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Aerospace

THE MAGAZINE DEVOTED TO YOUR INTERESTS IN FLIGHT

SAFETY

EJECTION SUCCESS IN COMBAT

HURRICANE HUNTERS RATTLING THEIR HALOS

Aerospace SAFETY

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SPECIAL FEATURES

REGULAR FEATURES

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PREFLIGHT

As the holiday season approaches we have a great deal to be thankful for, since it looks like the rate for major aircraft accidents could reach an all-time low. *Aerospace Safety* is proud of whatever part it may have had in preventing accidents, and the magazine will continue in the coming year to present the most meaningful information possible toward the goal of an even better record in 1969. But it is not records we seek. Rather, it is the saving of lives and resources. Each member of the staff extends best wishes for Christmas and a successful new year.

Our last issue for 1968 has some very pertinent material. "Ejection Success in Combat," page 2, contains some information that may be surprising, in that ejections in combat are more often successful than in non-combat situations. The authors give reasons for this, and they present a number of conclusions that will be of interest to crews of ejection seat equipped aircraft.

Two articles describe activities of aircrews with unusual missions. "The Hurricane Hunters," page 16, is an account of the men who fly WB-47s and WC-130s into tropical storms. While "Sixteen Tons" tells of some of the unusual cargo carried by C-123s in Vietnam and the conditions in which the crews must operate. Both the flying weathermen and the "trash" carriers fly important, exacting missions that demand the best.

Other items of interest this month cover such topics as the new anti-exposure suit, page 22; self-medication, page 24; and the value of frequent practice in making a decision when the chips are down for real, "The Secret Ingredient, page 20.

The Editor

SCRATCH THREE

Lt Col Thurman Lawrence, Jr., Directorate of Aerospace Safety

During 1968 three H-21 helicopters crashed during separate local support missions. All three missions were preplanned, routine, with no degree of urgency involved—just accomplish the missions in a safe manner. Two of the H-21s rolled over and crashed during liftoffs to a hover. A third, according to the preliminary investigation, fell out of an approach and crashed short of the intended landing spot. In all three accidents, the primary cause was determined to be pilot factor. Following is a brief of one of the takeoff accidents. It should be noted that H-21 aircraft operated major-accident-free for three years prior to 1968.

The helicopter was on a support mission, transporting men and equipment to a remote site. The landing site had been surveyed and, because of the terrain, panels were staked to the ground where each wheel was to be placed on landing. The pilot elected to make a downwind approach. Apparently the downwind approach was accomplished so that the landing gear would be correctly positioned over the panels. Obstructions were no problem to the direction of approach since only low brush surrounded the landing site.

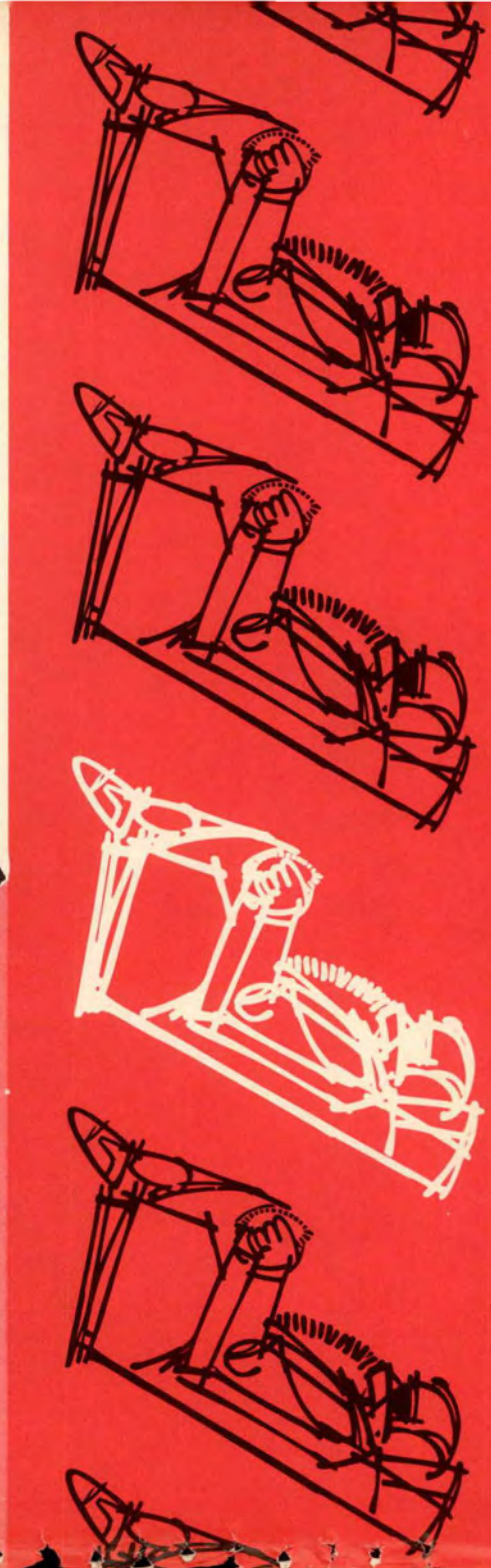
The pilot overshot the landing spot. A backward hover was accomplished with the flight engineer giving directions to place the landing gear over the proper area. As power was reduced after touchdown, the helicopter moved forward and the right landing gear rolled into a hole two to three feet deep. This hole was located one foot to the right and 18 inches forward of the intended gear placement panel.

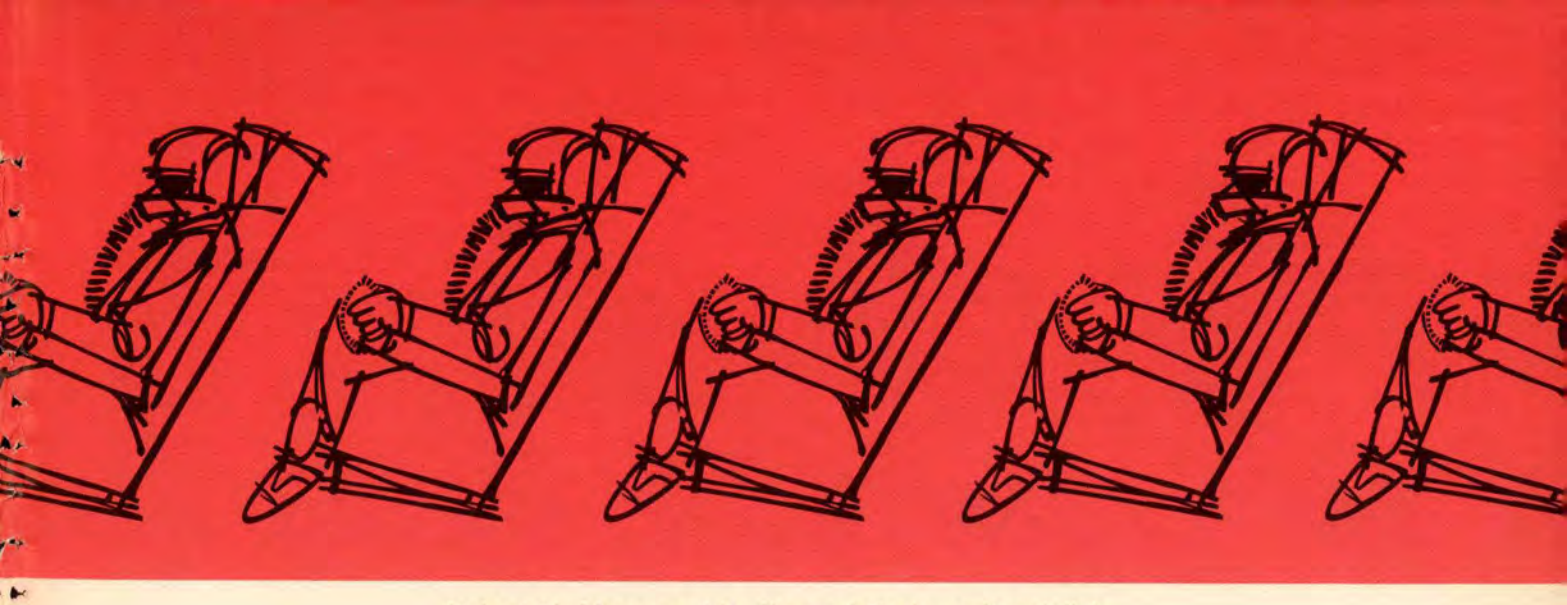
The instructor pilot who made the approach and landing applied maximum power in an attempt to take off and banked to the right. The right gear struck ground approximately 15 feet from its liftoff point and the main rotors also struck the ground. The aircraft sustained major damage and came to rest on its right side. Of the four crewmembers and five passengers aboard, one crewmember and three passengers received major injuries.

Here are some of the discrepancies noted:

- Takeoff and landing data were not computed.
- The pilot did not know the gross weight of the aircraft on takeoff.
- Passengers were not briefed.
- Cargo was not tied down.
- One crewmember was wearing an unauthorized helmet; he is presently grounded as a result of head injuries received during the crash.
- A downwind approach and landing were accomplished in winds estimated at seven to ten knots.
- Position was not maintained after landing, although the terrain was such that the ground position of each gear had been pre-marked.
- Control of the helicopter was not maintained during liftoff to a hover. ★

ejection success in combat





Robert H. Shannon, Life Support Systems Specialist
and
Lt Col Victor J. Ferrari, USAF, MC, Directorate of Aerospace Safety

Reams of data have been collected over the years pertaining to USAF ejection experience. Analysis of this information has led to progressive improvements in egress system hardware, but it is apparent that improvements are still needed.

One of the problems inherent in the analysis of egress data has been the lack of factual inputs concerning combat ejection experience. Are the parameters the same for combat and non-combat ejections? If there are differences, what are they? Do systems and procedures used in non-combat situations apply under the stresses and strains of combat?

These are some of the questions that have bothered life support people for years. There have been little historical data to turn to, so system design and training in emergency egress have had to depend on knowledge gained almost exclusively from non-combat experience. Despite the need for combat experience information, paperwork that would hinder accomplishment of the mission must be kept to a minimum.

Now, however, limited data are available from ejections under combat conditions in Southeast Asia. The following remarks are based on 101 combat ejections that were reported between 1 Jan 1967 and 30 Jun 1968. For security reasons, not all facets can be discussed, but sufficient information can be disclosed to provide the reader an idea of the hazards, problems and successes of USAF ejection systems in a hostile environment.

Review of these ejections indicated that great differences existed between combat and non-combat ejections. Therefore, it is virtually impossible to apply the vast reservoir of existing ejection experience to the problems of combat losses.

The 101 reported cases included one fatality. Of the successful ejectees, 19 received major injuries, 39 received minor injuries, and 43 escaped without injury. The very high success rate indicated by this experience is misleading because of incomplete reporting. It is a fact, however, that the success of ejections resulting from combat mishaps consistently ranges between 90 and 95 per cent. This compares to an average of approximately 85 per cent for non-combat ejections.

The obvious question is: Why this significant difference in favor of combat ejections? Surely the conditions under which they are accomplished are much more severe than non-combat situations.

The primary reason for the difference is quite simple: *Crewmembers do not delay the ejection decision.* The reaction to a hit by hostile fire is rapid and positive. After assessing the damage to his aircraft, the pilot immediately takes appropriate action. If the hit results in catastrophic damage, the pilot has no choice but to eject and take his chances with the situation in the immediate area. If the aircraft is still flyable, he heads immediately for the nearest designated "safe" area for bailout. He may fly the aircraft at rather high speed until it virtually becomes "unglued," but he does allow ample time for completion of the ejection sequence.

Review of reported cases showed only one instance in which the crew delayed ejection. In this case there was a loss of power without any accompanying instrument indications. This caused the crew to delay to the point that time became extremely critical. It was a case of wanting to believe the engine instruments rather than actual aircraft performance.

The distribution of combat ejections by terrain clearance dramatically documents the absence of delayed decisions. None were initiated below 500 feet. In total Air Force ejections, about 15 per cent are attempted below this level and approximately 60 per cent of all fatalities occur in this group. Although

many of these result from low level emergencies, delaying the decision to eject is frequently indicated. Most combat ejections are initiated between 2000 and 10,000 feet.

Another significant difference between combat and non-combat experience is the speed at time of ejection. As previously cited, getting to a "safe" bailout area sometimes requires flying the aircraft at high speeds. If it begins to come apart, the result is a high speed, uncontrolled ejection. High speed ejections occurred more than three times more often in combat than in non-combat situations. Eighteen per cent of the combat escapes were initiated at 400 knots and above as compared to about five per cent in non-combat ejections. A further illustration of the difference in speed at time of ejection is reflected in the proportion of ejections in the lower speed ranges, that is, less than 200 knots. Only ten per cent of combat ejections occurred at airspeeds of less than 200 knots, whereas in non-combat experience the figure consistently runs higher than 40 per cent. This latter experience has shown that if an emergency necessitating ejection occurs at high speed, the crewmember can usually slow the aircraft before ejection.

These rates did not include 10 cases involving the pilot extractor system. These were escapes from the propeller-driven A-1 aircraft at relatively low speeds and are not considered pertinent.

The higher incidence of ejections in the upper speed ranges introduces the problem of injuries due to the effects of windblast/flailing. This is critical in aircraft ejection seats that do not include extremity restraints. Of the 19 crewmembers who received major injuries, five (26 per cent) were due to the effects of ejection at high speed. In non-combat ejections, windblast/flailing was the cause of six per cent of the total major injuries. Admittedly, the combat experience in this area is relatively limited, but it does represent a serious trend. Any injury definitely compromises the crewmember's ability to escape and evade the enemy until he is rescued. Although it is impossible to determine the exact number of times an ejection injury has directly resulted in capture, there is reason to believe it is substantial.

The causes of the remainder of the major injuries were as follows: parachute landing—6, ejection force —5, struck canopy rail—1, struck by seat—1, and rocket blast—1.

From this it is apparent that egress system design must consider optimum protection against the possibility of injury during all phases of the ejection sequence. Perhaps the injury producing phase most difficult to design for is parachute landing. Training is the key factor, but improvements could be attained in areas such as personnel parachute recovery systems and devices for automatic deployment of the survival kit.

The 39 minor injuries were not analyzed in detail for several reasons. First, information concerning injury types and causes was generally lacking. Second, injuries classified as minor, while resulting in some degree of discomfort, are usually not incapacitating. But the fact that these 39 crewmembers were injured represents a serious potential. Had the injury been more severe, escape and evasion of over one-half of the population studied would have been adversely affected.

Difficulties before and immediately subsequent to ejection are continuing hazards to successful escape. About 22 per cent of the personnel involved encountered some difficulty. This figure is slightly lower than what we have seen in non-combat experience in previous years. The major problem before escape was difficulty in locating and actuating ejection controls. This was reported in seven instances. Windblast after canopy removal and "G" forces occurred six times; lack of time for adequate planning was reported once; and a heretofore unreported situation involving the sequencing system was reported by two crewmembers in different aircraft. They forgot about the built-in time delay between ejection of the fore and aft seats; consequently, they were out of position at the moment of ejection and one sustained a compression fracture of the spine.

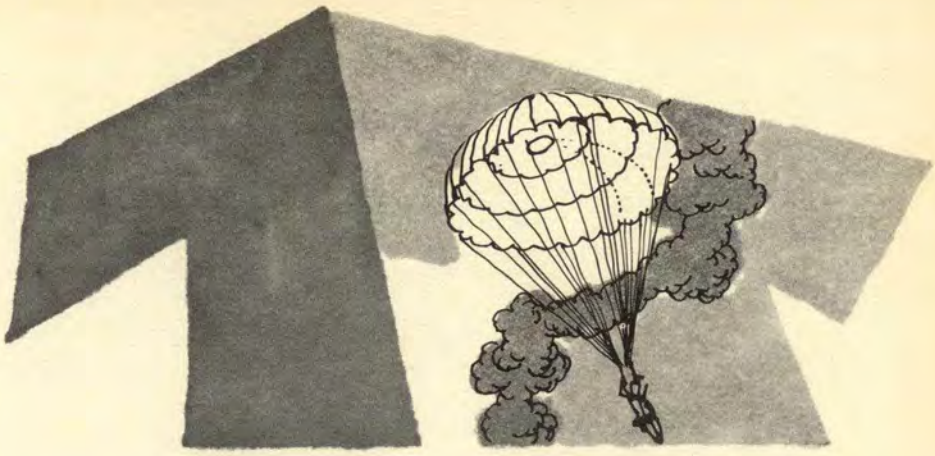
The problem of locating and actuating ejection controls is as old as ejection systems. Any delay in initiating the sequence can be critical, particularly at the low end of the ejection envelope. A reliable and safe single motion ejection system is still a valid and urgent requirement.

Difficulties after ejection are restricted to the time between system activation and a fully developed parachute. There were two cases of man/seat/parachute interference; seven held onto seat actuating controls; and one pilot had to manually open the lap belt, indicating a possible failure of the automatic function.

The percentage of those holding onto seat controls is quite high and probably is related to the psychic stress of the combat situation. The compulsion to hold onto something tangible may be greater after having your aircraft shot out from under you than that experienced in non-combat ejections. At any rate, a more positive means of separating the man from the seat is indicated. Also, some method of providing divergent trajectories for the seat and man after separation is necessary to prevent collision between the seat and the chute or man. This produced one of the more serious major injures. The pilot in this case sustained a femoral fracture. Fortunately, a rescue chopper was near and he was recovered almost immediately.

Another area of discussion concerns parachute descent and landing. The predominance of tree-covered terrain in SEA sharply increases the probability of a tree landing. Thirty-one, or about one-third of the reported ejections, resulted in tree landings. In 12 of these, the ejectee penetrated the trees to the ground. Nineteen found themselves suspended varying distances above the ground. When this happens the man must be able to free himself from his harness and rapidly reach the ground since this could mean the difference between escape and capture.

Water landings, the second largest category, accounted for 25 (28 per cent) of the escapes reported. The high percentage of success in over-water ejections is due to rescue personnel having been alerted to the impending ejection and usually being in place when ejection occurs. Also, over-water rescue is not complicated by the hostile forces often present in land areas. In the remainder of the cases, 16 touched down in open, relatively flat areas, nine landed on the down slope of hills, six in marshy areas, and one in jagged rocks. The type terrain was not reported in 11 instances.



The varying types of adverse terrain conditions encountered in SEA, coupled with the ever present possibility of hostile forces in the landing areas, dictate the need for a steerable parachute. Some crewmembers used the "Cut 4" procedure to good advantage. The newly developed four-line jettisoning system will undoubtedly result in more frequent use of this procedure for parachute maneuverability. The jettisoning system eliminates the objectionable feature of having to cut the designated lines with a knife. The ultimate resolution to the problem is to design the desired capability into the parachute recovery system. Consideration should also be given to newly developed techniques for midair pickup of the crewmember.

Generally, these escapes reflected an excellent egress and survival training background. This was a prime factor in egress success and the ability to cope with the extreme post-ejection survival conditions. The fact that the 25 crewmembers who landed in the water were successfully recovered is quite remarkable in itself.

In summary, our study of the 101 combat ejection reports led to the following conclusions:

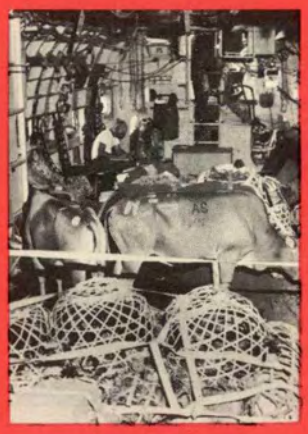
- There is a definite need to evaluate the performance of aircrew life support equipment in the combat environment.
- Existing non-combat experience cannot be applied across the board to the problem of combat losses.
- The success of ejections resulting from combat losses is significantly higher than non-combat ejections.
- Combat ejections are initiated at higher speeds than has been noted in non-combat experience.
- The occurrence of injuries during ejection definitely compromises the crewmember's ability to escape and evade.
- Difficulties before and after ejection are continuing hazards to successful ejection.
- Terrain conditions in SEA require greater emphasis on parachute landing techniques.
- Finally, life support equipment R&D must be expedited to assure the earliest possible availability of optimum life support equipment for USAF aircrews. ★

16 TON

Airman points to patched bullet holes in Ranch Hand UC-123. Aircraft has taken 546 hits since arriving in Vietnam in 1962.

S . . . . and what do I get?

Lt Col Robert F. Erbe,
Directorate of Aerospace Safety



Yeah! Tons of ammunition, indigenous type personnel, Viet Cong, cows, chickens, pigs, dried fish, R&R troops—tons. The only, only machine we could be talking about is the C-123K Provider—the basic Fairchild C-123 that has been operating in RVN since the beginning of the Vietnam war.

A normal day's work for the Provider is 16-20 tons of very diversified cargo, from pretty, sweet-smelling movie stars to boxes of dried squid. The average sortie is 40 to 50 minutes and you fly an average of 6 to 10 a day. Ninety-nine per cent are flown under a tactical VFR flight plan. The average flying time per day is five hours with a high of 10 being logged. The days are long, starting at 0430 and ending as the sun goes down. Very little C-123 flying is done at night; that is when important maintenance is accomplished. The key to moving people and supplies on time safely starts with a well-maintained, airworthy aircraft. C-123 maintenance in RVN is accomplished every night by dedicated personnel subjected to the routine harassment of VC rocket attacks.

The worldly experience of the C-123 personnel is fantastic. Majors with doctor's degrees, fresh out of graduate school, back to the cockpit types; lieutenant colonels just out of war college, crewed with brand new

C-123 taking off from strip at Khe Sanh. Aircraft has been backbone of airlift in Vietnam. Noise from jet engines causes combat photographer to protect his ears.

Some cargo is dropped by parachute, some by aircraft landing and discharging cargo. Conditions determine method.

second lieutenant pilots right out of flying school. On the flight line maintenance experience also varies. There are chief master sergeants with years of practical experience as well as new three-levels direct from tech schools. Molding this vast varied experience into an efficient safe operation is one big continuous task aggravated by the tremendous personnel turnover in RVN.

Taking all of these people out of their normal stateside environment for one year and placing them in a strange country to perform as a team was and is an experience no C-123 crewman will forget, no matter how hard he tries. To insure accident-free operation, personnel must remain as close to their stateside environment as possible. Here are some of the actions taken within the C-123 units in RVN:

- Flips were improved in 1967 to a real stateside operation. The new Tactical Airdrome Directory was a godsend to the new pilots. Radials and distance from the nearest TACAN are on each picture of the RVN base. The picture shows landmarks, runway orientation, gradient, crown, hazards, frequencies, ground fire information, etc. New publications of the Tactical Airdrome Directory were received by the C-123 pilots like the new Playboy Magazine. Old copies were never thrown away and were used over and over for training.

- Flip also put out a VFR map of RVN that was as good or better than stateside. Four maps, front and

back covered all of RVN in detail.

• Victor numbers are used instead of base names. Many of them are very difficult to pronounce and some bases have two or three names. PAX and cargo have been delivered to the wrong base because of the multi- and similar base names.

• In-country (RVN) IP and pilot checkout time was reduced considerably, based on the pilot's past experience, thus attaining a greater productivity for the year in Vietnam. Stan/eval (including instrument) checks, route checks, field checks—all must meet stateside standards.

Stateside operation was not attained in living conditions, transportation to and from work, and off-duty recreation.

Commanders are doing a great deal to improve these conditions but still they are the greatest irritants. Crewmembers develop ways to overcome these irritants but only through job satisfaction can they continue to produce outstanding results and airmanship.

Frequently during a critical resupply mission combat conditions will require immediate operational procedural changes. For example, how can you land 1000 feet down on a 2900 foot, 40 foot wide, wet dirt strip, avoiding ground fire, reverse the recip engines (which shuts down the jets), offload 44 Marines with all their combat gear, onload 58 Marines with all their equipment, and four KIAS, restart the jets, get airborne in *one* minute, and comply with all checklist items? Obviously, the checklist was not developed for such conditions and mission requirements demanded checklist modifications on the spot. Each critical resupply mission was given a special briefing, a combat checklist and flimsy, yet one crew, 44 PAX, and three C-123s were lost. Thank goodness such critical resupply missions were definitely the unusual.

The hauling of 16 tons in a C-123K in RVN makes you another day older and your RVN tour a very long year older. What do you get? Two rows of ribbons and a year of flying experience like you'll never forget. ★

Crews at Work—Aircraft commander checks map during shuttle to isolated forward area; loadmaster secures cargo destined for Special Forces camp; low altitude delivery of concertina wire. Heavy gloves protect hands. Left, ammo delivery to Army troops at Bu Dop airfield.

Rattling Their

Maj Richard C. Swift, APO San Francisco 93610

This article is written primarily for all those pilots who have proven their superiority over gravity and have earned those stars and wreaths on those hallowed wings they so proudly wear on their chests. It is this group which is faced with the problems of too much familiarity and reflexive actions in their everyday flying. Keeping these old pros out of complacency and its resultant troubles is a challenge to any Flying Safety Officer.

One effective technique is to occasionally "jar their halos" with a story that shows that what heretofore had been considered impossible did somehow happen. The impossibility in this true story is a gear up landing in a C-135.

First, let me quote from an article by Capt Raymond G. Troxler, M.D., *MAC Flyer*, Feb '67. "The best pilots have the highest degree of reflexive action, and this superiority can cause aircraft accidents. Given the right set of circumstances it (a gear up landing) can happen to you. . . . Oddly enough these accidents usually happen to good pilots."

Following my experience in this rather unbelievable, but true story I am about to relate, I made it a point to ask several of the truly professional pilots I know in SAC, MAC, and TAC if they thought four well-disciplined, checklist-oriented crewmembers could overcome all the safety features and land a C/KC-135 gear up. Unanimously they agreed that it was, practically speaking, impossible. However, on the other hand, everyone agreed that the single engine pilots could make gear up landings. I guess this is so because occasionally some of them prove the point. However, if any given man can do it alone, then a group of men can also do it; it's only a matter of probabilities.

For example, if each man on a crew has a one in 1000 probability of forgetting to lower the landing gear on any given landing, then via the laws of statistics, that crew as a group may have a one in a 1,000,000,000,000 probability of forgetting to lower the gear. However, this doesn't mean that they will have to make that many landings before the gear up landing will occur. It's like rolling dice, the statistics are one in 36 for a 12, but it may come up on the very first roll or the hundredth roll. This comparison is not exact, though, for there is a slight but important difference. Honest dice are strictly governed by the laws of chance, whereas we pilots can honestly influence the outcome of our flying events to our mutual benefit.

The crew in our true story is composed of three pilots and one each navigator and flight engineer. They are on an IP training flight for a senior pilot who has about 5000 hours, mostly in B-52s. Another IP

is riding in the jump seat and he has about 12,000 hours. As the IP in command I have only a little over 2000 hours, but all of it in the C/KC-135. The point is that we had over 19,000 hours of flying time in the cockpit but, as you will see, it didn't help us one bit. And maybe, as Captain Troxler indicates, it set us up for the incident.

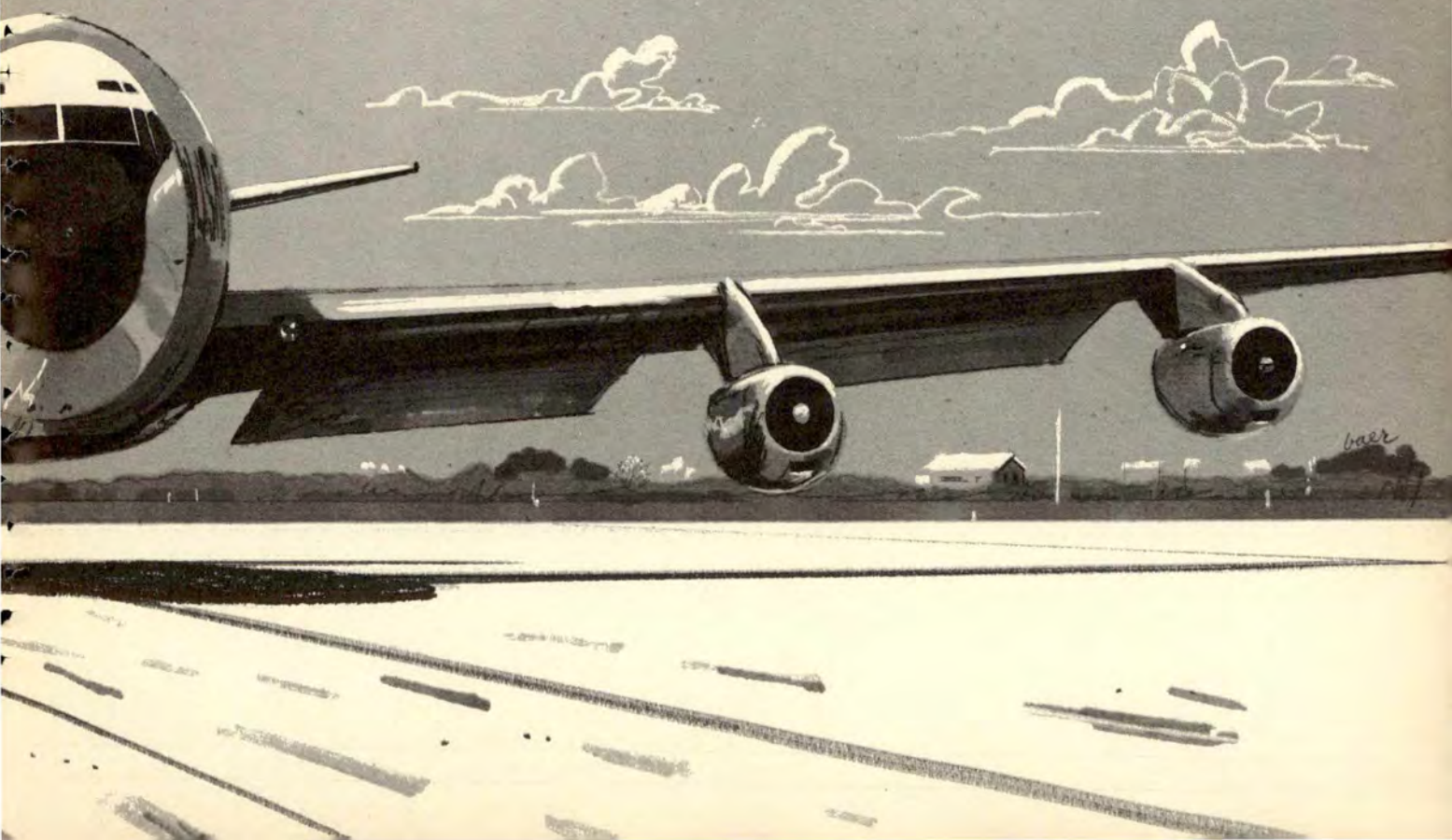
We had a nice field grade takeoff time around 1000 hours and proceeded to an airbase about 30 minutes away since home station had no ILS. We entered the pattern and first made a couple of GCAs. We were about to switch to the ILS pattern when a wind shift necessitated changing the active runway. This change precluded ILS approaches since they would be against normal traffic. Little did we realize that this was the first tiny circumstance that would, when added to several others, produce the "impossible" result.

We stayed in the GCA pattern and on the next touch-and-go the IP trainee was given a simulated loss of Nr 1 engine. The IP trainee responded with all the proper actions including retracting the gear. GCA vectored the aircraft to a position on downwind where the simulated emergency was terminated. The navigator asked if he could make an airborne radar approach since we weren't going to the ILS pattern. The request was honored and I decided to fly the pattern to give the IP trainee a rest. I then placed my checklist on the floor since the IP trainee would use his own. GCA was advised of our intentions and requested to provide radar monitor service.

The navigator vectored the aircraft and just as he gave a vector heading for a dog leg to final, GCA broke in and directed a turn to 140 degrees with instructions to break off the approach because of a hot scramble. At this very same moment the IP trainee had finished his coffee and was just starting to accomplish the Before Landing checklist. He then discarded the checklist to engage in a conversation with GCA for vectors to re-enter an airborne radar approach pattern.

GCA vectored the aircraft to a point on downwind about one-half mile abeam and inside a C-124 that was also on downwind. GCA was advised of the other aircraft. "Yes, we've got him on radar," GCA advised; however, because of the speed differences, GCA assured us we could complete our pattern with no problems. The navigator picked up the airborne radar approach while both pilots closely monitored the C-124. Eventually we were on a long final and it was realized the check list had been neglected. Just as the IP trainee began the checklist, GCA directed another breakout because of departing traffic.

Halos ....*the day the impossible became all too possible*



Several GCA vectors were followed and the aircraft was placed on base for a PAR approach. Because of the delays, training time was being lost so the IP trainee took over flying the aircraft and I resumed the checklist duties.

Just as the checklist was once again started, a call came from GCA advising the termination of radar approaches because of power failure in the GCA unit. GCA advised, "Breakout to the right and contact tower for instructions."

This was too much. The IP in the jump seat promptly started pulling charts from the map case to see if there wasn't some base nearby that had ILS available and where the flow of traffic was more orderly. As the IP in command, I could see the training flight going to pot and nothing being accomplished, for it was about 30 minutes since the last landing. I discarded my checklist reading to contact the tower. Of course, there was considerable traffic on the tower frequency. By the time I had contact, the aircraft had been maneuvered to a position about 14 miles out on final. Tower advised that we were Nr 2 in traffic, close behind two F-104s, but to continue the approach. We sighted the F-104s about one mile ahead and slightly left. The IP trainee retarded the throttles to a position that must have been just in front of the point where the horn would blow. We were slowly getting spacing on the F-104s, but not too rapidly. Just as it looked as if we were going to have to breakout again, the F-104s decided to carry their approach through and re-enter. The C-135 coasted right up to the start descent point without any throttle manipulation. At this point flaps were lowered to 40 degrees and a nice glide slope was entered. The tower came through with, "Cleared for touch-and-go," and we were finally going to get to land.

At about 350 feet, full flaps were lowered and the beginning of the flare for landing was initiated. The IP trainee must have been secretly admiring his throttle technique, for he had made little if any throttle adjustment since he originally selected that "perfect" throttle position way out on final. The aircraft came over the threshhold right on threshold speed and about 50 feet in the air. I glanced across the cockpit and out the right window and could see a red-headed USAF captain in the mobile control tower just adjacent to the end of the runway.

At this instant the flight engineer made what has got to be the calmest, coolest, most tactful question ever put to a pilot. "Sir, is this to be a touch-and-go landing?" Instinctively, the IP in the jump seat responded with "Yes." He did, however, glance up from the reams of charts he was engrossed in, just out of habit to see how the landing was going. With lightning fast reaction his arm shot forward, pointing toward the gear handle. Everyone's attention was directed to this area for there in all its glory was the gear handle in the UP position.

Having pandered you into a gear up accident, I must disappoint you, for from this extremely uncomfortable position the C-135 responded with all the grace of a bellowing tiger who just had his tail stepped on. Inside, however, it was very quiet, very, very quiet for what seemed like eternity.

"Tower, we'll be departing VFR," I said as the silence of the inner sanctum was broken. Impossible to land gear up in a C-135? Maybe so, but you'll never convince three pilots I know.

Was this the one in a billion or trillion? I can't say. But look at all the events that happened at just the exact moments to distract 19,000 hours of flying time from getting the gear down. It may seem that fate was against ever getting the checklist read. And where was that good old reminder from the tower? "Recheck wheels down, cleared touch-and-go." Well, tower operators, contrary to some popular beliefs, are humans too and we had gotten to a position on final where with radio conditions crowded we just got "Cleared touch-and-go." I've often wondered since how we ever slipped in without anyone in either the tower or the fighter mobile control tower noticing our sans-gear condition. But C-135s don't land gear up so who would be watching for that anyway?

Referring again to Captain Troxler's article, he points out that the more you fly and the more landings you make the more susceptible you become to gear up landings. Not because you are catching up with the so-called "law of averages," but because your actions are becoming more automatic, more reflexive.

What can you do when your one in a trillion day comes up? I say fight distraction with distraction. When distractions start to pile up on you, stop and do something you haven't done in a long time. Like how about an ADF low approach for you multi-jets who are always zooming in from 20,000. The old saying, "Variety is the spice of life," applies in the air as well as on the ground. Try to do at least a few things differently on every flight. Use your imagination; the sky's the limit.

Incidentally, since we live in an era of records for just about everything, in closing, the crew in the above cited incident would like to lay claim to the record for "The lowest altitude ever descended to with inadvertent non-extension of landing gear for any model of the 135s." ★

the I.P.I.S. approach

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

Q When discussing high altitude approach procedures, AFM 51-37 states: "After crossing the IAF, turn in the shorter direction toward the penetration course. Start descent when over or abeam the fix headed in the direction of the penetration course." Does this mean an aircraft should be wings level out bound before starting descent, and can a pilot roll out on an intercept heading towards the penetration course or must he first parallel?

A Many questions have been asked on this subject, and we will reword the procedure in our next revision of AFM 51-37. The intent of AFM 51-37 is to allow descent when the aircraft heading is within 90 degrees of the penetration course and station passage has occurred in relation to this course. Therefore, descent may be started before a wings level attitude is established, provided the two criteria are met.

Whether the pilot should first parallel the penetration course or roll out on an intercept heading is a judgment call. The book procedure is not a mechanical process. If a pilot is sure of his position and carefully considers the magnitude of turn, airspeed, and wind, he may wisely elect to continue his turn to an intercept heading. This is particularly true when making IAF turns at penetration airspeeds which are normally considerably higher than holding airspeeds. In all cases, excessive intercept angles close to the facility must be avoided.

Q ENROUTE RADAR/TACAN approaches are appearing with increasing frequency in the terminal instrument approach procedures. When filing an IFR flight plan, may an intersection depicted on an ENROUTE RADAR/TACAN approach be filed as the destination IAF?

A Intersections depicted on ENROUTE RADAR/TACAN approaches should not be filed as destination IAFs. The purpose of these relatively new approach depictions is to expedite traffic and provide clear lost communications procedures after a clearance for an enroute descent has been issued. ENROUTE RADAR/TACAN procedures are predicated on two-way radio contact between the pilot and the terminal controlling agency. If a pilot filed an ENROUTE RADAR/TACAN intersection for his destination IAF and experienced radio failure enroute, he would not be sure of what procedure to follow. Clearance for an enroute descent would not have been received. Should he make an enroute descent anyway? or should he maintain his assigned altitude until reaching the intersection? If he maintains his assigned altitude until over the intersection, where should he descend? A filed destination IAF should provide a definite procedure to be followed with or without radio communications. Significantly, every base with a depicted ENROUTE RADAR/TACAN approach has standard instrument approaches published. If a pilot wants an ENROUTE RADAR/TACAN approach, he should make his request to the appropriate controlling agency when approaching his destination. ★

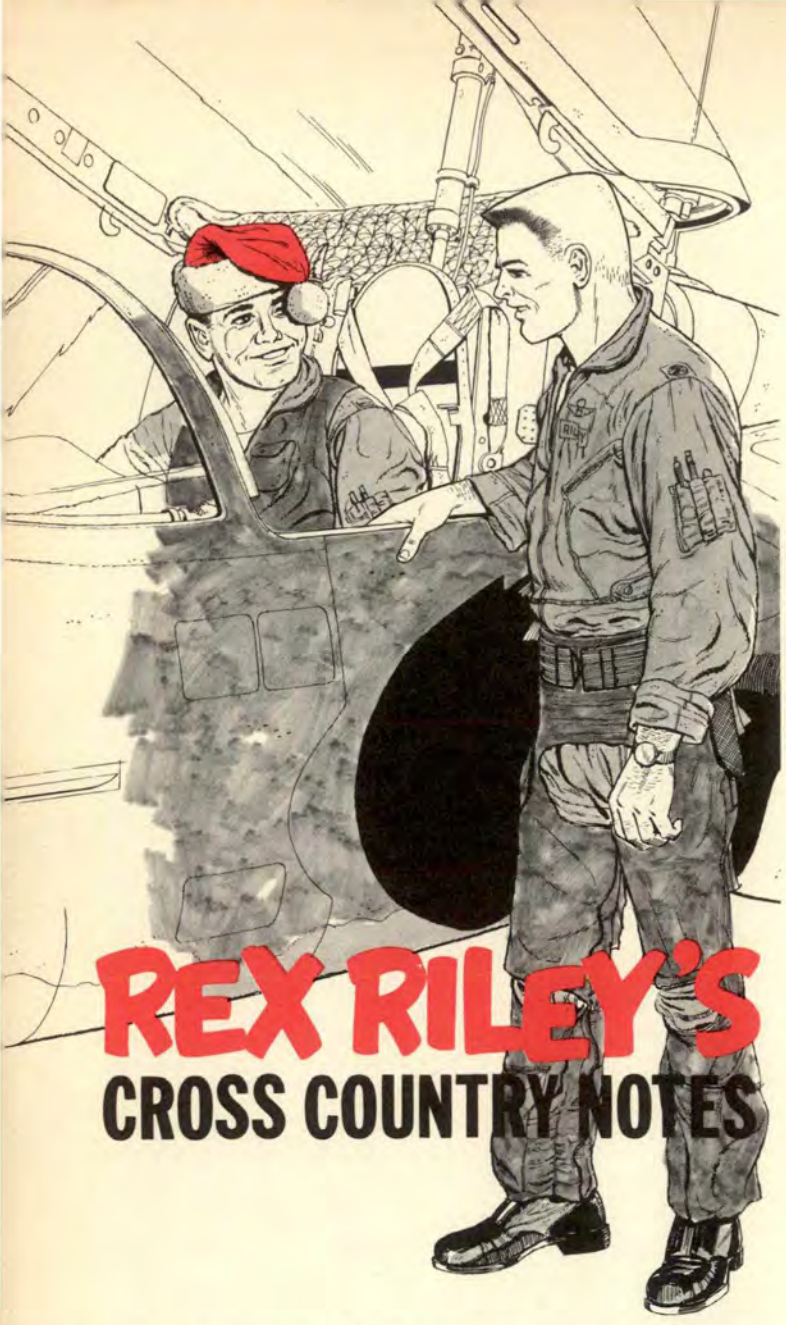
ANNIVERSARY

This month marks the fourth anniversary of the "IPIS Approach." As you probably realize, the "IPIS Approach" uses questions from the field for subject matter, and we appreciate your response to the feature.

IPIS is the pilot's representative, the pilot's point of contact for instrument flying needs. We attempt to develop instrument procedures with you, the user, in mind. We are receptive to all queries related to instrument flying, and your inputs from the field are needed. Every question has an answer, and procedures should be constantly evaluated and refined. Why live with a condition you either don't understand or think can be improved? Help us to help you. Address questions or suggestions to USAF IPIS (FT-IPIS-PS/IPIS Approach), Randolph AFB TX 78148. Telephone extension 4207, 4421 or 5523.

Merry Christmas from the USAF Instrument Pilot Instructor School and best wishes for a safe and productive New Year.

LTCOL H. D. ALLSHOUSE
Commander, USAF IPIS



REX RILEY'S CROSS COUNTRY NOTES

NORMALLY, MANY OF US DON'T THINK OF FLYING SUIT SLEEVES as protective equipment, but believe me, they are. Just the other day a fire involving a helicopter on the refueling pits at one of our busy airports caused:

- the pilot to be emergency evacuated to a hospital where he will be for at least six weeks recovering because his sleeves were rolled up and he wasn't wearing gloves;
- the copilot to be hospitalized for a week because he had his sleeves rolled up (he had his gloves on), and
- the engineer to spend several weeks in the hospital despite the fact that he had his gloves on and his sleeves down. The copilot and engineer would probably have sustained much worse injuries had they not had their gloves on. When fire strikes, the extra protection afforded by long sleeves and gloves is well worth the discomfort.

The copilot's problems were compounded and his exposure considerably lengthened because he had trouble removing his window prior to egress. The release handle did not move as far as he thought it should and this caused him to think it was stuck. This emphasizes another important protective device: training! If it is at all possible, crewmembers should be trained in the actual use of escape hatches and windows.

THE GOLDEN MIKE AWARD was received recently by the 2037 Comm Squadron, Luke AFB, for its rating as the best in TAC during a given period. On my next X-C, if Luke's on my itinerary, I'll keep in mind that I'm calling TAC's best! Congratulations to the 2037th!

FAA WITHDRAWS PROPOSAL to require all jets and aircraft weighing more than 12,500 pounds to operate IFR when in controlled airspace within continental United States. (See page 14 of AEROSPACE SAFETY, March 1968, item "Proposed Reduction of VFR Flying.") FAA said its decision to withdraw this proposed requirement was based on public reaction which indicates it isn't the most feasible method of providing the desired improvement in flight safety.

NEW F-4 FILM—for units operating this aircraft: FR 1023, F4B, Spin Test Evaluation, 20 min, color. It depicts tests of F-4B aircraft under various spin conditions; pictures were taken by cockpit-mounted camera which recorded post-stall gyration, right and left accelerated stalls, spin entry, normal and flat spins.

If this film is not available through local base facilities, it may be ordered from the Film Library Center, AAVS (MAC), 8900 South Broadway, St Louis 63125.

WOULD YOU TRY TO FLY a sick airplane? No! Maybe! It depends . . . . Basically, the answer should be NO! But, granted, there are some shades of gray. How about an oxygen system that appears to be faulty? Would you take the bird in this case? Here's what happened.

The oxygen system indicated four liters during preflight but during the quick check inspection just prior to takeoff it showed only two liters. After takeoff the quantity low warning light illuminated and the gages indicated less than one liter in front and zero in the rear cockpit. Both pressures were normal. The mission

was aborted and a safe landing made. The cause was a leaking LOX converter.

The point is this crew took a chance that could have cost their lives and an aircraft. Chances are they would have caught it in time. But there's the possibility that they wouldn't have and the result could have been a couple of hypoxic pilots.

If you haven't felt that helpless, startling, sinking-feeling-in-the-pit-of-your-stomach sensation, you haven't lived. Your feet are about to bend the brake pedals, but the bird seems to be accelerating straight ahead and the end of the runway is coming on fast.

Friend, you are hydroplaning. Sliding just like some fellows recently who went right on off the end. The primary factor was attributed to miscellaneous unsafe conditions in that some form of hydroplaning occurred. . . . Contributing was a slick runway surface due to recent seal coating of the runway.

There were additional findings which were not considered to have contributed to the accident. Now, check the recommendations, some of which are listed here.

- That AFSC accomplish an immediate study to determine effective methods to prevent aircraft hydroplaning on runways.
- That AFOCE direct an immediate study of runway surface materials, textures and their effects on the coefficient of friction to establish minimum surface standards in an effort to prevent aircraft hydroplaning on runways. The results of this study should be published for pilot information.
- That AFRD direct an immediate study of the present RCR system to determine its adequacy in light of the many varied types of runway surfaces used by USAF high performance aircraft.
- That an article, using the latest known facts con-

cerning aircraft runway hydroplaning, be published in *Aerospace Safety* magazine.

- That ACIC identify, in the remarks section of the IFR/VFR flight planning supplement, all airfields with runways surfaced with a non-aggregate finish.

This would be a good time for pilots to read, if you haven't seen them, or reread if you have, two recent articles in *Aerospace Safety:* "And Away We Go," June 1968, and "Slippery Runways and Crosswinds," October 1968.

They contain a lot of good poop. However, it appears that, as we gain more knowledge of the hydroplaning phenomenon, much remains to be done. Recognition that an airplane could hydroplane occurred only a few years ago. Since then most of the remedies have centered around pilot technique, although some recent research indicates that improved runways and associated areas and equipment would do much to alleviate the problem. May such efforts continue so that hydroplaning will become a problem we *used* to have.

A COUPLE OF AERO CLUB PILOTS got into a bit of a bind recently when they made a mistake and landed in deep snow that caused their Cessna 172 to flip on its back. Apparently they weren't seriously hurt but the airplane was.

Seems they were well briefed on route, airfield location and condition, as well as identifying features and hazards. But they got a little overeager to get on the ground. After VOR station passage the pilot mistook the first strip he saw for his destination, which was one and a half miles west of where he landed.

Despite different runway headings for the two runways and prominent landmarks which should have been spotted since he made one go around, he still tried to land at the wrong place.

Now don't write this off as "just a couple of stupid private pilots." Not long ago a military crew landed an Air Force cargo aircraft on a dirt strip about a mile from an Air Force base. They discovered their error, did a 180 at the end and took off again. Destination: the air base a mile away.

There were extenuating circumstances in both cases. Snow may have been a very real factor for the aero clubbers. Snow often masks identifying objects and can cause illusions as well as other types of confusion. Keep this in mind. With heavy snow things may not be what they seem and your eyes can fool you. Almost always the pilot will have plenty of information to enable him to sort out the real situation, but he has to use what he's got. We might add that the installations people owe the pilot the best conditions they can possibly provide. ★

WEATHERMEN AT WORK

THE HURRICANE HUNTERS

Job satisfaction is about the highest reward one can expect from a military career, and the men of Air Weather Service's Hurricane Hunters have this satisfaction in full measure. For their efforts permit millions of people to sleep more soundly at night during the season of the big tropical storms. Among those who can go about their daily business with fewer worries are commanders who have to be concerned about getting the base buttoned up and aircraft evacuated when a hurricane threatens.

What about these "Hurricane Hunters?" What do they do? Who are they? The Hurricane Hunters are the 53d Weather Reconnaissance Squadron based at Ramey AFB, Puerto Rico. They and their counterparts in the Pacific, the 54th WRS, are part of the 9th Weather Reconnaissance Wing with headquarters at McClellan AFB, California. They do hunt hurricanes, or more properly, tropical storms. But they do a lot of other things that are of direct benefit to both the military services and civilian population.

Their basic job, however, during the hurricane season, which lasts from June to November, consists of regular flights along established routes, and special missions at the request of the National Hurricane Center at Miami. The 53d does the job with five WC-130B and six WB-47 aircraft. A WC-130 crew consists of six men—two pilots, navigator, weather officer, engineer and weather observer; there are three men in a WB-47 crew—a navigator and two pilots, the pilot in the back seat acting as weather observer. Normal mission time for the WC-130s is 10 hours and for the WB-47s six hours. The following will give

some idea of the different types of missions:

• Regular weather reconnaissance along five different established tracks during the hurricane season.

• Special missions in response to the National Hurricane Center. These consist of flights into hurricanes and tropical storms that might become hurricanes, and flights into areas where evidence indicates that a tropical storm may be brewing.

• Missions in support of NASA manned space flights.

• Support of Air Force overwater flights. For example, B-47s of the 53d fly a pathfinder mission across the Atlantic 10 hours ahead of a fighter launch for an overseas destination and a Scout mission three hours ahead and at fighter altitude.

• Two B-47 crews are always on duty at Clark AB in the Philippines, flying weather reconnaissance in support of B-52 refuelings.

• Special projects, such as seeding flights during fog dispersal experiments last winter at Elmendorf AFB, Alaska, (accomplished by the 54 WRS from Guam) and other support of research efforts conducted in a number of places. This winter C-130s are participating in fog dispersal experiments in Germany. Earlier this year B-47 crews flew sampling missions after a Caribbean volcano erupted to get ash scatter patterns for scientists.

• Mercy missions the C-130 crews are occasionally called upon to perform.

The 53d is part of a huge effort that includes U. S. Navy aircraft flying similar tracking missions, ESSA satellites and a far flung radar network. Squadron operations result in a constant flow of weather information that is used by the Weather Bureau and military forces. Data is transmitted by radio to a weather monitor at Charleston AFB. Then the information is relayed to the Chief Aerial Reconnaissance Coordination, Atlantic Hurricanes (CARCAH) at Miami and the Weather Relay Facility at Tinker AFB for dissemination over high speed automated circuits. This and other data from all over the world flow into the Air Force Global Weather Central at Offutt AFB for analysis and prognosis and transmission to overseas stations. The CARCAH coordinates USAF and Navy reconnaissance and is responsible for the Plan of the Day (POD) which defines the reconnaissance effort.

Although the WB-47 and WC-130 crews have different flight profiles, most missions start pretty early in the morning. Generally this means a 0430 show and 0630 takeoff. Here's a typical 10-hour WC-130 mission. First, there's a crew briefing by the aircraft commander. This covers the mission, any changes in the handbook, SOPs, and any other information the A/C considers pertinent. The crew then picks up personal equipment and proceeds to the aircraft for preflight. (The squadron has its own personal equipment room but shares a technician with its SAC host. The crews say they get excellent support.)

After preflight the rated members of the crew go to Ops for flight planning, weather briefing and, perhaps, a final cup of coffee before takeoff. Back at the aircraft the AC runs through emergency procedures with the crew and the mission is ready to go.

Since atmospheric pressure is a major item recorded during the flight, the aircraft is leveled at 1500 feet after takeoff while the radio and pressure altimeters are calibrated against ground radar. Then the aircraft climbs to altitude, normally 18,000 feet, and heads for the search area.

What happens then depends on

WB-47 of 53d Weather Reconnaissance Squadron and pilot at controls. WB-47 crews fly high altitude portion of storm tracking and other missions performed by Hurricane Hunters.

These photos show WC-130, above, aircraft commander at controls, left, and weather observer checking dropsonde, right. Many missions are a piece of cake, others are jarring encounters with storm-produced turbulence.

the mission. When flying a normal track, the aircraft may descend to 10,000 feet and no lower, if there are no indications of a storm. However, surface pressure, temperature and wind direction and force are the primary things that need to be known if a storm is developing. In this case the aircraft will be flown at 1500 feet while the weather officer takes his readings. This may last from 30 minutes to two or more hours. When this work is done the aircraft heads home at an altitude that depends on the length of the mission. This may be 30,000 feet. Fuel is the one limiting factor on mission length.

Sometimes the routine gets rather boring, as the aircraft drills along, almost all of the time over water, sometimes under clear skies and above calm seas, with no indications of a developing storm. This is one of those missions euphemistically described as hours of boredom punctuated with brief moments of stark terror. But, surprisingly, even during hurricane wall cloud penetration there may be little or no turbulence. Then next time the crew may take a real beating. Recently all but one man of a six man crew got airsick.

During the flight the weather officer and navigator are the busiest men aboard the aircraft. The weatherman is constantly collecting data which are periodically transmitted to the National Hurricane Center. Primary items, which are used for forecasting, are time, latitude, longitude, winds, temperature, dewpoint, true altitude, flight conditions, cloud and sky conditions, altitude of pressure surface, turbulence, present weather (rain, etc.).

A tropical disturbance becomes a storm and is given a name when the winds in a closed system reach 34 knots, and is tagged a hurricane when the wind gets to 65 knots. When a crew penetrates a storm the weather officer looks for indications that make it by definition a storm: temperature rise in the center, westerly winds, and a pressure drop (this may not be very great in the formative stage but becomes significant in a well developed storm). Meanwhile, the weather observer is recording information from dropsondes on conditions from the surface to flight level.

The safety record of the 53d is outstanding and after you fly with these crews and observe the overall operation several reasons become apparent. For one thing the mission has certain obvious hazards that are recognized and planned for. Briefings are detailed and explicit, the crews are competent and take their jobs seriously, and they are well aware of the need for and the value of their work.

Maintenance, of course, is a vital factor in both flying safety and mission accomplishment. There are over 300 men assigned to maintenance in the 53d, which may sound rather high for a unit having 11 aircraft. But due to its unique mission, the 53d more nearly resembles a small wing than a squadron. The WC-130s and WB-47s are supported by a self-contained specialist system which includes electrical, hydraulic, propeller, and accessory maintenance. Some of the equipment used on air research or weather missions is not common to the rest of the Air Force so the squadron has its own Air Research Equipment Section. This section, like the rest of the unit, is manned on a 24 hour a day, seven days a week, basis, and where you may be fortunate enough to have holidays, the 53d does not. Weather knows no holidays.

The squadron's WC-130s are on a 42-day Phase Inspection schedule, and the WB-47s are on a 49-day schedule. All work is accomplished through squadron resources except that engine support is furnished by McGuire AFB for Hercules engines and the SAC 72d Bomb Wing on base supplies the WB-47 engines. Each aircraft has an assigned crew

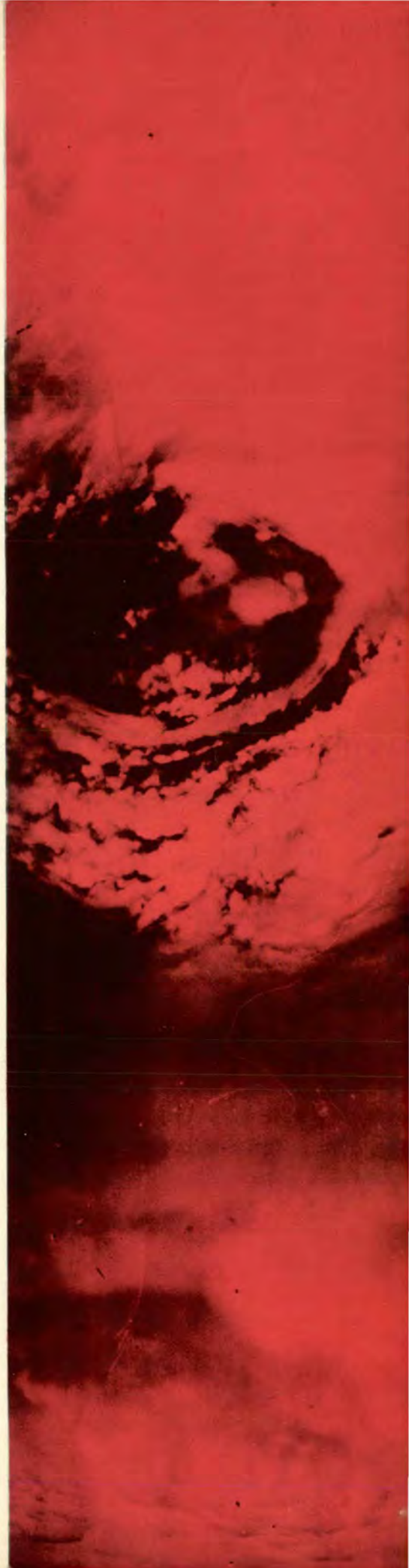
chief. These men furnish around the clock coverage of the aircraft. When aircraft are deployed away from the home station on operational missions, maintenance personnel are required to go along in support. These men, as well as the aircrews, are briefed on the reason and need for most of these missions and consequently morale is always high. Supervisors have worked out schedules to hold overtime work to a minimum, but there are times when overtime is required. Here again, the reason and need is clearly defined and men work hard and willingly to get the job done.

There are always those times when base support is needed. Since SAC works under 66-1 and MAC works under 66-3, you would imagine a conflict, but this is not so. The workload controls of the two commands have worked out a priority system which insures maintenance support on an impartial basis. For instance, SAC training missions will give way to MAC storm missions and on those aircraft having equal priority, the 53d gives way to the 72d Bomb Wing.

The 53d is a rather small outfit, which means dual jobs for most officers, but its size has advantages. Within a few days a new man knows everybody in the squadron. It's a close knit organization.

There is much still to be learned about hurricanes, and current research is probing the structure and energy at various levels in these violent storms. Scientists of the National Hurricane Research Laboratory are building numerical models of hurricanes and steadily improving forecasting techniques. The Hurricane Hunters' role is to provide much of the information needed by both the researchers in their long range studies and the forecasters that deal with day to day, even hourly, developments. Thus, their missions take them from low level penetrations up through the higher levels where the structure of the storm may vary significantly from that near the surface.

Future projects will be more exotic. Even now attempts are being made to correlate satellite, high flying WB-47 and lower level WC-130 gathered information with ground radar returns. TROMEX, Tropical Meteorological Experiment, is one such research project planned for the near future. An even more ambitious effort, GLOMEX, Global Meteorological Experiment, is only a few years ahead. These projects and others are aimed at eventual hurricane control. That is way out on the horizon but the Hurricane Hunters will be there. ★



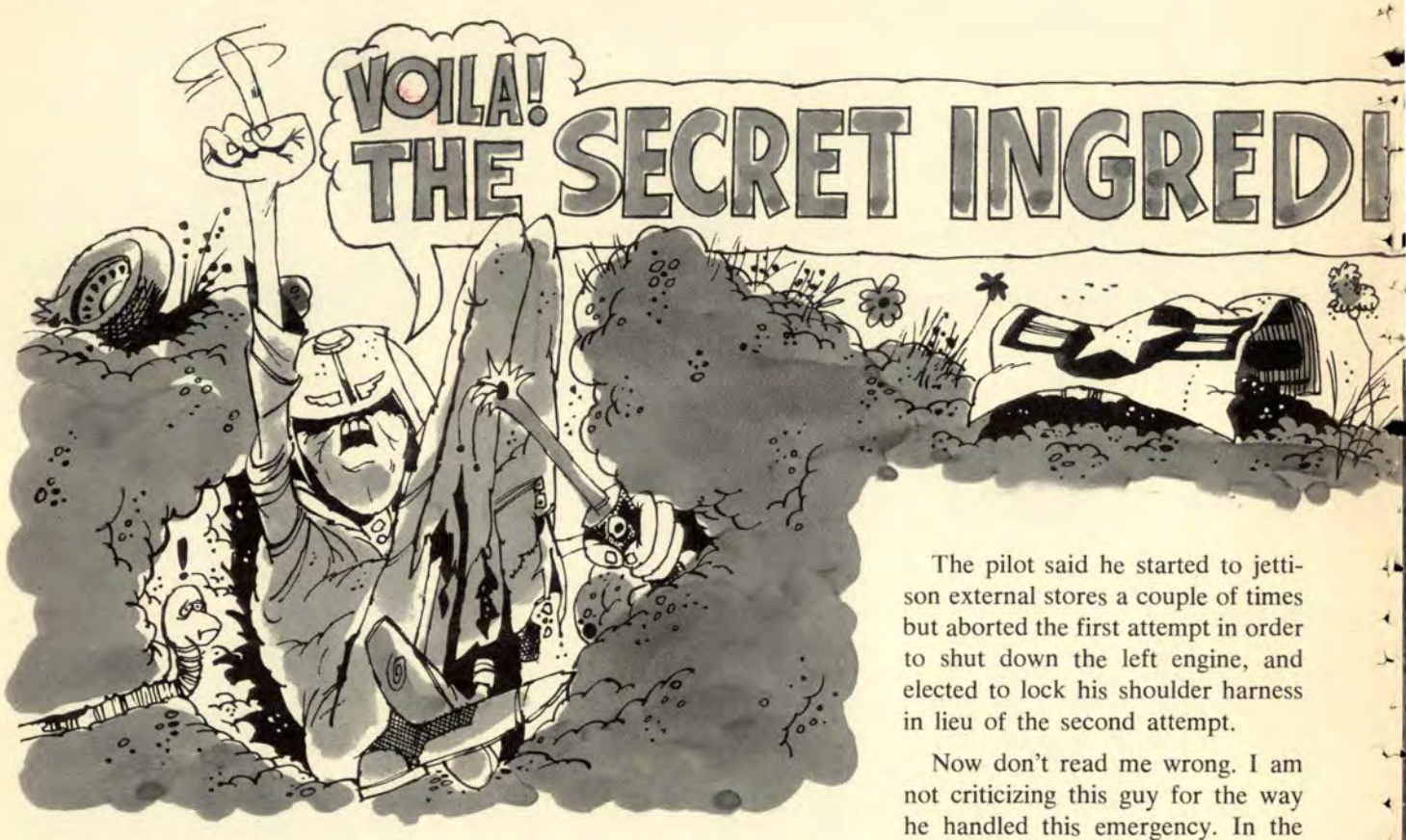
I just got back from a briefing on MADAR (Maintenance Analysis Detection and Recorder), the little computer they're putting in the C-5, and some of the follow-on computers designed to monitor the guts of these big expensive birds. These computers are a cut above human in some respects—they check themselves out when the crew first turns on electrical power and are capable of deciding just what is a normal operation for whatever components they are monitoring. They'll also allow for normal changes in the components' operation, but as soon as a component starts to give trouble the pattern of inputs to the computer will change and the computer will signal the trouble. The flight crew can then go through a simple trouble-shooting routine that will show exactly what is going wrong with what and take whatever action the computer indicates they should take.

Hoo boy, now we take orders from a black box! Some of the follow-on models will sidestep a few of these steps and automatically print out the problem and its source.

All of this is a leisurely type operation since the computer is supposed to sense the failure well before it reaches the broken hardware stage. Unfortunately, many failures refuse to adapt themselves to this concept. On second thought, perhaps I should have said "fortunately" since we airplane drivers just might find that we've lost our jobs to the black boxes, if they could handle all failures. But then we don't always come out ahead of the situation.

I just picked up a message or two from the daily stack that illustrates. An A-37 pilot on a scramble had to react to an engine failure just at liftoff. He retarded the throttle and then tried to regain power without success. Since he was having difficulty maintaining directional control he decided to abort, chopped both throttles to idle and shut down the sick engine. So far, his reaction was pretty good since he needed one engine at idle to power the hydraulic system so he would have nose gear steering.

He shut the good one down just before taking the barrier — after much heavy braking—but the bird slipped out of the barrier and dinged itself when it crossed the perimeter road.



The pilot said he started to jettison external stores a couple of times but aborted the first attempt in order to shut down the left engine, and elected to lock his shoulder harness in lieu of the second attempt.

Now don't read me wrong. I am not criticizing this guy for the way he handled this emergency. In the first place, it isn't fair to sit calmly behind a stationary desk, unbothered by distractions, and methodically pick out the "best" way to extract oneself from a tight. The pilot is handicapped by lack of time and is having to figure out what's going on, while the guy at the desk knows what went on since the investigators have already figured that out for him.

But I can make some observations which just might help someone else stay ahead of a situation like this . . .

to sort of keep the black boxes from taking over too soon.

Between the big war and that other little skirmish I managed to stay rather unproficient in the reserve training program, which was a far cry from what it is today. Despite all the rust, I managed to get checked out in the A-26, which is a fair to middling piece of aircraft whether you jet types care to admit it or not. One thing about the checkout program that really bugged me

Lt Col Karl K. Dittmer, Directorate of Aerospace Safety

was the single-engine go-around they made us do. That dumb bird wallowed through some 600 to 800 feet of sky before I could get it cleaned up and climbing from a simulated single engine approach. Must be me, thought I, because this bird is supposed to have good single engine performance.

Very astute. I was disgusted enough to put in a couple of missions practicing nothing but single engine go-arounds, at a safe altitude, and from that point on was able to clean up and get it flying without losing more than 150 feet. Which gives you an idea of what a little practice can do.

But you can't practice all emergency situations to this degree, and you must be careful to practice correctly. Aborts fall into this category. You flat can't practice one at 10,000 feet like you can a single engine go-around. If we tried we'd have drag chutes and external stores scattered all over the world. But, you can practice in a simulator if they have one for your bird, and you can go through the motions—touching each control very lightly (except the jettison button) as you mentally go through the procedure. The beauty of this mental practice is that you can do it anytime you have time to kill when sitting in the cockpit, like on alert or while waiting for start engine time.

There is another aspect to emergencies and emergency situation practice which is commonly overlooked. I used to instruct various pilots coming into a desk job flying program. Most were good pilots with smarts enough to study and memorize the bold-face procedures. I could say, "Give me the procedure you'd use for a very low altitude ejection," and they would rattle it off like a school kid reciting the Declaration of Independence.

Then, while one of 'em was actually flying the aircraft, I'd say, "You've decided to take off from a high altitude field on a hot day. The overrun is rough and rugged and your computed takeoff roll will get you airborne in the last 1000 feet. A real close situation that causes you to compute everything to the gnat's eyelash. The bird checks out O.K. and everything is smooth right through lift off. Then, just about the time you are 100 to 200 feet over the overrun, with the gear coming up, there's a loud noise from the engine, you feel the bird decelerate, smoke pours into the cockpit as the fire warning lights come on. What are you going to do?"

Usually there would be a looooong pause followed by, "Well, I'd check rpm."

"It is unwinding."

"Then I'd look at the EGT. . . ."

"Top scale."

"Well, I'd stopcock. . . ."

"I think by now you would be dodging boulders in the overrun. Look, emergencies don't announce themselves as a series of events. If I were you, I'd start practicing my emergency procedures by imagining situations and figuring reactions. What I just outlined was roughly what you would experience when faced with an engine failure—a turbine coming unglued or some other gross problem. I placed the failure over a rough overrun because I wanted to make your best line of action to be the low altitude ejection procedure. In an actual case you should've yelled, "EJECT" to the other guy and punched out without pausing to stow loose equipment or to do any of the other stupid things they once had in the start of that procedure."

Far as I know, my little speech still holds water. At least, the earlier you can come up with a correct evaluation and take action the better your chances. With practice, perhaps you may never end up featured in the stack of reports on my battered desk. Certainly not like the young F-104 troop who, for some reason or other, got into a steep dive at fairly low altitude. From all indications he had time to size up the situation as hopeless and still punch out in time. But he delayed just a little too long. Practice is the best insurance against indecision. ★

NEW ANTI-EXPOSURE SUIT

SMSgt John R. Schumann, Life Support SPO, ASD,
Wright-Patterson AFB, OH

A new anti-exposure suit will soon make its appearance on the Air Force scene. Designed with the comfort of the aircrew member in mind, the new garment, designated the CWU-21/P, will eliminate the need for artificial ventilation and greatly reduce the bulk which to date has caused great discomfort and reduced acceptance by the user.

The material used in the CWU-21/P is cotton. Specially woven and treated, it allows vapor to pass

Special underwear for extreme cold.

Spacer liner provides insulation.

New anti-exposure suit reduces bulk; rear view, inset.

through it, but when immersed in water the fabric swells instantly causing it to become water-proof prior to any water penetrating the cloth. Conversely, as soon as the garment dries, it returns to its original free-breathing state.

The garment is worn under any of the standard flight garments, K-2-B or CWU-1/P. This then allows each command to select an outer garment which best meets the aircrew members' needs.

In addition to the ventile garment a spacer liner is worn. This spacer maintains the layer principle of insulation. It also enables vapor to be readily transferred from the skin surface out through the ventile garment.

Special underwear has been designed and tested for the Ventile System. This underwear will only be needed under extreme cold conditions. Again the comfort of the wearer has been foremost in the design. Made of a stretch, batted material, it offers no restriction to body movement and provides very excellent insulation. All items of the Ventile System are washable in cold water.

Life Support personnel supporting the Field Testing (OT&E) of the Ventile System reported a great reduction in time required for fitting, maintenance repair, etc. when compared to the CWU-10/P assembly, which this new system will replace on an attrition basis.

The new garments will appear in the inventory this winter. ★

THE AUTHOR, SERGEANT SCHUMANN, PERFORMED THE INITIAL MID-ARCTIC TESTS ON THIS REMARKABLE GEAR IN ALASKA.

New flying suit is more form-fitting, vented in shoulders, as shown. All items add up to new Ventile System for greater crew comfort.

Let the medics do the doctoring

YOU DO THE FLYING

Lt Col Robert H. Bonner, USAF, MC, Directorate of Aerospace Safety

A common misconception held by many is that, if you can buy a medicine without a prescription, it's O.K. to take the medicine and fly. Unfortunately, this is not true. *Any medication,* prescribed or not, can have serious side effects in the hostile environment of flight.

Side effects or "reactions" to medications are divided into two broad categories: (1) Known or predictable side effects and (2) "Idiosyncratic" or unpredictable side effects.

Examples of predictable side effects are the drowsiness with antihistamines, the blurring of vision associated with stomach relaxers, the euphoria associated with tranquilizers, and the excitement produced by amphetamines (dexadrine). We know these side effects are harmful and no aircrew member will fly while taking these drugs *if he knows* what they contain. However, the aircrew member usually does not know what is contained in medications that can be bought from the corner drugstore without a prescription. Herein lies one of the dangers in taking unprescribed medication.

How many of you realize that the easily obtained cold tablet contains an antihistamine? You know what antihistamines do: they make you sleepy! Not very good for flying, is it? Do you know that some of these cold preparations contain quinine and that quinine can cause severe vertigo? Do you know that some common decongestants contain substances which increase your susceptibility to hypoxia? Did you know that some indigestion medicines contain baking soda which, at altitude, can liberate CO_2 causing painful gaseous distension of the stomach? Most of you will probably answer "negative" because you're not expected to know. Your flight surgeon does know about these medications, and you should have his advice before taking any medicine.

The most serious side effects are the unpredictable or "idiosyncratic" ones. They are dangerous because you don't know when they are coming or what form they might take. Additionally, having safely taken a medication in the past is no guarantee that a reaction won't occur.

Examples of unpredictable side effects are the shock, and sometimes death, that occurs after a shot of penicillin, the fainting that occurs after use of neosynephrine nose drops, the violent diarrheas that result from a variety of drugs, and the stomach bleeding that can occur from simple aspirin! It doesn't take too much "smarts" to realize that these reactions make your job of safe flying rather difficult. Again, many items easily obtained in the BX or drugstore without precrip-

tions can cause "idiosyncratic" reactions. I'll bet few of you realize that many of the cough drops, throat discs, and nasal sprays contain small quantities of antibiotics. Do you realize that simple laxatives can sometimes cause severe, explosive diarrhea without warning? Again, you are not supposed to know about these things, but your flight surgeon is. Consult him!

A final point is the danger of taking your buddy's medicine that has been prescribed for him. The best illustration of this is an actual case. A Lt Col command pilot developed a nagging headache at home. Discovering he had no aspirin, he went to his neighbor to borrow some. He was given 12 aspirin, two of which he took immediately. After two hours, his headache was still present so he took two more aspirin. Within an hour, the pilot developed severe dizziness, became very drowsy, and had difficulty walking. He was brought to the flight surgeon and after careful questioning, the above story was related. He also brought some of the "aspirin" his neighbor had given him. The flight surgeon was amazed. The tablets were not aspirin, they were *Miltown*, a potent tranquilizer!

The pilot had taken four times the prescribed amount. Luckily, he suffered no ill effects. However, if he had developed his headache prior to a flight and had taken these borrowed pills and then started his flight before the delayed effects occurred, this story could have a tragic ending. The conclusion is clear: *never take medications that have been prescribed for other individuals.*

Remember this point: All medicines, prescribed, borrowed, or purchased without a prescription, can have an effect on safety of flight. Before taking any medication, consult your flight surgeon. Let us do the doctoring. You do the flying. O.K.? ★

MISSILANEA

DETERMINATION OF CAUSE FACTORS—The following quote from AFR 127-4 states the Air Force policy on investigation and reporting USAF accidents/incidents:

"Investigating and reporting of accidents and incidents serves a vital function in the overall USAF accident prevention programs. The determination of cause factors, dissemination and crossfeed of information, and timely corrective action reduce the probability of recurrence of accidents."

The intent of this policy is not always fulfilled. Investigations which result in the determination of a cause factor that is unsupported by physical evidence, or are conducted as a "witch hunt" just to change some component for the sake of closing the investigation do not accomplish the desired results.

An "Undetermined" cause factor for an accident or incident does not yield the information necessary to prevent future mishaps. However, a wrong cause factor does not yield this information either, and it generates a needless, expensive investigation.

Two hypothetical cases, but based upon actual occurrences, may illustrate the point:

A missile is inadvertently jettisoned from a fighter aircraft. Subsequent investigation can find no malfunction within the aircraft fire control system or launcher. Assuming an exhaustive investigation was conducted, the cause is undetermined. However, unwilling to accept this, the investigation is pushed to "find" some cause. The most likely component is now suspect; the widget control relay is picked, and an Unsatisfactory Report is submitted. The responsible depot must now investigate this "failed" item and place all widget control relays throughout the Air Force under surveillance.

As another example, a support structure for a piece of equipment "breaks" during assembly by field level maintenance personnel. The Unsatisfactory Report immediately initiates an investigation into all support structures to determine the extent of the faulty techniques used during manufacture. Subsequent analysis of the "failed" item reveals that it was properly made to specification, and that failure was caused by an overstress condition. In both cases, costly investigations have been carried out because the report was misleading or erroneous.

In essence, accident/incident cause factors, when possible, should be determined so that proper corrective action can be taken and future accidents prevented. Every effort must be made to investigate all possible mishap causes, to insure that the cause factor is adequately documented and supported by the available physical evidence. No rationale can justify a misleading or erroneous report.

Capt. Walter S. Yager
Directorate of Aerospace Safety ★

NOT LONG AGO a jet engine was junk-piled by an ingested overseas cap, complete with attached railroad tracks. The other day cockpit-induced FOD again reared its ugly head. A T-37 landed and the pilot opened the canopy as he approached the ramp. The right engine immediately flamed out and the journey to the blocks continued on one engine.

Investigation revealed that the incident was caused by ingestion of a pocket syllabus deck with metal rings. The book had gotten out of the IP's pocket during acrobatic maneuvers. Chalk up one to operator factor because the instructor pilot did not secure the item in his flight suit pocket and it went unnoticed after touchdown. Other loose items in the cockpit added to the embarrassing evidence.

We have enough trouble with foreign object damage from outside sources without adding our own log to the fire that can destroy us. If it isn't in your hand, stow it! Clip it, zip it, button it, snap it, whatever!

THE T-29 FLIGHT EXAMINER simulated a Number One alternator failure to check the pilot's reaction and response. They were on downwind about one minute prior to turning base. After discussing the malfunction with the examiner, the pilot decided to shut down Nr 1 engine; simulated shutdown was started while turning to base leg. Power was reduced to simulate "caging" the bad engine and the resulting gear warning horn was silenced by the left seater. Discussion of the emergency procedure continued until flare out for touchdown, when a scraping noise was heard. The flight examiner immediately took control of the aircraft and applied maximum power to execute a go-around because he realized that the gear was not down. The go-around was normal with no unusual vibrations or abnormal engine instrument indications.

After a successful recovery, damage to the left engine propeller tips was discovered. The primary cause was pilot factor, in that the examiner induced a failure to follow checklist procedures by attempting to instruct at a critically inopportune time during a training flight. He did not insure that the gear was down. The student flight engineer did not properly read or receive response to the before-landing checklist, and the instructor engineer was not supervising. This incident re-emphasizes the necessity for instructors and flight examiners to constantly appraise and reappraise their operating methods and techniques.

THE FAC PILOT completed a rocket pass and returned to 6500 feet to monitor the approach of the lead strike bird who was 4000 feet below him. With an indicated airspeed of about 100 knots, he rolled his O-2A into a gentle 15-degree bank to the left to watch the action. The aircraft quite suddenly began to roll quickly to the left. Rudders and ailerons had little if any effect, and as the maneuver progressed, use of the controls seemed to aggravate the condition.

Normal spin recovery was ineffective as the plane wound up to approximately 360 degrees of turn per second. The pilot retarded the throttle, fought the situation for about 10 seconds, then decided to bail out because recovery airspeed was too slow in coming. Movement inside the aircraft was understandably difficult as he pulled himself slowly towards the door. He unlatched and jettisoned the copilot's door and it fell away immediately. Reaching out and grabbing the strut, he moved into a position to push away and pop his chute. At this moment he felt a noticeable vertical deceleration and slowing of rotation. The pilot then reached back into the cockpit and moved the yoke opposite to the direction of spin. The spin rate slowed immediately, and he flew out of it using his left hand

only for aileron and elevator control. Recovery was completed at 1000 feet. He climbed back into the seat, applied power and returned to home plate without further incident.

Suspected cause is that the pilot flew into and along the wake turbulence of the escort strike aircraft, which had passed the position where the incident occurred within the preceding minute at 500 knots. There was no visual or audio warning prior to the maneuver, such as abnormal airspeed, stall warning horn or wind noise past the cockpit. This incident stresses the importance of avoiding high velocity wake turbulence.

Maj C. L. Fletcher, Safety Officer

"FAST FIX" CEMENT that hardens in 30 minutes or less is being used in Southeast Asia to fill mortar and rocket damaged runways.

Developed for AFSC's Aero Propulsion Laboratory, the cement is being tested at Air Force bases under operational conditions. The Navy has a similar program.

Tests showed the cement would provide a strength equivalent to concrete that has dried for 28 days. A simulated fighter aircraft with a load of approximately 58,000 pounds was successfully supported 30 minutes after the cement hardened.

At Eglin AFB, simulated 750-pound bomb craters were filled to within a foot of the top with sandy debris.

The last foot of the approximately 40-foot diameter, 14-foot deep crater was filled with a uniform aggregate. The "Fast Fix" cement was poured at 1000 gallons per minute over the aggregate and spread down through it to form a quick-setting concrete. Other tests required the cement to be compatible with conventional, transit truck concrete mixers.

Also demonstrated during tests by the Navy were containers which hold ingredients for one and one-half cubic yards of concrete. The flexible, tough rubber containers could be used to store "Fast Fix" cement for use in remote areas. The six-foot long, four-foot diameter containers have two compartments, sealed off from each other. The inner compartment could hold up to 12 bags of dry cement, while the outer compartment holds sand and gravel or crushed rock and water.

THE CENTURY SERIES FIGHTER was destroyed when the pilot attempted a deadstick landing. He walked away from it uninjured but wound up a good deal smarter because of the accident board findings. This lucky gentleman took an unnecessary chance when he elected to try a landing instead of bailing out, because he had not had the benefit of a complete preflight briefing. Had he had a comprehensive briefing he would have known that the jet barrier at the en route base involved was out of service 'til further notice. Flight leaders must conduct these briefings without interruptions or diverting activities of any kind; all flight members must be well informed. Lack of adequate briefing was not the only malpractice in this accident situation. No member of the flight verbally declared an emergency, nor was the IFF/SIF equipment used to indicate a dire condition. FLIP "Emergency Procedures," paragraph IV, outlines the means and procedures to be used to insure notification of necessary ground and air units. After making the decision to ride it down, executing good flameout approach and touchdown, the pilot robbed himself of any chance for a completely successful recovery by neglecting to use proper utility hydraulic system failure braking technique. He intermittently applied the brakes throughout the landing roll.

The Dash One states, "If the utility hydraulic system has failed, leave the antiskid switch ON and apply the brakes smoothly, gradually increasing pedal force. With the brake emergency hydraulic pump power braking action will be available as long as there is hydraulic fluid in the utility system, and electrical power (battery bus) is available."

If you are to profit from this pilot's misfortune we'd all better look up the emergency braking procedures for the machine we are driving and make sure we've got it down to a gnat's eyebrow.

Last, but not least, one other very important item "fell out" of this accident investigation: The pilot of the accident aircraft was not available to the board for interview until about 72 hours after the accident and he was not interviewed by a USAF flight surgeon until seven days later. The board recommended that the pilot/aircrew be detained at an installation as close as possible to the accident scene, if medically practical. This accident is almost a classic example of what we can learn from investigation fallout. ★

Mail Call

Keep those cards and letters coming. Write: Editor, Aerospace Safety Magazine, AFIAS-E1 Norton AFB, California 92409.

"LIGHTS IN THE COCKPIT"

As a regular subscriber to your magazine, I particularly enjoyed the technical accuracy of the September article—"Lights in the Cockpit."

The purpose of this letter is to request permission to reprint that same article in our Air West publication "Flight Safety Quarterly." As you know, our turbojet aircraft are equipped with both red and white lights, and our crews would find this article most informative.

D. R. Hinson
AIR WEST
San Francisco, CA

Be our guest!

THE CAP

As an Auxiliary to the USAF, the Maine Wing Civil Air Patrol would like to have permission to reprint "Life Savers" by Major S. J. Templeton, Eastern ARRC, Robins AFB. This article appears on pages 18 and 19 in the August issue of AEROSPACE SAFETY. I need twelve copies of the article for our squadron information officer to place in public libraries in their communities.

For several years now, the Maine Wing has attempted to keep CAP literature in public libraries as a community relations project with an aim to recruiting in the specific area covered by the squadron. To this particular article, the squadron would attach a slip with its name, and the date and place for the meeting.

I note in your masthead that "AF organizations may reprint without further authorization" but wasn't sure if that included CAP, an auxiliary.

Thank you for your help.

Lt Col J. Frances Hapgood, CAP
Maine Wing Information Officer
Portland, Maine 04101

You're welcome to reprint the article, meantime a few extra copies of the August magazine are in the mail. Your interest is appreciated.

SURVIVAL EQUIPMENT AND TRAINING

Reference: Maj. Bostwick's letter, Mail Call, *Aerospace Safety*, September 1968.

The design of Life Support Equipment is definitely an area where improvement is required; however, there are other areas in aviation—with which we live day to day—where improvement is also required.

We agree that when designing equipment for emergency use, stress on the individual is a prime consideration. However, the properly trained individual will not "follow in what seems to be the natural course of action," but will perform the required procedures in a confident and systematic manner—even under stress. Testimony by graduates of our school who have experienced successful survival episodes attest to this attainment.

Above, I mentioned the properly trained individual; we believe this to be the key to a successful survival episode. The properly trained individual is not only confident, both in himself and in his equipment, he is also capable of performing the required procedures. Until all actions are automatic and the human element eliminated in an escape/survival situation, effective, realistic training is a must.

Capt Dean Keltner
ADC Life Support Training School
Tyndall AFB, FL

As we understand Major Bostwick's letter, there is no basic disagreement between you. We think that all will agree that aircrews deserve the very best personal/survival equipment possible. And that the same goes for the training in its use. Having visited the ADC Life Support Training School, we are familiar with your excellent facilities and program.

Thanks for writing and keep up the good work.

WELL DONE

☆U.S. GOVERNMENT PRINTING OFFICE 1968 341-212/4

Major
Robert K. Parsons

Air Force Flight Test Center
Edwards AFB, California

On 4 January 1968, Major Parsons was flying an F-104A at FL 330 when he heard a loud thud, followed almost immediately by oil pressure fluctuations. Los Angeles Center was notified of the problem and Major Parsons started to return to Edwards AFB.

At this time the oil pressure dropped to zero and the engine exhaust nozzles began to fail to the open position. With imminent engine seizure virtually a certainty, Major Parsons decided that the only possible landing site available was a dry lakebed approximately 40 miles distant. Realizing that the recommended 80-90 per cent rpm with nozzles full open would provide insufficient thrust to make the lakebed, Major Parsons immediately selected afterburner before the nozzles failed to full open, thereby insuring an afterburner light and required thrust. The external fuel tanks were jettisoned over an uninhabited area and aircraft energy was increased by climbing and increasing airspeed. At first indication of engine failure, Major Parsons reduced power to idle and zoomed the aircraft to exchange excess airspeed for altitude and set up a glide that allowed him to arrive over the lakebed at optimum forced landing pattern altitude.

On arrival over the lake, Major Parsons observed standing water on approximately 50 per cent of the approach end of the intended landing area. He determined, however, that if he touched down just over the water, there would be sufficient margin to safely stop the aircraft before running off the lakebed into the desert. He modified his pattern so as to utilize the dry area and the landing was made without incident or damage to the aircraft. Major Parsons' quick and accurate analysis of this inflight emergency and his skillful handling of a serious situation enabled him to save a valuable F-104 aircraft. WELL DONE! ★

Major
Council L. Royal

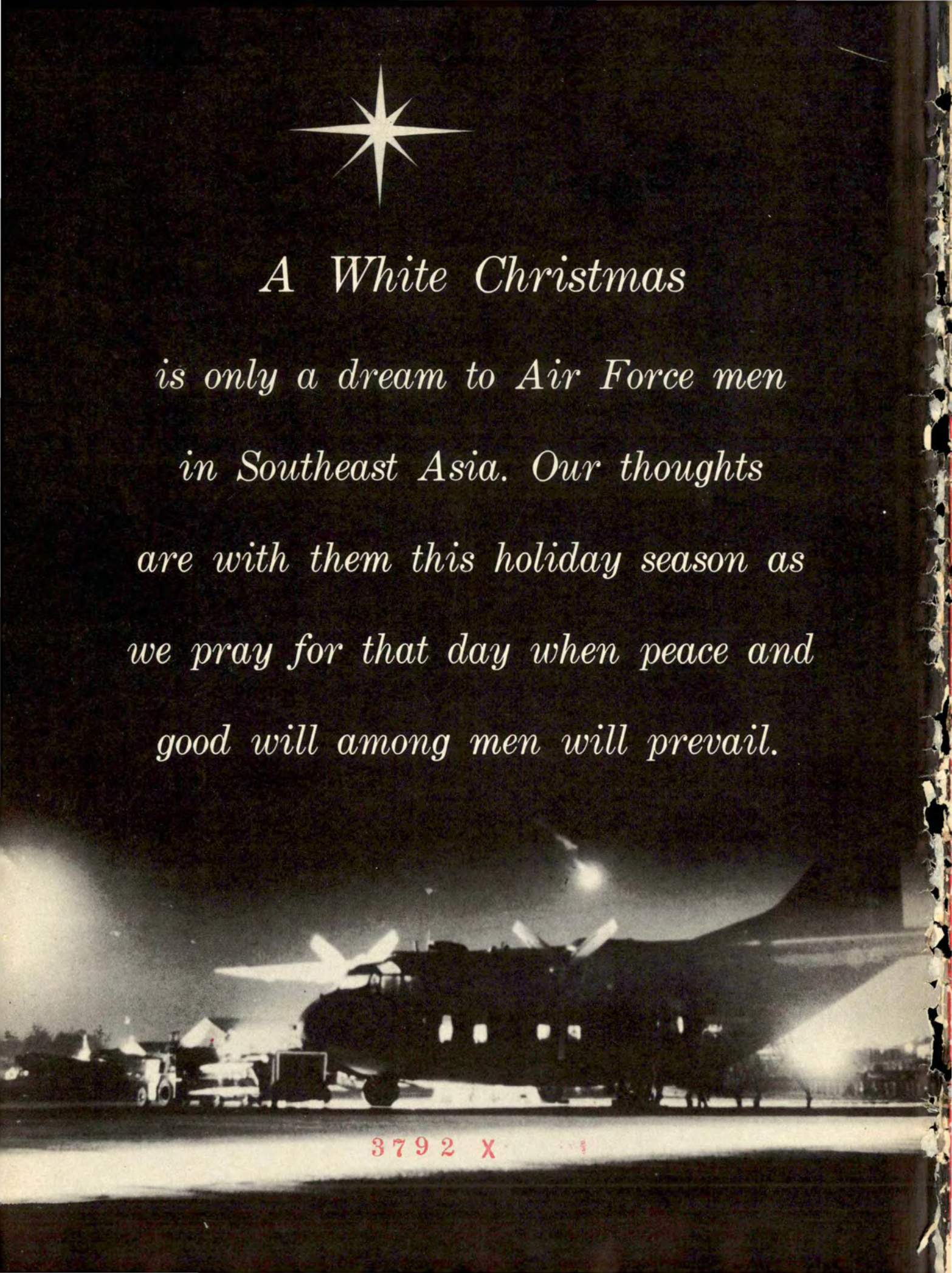
553 Reconnaissance Squadron
APO San Francisco 96288

Major Royal and a crew of 18 departed Korat RTAFB on a mission in a C-121 on 9 Dec 67. Approximately three hours after takeoff, while cruising at flight level 160, the primary system hydraulic pressure warning lights illuminated and the primary quantity and pressure gages went to zero. Major Royal immediately called for primary hydraulic failure checklist, which directs placing the primary pumps off, aileron boost off, elevator and rudder auxiliary boosters on. This provides boosted elevator and rudder and some aileron control through linkage. Before trouble shooting could begin, the Nr 1 engine overspeeded with no prior warning and had to be feathered. METO power was applied to Nr 2 and 3 engines and the aircraft was headed toward home base. The crew was notified of the possibility of a bailout and completed initial parts of the applicable checklists.

With the situation under control, fuel was dumped to 110,000 lbs aircraft gross weight to reduce the power requirement on the remaining engines. When trouble shooting of the hydraulic system was begun it was discovered that there was a major leak in the primary hydraulic system. Consequently, the hydraulic crossover valve which allows the secondary system to power the flight controls through primary system plumbing was not opened.

A few minutes later sparks began coming from the Nr 3 PRT (power recovery turbine) on Nr 2 engine. The engine had to be shut down leaving the aircraft operating on Nrs 3 and 4 engines. By this time the aircraft was within 60 miles of Ubon RTAFB and a decision was made to land there. Major Royal ordered another 6000 lbs of fuel dumped and a straight-in approach was made. The aircraft was kept high on the glide path to lessen power requirements and GCA was so notified. Major Royal lined up to the right of center line and allowed the wind to drift the aircraft over, so that a turn into the dead engines could be avoided, and a successful landing made.

Major Royal and his crew exibited a high degree of skill and professionalism. The outstanding aircraft knowledge and crew coordination displayed during this emergency qualifies Major Royal and his crew for a Well Done award. ★


A White Christmas
is only a dream to Air Force men
in Southeast Asia. Our thoughts
are with them this holiday season as
we pray for that day when peace and
good will among men will prevail.
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