a radial, radar vector, or a final approach course beyond the segments of an instrument approach procedure.

Under the revised procedure, ATC will issue the approach clearance only after the aircraft is:

1. Established on a segment of a published route or instrument approach procedure or

2. Assigned an altitude to maintain until the aircraft is established on a segment of a published route or instrument approach procedure.

The significance of this change is that now ATC is responsible for furnishing altitude assignments to aircraft flying unpublished routes in terminal areas. This procedure provides a double-check between the controller and the pilot on the proper altitude to maintain for terrain avoidance.

The new procedure supersedes the similar procedures used in the past for aircraft receiving radar vectors. Now all aircraft, those on vectors and those flying unpublished routes via aircrew navigation, will receive altitude guidance.

When an aircraft is established on a published route where charted altitude information is available (a segment of an instrument approach procedure or an airway), the aircrew is still expected to comply with applicable published altitudes unless otherwise directed by ATC (AFM 51-37).

These procedures are published for controllers in FAA Handbooks 7110.8D (Terminal) and 7110.9D (Enroute). A new handbook will be published in January 1976 consolidating the Terminal and Enroute volumes.

THE GUST GOT 'EM

Two pilots from a sister service were making an approach to a helipad in a UH-1. The pilot was not happy with the approach and started a go-around. During the attempted go, a wind gust estimated at 35-40 knots caught the Huey, spun it 180 degrees, caused a hard landing and $1500 damage to the landing gear and fuselage skin.

OPS TOPICS

CO CAN KILL

Shortly after takeoff, the navigator and radar navigator on a B-52 experienced mild eye irritation and smelled an unusual odor while on normal oxygen. None of the other crew smelled the odor since they were all on 100% oxygen. After about 8 minutes of searching for the source of the fumes, both the nav and the radar began to experience symptoms of hypoxia. They both went to 100% oxygen and the pilot declared an emergency. After fuel was burned down to landing weight, an uneventful landing was made. Maintenance then discovered that nr four engine had used an excessive amount of oil. It is probable that the oil fumes generated a high level of carbon monoxide which caused the radar's and nav's symptoms of hypoxia.

LOST WINGMAN

The flight of two F-4's was making a recovery to home base. There were numerous heavy showers in the area so lead was trying to pick his way through them. The flight had just taken up a new heading to avoid the heaviest of storms when they entered an area of heavy rain and light turbulence. After about 5 seconds the WSO in the lead aircraft stated that he had lost sight of nr two. Then lead felt a thump when he was hit by two. After he hit lead, nr two turned away and executed lost wingman procedures. Shortly thereafter, the flight broke out of the showers and in VMC rejoined and executed the recovery.

TURBULENCE

The T-39 was cruising at FL370 when it encountered high cirrus clouds. The crew queried ARTC for best radar routing since the T-39 had no radar on board. Center checked with a commercial airliner which reported no turbulence along the planned route. The crew checked on weather along the route once again when they changed frequencies. Again there was no turbulence reported. Shortly after entering the cirrus, the aircraft encountered moderate turbulence and nr one engine compressor stalled and flamed out. The crew got clearance to descend, and after restarting the engine made a recovery at home base without further incident.

NEAR MISSES AND NAVIGATION

A recent near miss was the result in part of a misunderstanding between aircrews and air traffic controllers. It seems that the aircrew of a tanker on a refueling track expected periodic vectors to stay within refueling air space. Unfortunately the controller was not aware of this requirement. As a result, the tanker/receiver combination strayed to within 5 miles of an airway centerline. The center then took action to preclude a midair with a civil jet through altitude separation. Regardless of the details of this incident, aircrews should remember that the *primary* responsibility for navigation remains with the aircrew no matter what air traffic control service is provided. ★

WEAPON SAFETY TOPICS

SAFETY—WHO IS RESPONSIBLE FOR IT?

Safety personnel at all echelons are faced with the selling of safety as the responsibility and concern of everyone—supervisors and workers. Many words have been written and said about the matter, but perhaps an Air Force captain said it best a few years ago:

"Safety is not something one can take or leave alone. It is not an activity that is participated in only when one is being watched or supervised, or when there's a safety man around. Safety is not posters, slogans, or rules; nor is it movies, meetings, investigations or inspections.

"Safety is an attitude, a frame of mind. It is the conscious awareness of one's environment and actions all day, every day. Safety is knowing what is going on, knowing what can injure anyone or anything, knowing how to prevent that injury and then acting to prevent the injury or damage. To do this does not require a genius or a PhD or even a degree or a title of rank. All it requires is intelligence and a reasonable amount of native ability to see, hear, smell and THINK. To ignore safe practices does not indicate a brave person, only a foolish one; and to do things safely and correctly is the mark of a wise man, not a timid one."

READ AND HEED!

BEWARE—ARMED FUZE

During an annual inspection of FMU-7/B fuzes, rust was found on the containers. Additional examination revealed that several hermetically sealed containers of fuzes had been previously opened and improperly resealed. Upon examination of the fuzes, one was found in the armed position with its firing pin protruding through the foil on the head of the fuze. Improper packing, handling, and shipping procedures apparently resulted in the arming of the fuze. Additionally, the boxes were inadequately marked in that they did not identify that the fuzes were not hermetically sealed.

AN ACCIDENT CAUSED ACCIDENT?

During a reentry vehicle (RV) mate, an anomaly occurred in the hoist system. To stabilize the RV the missile maintenance team disconnected the umbilical come-along and performed a hasty mate on the umbilical. Four days later, a wet missile was discovered—a result of the hasty and incomplete mate.

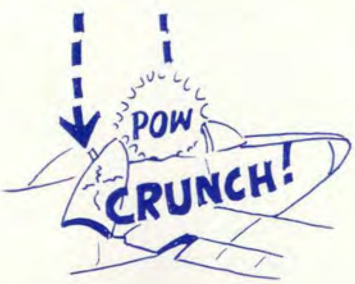
At another unit a wet missile was found. During removal of the missile for return to depot, a step in the checklist was missed and the lower umbilical wasn't disconnected.

In yet another case, during initial inspection, a team member noted the umbilical coolant line was leaking and attempted to stop the leak. Unfortunately, instead of reconnecting the coolant line he disconnected it. Result—a damaged guidance and control unit.

In each of these cases, further damage, and perhaps another investigation, was caused by another error after the original mishap occurred. Safety and maintenance personnel must stress the necessity for carefully evaluating the mishap before further action is taken. In the above examples, time was not a factor and the damage was even more unacceptable as a loss of resources than the original mishap. Slow down, don't compound an error with another error.

THE SEAT OF THE PROBLEM

Two Propulsion Branch technicians were dispatched to a B-52 to perform an engine runup. Upon entering the cockpit, the technician checking the copilot's seat could not see the nr one safety pin or streamer in the right arm rest. To facilitate his search for the pin, he sat down in the seat and jiggled the arm rest. Thinking it might be in place inside the arm rest he raised the arming lever. Five initiators and three thrusters functiond as designed. Ejection was prevented by safety pins two and three being in place. AFR 66-51 directs that anyone having access to aircraft with egress systems will be trained in the safety and security of the systems. How did this happen?



TRY IT—IT WORKS

During a normal maintenance operation, the canopy would not open. When an attempt was made to open it, the emergency canopy jettison system was activated. It worked. The canopy glass was broken, the upper backbone of the fuselage and the right wing were damaged, but the canopy was no longer stuck.

TRIPPED UP AGAIN

An augmentee security guard was severely burned when an M49A1 surface trip flare functioned in his hands. Since he was an augmentee, the question is raised whether he had adequate warning, training, and supervision. This question is raised because just 9 days later an untrained and unsupervised civil engineer worker was also seriously burned when another M49A1 trip flare functioned in his hands while he was repairing a fence. Neither of the injured was authorized to handle the flares, but perhaps through their lack of training and supervision they weren't convinced. ★

HOW STRONGLY DO

If you are tempted to fly over mountains—or any other cold terrain—in winter wearing summer clothing, think twice . . . and remember LTJG Doody.

Scenario: LTJG Gordon Doody, VA-215, is sitting in the cockpit ready to move. His thoughts go like this . . .

"Well, it's just about time to taxi out. Everything checks out okay. I'll just wait for the plane captain to give me the signal, and then it's off to do a little DCM . . .

"Wait a minute! What's going on here? The skipper is heading out this way with that SERE-type (survival) LCDR. I wonder what they want. Maybe he wants to tape some jet engine sounds for that film the squadron just did . . .

"Now why in the hell do they want me to shut down? I haven't done anything wrong. Or have I? Hope the old man didn't see me clowning around in the cockpit a minute ago. Well, I guess I'll soon find out . . ."

The CO, CDR R. D. Mixson, speaks . . .

"Congratulations! You have just ejected over the Sierras. All you have with you is your chute, seat pan, and present flight gear. This is LCDR Dick Ritz. You will follow his orders. Good luck!"

And a few last words from LTJG Doody . . .

"Great pork! This can't be true!

"We're not really going to the mountains, are we?"

With that brief exchange, VA-215 SAREX (SAR Exercise) 1-75 began. The exercise scenario, developed by LT Sergei Kowalchik, the VA-215 safety officer, and LCDR Gary Ostrander, VA-215 operations officer, was based largely on the element of surprise. First, a date for the exercise was chosen. Then a time slot was picked on the daily flight schedule. Ironically, the schedules officer, LTJG Gordon "Howdy" Doody unknowingly wrote himself into the slot chosen. He was allowed to man and start his aircraft—thinking all the while that he was going on a DCM hop. We've al-

YOU FEEL ABOUT LIFE?

The SAR helicopter lifts the "survivor" into a preselected meadow at 8000 to 8500 feet.

LTJG Doody finds a spot clear of snow and inspects and inventories his gear soon after arriving in the mountains.

Three of the four observers and their shelter. They are (left to right) Lt Dave Kelly, LCDR Dick Ritz, and Mr. George Banky.

ready told you what actually happened.

At this point, LTJG Doody was taken to the NAS Lemoore SAR helo which was waiting to take him and four observers to a preselected site in the High Sierras. Unfortunately, weather conditions precluded inserting anyone on that day, so the entire operation was postponed until the day following. This negated some of the shock factor but did not help LTJG Doody much because his flight gear was impounded. This gave him no chance to procure extra food and clothing.

The refusal to allow the chosen pilot "survivor" to add extra clothing to his gear tied in directly with the major reason for the exercise—a desire to illustrate the need for pilots to wear adequate protective clothing when flying in a winter environment.

Prior to the start of the exercise, Barn Owl pilots had been briefed to wear long underwear and winter flight suits whenever they were scheduled to fly over the Sierras. As is usually the case, some of the pilots were content to be more comfortable in the cockpit in their summer flight suits. Of course, cockpit comfort is nice to have, but it certainly was small comfort to LTJG Doody on the following day when he and the four observers were airlifted to a meadow at the 8000 to 8500-foot level in the High Sierras. With a temperature ranging in the low 30s, with 4 to 5 inches of snow on the ground, LTJG Doody's summer flight suit was essentially valueless. He was allowed to don waffle weave long underwear, but even this did not help very much.

On reaching the meadow, LTJG Doody was left to his own devices while the observers constructed their shelter. Although somewhat confused initially about where to start and what to do, LTJG Doody soon began a logical survival sequence.

First, he selected a spot relatively clear of snow and took stock of his gear. In addition to his survival vest and LPA, he was given a parachute, a liferaft, and the contents of a seat pan. After completing his equipment inventory, he searched for a site for his shelter. He selected a "V" formed by the trunks of two large, fallen trees. The shelter he constructed was excellent and as comfortable as possible under the circumstances. By the time he finished his shelter, the sun had set, and the temperature had begun to drop.

During the early evening, he continued to prepare the inside of his shelter. Despite his relatively light clothing, he was able to stay relatively warm by keeping busy.

At approximately 2045, jet aircraft were heard overhead. Using a

The "survivor" puts the finishing touches on his shelter, built between two fallen trees. The observers termed it "excellent."

Temperatures dropped to 24-26 degrees during the night, but LTJG Doody was warm and comfortable.

You can barely see LTJG Doody bundled up inside his shelter.

LTJG Doody spent a comfortable night in his shelter, although observers were very uncomfortable.

PRC-90 radio, preset to an exercise frequency, he made contact with what proved to be two VA-215 A-7Bs returning from a night mission. For the next hour, he conducted a mini-SAR exercise. He practiced vectoring the aircraft to his position and also tested his night signaling devices. Upon completion of this, both he and the observers prepared for sleep.

Meanwhile, the temperature was falling to the mid-20s. This temperature drop and LTJG Doody's extreme discomfort presented an excellent opportunity to test a mountain survival suit known as the Bugaboo Mountaineering Sierra Kit. At 2200 the observers gave him a kit.

The suit, made of synthetic fabric and goosedown, consists of a jacket with hood, gloves, trousers, and body bag. Added attractions from a Navy/survival point of view are its bright orange color and its size when packed. The entire outfit can be hand-packed into two cylindrical bags approximately 8 inches long and 4 inches in diameter. When the suit is vacuum-packed, the size can be cut in half. (The Air Force has tested and evaluated this suit but there are no present plans for procuring it.)

This Sierra kit enabled LTJG Doody to pass the night very comfortably even without a sleeping bag. The observers, outfitted in long underwear, summer flight suits, standard issue winter survival suits, headgear, and gloves, were quite uncomfortable during the early morning hours even with sleeping bags.

The exercise ended the following afternoon when the NAS Lemoore SAR helo "rescued" LTJG Doody and the observers. Before the exercise ended, however, there were sevral opportunities for further training —which included conducting SAR support exercises with VA-215 aircraft during both day and night conditions and testing night location aids.

The exercise brought to light many pointers and hints for the individual pilot who might find himself in a winter mountain survival situation. Most of these are SOP. Many are not followed. Any one of them could mean the difference between life and death—your death.

• First, and most important, follow the Boy Scouts' motto and "Be Prepared." Wear proper clothing when conditions dictate it. In a winter situation, consider taking along an extra pair of heavy socks, a good pair of winter (waterproof) gloves, and some kind of ski cap or watch cap.

• Don't count on being rescued the day you eject. Many factors—chief among them the weather—can prevent this. Consider carrying extra food such as beef jerky or candy.

• If you do find yourself in a winter mountain survival situation, be logical. If you have time, inventory your gear, but keep in mind that your primary and immediate objective is a decent shelter. All other things can come later.

• Don't exhaust yourself. Working at high altitudes is different from working at low levels, so conserve your energy by pacing yourself.

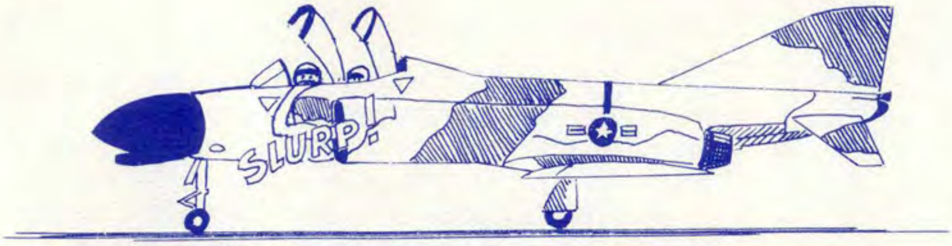
• Remember that a fire can be one of your most important assets. It can provide warmth as well as become an excellent night visual pinpoint. VA-215 SAREX pilots reported that they could see LTJG Doody's fire long before they came within radio contact range.

• Lastly, be cool. Most aviators consider themselves Sierra Hotel gents in the air and about town. Maintain that attitude in a survival situation, and you will be miles ahead.

The choice of whether or not to consider these basic elements of survival is the pilot's. But keep in mind LTJG Doody's words when questioned about the value of adequate protective clothing: "How strongly do you feel about life?"

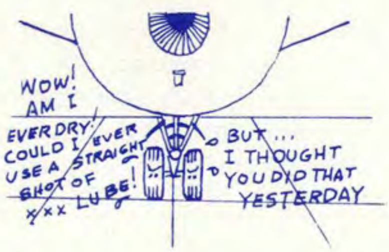
Reprinted from *Approach*. ★

who goofed



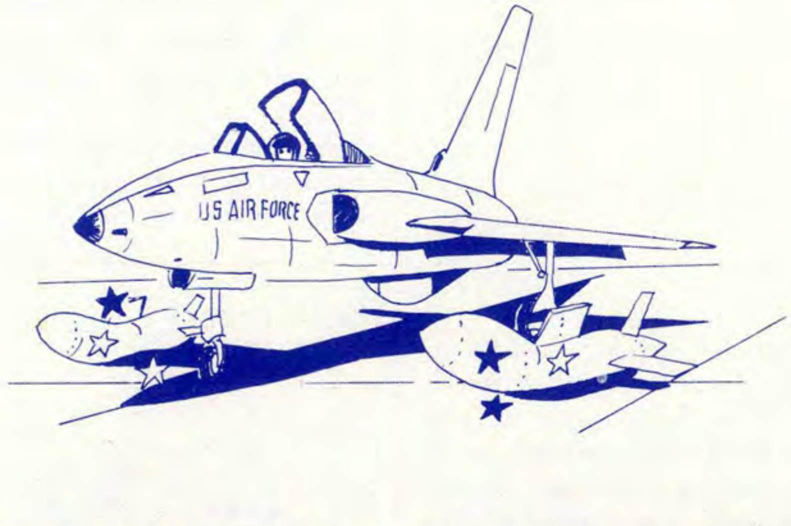
While the F-4 was parked in the de-arm area, the pilot pulled the face curtain safety pin out of the pin stowage bag and installed the pin in the ejection seat. The pin bag with the remainder of the pins was then put on top of the seat for taxiing to the parking area. As the aircraft was turned to the right leaving the de-arming area, the pin bag fell off the seat. The pilot was able to catch the bag before all the pins had dropped out of the bag. He then briefed the ground crew at the parking area about a pin falling out. The ground crew installed the safety pins, and all the pins were accounted for but one. The crew chief immediately checked the intake area and there it was—pieces of the red streamer in the left intake area. The engine was removed and inspection found minor FOD throughout the compressor and on the first and third stages of the turbine wheels.

no lube no gear



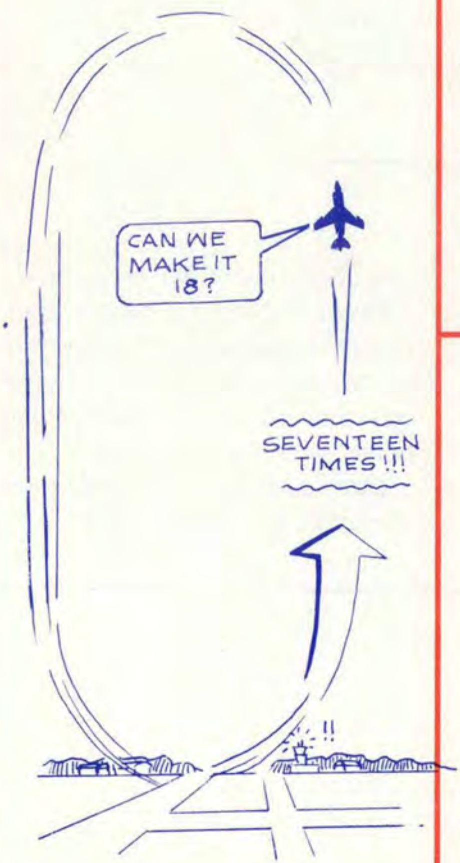
The KC-135 pilot was performing his descent checklist. When he tried to put the gear down the nose gear would only show an intermediate position. The crew had to lower the nose gear manually. During post flight inspection, the nose gear was found dry from improper lubrication. After 10 man-hours and proper lubrication, the nose gear retraction tests were completed without malfunction. By the way, the servicing records showed that the nose gear had been lubricated the day before the incident (?).

mum is a bummer



The crew chief of an F-105 that had returned from a flight installed down locks and safety pins, but . . . since he was unable to find the pins, the 450 gallon fuel tanks weren't pinned. Shift change came around and he was relieved of duty. He hadn't found the tank pins yet and forgot to tell his relief or supervisor of the missing pins. Later when the new technician who had come on duty left the aircraft to get a set of BPO cards, the load crew arrived and started installing a centerline MER and adapter. When they got to the pylon jettison check, two 450 gallon fuel tanks were dropped on the ramp. No one knew about the missing pins. The aircraft forms were at debriefing.

dragging



The F-4 was on landing roll when the aircraft started veering to the right; however, the pilot was able to keep it centered on the runway with nose wheel steering. Troubleshooting revealed the lock plate for the adjusting ring had been left off when the right wheel was rebuilt. During the previous 17 takeoffs and landings, the bearing adjusting ring backed off allowing the right wheel and tire to come free from the bearing cone sleeve. This also allowed the wheel to move inboard and rotate on the disc drive keys causing severe gouging.

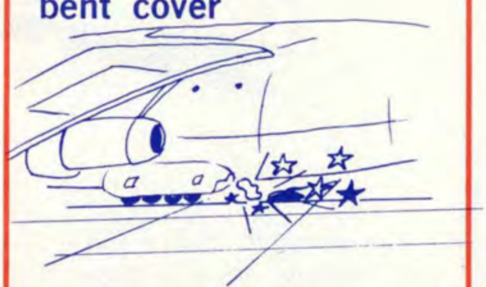
cockpit FOD

The T-38 made an emergency landing because the pilots couldn't move the stick more than ¼ of normal travel aft. When they checked the aft stick well, the pilots found an instrument floodlight cover. It didn't take much investigating to find where the floodlight cover came from. It was from the front cockpit and had worked its way back under the instrument panel to the aft stick well. The missing cover was not entered in the forms and neither the crew chief or the pilot noticed that it was missing during their pre-flight.

no fuel

A CH-3 pilot was preparing for a training mission. The pre-flight was normal through engine start. When the rotors were engaged and fuel boost pumps were turned off, fuel flow for nr 1 engine dropped to zero and the engine flamed out. Inspection found the drain cock in the fuel filter was cocked partially open by a small piece of O-ring in the drain cock. With the drain cock partially open, the engine driven fuel pump was able to draw air into the fuel system.

bent cover



The C-5 was being marshalled into the parking spot. During taxi, the left main landing gear traveled over a fuel pit cover. A deficiency in the pit cover allowed it to raise causing damage to the aircraft brake hydraulic lines and the pit cover.

believe it!

We've heard some crazy things but this is near the top of the "I don't believe it list." A C-130E was leaking fuel, so the bird was towed into the fuel cell hangar for repair. To pinpoint the source of the leak, the fuel tank had to be entered. Good thing. The guy in the tank found four large pillows that the aircraft had been hauling around.

loose pin

While on a single ship training sortie, the F-4 pilot encountered a fire warning light on the left engine. The engine had to be shut down to extinguish the light. There were no discrepancies in the fire warning loops or connectors. However, the engine technician found a hot air leak and removed the engine for detailed inspection. During the inspection, the technician found that the alignment pin for nr 9 combustion can was not properly installed. The threads on the pins were stripped; however, the boss wasn't damaged. There had been no work done on the engine in this area since the engine arrived from overhaul. Wonder where the inspectors were when it came time to check the can?

no communication

The specialist team was assigned to run an engine for an ops and stabilization check. All the pre-run checks were correctly performed, and the team started the run. The engine was running at military power for the stabilization check. The engine operator was concentrating on the engine instruments so he didn't see the C-130 taxi to a position about 50 yards from the test cell. The C-130 was parked tail to the test cell and then the crew started a high power engine run. The blast from the C-130 propellers struck the test cell at about 40 knots. This wind caused the engine on the cell to twist severely in the mounts. The operator tried to shut the engine down but the throttle control lever was jammed when the engine twisted. It took him several tries to free the lever and shut down the engine. But before he could, the engine had run out of control for 30 seconds or more and had experienced both an overspeed and overtemp. A little communication between the test cell and the C-130 operators would have prevented a mishap like this.

hot start

The F-4 aircraft was scheduled for a cartridge start. Nr 1 was started and all indications were normal. As nr 2 was started, the crew chief reported there was a Fire in nr 2 engine bay. Fire equipment responded and quickly extinguished the fire. Investigation disclosed a cracked oil line allowed oil to feed the fire during the cartridge start. ★

MAIL CALL

continued from page 28

This speed decrease is insidious because it happens without any sense of deceleration since the groundspeed tends to remain constant unless the throttles are changed. A pilot intent on visual cues during the last part of the approach may not notice the airspeed suddenly bleeding off which would result in arriving in the landing zone out of airspeed. With a strong headwind for example, it's not uncommon to lose airspeed below touchdown speed prior to landing flare.

The best protection against the headwind shear is to develop safe habit patterns such as a good look at airspeed about 200 feet above touchdown. If the airspeed is just starting to decrease, moving the throttles forward slightly will usually accelerate the airplane to maintain indicated airspeed. Since shear is so common, it's best to expect it and plan to counteract it on each approach if it shows up.

JAMES M. DIEHL, Lt. Col, USAF
KC-135 CFIC Instructor
Carswell AFB TX ★

MAIL CALL

The October issue of *Aerospace Safety* was welcome as always. I read each issue for information useful in the SAC Central Flight Instructor Course. I enjoyed the article *Landings—Good and Bad* but I feel that the wind shear discussion is partly incorrect and misleading.

Wind shear causes a change in airflow around an airplane faster than the momentum of the plane can change to adjust to the new flow unless definite changes of thrust are applied promptly. Wind shear can affect an airplane from any direction; vertically or horizontally—either from the side or fore and aft. Vertical shear on final could feel like an updraft or downdraft which would cause a ballooning above or sinking below the glide slope and would be recognized quickly. Horizontal shear fore and aft would not accelerate the airplane forward or backward due to the airplane's mass and clean frontal profile but would be registered as a change of relative wind or indicated airspeed. A decreasing headwind would register as a decreasing airspeed and decreasing tailwind as an increasing airspeed. This probably would not be noticed as easily since the glide slope would remain unchanged while only the indicated airspeed would change.

The article suggests that wind shear affects the groundspeed when it actually affects the indicated airspeed. The term wind shear in the article is used as if it were a steady tailwind or steady headwind. A steady tailwind approach has a fast groundspeed while a steady headwind approach has a slow groundspeed. The rapid change of wind caused by a shear changes indicated airspeed without giving the ground speed a chance to change and stabilize. The groundspeed does tend to change, but its amount of change is negligible for the short time available on final approach (about 30 seconds from 200 feet to touchdown).

Given the example of a tailwind on ILS which changes to a headwind, the flight path angle doesn't change as the article suggests. The glide path angle is fixed because the airplane travels the fixed gradient or angle of the glide slope. The vertical velocity changes, however, with ground speed. A tailwind approach is hazardous as many unfortunate pilots have discovered for years but not for the reasons in the article. Instead of steep glide angle and low thrust resulting in a short or hard landing, the airplane will have the exact opposite hazard. When a tailwind suddenly becomes a headwind the indicated airspeed will suddenly increase resulting in excessive float, long touchdowns at high speeds with a need for even less power. Both the float due to the shear and the high groundspeed due to the steady tailwind prior to the shear make stopping the airplane difficult.

Most landings are made into the wind which gives the airplane the advantage of slower groundspeeds for touchdown and stopping. However, if the headwind stops abruptly, the airplane is exposed to the hazard of a hard landing unless it can accelerate to a safe indicated airspeed. Vertical shear or "downdraft" can force the airplane to drop off the glide slope faster than it can climb which would result in landing short of the runway. If the headwind shear and vertical shear happen together (as they often do), the hapless pilot finds himself in the jam of losing altitude and airspeed at the same time. This is probably what happened in the Air Force accident 200 feet short of the runway and the DC-9 accident mentioned in the article.

Vertical shear can be caused by rising warm air followed by descending cool air or "thermals." A common example of this is at Hickam when approaching over Barbers Point, then the entrance to Pearl Harbor then the overrun of Honolulu International runway. Vertical shear can also be caused by mechanical disturbance of air flow due to terrain or obstructions. Updrafts and downdrafts near buildings, cliffs and canyons such as at Offutt or Guam act like miniature mountain waves.

The vertical shear caused by a thunderstorm is the most violent and easily avoided—don't fly near thunderstorms.

The horizontal shear is the most common yet least suspected of all wind hazards yet it wasn't mentioned in the article. Horizontal headwind shear is the most common cause of hard landings especially when no other explanation is obvious such as a duckunder. Some flight manuals discuss it by its technical name, wind gradient, instead of by its common name wind shear. Wind speed is usually higher above the ground than near the ground due to frictional drag of the air mass with the ground surface. The runway wind can be 10 knots while the wind at 200 feet on final can be 30 knots for example. This is the situation facing the pilot on nearly every landing. Unless power is added, the indicated airspeed drops off due to the headwind dying off. continued on page 27

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UNITED STATES AIR FORCE

Well Done Award

Presented for outstanding airmanship and professional performance during a hazardous situation and for a significant contribution to the United States Air Force Accident Prevention Program.

Captain James R. Polizzo and crew 514th Military Airlift Wing (Associate) AFRES McGuire AFB, NJ

L-R, TSGT JOHN G. FINLEY, FE, MAJ JERALD M. DAVIS, NAV, CAPT EDMUND ROSSNAGEL, PILOT, CAPT JAMES R. POLIZZO, AC, CAPT MARIO A. CINQUINO, PILOT, SMSGT DAVID P. MOSKOWITZ, LM, SSGT JOHN A. BLACKLEY, LM, SGT ROBERT N. PARILLO, LM, MISSING, NOT IN PICTURE: MAJ FRANCIS D. DUGAN, NAV (732 MAS), TSGT PERVIOUS A. CLOSE, FLIGHT ENGINEER.

Captain Polizzo and his crew departed Torrejon AB, Spain, for McGuire AFB, NJ in a C-141A. The weather was good and all was normal until the aircraft reached 1500 feet AGL. Then there was a loud bang and the aircraft yawed to the right. The gages indicated a problem with nr 3 engine and at first it was thought that the nr 3 thrust reverser had opened; however, the auxiliary navigator had just installed the sextant and could see that the nr 3 engine cowling had come off and lodged on the leading edge of the right wing. The scanner, meanwhile, reported smoke, fuel mist and damage to the engine, wing and inboard wing flap. Captain Polizzo declared an emergency, requested clearance to Torrejon at 5000 feet MSL to jettison fuel. After a controllability check in which no control problems were noted, Captain Polizzo made a successful approach flap PAR approach and landing. After the aircraft cleared the runway, it was stopped, engines shut down with fire handles and all passengers and crewmembers evacuated. Captain Polizzo and his crew prevented a serious inflight emergency from becoming a possible disaster. Their performance reflects great credit on them and the US Air Force. WELL DONE! ★

NEW MAGAZINE COMING

"MAINTENANCE Magazine," a new Air Force quarterly for aircraft and weapons maintenance technicians is about to be launched. Scheduled to hit the field this February, the 64-page magazine tackles a broad range of subjects related to aircraft, missile, and weapons system maintenance. All material is designed to interest and encourage the aircraft and weapons maintenance technician to do his job safely and effectively.

The tone and style of the five-by-seven, two-color magazine reflects its orientation to the younger airman. As with DRIVER Magazine, bold imaginative layouts are used along with numerous photographs. A majority of the articles will be written by maintenance people in the field, and the editors plan to keep the magazine closely attuned to the interests and concerns of the young readership.

As a result of the specialized orientation of MAINTENANCE Magazine, distribution of AEROSPACE SAFETY Magazine is now limited to aircrews and others directly involved in flying operations. Comments, suggestions, and ideas related to the new "MAINTENANCE Magazine" are welcomed. Contact AFISC/SEDA, Norton AFB, CA 92409, Autovon 876-2633.

Airman Michael J. Valenta and TSgt Harry Gethers of the 35 FMS, George AFB, get a sneak preview of the new Maintenance Magazine.