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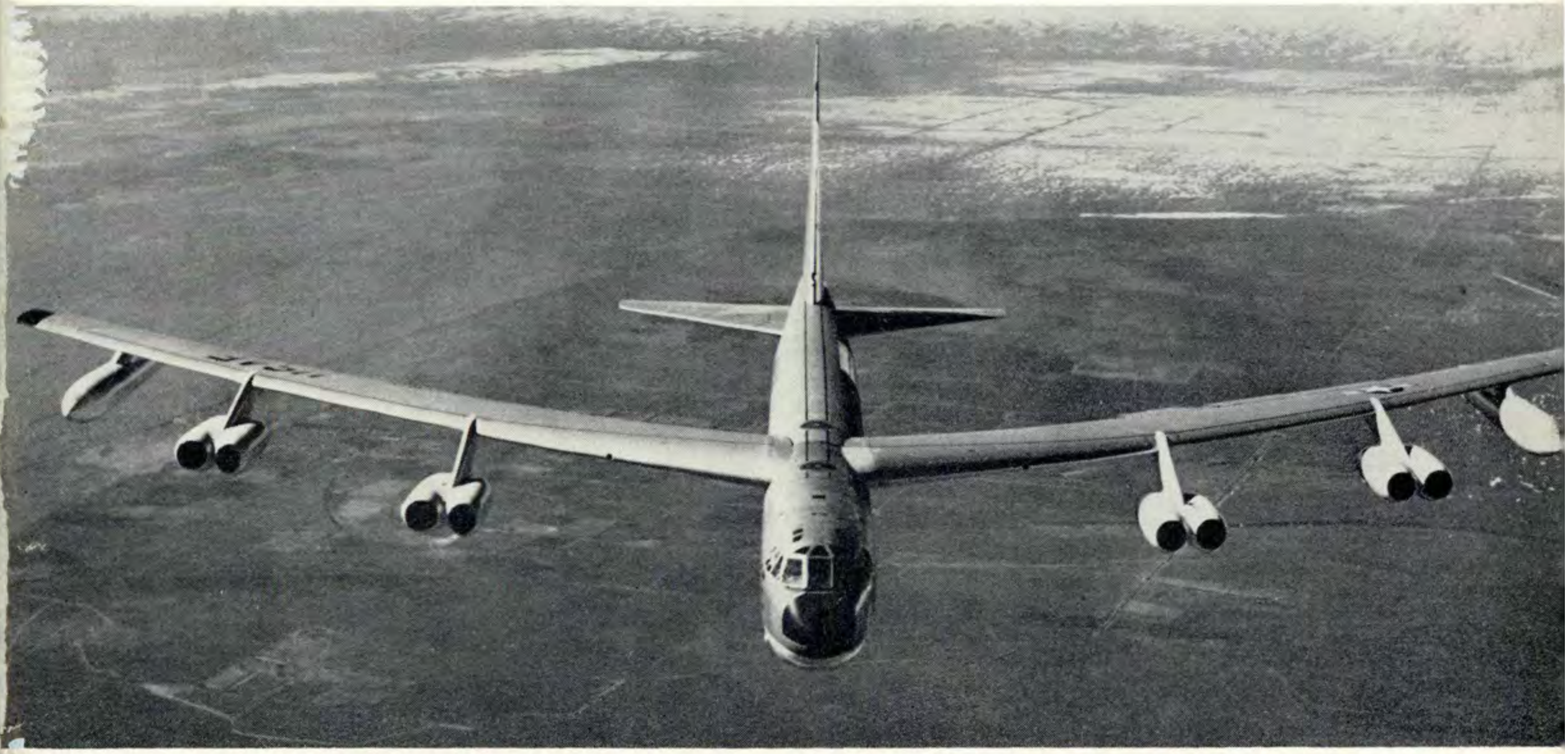
SAFETY

UNITED STATES AIR FORCE



... FROM THE GROUND UP ··· FEBRUARY 1961

LESS THAN A HUNDRED FOR '60

What *is* accident prevention? Or how intangible can you get? How can you tell even how you're doin' when you can't count something that didn't happen? So you might say, "Just the fact that you can't count 'em because they didn't happen is a yardstick of how you're doin'."

This is the yardstick we have been using for the past few years at least so for want of a better one, I suppose we'll have to keep on using it.

Some months ago I flang a challenge to the approximately 25,000 pilots who fly the T-33. Never in the history of the T-Bird (since '48) have we completed a calendar year without more than 100 major accidents. Half a hundred and ten got off to such a good start that I thought maybe, just maybe, this would be the year. Hence the challenge.

As the saying usually goes: "This correspondent is pleased to report . . . We dood it."

Here's the major accident box score for '60 as compared to '59: 1959: 133. 1960: 73. To put it mildly, this is excellente. So now that we got it, let's try to

figure out *how*. Statistics are easy and we have already gone over these and have a couple of ideas why we broke a century in 1960. Now how about you? How about your ideas? We know that some of you have some good ones as to why the number of accidents went down so let us hear about them.

Remember the idea you send us today may save some pilots' posterior tomorrow. Drive carefully.

Maj. Wallace W. Dawson, ATC

IN THIS ISSUE

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VOLUME SEVENTEEN NUMBER TWO — USAF RECURRING PUBLICATION 62-1

Gear Down and Locked

RECHECK •

After the Chief of my Fighter Branch had finished his briefing of an F-100 major accident, a sense of futility swept over me—another gear-up accident. We knock ourselves out running safety surveys, investigating accidents, putting on safety presentations, indoctrinations, publishing the word, and a multitude of other means of preventing aircraft accidents, and then through the actions of one pilot it suddenly seems to be in vain. If this were the only gear-up accident of the year, I could live with it. But this accident made a total of 25 gear-ups for 1960. Now that's pretty hard to take, even when you consider that 1960 shows more than 50 per cent reduction over, say, 1955, when there were 56.

Landing without gear is not new, actually. Ever since the first military plane was designed and built (having a retractable under-carriage), we've been plagued with the gear-up type accident. Some of these accidents have produced stories that are practically legend by now. Such as the aviation cadet who landed gear-up in the old BC-1 despite the tower's shouted advice to *take it around*. When questioned as to why he didn't heed the tower warning, the cadet replied that he couldn't understand the tower because the "damned" horn was blowing so loud. Then there is the legendary story about a pilot at the old Kelly Field who, after landing gear-up, somehow managed to turn upside down. As the crash crews arrived they were amazed to see the landing gear start to extend. Inside the up-ended AT-6 the pilot was calmly pumping the gear down. We've come a long way since the days these stories happened or were conceived, but the same type accident is still occurring. Now, however, it is not nearly so funny, and it's a great deal more expensive.

In reviewing these accidents, one thing becomes very clear: A gear-up accident can happen to anyone—even you. We have cases on record that run the gauntlet—from the aviation cadet to full colonels. Some of the pilots involved had over 8000 hours of flying experience. Not long ago a close friend told me that had it not been for an alert tower operator he would have bellied-in a T-Bird. And I know, because I've almost done it myself—twice.

In trying to analyze this kind of accident I wondered if the type of airplane didn't have a lot to do with it. A look at the records shows about as expected: Single-engine jet fighters and trainers are involved in most cases. This is easy to understand when you consider that a single pilot in the cockpit has his hands full these days. He's moving around the pattern at a pretty fast clip, and there is no copilot or flight engineer to help run the checklist. Excessive and unnecessary radio chatter doesn't help either. Mind you, I'm not excusing the single-engine jet troop if he just plain forgets to lower the gear. In my book when this happens, whether it results in an accident or not, he has just lost the title of Professional Pilot and has reverted back to an amateur. Maybe it's because when one flies a single-engine jet, that he can be more tolerant with a fighter pilot than with the crew of a multi-engine transport or bomber who bashes an expensive airplane because the gear wasn't lowered. For instance, it isn't easy to be sympathetic with the crew of a B-50 that landed gear-up this year in the United Kingdom. The Aircraft Commander and the Copilot were both Instructor Pilots and the Flight Engineer was highly qualified. Yet they rode the GCA final, ignored checklists, acknowledged "gear down" challenge and bellied in. Then there's the crew of the C-97 who put a paper coffee cup over the warning light in the gear handle so it wouldn't shine in their eyes. The warning light showed red right up to the time they cut the batteries after landing gear-up. Is it any wonder that commanders and supervisors age prematurely or end up with ulcers?

One statement commonly found in the investigation report of a gear-up accident is: "It is recommended that the Director of Flight Safety Research investigate the possibilities of developing a 'fail-safe' device to insure the pilot is alerted to the fact that he is performing a gear-up landing." This is a nice, tidy, neat recommendation, but please believe me when I say it's a lot easier to make the recommendation than to take action on it. For some years a good many people have spent a lot of time and money in the attempt to develop such a "fail-safe" device. One idea that looked most promising at first was tied in to the airspeed indicator. As the airspeed was reduced to approach speed a shield gradually blocked out the indicator if the gear wasn't down and locked. Throttle-locking devices, flashing warning lights, wig-wag signals that move across the windshield and a variety of other gimmicks have been thought of, proposed and finally abandoned as impractical. The Navy is presently evaluating a random counter. The pilot must call out these numbers when he gives the gear check. Maybe this gadget will eventually fill the bill for a "fail-safe" device. But let's be practical; during 1961 at least, we're going to have just the warning devices we have right now: an audio signal such as the horn or buzzer, the visual signals like green lights for safe, red for unsafe, and selsyn indicators.

Very frankly, with the high-type supervision that now exists and the professional pilot approach, we should be able to solve the problem. Whether or not we succeed, remains to be seen, but *we should*—because this type of accident *is* preventable.

I am firmly convinced that if our pilots are sufficiently educated as to the reasons why gear-up landings occur, we'll see a decline of at least 50 per cent. This doesn't mean that at every briefing or pilots' meeting they should be cautioned not to land without the rollers; they've known that for a long time. But, if they are sufficiently educated to the fact that practically all inadvertent gear-up accidents are caused by a *diversion*, a *distraction* or an *interruption* of *landing procedures*, we'll be well on our way.

There hasn't been a problem yet—if attacked hard enough and long enough—that can't be solved.

Major General Perry B. Griffith
DIG For Safety

WE'VE GOT THE SAFETY BUG

Maj. Gen. R. L. Waldron
Commander, Western Transport Air Force
Travis Air Force Base, California

Yes, we in MATS have the "Safety Bug." We've been inoculated with the big needle loaded with a serum described as follows:

"The safety record of the Military Air Transport Service to date has been excellent, but our goal is not excellence, nor is it the best safety record in the Air Force. Our goal is the complete elimination of every preventable aircraft accident in this Command."

In other words, as its Commander I have been inoculated with the Safety Bug in order to prevent having accidents of any kind in my command. This includes all types of accidents: ground, flying, nuclear, missile, and explosive.

You're probably wondering about the effects of this inoculation. To me, the result is that I have a personal, aggressive, and continuous command interest in safety, the objective being the complete elimination of every preventable accident in Western Transport Air Force. This objective is based on these technical procedures:

First, my boss, General Joe Kelly, MATS Commander, gave me the big needle and then I gave it to my subordinate commanders. They, in turn, gave the big needle to their subordinate commanders, and so on, until everybody in the command was inoculated with the Safety Bug.

My position is not that of an expert but as a representative MATS Transport Air Force Commander—the guy who must assure that mission accomplishment is accident-free. My viewpoints are presented not because of the safety record we have established but because of the one we are building, plus the manner in which we go about building it.

Before getting into the specifics of my presentation, however, I'd like to give you some background material and a brief description of our resources, our mission, and the inherent accident potential that exists in my operations.

MATS, as you know, consists basically of two strategic airlift forces and four technical services.

The two strategic airlift forces are known as Eastern Transport Air Force and Western Transport Air Force. Eastern covers one-half of the globe from the Mississippi River eastward to Dhahran, Saudi Arabia. Western, which I command, covers the other half of the globe and extends westward from the Missisippi River to Dhahran, Saudi Arabia.

The four technical services which support the Armed Forces are Airways and Air Communications Service (AACS); Air Weather Service (AWS); Air Rescue Service (ARS), and the Air Photographic and Charting Service (APCS).

In all of MATS there are approximately 1100 airplanes, and of this number about 160 strategic transports are in my command. These include C-118s, C-124s, C-121s, and C-133s. It is the primary mission of WESTAF to train for its D-Day missions. In other words we are a force in being that in peacetime carries cargo and personnel in connection with the training which is necessary to perform our wartime missions. Each transport aircraft flies approximately 5 hours a day, and each troop carrier aircraft flies about 2½ hours a day. Our total strategic transport force in WESTAF, therefore, flies approximately 20,000 hours per month. However, we often surge to much higher utilization rates as occasion demands. In "Big Slam" last March, for example, we flew our entire fleet 8 hours per day for 15 days through some of the worst weather we've ever encountered. In addition to the strategic fleet, we have eighteen C-131s which provide air evacuation service to all the Armed Forces in the ZI. Administrative aircraft bring the total of air frames in WESTAF up to approximately 200.

Sixty per cent of our strategic transport flying hours are allocated to channel traffic, that portion of our operation for which schedules are published in advance. The main routes are the West Coast of the United States to Alaska, West Coast of the United States to Tokyo, to Kadena, Clark, and on to Dhahran, Saudi Arabia. The remaining 40% of our strategic flying hour authorization is allocated to special missions.

A few examples of special missions are the support that we have provided for the emergency situations in the Middle East, Formosa and the Congo. We provide nearly all airlift for missile support operations. We have provided airlift for "Deep Freeze" and the Geophysical Operations that have been under way for the last two or three years in both Arctic and Antarctic Areas. We fly missions into many marginal fields; for example, Sparrevohn, in Alaska, is only 4000 feet in length. It has a 12-degree gradient, is covered with ice and snow during the winter months, and landing is only in one direction. On the approach there is a sheer cliff at the near end of the runway. On the other end of the runway is a vertical mountain. Takeoff, therefore, must be made with zero payload, since failure of an engine on takeoff would probably result in a loss of an aircraft and crew because of the high terrain.

It is typical of MATS operations that we fly anywhere any time, and land at numerous and varied types of airfields. Our mission is very important and it does involve accident potential.

Now within this framework of resources, mission, and inherent accident potential, it is my philosophy that *before a mission can be considered truly successful, it must be completed accident-free.*

First, and of primary importance, as in all cases of military management, the safety program must start with the Commander. How many times have you heard that one? In fact, it is Air Force policy that accident prevention must be a function of command. In WESTAF this policy is carried forward vigorously by the Commander and each subordinate commander down to the smallest detachment. In the language of the hipsters and the beatniks, the Commander must be thoroughly "bugged" on Safety. The injection each commander receives is carried out personally by the commander at the next echelon. I hope that I've placed sufficient emphasis on what I consider the requirement for this basic ingredient: *a personal, aggressive interest on the part of the Commander.*

The next requirement from the Command position then is to establish a program of *Safety Anticipation.* This is another way of saying "Accident Prevention." Safety anticipation is also in consonance with a basic philosophy of mine. I'll state it here:

"Have a system of management which is alert to and can see far ahead on the horizon those little red flags that indicate potential trouble and difficulties.

Anticipation is, of course, planning. Therefore, we are constantly alert for those preventive measures which in the transport business are essential to eliminating an accident *before* it happens.

Following is WESTAF's 7-Point program of Safety Anticipation. We believe that to a certain extent, it is over and above other safety programs.

- Can Do.
- Management.
- Inspection Augmentation.
- Selected Surveys.
- Product Improvement.
- Quality Control.
- Recognition.

Of course, some of the items in our program are within the average safety program, but in our operation they receive more than average emphasis. Other items in WESTAF's program are not in other safety programs.

The first item, "Can Do," is the motto of Western Transport Air Force. Literally and in fact, with respect to everything we do, this slogan is paramount. It establishes our esprit de corps and is the motivating force to a sure, positive attitude toward safe mission accomplishment. Positiveness permeates my command in every aspect.

Management of aircrew resources is not new but has recently become a special interest item to me. In WESTAF we have established a statistical reporting system that tells us exactly what each crewmember does each hour of the day. As a matter of fact, it's a manpower accounting system for crews, and is broken down as follows:

Duty Time:

- Duty time on trips (75% of trip time).
- Duty time on other TDY (33.3% of TDY time).
- Local flying.
- Ground training.
- Barracks standby alert.
- DNIF (Duty status).
- Squadron and administrative duties.

Restricted off-duty time:

- Off-duty time on trips (25% of trip time).
- Off-duty time on other TDY (66.7% of TDY time).
- Pre-trip crew rest at home station.
- Home alert.
- DNIF (non-duty status).

Unrestricted off-duty time:

- Post-trip crew rest at home station.
- Leave.
- All other unrestricted free time.

This system accounts for a crewman's life, so to speak, but more than that it can be a red flag that pops up *before* low morale, fatigue, or an unhappy wife or home situation set upon a man and induce an operational hazard. With this tool we can avoid unnecessary and unproductive augmentation of crews, eliminate many additional home station duties, equalize workloads between various subordinate commands, improve training standards, and, in total, bring increased safety and morale to the Command.

Based on 168 hours in a week, our preliminary report indicates that WESTAF crews have only 70 hours unrestricted off-duty time as compared with 128 hours unrestricted off-duty time for commercial airline crews. It appears that there may be justification for the claim that our crewmembers are working too hard and that safety may be jeopardized. Serious consideration is being given by MATS to request increased crew authorizations from USAF for crew manning. In this connection, the theme of WESTAF's Commanders' Conference will be "Improved Crew Management."

The third point in our Safety Anticipation Program is *Inspection Augmentation.* As stated previously, safety is a function of command. However, we have no safety inspection capability within the Office of the Inspector General, WESTAF. Therefore, in every inspection made, two Safety Officers are assigned as "inspectors." These officers follow a specially designed checklist applicable to all aspects of safety and thoroughly screen the safety program of the command being inspected. This then makes my inspection system slightly different from others. The basic concept of my inspection system is described as "The Five A's:" *Analyze, Assist Adequately,* and *Acknowledge Accomplishments.* In addition, I make it a point to be present at every inspection critique. If the inspection reveals a weakness in safety, the local commander must step up to the head of the line and be given an inoculation of the safety bug.

Selected Surveys. Aircraft accident prevention surveys recommended by the Director of Flight Safety Research are conducted semi-annually at each of my Wings or comparable Groups by the commander concerned. Those squadrons located away from their parent organization also participate in this exercise. I've learned that an analysis of the number of URs, OHRs,

WE'VE GOT THE SAFETY BUG (Cont.)

ground accident reports, station delay rates, operator reliability, overall discrepancy reports, and aircraft utilization rate accomplishments will help us to determine which organization needs assistance to bring it up to the standard desired. So, a "selected survey" follows. This is in addition to those required by Regulations. The term "selected" is used to denote that one particular team has been selected to make a special survey of an organization whose safety record appears out of date. I've found that this is a very effective tool and, as you can see, is safety anticipation in action.

The fifth point in our program is *"Product Improvement."* Now, ever since a certain horse lost a shoe for the want of a nail, the emphasis has been placed on supply. Losing the nail, of course, forced the horseman to abort and, in turn, reduced his capability to zero.

I assigned our sharpest investigator to this rhyme and he came up with the primary cause as being the blacksmith since he failed to install the nail properly. This prompted us to set up a program to prevent the WESTAF Supply Train from losing its rivets en route. We called it our "Product Improvement" program. It is designed around a quality audit team (Supply, Maintenance and Safety) for the purpose of determining future needs and *before* rather than *after* the fact care of our aircraft.

For example, let's follow one of our teams in action on one of our primary mission aircraft, the C-121 Constellation.

- This team found extensive corrosion under the deicer boots. The cause was the bostic cement that was used in securing the boot to the wing. Hq AMC was advised and an improved product was developed. This not only eliminated our problem but assisted other bases or areas wherein USAF aircraft might be exposed to similar difficulties.
- We suspected that fuel tanks on several of our C-121s were chronic leakers. The audit team took a real close look, got after the problem and was able to substantiate the need for 100% fuel tank inspection and repair during PARC. Thus, the problem was eliminated before it started to get serious.
- Last fall we had a brief period of R-3350 piston failures. The audit team dived into this one, found the cause, and secured a retrofit by the installation of hard pistons. Since the modification, engine difficulties resulting from piston failures are practically nil.
- And here's another problem we were facing. The C-121G propeller restricted our aircraft to normal gross loads and did not allow a maximum emergency load takeoff. Of course, this hurt our wartime capability, therefore action was initiated to effect engine nacelle beef-up, rewiring the system, and installing a new and improved propeller. It's true the change has been costly, but we will now be able to plan and fly our war emergency requirements with safety.
- Other areas in which the team recognized a need for improvement concerned the flight control and autopilot system, a nosewheel well modification, changes within the flight engineer's electrical panel, and improvements to the main electrical junction box.

The examples show where the audit team's anticipating a problem has improved our product and increased the safety margin.

Next, we have *Quality Control—Personnel.* We realize, of course, that no matter how energetic our supervisors are, a comprehensive program of Personnel Quality Control is necessary. Therefore, my Deputy for Personnel has been inoculated and as a result has established a Personnel Quality Control program. It outlines a long list of requirements and sets work standards with the objective that our military and civilian personnel are competent, conscientious people. It places emphasis on retention of talented first term airmen and young officers, and takes steps to see that each is offered an attractive career. We make special effort to stimulate them with the "Can Do" spirit and supervise accordingly. The end result is a strong and safe transport force of aircraft and men.

Last, but certainly not least, is *Recognition.* None of us will deny that a little pat on the back for a noteworthy performance goes a long way in developing a feeling of wanting to belong—wanting to do a job and do it well. I anticipate within my Command that we are going to have emergencies and that engine and aircraft malfunctions are going to occur. When they do, I make it a point to be there on the spot, following the emergency and visualizing what I would be doing. It isn't easy for a Commander to sit by and wait hour after hour while a heavily loaded C-124 plows along straining its energy to make it across the long, vast stretch of water. And when the aircraft lands safely, I wonder "does the crew realize that their Commander has been there watching, waiting and rooting for them?" For these reasons I have placed special emphasis on the importance of commending my men for a job well done.

I recall a recent case of a C-124 en route from Honolulu to Travis. It lost one engine at Equal Time Point—half way. Shortly afterwards, it lost another engine. A portion of the cargo was jettisoned, but only that amount to assure that the pilot would not ditch. Within minutes he called in to say he had lost partial power on No. 3 engine and was preparing to ditch. It was touch-and-go for a long time, but I'm happy to say they made it all right only after a final decision as to whether or not the aircraft was *going over or under* the Golden Gate Bridge.

As the crew stepped out of the aircraft at Hamilton, my personal "Well Done" message was presented. This was a pat on the back, but I didn't consider it enough. My Information Officer, also in on the job, furnished the entire story to the Command publication, The MATS Flyer, to tell the lesson learned, not just for recognition of the crew but for the purpose of giving all MATS crewmembers the opportunity to learn how one crew functioned and handled an extreme inflight emergency.

Recognition is an act of expressing appreciation for a job well done. By anticipating that an emergency will arise and being prepared, immediate on-the-spot recognition can be given.

And this is our seven-point package program for "Safety Anticipation," another way of saying "Accident Prevention." It has been most successful for me and I hope it will be helpful at other Commands. ★

Old D-Rings NEW T-HANDLES

Left, is the old but fast disappearing D-ring. Through continued use the elastic became more elastic. Coupled with a shallow pocket, oftentimes the D-ring was out more than it was in. Below, is the new T-handle with zero lanyard hooked up. Windblast will have no effect and spilled chutes should now be rare.

Several inquiries have been received asking the reason for replacing the old familiar D-ring on the automatic seat-pack parachute (SA-17) with the present T-handle configuration. Also, there seems to be a bit of confusion concerning its proper use.

We're taking advantage of that old one about a picture being worth a thousand words. Perhaps a word here and there, plus the accompanying photographs will clear up the situation.

The reason for the modification (T.O. 14-D1-2-564) is to provide the seat-pack chute with a windblast-proof ripcord (T-handle) and enable the chute to be fitted to aircrewmen of small stature. Even though the majority of us have not been subjected to windblast forces great enough to displace the D-ring, it is a real comfort to those pilots who fly every day to know that this modification would prevent inadvertent chute deployment because of the windblast effect on the ripcord. Pilots have reported that on occasion the D-ring has dropped out of its retainer pocket. This can't happen to the T-handle.

The two holes in the T-handle are for attaching the zero lanyard. Hope you don't forget—but if you should actually have to use the T-handle subsequent to ejection (because you *forgot* to lock the automatic lanyard in the lap belt), remember to grasp the entire T-handle and pull!

Incidentally, on page 21 Rex quotes some information from the Operational Support Engineering Division, ARDC, about a new chute soon to be available to the units in the field. The present equipment, however, will remain in use until that time. ★

Capt. Reynold E. Janek, USAF
Aviation Physiologist, Asst. for Life Sciences

The wrong way and the right way. At the right you see the incorrect method of pulling the new T-handle. A person having large fingers, or wearing gloves, might find himself semi-permanently attached to the T-handle with flaying ripcord. Below, note the correct grasp, in event the zero lanyard is not used.

Below, one of the side benefits of the modification. Arrow shows position the backstraps are tacked to seat as opposed to strap on right (old way) which often caught on most any projection.



C • NOTES

F-100

Pilot error-induced. Major General John D. Stevenson, Air Defense Command, gave a whopping good speech at the 1960 Annual Safety Congress entitled, "Ideals and Realities." It is reproduced verbatim in the October issue of ADC's INTERCEPTOR Magazine. He shot straight from the shoulder and hit some of my favorite targets. I recommend it for reading especially for those who hold the purse strings. His main thesis is that accidents labeled "pilot error" under our present system of evaluation are really induced in many cases by materiel failure or malfunction. The reality of the situation, as so forcefully pointed out by General Stevenson, is that we, as pilots, are going to have to cope with the failures and emergencies that are thrust upon us.

In going back over the past few months the one thing that stands out as most commonly overwhelming a pilot with failures is that of the antiskid system. This is hardly ever any sweat if everything else works, but when a drag chute fails, or on a wet runway something must be done to salvage the situation. Some recent accidents have revealed that all pilots are not completely familiar with the antiskid system in the F-100. The most popular misconception is that antiskid malfunction is not the cause of failure to receive braking action when the light is off and no cycling is felt. Lack of cycling can mean at least four things, such as a complete loss of fluid, failure of both utility and electrical systems, failure of the antiskid control box, and failure of an antiskid sensing unit. The odds for the first two are fairly low, but the latter are quite common.

Now for the next misconception. Some pilots are misled by the statement in the Flight Manual which says that the antiskid OFF light should come on within 1½ to 4 seconds after the antiskid switch is turned off. This does not mean that a wait is required for braking action after the switch is turned off. It is immediate. When the antiskid system is preventing braking action, it is doing so by relieving brake pressure with an energized solenoid. The instant you turn the switch off, the springloaded solenoid snaps back and "Whammo!" you have pressure going to the brakes. Naturally if the brake pedals are fully depressed the brakes will lock and blow a tire, hence the warning to get off the brakes *before* turning off antiskid.

Now how can you help maintenance to keep the antiskid working? I'd give odds that at least 20% of the in-commission F-100s on some bases have a less-than-perfect antiskid system. The reason is that few pilots use the brakes to the point of exercising the antiskid system. It is not my intention to detail corrective action for this, but I'd suggest that maintenance officers attempt to educate the pilots so that failures will be detected *prior* to the accident.

Lt. Col. Waring W. Wilson, Fighter Branch.

F-102

Recently I read one of Convair's F-102 Interceptor Service Notes and believe this information is of concern and interest to Units flying this aircraft. There is an increase in the number of F/TF-102A service reports on flight control mechanical linkage discrepancies, such as loose bolts, slop in the linkage, sticky valves and so on. Items such as these are considered to be a direct function of wear, consequently as an aircraft gets older, more occurrences can be expected. Detection of these conditions goes with normal maintenance of F/TF-102A aircraft and is outlined in the basic periodic inspection requirements for system 14 of T. O. 1F-106-6 (Flight Controls). Most of these conditions are first detected as a result of pilots' squawks rather than being picked up during periodic inspection. Typical pilot comments range from: "It's hard to fly"; "flies like it's riding on a ball"; "cannot trim"; "overtrims"; "it's sloppy"; and other comments you may know of. Pilot over-control, or out-of-phase control, results when the pilot's reflexes—coupled with the excessive play in the system—are not keen enough to maintain stable flight.

The basic problem, which is responsible for this condition, is that no particular maintenance group or AFSC is assigned the responsibility to inspect for these mechanical flight control conditions and correct them. Radar technicians and electricians will normally maintain the electrical damper and AFCS systems, and hydraulic specialists will maintain the servo valves. No specialists, however, are assigned the responsibilities of maintaining the mechanical systems or the trim and feel systems.

One approach—used at some F-102 bases—which has been highly successful, is the establishment of a flight controls maintenance team. It is composed of radar, hydraulic, electrical, and mechanical technicians. Thorough training of these technicians on the flight control system enables the team to adequately troubleshoot all portions of the system. In many of these teams it is the radar technicians who have the background and training to comprehend detailed analyses of servo systems.

The above information is well worth passing on to the troops flying the '102. It is recommended that flight control teams be established at all F-102 bases as an interim measure to handle all flight control maintenance until such time as a definite AFSC for this assignment can be created.

Lt. Col. Edwin Bishop, Jr., Fighter Branch.

F-104

Although the job of accident investigation doesn't appeal to the majority of pilots, one thing can be said about it: It is interesting work. Of course, it has its bad side too, and I'm not referring to the unpleasant task of trying to find one of your ol' buddies in a large hole in the ground that smells of JP-4 and contains small bits of charred metal. I am referring to cases wherein the cause of the accident is *undetermined*. Actually, very few accidents are completely undetermined, for there is usually some clue that something was amiss. Perhaps the pilot ejected successfully and can give you a statement, or he made a radio transmission prior to impact, or ground witnesses observed the crash, or instruments or controls reveal discrepancies.

Recently we lost an F-104B because of flameout. Fortunately, both pilots ejected successfully, and the aircraft hit in San Pablo Bay. The '104, carrying pylon tanks and Sidewinders, had experienced severe nose gear shimmy during takeoff, and the pilots had to reset the generators to get electrical power. Power to some of the instruments was regained, and after approximately 50 minutes of flight the IP started to let down from 10,000 feet, to land. The engine quit, and after one hurried airstart attempt, corrective action was taken by the IP and pilot by grabbing and pulling the seat D-ring.

The Navy picked the bent bird out of the water and a thorough check was made of the parts and pieces pertaining to the fuel and electrical system. Fuel was aboard the '104 at impact, since the pilot's helmet bag found in the wreckage was saturated with JP-4. A malfunction of the main fuel shutoff valve was immediately suspected; however, the valve was recovered in the open position and impact damage verified this. All electrical components that were recovered appeared in good shape and with no apparent malfunctions. About the only thing the Board could do was to find the primary cause to be materiel failure of the fuel system from an undetermined cause. In addition, it found that the IP used poor judgment by not landing when the electrical malfunction occurred at takeoff, because of severe nose gear shimmy.

And more recently, we lost another F-104 under similar circumstances. The engine flamed out while in the landing pattern with approximately 1800 pounds of fuel aboard. Investigation revealed that the pylon fuel shutoff valve was in the "open" position at the time of the crash. This would cause over-pressurization of the forward fuel cell and result in closure of the fuel cell inner-connection flapper doors which would trap any fuel remaining in the aft main fuel cell. Prior to the time of power loss, the pilot had noted a fuel low-level light illuminate at 2900 pounds. At an indication of 2300 pounds of fuel remaining, the fuel low-level light went out. When the engine flamed out, the pilot noted illumination of the boost pump failure light. Fortunately, again, ejection was successful—and at 600 feet.

Beyond doubt, the cause of both accidents was the result of a malfunction of the pylon fuel shutoff valve. We lost two irreplaceable aircraft before we found the cause of the crashes. Needless to say, action has been taken to prevent similar occurrences.

In Las Vegas at the "Strip" hotels, they pay 10 to 1 odds on 8 the hard way. The odds on making a 2 are 30 to 1. We rolled up two and still lost.

Maj. Robert M. Scott, Fighter Branch.

MATADOR  training and

The time is T-minus one day. The place: Cape Canaveral. The big moment for R-585-0-0, a TM-61C Matador launch crew, is hours away. Nine months, hundreds of manhours and thousands of dollars have gone into the training of this crew. Now the proof of effort is near at hand. Each man goes about his pre-launch duties with a confidence borne of thorough training and intelligent effort. As he performs his specific duties each man subconsciously reflects on the first time that he came in contact with this particular system or that piece of equipment. He remembers how he was overwhelmed by tubes, wires, and related equipment that seemed to be beyond comprehension. But slowly, and with the patient guidance of his instructors, he began to see everything in its proper relation.

Even more basic than the technical knowledge is the innate feeling for safety of each team member, for of all the aspects of launch training none has received more emphasis than safety. In every phase of his training the student has been impressed repeatedly with the importance of missile safety. He is well aware of his place on the team and he fully realizes that the success or failure of this operation rests both singly and collectively on him and his fellow crewmembers. Also, he recognizes that to a degree the reliability of this missile system is determined by his launch crew.

Although the TM-61C is a turbojet type of missile it has as many dissimilarities as similarities when compared to conventional aircraft. The biggest problem encountered in training a Matador launch crew is that of coordination.

Let's follow MSgt John Williams through this countdown. He is a typical launch crew chief. With 12 years in the Air Force, Williams is a cross-trainee from the aircraft maintenance field and is now completing his final phase of launch training. His job is Launch Technician.

Singularly his duties are related to the missile and the zero-length launcher. Collectively he has a variety of responsibilities connected with positioning of equipment and missile transfer procedures. Presently he is directing a transport vehicle with a missile into position. This job, which seems simple enough under normal circumstances, is complicated by the limited area allotted to a launch pad. To prevent damage to the equipment, a lookout is appointed to guide the vehicle driver when his view is blocked. Once the missile is in position, the missile sling is lifted into place, and checked carefully to make sure the sling is securely attached. Everything okay so far, Sgt Williams checks to make certain the men are at their proper stations. Each crewmember has been assigned a position during the transfer of the missile from the vehicle to the launcher.

Once the missile has been transferred to the launcher, and the wings installed (complete with primer cord) the pad is cleared of all personnel not required for launching.

At this point in the countdown, armament personnel mate the nose section and the booster rocket motor to the missile. Sgt Williams knows this requires the precision and exactness that go with munition safety. Precision—in the handling and direction of the crane so as not to damage the rocket motor or the missile stabilizer. Exactness—in the alignment of the rocket motor lifting band, use of the two bomb hoists and ejector head tolerances. If the lifting band should be off center the booster rocket cannot be hung with the bomb hoists that are used to position it under the missile. While positioning the booster rocket for the hookup, the bomb hoists must lift in unison or the hookup cannot be effected. If the ejector head is out of tolerance, too much stress would be placed on the booster rocket trapeze (rear support assembly) during burning, and the rocket motor would break loose and free-flight rather than assist—making it impossible to hang the booster rocket unit in the first place. This missile crew chief realizes that the booster rocket checks are simple but they could also mean the difference between a disaster and a successful launch.

When the nose section and booster rocket motor mounting to the missile is completed, the launch officer directs the entire crew to return to the pad to continue the countdown. Each man checks his assigned equipment for damage and operation, including proper electrical grounds, protective covers, fuel and fluid leaks. Since the missile is essentially an electro-mechanical machine, it is vitally important that only the desired electrical currents are present. Static electricity might easily ignite JP-4, gasoline, or possibly the rocket motor which is now installed. Needless to say this would cause a catastrophe. Once a missile has caught fire it is extremely difficult to put out except with heavy support equipment.

The crew chief serves as the focal point for all activity on the pad. Even the crane operator is directed by the crew chief. Throughout the countdown the Launch Officer is in communication with the missile operations center, advising them of the current checks being carried out and when they are completed, such as missile transferred, booster rocket bottle hung, wing destruct completed, missile raised and so on. Also, they are advised of any problems encountered and corrective action taken. It is extremely important that all phases of a launch operation be coordinated with interested units; this need for coordination is particularly necessary on the launch pad itself. Each team member must perform his duties in a proper sequence not only within his own area but also in relation to the activities of his fellow team members. To facilitate an orderly operation, the Launch Officer periodically announces the T-time over the loud speaker.

As the countdown progresses, the point is reached

when the final checks of the warhead are necessary. Were this a tactical countdown, MSgt Williams would then move forward of the missile to observe the checkout of the nuclear warhead; if a warhead emergency existed he would alert the pad. At this time he is relying wholly upon the technical skill of his armament specialists. Their proficiency and reliability in handling nuclear components and intricate electronic testers must be flawless. Any breach of safety at this point would be disastrous.

Next, he supervises the checkout of the hydraulic and electrical elements of the controls and guidance systems. He is still ever mindful of the time versus safety situation. At the conclusion of the guidance check, the missile wing destruct system has to be electrically connected within the missile. This system enables the range safety officer to explode the missile any time it doesn't perform in the desired manner. Here again a careful check is made by the armament men to determine if the circuit is entirely free of stray voltages. The guidance test equipment must be disconnected from the missile to assure that an inadvertent test signal will not detonate the destruct system. Just prior to this phase, the pad must again be cleared of all unnecessary personnel. After approximately T-10 minutes, the system is completed—MSgt Williams then directs that the booster rocket igniter be inserted in the bottle. During the handling of this piece of explosive ordnance the pad remains closed to all except those actually working on the booster rocket. After the insertion of the igniter the crew chief directs the elevation of the missile, making sure there are no items of equipment behind the missile. Not only does he have to contend with the jet exhaust in this case—there's also the booster rocket blast. Even though the blast of the rocket motor on the pad lasts for only a fraction of a second, the force is ten times greater than the thrust of the jet engine. The launcher uplocks are engaged and the launcher support arms are checked in the unlatched position.

The clock continues to run and the armament men again make a stray voltage check of the umbilical cable *prior* to connecting it to the igniter.

Following the arming of the rocket motor, MSgt Williams hears the Launch Officer order all personnel to insert their ear plugs and prepare to start the engine. Even at 60% the noise level of the engine is sufficient to cause permanent damage to the unprotected ears of personnel. He also sees that all unnecessary personnel have entered the shelter of the blockhouse.

As the jet engine starts to turn over, he closely observes its reaction. The two men stationed to observe the spoiler action give the okay and Williams quickly checks the horizontal stabilizer for proper positioning. As the engine settles at 60% RPM the Launch Officer turns off the external power to the missile and it is now safe to disconnect all cables to the missile, with the exception of the umbilical cable.

After disconnecting the appropriate cables the crew chief quickly checks the launcher circuit breakers and electrical power, then he removes the firing arming plug from the launch control panel. He is the last man off the pad. The fire guards stationed next to the missile with fire extinguishers during the initial engine runup and the armament men have already retired to the blockhouse. The firing arming plug is handed to the Launch Officer who runs the engine to 100% RPM and inserts the arming plug in the fire control box, breaks the seals to the fire buttons and all but the final circuit to the booster rocket is closed. After the final visual check of the stabilizer and upon the arrival of T-Zero, the Launch Officer presses the fire buttons. The missile leaps from the launcher and is on its way!

You can very readily see the importance of safety in missile operations. Operational safety requires personnel who are proficient, reliable, physically fit, and mentally alert. Whereas most operations place a premium on technical ability and a lesser value on teamwork, a launch crew requires both.

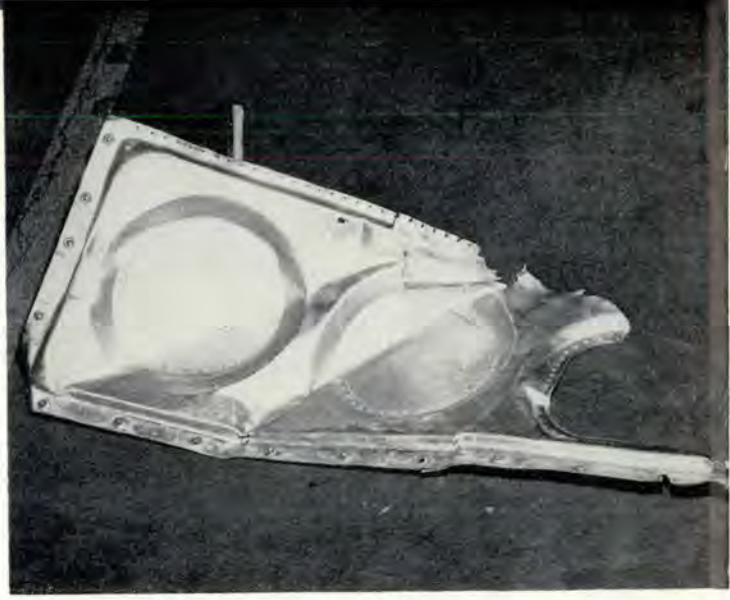
During the transfer of the missile, the hazards of dropping or puncturing the skin are ever present, and either one of these could scrub the mission or injure personnel. The hoisting of the warhead and rocket motor is even more dangerous with the presence of nuclear material and high explosives. This operation must be accomplished with a minimum loss of time while exercising maximum ordnance safety procedures. During the guidance checks over 1000 amperes at voltages in excess of 375 volts are required. This, coupled with static electricity and with the added ingredients of fuel and ordnance, creates a potential hazard. Therefore, electrical earth grounding of the equipment is continually checked. The positioning of the huge checkout vans near the missile again is complicated because of the limited area of the launch pad. The toxic liquids, trichlorethelene and gasoline, are also ever present on the launch pad.

Trichlor is used as a cleaning agent and the gasoline in the launcher is used for starting fuel. These are just a few of the operational hazards encountered during the launch crew chief's day. There are others—too numerous to mention.

As stated before, an accident to a missile can vary from minor structural damage to a catastrophic nuclear detonation, resulting in a tremendous loss of striking force.

Success and safety result from adherence to checklists, maintaining sequence through checklists, and experience. The key to missile safety is reliability and teamwork. The success of the Air Force mission as a whole is largely dependent upon safety to conserve combat capability through accident prevention. ★

Capt. Travis L. Simpson and 1st Lt. LeRoy A. Lamb, Jr.
USAF Tactical Missile School, Orlando, Florida



"You take the bottom and I'll take the top" is heard often when two pilots prepare to mount a T-33. In this particular case, thirty minutes later the T-Bird was a mass of . . .

WRECKAGE IN

The Monday Morning Quarterback and General Discussion Club's coffee session was interrupted by a late arrival.

"Have you all heard we just lost a T-Bird?"

"Where did you pick up that poop?"

"I was checking my Form 5 when the word came in from the Naval Air Station. They were checking tail numbers and happened to call our Ops section first. There's no doubt that it's one of ours. Two choppers on the scene and they've picked up both pilots—condition unknown for right now."

The rest of the day the rumors ran rampant. Both pilots were reported to have died. In the beginning it was rumored that a mid-air collision had occurred, but only the wreckage of one airplane was found in Rattlesnake Gulch.

By the afternoon of the next day, the ungarbled word was pretty well established. Both pilots were in the Naval Hospital a hundred miles away. The front seat pilot, a Captain, was in real bad shape but still holding on. The rear seat troop had a broken shoulder, skull fracture and lacerations and bruises of both legs. He was coherent and able to tell some of the events that had taken place. The airplane, for some unknown reason, had disintegrated in the air.

In telling you this story, it would be simple enough to merely state the causes the accident board established, their recommendations, some personal philosophy and let it go at that. But I want you to remember this article every time you go out to an airplane to fly. So, in order to help you remember and impress you with the moral I'd like to give you the facts necessary for a complete understanding.

If I were in your place, I'd like to know first what happened. Well, it was a real nice spring day. You know the kind—clear, a bit balmy but not hot. The mission had been laid on the day before, an Instructor Pilot Standardization check. While both were attached to the base for flying, they were assigned to duty stations off-base and, consequently, they hadn't met until that morning. After a local clearance was filed, they pre-flighted the airplane. The IP looked over the top while the other pilot checked the bottom. The T-33 had a full fuel load (813 gallons) because of a change in aircraft assignment.

For the rest of the "what happened" part here, in his own words, is the story by the surviving pilot. (The IP in the front seat died of head injuries 4 days after the accident.)

"We entered the aircraft and I took the rear seat in order to make rear seat landings and so on.

"We took off at 0920; I was flying the aircraft. I made a standard VFR departure. Due to the excess fuel it was necessary to fly awhile in order to reduce the fuel load. Accordingly, upon arriving at 16,000 feet in the acrobatic area, I reduced throttle to 92% RPM and turned south. We flew over San Pablo, made a wide left turn and headed north again, all this time at about 16,000 to 17,000 feet. When we arrived back in the acrobatic area the fuel load had been reduced to 600 gallons, not yet light enough to begin procedures. Looking to the east, we saw an aircraft, slightly below and east of us, and heading east. We discussed whether it was a Tiger Cat (F11F) or a Couger (F9F). I turned east, slightly to the right, above and behind. I pushed the throttle to 100% RPM, dropped the nose slightly and paralleled his course while in a very shallow dive. In a few minutes we had approached the other aircraft sufficiently to identify it. I was cross-checking the airspeed; it was 430 knots. I reduced throttle, (I believe to about 90% RPM) and started a gentle turn to the left, approximately 1500 to 2000 feet behind the other aircraft. I had turned through about 30 degrees and I believe I had started to advance the throttle, when without warning our aircraft suddenly and violently entered an uncontrollable roll to the left. Thereafter I had no control over the aircraft.

"There is a short blank space in my memory at this point and then I had these sensations: Being upside-

Shown at left is the left-hand and a portion of the right-hand upper access doors. This recovery gave the investigators their first clue. A close-up of the access doors is shown below. Note carefully that five Airloc fasteners show no signs of being locked, while the remaining two, and others not shown, failed as result of windblast on the unlocked portion of the upper access doors.

RATTLESNAKE GULCH

down or at least thrown violently and constantly against my shoulder harness; the aircraft inverted and spinning rapidly around its vertical axis; blindness, thus unable to find the seat handles. (I believe the blindness resulted from the canopy's coming off sometime during the previous "blanked-out" period, allowing the wind to strike my eyes, as my visor was up.)

"Because of these sensations I knew I had to get out of the aircraft any way I could and I knew that I didn't have much time left to do so. I found my seat belt buckle and unlatched it. (I believe now that I realized at that time that the canopy was off, though I don't remember thinking about it).

"As soon as I released the seat belt, I reached for the ripcord and pulled it, realizing that the negative G that I had been sustaining in the aircraft would throw me clear. The parachute opened immediately.

"I could see nothing, my entire field of vision being bright red. I landed in brush but could determine nothing else about the terrain due to my blindness. Sometime later a helicopter and then a ground party arrived. I have no idea what caused this accident."

Now we know what happened. Put very simply, the airplane disintegrated in midair, around 10,000 feet, with the airspeed around 430 knots. We also know it wasn't a midair collision.

In an aircraft accident, qualification of the aircrew members is always a question so let's see how the two pilots measured up.

The Instructor Pilot, in the front seat, was a Command Pilot with a total of 4700 hours. He'd graduated from flying school in 1943 and was just over 40 at the time of his death. Included in the 4700 hours were 2100 hours in single engine jet aircraft. He had almost 1700 hours in the T-33. A friend of his said that he had instructed cadets in T-Birds at a Texas base with the Air Training Command. Our own Base Flight people thought enough of him to appoint him an Instructor Pilot, Instrument Flight Examiner and Functional Flight Check (Test Hop) pilot.

The rear seat pilot was also on orders as an IP and functional check flight (FCF) pilot. He wasn't as high in total time, 2200 hours, but over 1400 hours were in single engine jet aircraft. He's 35 years old and has been rated since 1952.

In my book I'd say that both pilots were highly qualified, mature and competent; probably you arrived at the same conclusion. Here comes the puzzler then: During the preflight, why didn't at least one of them check the upper engine access doors thoroughly to be sure that they were secure? For as sure as you're sitting where you are, that's what set up the accident.

Let's backtrack for a few minutes 'cause we're getting ahead of our story. Once the pilots had been evacuated came the puzzling job of examining bits and pieces of the airplane to figure out, WHY? You've got to admit a T-33 coming unglued in the air is not common. Flameouts, landing long and short, porpoise, generator failure and the like happen a few times each year. To help fit the pieces together, the base called on the experts from the Directorate of Flight Safety Research. The action went something like this: First, diagram the scene as to where each part of the airplane was found. Sounds easy, but Rattlesnake Gulch is not the easiest terrain in the world on which to pad around. And the wreckage was spread over an area a mile wide and 3 miles long. Second, all available witnesses were questioned including the rear seat pilot. Third, all of the bits and pieces were put on a flatbed and trucked to the base. Then began the tedious process of putting the parts into some semblance of the original airplane. Once this was done came the minute inspection of each piece of the wreckage. Mr. Richard J. Pennoni, Aeronautical Engineer, Directorate of Flight Safety Research, spent many, many hours with the T-33 metal jigsaw, and his detailed investigation and analysis was invaluable to the board.

Just exactly what did happen? Actually it started the day before the flight when the upper engine access doors had been opened for maintenance. Apparently maintenance personnel did not completely secure all of the Airloc fasteners on the left forward portion of the doors. This error also went unnoticed by maintenance personnel during the preflight the morning of the accident. When the pilots missed this unsecured access door on their preflight the accident was well on its way.

As the airspeed built up, the access doors were subjected to distortion and bending. This, in turn, caused their entering the airstream at such an angle as to create aerodynamic loads sufficient to overstress the aircraft. It's also possible the access doors struck the empennage while the aircraft was traveling near its limiting mach in such a manner as to overstress the empennage section to the point of structural failure. In either case the aerodynamic effects were sufficient in magnitude to have caused unstable flight, and loss of control resulting in subsequent gyrations which produced structural break-up.

In case you are wondering if the accident board considered engine failure, fire, explosion, or metal fatigue, be assured they did. Despite the close attention given these areas, there was no evidence whatever that any of these factors caused or contributed to the accident.

What happens to the crewmembers when an airplane starts going to pieces, very quickly, in the air? This question has been partially answered by the surviving pilot's statement earlier in the story. Examination of the wreckage, equipment, questioning of witnesses and a keen analysis by the Flight Surgeon member of the accident board gives the rest of the answer.

"It has been deducted that the left engine access door came open and ripped off in flight, followed by an almost immediate disintegration of the aircraft. Thus over a period of just a few short seconds, the wings, empennage, and engine were separated from the fuselage. The canopy was accidentally blown by a mere chance ripping away of the external emergency canopy jettison mechanism; however, the exact point at which this occurred is unknown. It is significant that neither pilot activated the canopy. It is also significant that neither pilot actually ejected. The surviving pilot states that he was immediately subjected to violent gravitational forces, primarily negative G, being thrown against the lap belt with a feeling that he was "upside down." His vision was lost almost instantaneously and he said that he "saw red," which has been interpreted as a possible Redout.

"At the onset of the accident his helmet chin strap was not fastened nor was his visor down, thus both helmet and mask were subsequently lost, and were never found. Here again, it is unknown at which point they were lost—before or after the canopy was blown and/or before or after he left the aircraft. His visual impairment and loss of helmet could be attributed to either excessive negative G or windblast—or both. Physical findings would substantiate either.

"Due to this visual impairment and excessive gravitational forces, Captain B. was unable to reach the ejection seat handles; however, he managed to unfasten the lap belt and was thrown from the aircraft. The canopy was evidently gone by this time although he does not recollect being aware of this fact. Had the canopy been intact, he would never have left the aircraft. His injuries were probably sustained at time of leaving the aircraft.

"It is reasonable to assume that the pilot in the front seat was subjected to the same forces, and likewise was unable to activate the ejection seat. However, as a result of inertia forces during extreme gyration of the aircraft, the front pilot's seat separated from the cockpit by disengagement of the catapult tube trunnion from the fuselage support brackets. Thus, he and his seat were literally thrown from the cockpit, with him still strapped to the seat. This evidently occurred early in the sequence of events prior to Captain D.'s leaving the aircraft, but probably subsequent to the blown canopy. The plexiglas portion of the canopy was shattered in flight but it has been impossible to determine the exact cause of this since any portion of the disintegrating aircraft could have come in contact with the canopy.

"It is possible that Captain D. and his seat were thrown through the canopy but this is considered unlikely. His lap belt separation and chute deployment were a result of automatic function. This pilot was wearing a Bill-Jack helmet with a Hardman retention kit for the oxygen mask and it is significant that both were retained throughout the whole episode. However, despite this, he received extensive head injuries which later proved fatal. It is believed that these were sustained upon leaving the aircraft and that he was unconscious while descending in the chute. The latter is substantiated by eye witnesses who state that he was "slumped in the harness on the way down."

"Examination of the helmet revealed the shell to be cracked and slightly depressed in the posterior segment (occipital region), indicative of a severe blow in that direction by a fairly blunt object. Paint smudges were present on this area of the helmet. The paint was analyzed and found to be identical with that found on the defrosting system along the trailing edge of the front windshield. No other exposed areas within the cockpit bore this paint. It has therefore been reasoned that Captain D's helmet struck this area with tremendous force as he was being thrown from the aircraft. Wtih a normal ejection, he would have to be leaning forward with the shoulder harness unlocked and the head down, in order to strike the posterior extremity of the front windshield in this fashion. However, if the seat was actually torn away from its mountings, as in this case, this would be more feasible.

"It is unknown whether or not either man's shoulder harness was locked at the time of the accident. Of course, it is possible that either or both men could have been struck by a portion of the aircraft after leaving the cockpit, but this is only a consideration which can be neither proved nor disproved.

"In regard to the Instructor Pilot's head injuries, it is felt that he received a blow sufficient to cause death, regardless of what type of the presently available helmets he might have been wearing. It is ironical that the pilot who lost his helmet survived, whereas the one who retained his helmet was killed."

Now you know the whole story. I believe you'll agree that it didn't have to happen, but it did. About the only questions remaining then are, what has been done, what is going to be done, and what can you do to prevent another tragic accident like this one?

This particular base has painted a red 2-inch stripe through the center of each of the 46 Airloc fasteners of the upper engine access doors as an aid to pilots and maintenance personnel. The prime AMA didn't go along with the idea that a Technical Order be published requiring this on all T-33s. Their position is that the Airloc fasteners, when locked, are parallel to the edge of the access doors and this is enough for a visual inspection. Also, that red stripes are usually limited to areas which are not readily accessible since the manhours to maintain paint is excessive. It appears to me that if damage or an accident can be averted by painting these red stripes it is more than worth the effort.

The T-33 Dash One dated 15 January 1960, states on page 2-3 under Exterior Inspection (F-4): "Engine access doors—closed and fasteners secure." This in itself does not warn pilots that inflight opening and/or separation can cause a hazardous control problem, strike damage to tail surfaces, and possible loss of the aircraft. It has been recommended to the prime AMA that the Dash One call special attention to the security of the access doors by incorporating a WARNING similar to that listed for the nose compartment doors (Exterior Inspection, Page 2-11).

The next revision of TO IT-33A-6 will require a special inspection of the plenum chamber doors rather

Strange are the happenings in an aircraft accident. Above, the nose section, cockpit and part of main fuselage section, while damaged heavily, are intact. Below, tail section, widely apart from wreckage, also was fairly well intact. Wings were found in another area; one barely damaged, the other amazingly good, considering this accident.

than the requirement for inspection of fairings, panels and doors for security.

So what remains to be done? The answer is pretty obvious: more attention to your preflight inspections and this goes for pilots and maintenance personnel alike.

I know one thing; since I found out the cause of this accident, I haven't failed a single time to give the access doors and the rest of the bird a damn fine going-over. How about you? ★ **J L T**

"This is a parachute. You won't need it so I won't scare you by telling you 'bout how it works."

"And you pull the D-ring after you count one, two, three . . ."

2 POINTS OF VIEW

"So who has to know anything to be an Airdrome Officer?"

"Look, Innkeeper, beer is not intoxicating."

"He not only couldn't walk the line, he couldn't even see the line."

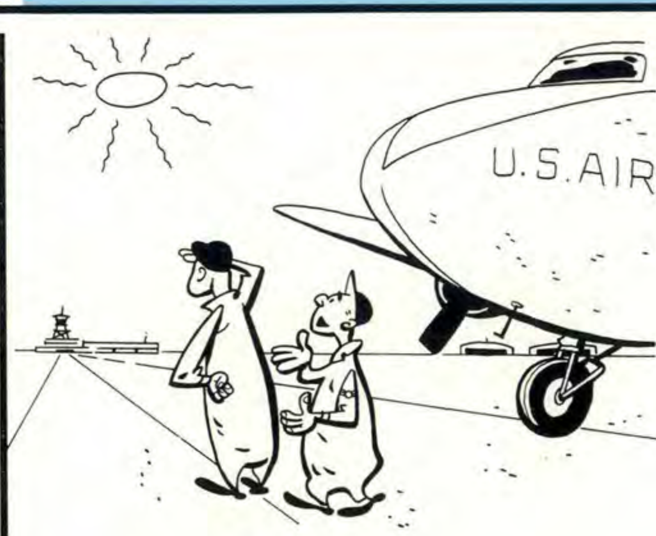
"Hard hat, smard hat—who needs one?"

"Nope, it wasn't a wrench; it was somebody else's hard hat."

"When the old man came in, there was no transportation—transients waiting to clear, two aircraft overdue and the AO had been at the club for two hours."

"It takes all kinds," someone once said. Come to think of it, it does, and that even applies to pilots who fly the latest—and most expensive—aircraft. Quite often a cartoon-feature, or a short story with a vein of humor, can tell a better story and be more thought-provoking than the straight words-of-warning type. After listening to some hairy tales during trips to the field or to reports by pilots returning from TDY and reading some of Rex Riley's mail, I decided that a similar method would provide another way to promote our mission: prevention of aircraft accidents. Some of these bits may even remind you of someone or of a similar happening. If you have some good offerings for the Two Points Basket, the staff welcomes your ideas. ★

"We'll park you as close to base ops as we can, sir!"



"Are we still in Texas, sir?"

✓ CHECKLIST ✓

The Navy and Marines have also had their troubles recently with losses of helicopters during actual search and rescue missions. An analysis by the Commanding General, Marine Air Forces, Pacific, of the various accidents is excellent and should be passed on to our own helicopter personnel.

"In the last 29-month period, 8 major helicopter accidents have occurred during Search and Rescue missions in AIRFMFPAC alone. These accidents caused 5 fatalities and 9 critical/serious injuries. Four helicopters received strike damage and 4 required major overhaul. In 6 of these 8 cases power settling and/or loss of RPM was a major factor. Four of these accidents occurred above 5000 feet. It is realized that the most hazardous helicopter operations are those undertaken for rescue purposes when human lives are at stake and uncommon risks are inclined to be taken. However, in none of the accidents mentioned herein did the urgency of the mission require the slightest departure from proven safe operating procedures. The original disaster is only compounded when the end result of an SAR mission is a concentration of consecutive crashes in a common locality. Effective mission accomplishment, which includes a proper margin of safety, is a command responsibility. All commanders must insure that pilots under their command are properly briefed on all phases of the SAR mission and the requirement for successful completion of such missions. Greater emphasis must be placed on the requirement for maintaining proper RPM and adequate reserve power while at slow airspeed or in hovering flight to insure capability to recover from dangerous or unanticipated flight conditions. All helicopter pilots must be thoroughly briefed on the peculiarities of power settling. Special emphasis must be placed on the requirement for persons engaged in SAR missions to guard against distraction, preoccupation, unwarranted haste and departure from known safe procedures."

• • •

H-43B Splash—Two H-43Bs were disassembled at the factory and airlifted to an Air Force Base. One was reassembled and test flown without incident. However, the other encountered a few difficulties. As collective pitch was applied for lift-off, the pilot heard a loud and unusual noise. The aircraft vibrated laterally (to say the least), lurched to the left and aft and as the pilot said later, "started manufacturing match sticks." The right pylon and rotor had separated from the aircraft, both sets of blades were destroyed, the left front wheel sheared, rear wheel strut came through the fuselage and both tail booms were broken. In addition to the damage to the helicopter, one F-106 received major damage, while one F-106 and an H-43B each received minor damage from flying debris.

Investigation revealed that the rotor shaft control rods between the azimuth bar and right hand rotor head had been reinstalled 180° out of phase. The im-

properly-installed shaft control rods produced an abnormal rotor response to pilot-applied cyclic control as follows:

- Application of forward cyclic would cause the right rotor to tilt aft instead of forward.
- Application of right cyclic (lateral cyclic) would cause the right rotor to tilt to the left instead of the right.
- Rather than blade-to-blade clearance being influenced only by differential cyclic (rudder pedals), it would, under these particular circumstances, be much more sensitive to application of cyclic stick. Approximately ⅓ (2″) of forward cyclic and ⅓ (2.5″) of right lateral would cause twice the relative blade-to-blade vertical displacement as normally caused by 100% application of rudder pedal.

So, pilots and maintenance personnel, check those flight controls for correct direction response in relation to cyclic stick and rudder pedal movement prior to engine start after replacement, installation or rigging of the flight control system.

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Accident Prevention Quote for the Month—Training is everything. The peach was once a bitter almond. Cauliflower is nothing but cabbage with a college education.—Mark Twain.

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USAF's Aces—A composite list of USAF's top aces in the two World Wars and Korea published in the Air Force Magazine, September 1960, contains a sobering warning to all of us. *Accidents* have succeeded where the enemy couldn't.

Major Richard I. Bong, 40 victories, Congressional Medal winner, killed in F-80 crash, 1945.

Major Thomas J. McGuire, Jr., 38 victories, Congressional Medal winner, killed over Philippines, 1945.

Colonel Francis S. Gabreski, 37½ victories, on active duty.

Captain Robert S. Johnson, 28 victories, Republic Aviation executive.

Colonel Charles H. MacDonald, 27 victories, on active duty.

Captain Edward V. Rickenbacker, 26 victories, Congressional Medal winner, Board Chairman, Eastern Air Lines.

Colonel John C. Meyer, 26 victories, on active duty.

Major George E. Preddy, 25.83 victories, killed over Brussels, Belgium, Christmas Day, 1944.

Colonel Walker M. Mahurin, 25½ victories, Northrop Aviation executive.

Captain Don S. Gentile, 23 victories, killed in T-33 crash in vicinity Andrews AFB, 1950.

Captain Ray S. Wetmore, 22.59 victories, killed in aircraft accident near Otis AFB, Mass., 1951.

Colonel David C. Schilling, 22½ victories, killed in auto accident Mildenhall, England, 1956.

Lt. Colonel Gerald R. Johnson, 22 victories, killed in accident, 1945.

Colonel Neel E. Kearby, 22 victories, Congressional Medal winner, killed over New Guinea, 1944.

Colonel Jay T. Robbins, 22 victories, on active duty.

Lt. Colonel Fred J. Christensen, 21½ victories, currently a member of Massachusetts ANG.

Lt. Colonel George A. Davis, Jr., 21 victories, Congressional Medal winner, killed over Korea, 1952.

Lt. Colonel Vermont Garrison, 21 victories, on active duty.

Colonel John C. Herbst, 21 victories, killed in F-80 crash, 1946.

Major John J. Voll, 21 victories, on active duty.

Major William T. Whisner, Jr., 21 victories, on active duty.

Colonel Glenn T. Eagleston, 20½ victories, on active duty.

Lt. Colonel Thomas J. Lynch, 20 victories, killed in action, 1944.

Lt. Colonel Robert B. Westbrook, 20 victories, killed over Philippines, 1944.

Colonel Hubert Zemke, 19½ victories, on active duty.

Major Duane W. Beeson, 19.33 victories, deceased, 1949.

Colonel Glenn E. Duncan, 19 victories, on active duty.

Colonel Patrick D. Fleming, 19 victories, killed in B-52 accident in 1956.

Major Leonard K. Carson, 18½ victories, on active duty.

Lt. Colonel James Jabara, 18½ victories, on active duty.

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H-43B Accident Investigation Team—Investigation of major aircraft accidents involving the H-43B helicopter has brought out the need for specialists to assist Commanders in the investigation of future accidents because of wide dispersal of aircraft, small number assigned each base, and general lack of knowledge of helicopter operational limitations, design and maintenance problems. An Air Force/Industry H-43B Helicopter Accident Investigation Team has been established consisting of representatives from the Directorate of Flight Safety Research, specialists from Middletown AMA, Lycoming Division, Avco Corporation and Kaman Aircraft Corporation. This team will be on call by the Director of Flight Safety Research. The H-43B Helicopter Accident Investigation Team will not normally assume responsibility for the investigation of future H-43B helicopter accidents, but will be available to assist Commanders in investigations, as determined by the Director of Flight Safety Research.

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Heavenly Rebuttal—A parked C-47 was recently damaged by a tornado at a Naval Air station. The incident report assessed the primary cause as "An Act of God." The subsequent paragraph stated, "Personnel offered opportunity for rebuttal: yes!" We presume that this request for rebuttal was routed through the Chaplain's office.

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Flight Data Cards—Majors Robert G. Miller and Harold L. Crispi, of the 329th Bomb Squadron, Castle AFB, Calif., study the new B-52 flight data card conceived by Miller. Designed to provide high altitude flight information to student pilots the card, inclosed in plexiglas, is placed in the control column of the pilot compartment. There it can be reached quickly so pilots can read at a glance what altitude to maintain for specific compass headings. The time saved by pilots using the card helps to reduce midair collision possibilities between jet aircraft. On the reverse side of the card is B-52 takeoff data, an aid to student pilots. The card has been processed through the 93d Bomb Wing Standardization Board, and is distributed to all B-52 units at Castle. ★

WHO RUNS YOUR GROUND

A few Ground Safety Officers seem to be of the opinion that THEY are running the program. Alone, that is. Granted—and fortunately—this is true at only a few bases but their programs clearly reflect the results of the "one man show."

Just as a Base Commander is only as efficient as his staff, so it is with the Ground Safety Officer. Unless he has solicited the assistance of the various agency heads and is utilizing their skill and know-how, instead of relying solely upon his own, he can expect to have little more than a mediocre program. Safety—be it ground, flying, missile or nuclear—is everybody's business. Let's get *everybody* in the act.

In your capacity as Ground Safety Officer you should be well known to every Group and Squadron Commander on your base, not only by name or because you've been introduced at the Staff Meeting. It should be because you have made personal visits to each organization and made it a point to brief each commander of your findings, and particularly because you've made *concrete constructive recommendations for the correction of any discrepancies you may have found.*

By now some of you perhaps are thinking, "That sounds fine but I just don't have time for all of that on *my base."*

Well, Mr. Safety Officer, how about you? If you are operating on a base where the only time you get into the Old Man's office is when he has to chew you out for something or other, better take stock of yourself. You may not have done a thorough selling job. You do have to sell yourself to the Base Commander, and perhaps the biggest part of that selling job is going to the Commander with *answers*—not *questions.*

If your Commander is going to the Provost Marshal, the Medics, or to the Civil Engineering Officer when the problem is actually one of Ground Safety, again you haven't done your selling job. Or, to put it another way: "Are you helping with the solution or are you part of the problem?"

Once you have sold yourself to the Base Commander and to the various unit commanders, better than half of your job has already been accomplished. Now comes the actual implementation of the program, and if you have done your job properly this will be accomplished not by you and your NCOs, but by the organizations themselves. Remember, very rarely is Ground Safety an action agency. We merely hold the reins and steer the way in order to arrive at the fulfillment of the Ground Safety mission. This is where your first team—your Commanders, Squadron Safety Officers, and NCOs—takes over. But, we must give these people the wherewithal to work with.

Are you making all possible use of the services of your various staff and support agencies to further your safety program? All of them can offer valuable assistance in their specialized fields and these offerings can dovetail and form the nucleus of a well-rounded program. Your Information Services and Personal Services Officers, the Chaplain, Surgeon, Provost Marshal, Food Service, Base Exchange and Civil Engineering Officers, all being part of the staff, are ready and able to assist in making worthwhile contributions to your program. Let me illustrate this thought with an example. At Mather AFB the services of the Automotive Maintenance Section were put to use in behalf of the safety program. A problem existed wherein 1½-ton trucks were sometimes used on the flight line to pick up crews, and climbing into and off these trucks was not conducive to good safe practices. The Automotive Maintenance Officer came up with a good idea, and fastened a set of steps to the truck with just eight bolts. No more jumping to the ground from the truck bed. The steps are coated with bright yellow paint and the treads with nonskid paint. Reflectorized tape is placed on the uprights and the angle-iron flat surface to give greater visibility and protection at night. The entire project was accomplished by using salvage materials plus only 14 manhours of labor.

Another product of the Automotive Maintenance Sections' ingenuity are the rounded pieces of sheetmetal on either side of the uprights on the truck. This serves a twofold purpose: It provides greater rigidity of the bows and adds immeasurably to the life of the tarpaulin truck covers by eliminating excessive wear against the sharp edges of the wooden uprights.

With both improvements in use, the Ground Safety people saw the need for still another safety feature: a light. The Automotive Maintenance Section outdid themselves. The mounted *two* lights which work in conjunction with the dome light inside the truck cab and are controlled from there. Another safety measure is the removable type crew benches which are fastened on either side of the truck when used on the line. The above is just one example of how Ground Safety and one of the Support Sections can work together to build safety into an operation.

Another valuable source of assistance—but one often

SAFETY PROGRAM?

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Fred E. Budinger, Director of Ground Safety
3535th Navigator Trng Wg, Mather AFB, Calif.

overlooked—is the ladies. The Wives' Club, both Officers and NCOs, can and will, if properly encouraged, accomplish a great deal for the safety program. Make it a point to include them in your safety presentations and call on their organizations for such worthwhile projects as slogan and/or poster contests, teenage driving contests, and for speakers giving the woman's point of view on ground safety. And, of course, once you have sold them on safety, their influence upon their airman husbands or teenage dependents is certainly not to be underestimated. Don't sell these gals short. They can do wonders for your program. This is a proven fact.

Quite often the Ground Safety Officer finds himself in the same position as the chef in a good sized restaurant or hotel dining room. He doesn't really have *anything new* to offer the patrons, yet he must prepare and serve his entreés in such a manner as to always make them appear attractive and appealing. If you're serving the same brand of hash to your troops month after month, you'll soon lose your customers.

How about your Off-the-Base program? Do you have one, or are you just trusting to luck? Are you associating yourself with the local organizations, such as your local safety councils, Chamber of Commerce, City Police, County Sheriff and State Highway Division offices? The services of these organizations can always be utilized to good advantage. You should become well acquainted with these groups so that when you have need for their assistance—whether it be to furnish a speaker for a Commander's Call or to assist in an accident investigation—you already have your foot in the door; your status is known and recognized.

Again at Mather AFB, a member of the California Highway Patrol conducts two hours of every one of our 32-17 Driver Improvement Courses and this is merely one of the many services they render. Recently, General Callish, Commander of Mather AFB, presented an engraved plaque to Officer Kelly of the CHP in recognition of the more than 2000 hours he devoted to help promote traffic safety at this base. The effectiveness of these efforts is evidenced by the fact that in the past few years Mather has experienced fewer traffic fatalities than any other base in northern California.

Summarily, by gaining command support and utilizing the outside sources at your disposal, you are in a position to score in this game of safety. But it takes a combined effort, so line up your team, call the right signals and you too can be a winner! ★

• CROSS COUNTRY NOTES FROM Rex Riley

Once again Rex managed to snooker the boss man for a week's TDY so he could prowl the skies and various AFB's. As usual, some aches and pains were uncovered en route as well as some "goodies." If you don't agree, take a blast at Rex. If you have some experience of your own which you think others ought to know, send it along.

Rex had hardly cleared the local area before he was ticked off at some clown trying to make a position report—"trying" is a good word too. The conversation (center frequency 301.4) went something like this: "Ah—Phoenix Center, this is—ah—ah—AF 7954—ah—6 on an Instrument Flight Rule Clearance from Norton AFB to Biggs AFB, to Albuquerque. Dah—we were over the Phoenix low frequency at 1215 your time, cruising—ah—ah—12000 feet, assigned altitude. I estimate to be over Tucson VOR at—ah—stand by one. Hello Phoenix Center, I estimate to be over Tucson at 1255. Cochise should be next. Over to you." Holy mackerel, how unprofessional can you get? The FAA troops have a lot of traffic to contend with and when a joker like this comes along it just ties up the already over-crowded channels available. This report should have been shortened to: "Phoenix Center, AF 79456, Phoenix at 15, 12000 assigned, Tucson at 55, Cochise." If you're out of practice on position reporting look on the back page of the En Route-Supplement or the bottom of your 21A (Flight Plan and Log). In case some of you "sharpies" are wondering why Rex was listening on 301.4 when he was supposed to be guarding the Center Discrete, the answer is that his T-Bird had only an ARC 27 and 279.6 (Phoenix Center) was supposed to be set in, but wasn't.

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On 14 October 1960, Hq USAF message (1299/60) was sent to all major commands. Briefly it stated that messing facilities, in which flying clothing can be worn, should be readily available to rated personnel preparing for morning flights. Otherwise, there may be a tendency to skip breakfast, which, from a safety point of view, is not recommended. From traveling around it appears that he word hasn't filtered down to base level because at some stops there still isn't any place you can eat breakfast in flying togs.

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Rex came across a real fine procedure at Webb AFB in the event an unusual physiological reaction (hypoxia, bends, sickness, etc.) is experienced in flight. Briefly it goes like this: If any crewmember suspects an unusual physiological event has happened, is happening, or going to happen, he calls the tower, gives his aircraft number and declares a "Medical Emergency." The tower people pass this to Base Ops, who in turn notify the Flight Surgeon and dispensary. This is done on the secondary crash phone network and it is clearly stated that it's a Medical Emergency. The FSO is also notified in the same manner. So, when the airplane turns off the runway the pilot is met by a host of qualified people including Physiological Training personnel. The Flight Surgeon treats the aircrewman on the spot, if needed. Otherwise he interviews him, evaluates the symptoms and either clears him for further flight or takes him to the dispensary for tests. The airplane is impounded and the oxygen system is completely checked over by Physiological Training before any other flights. This procedure is established at all Air Training Command bases and looks like a "goer." What kind of system do you have at your base?

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Rex lucked out on this trip and was parked out in the boondocks only once in about six stops. Even this one time couldn't be avoided because the ramp in front of operations was full of transients. This you can live with and understand. But when the alert crew parks you a mile and half away when there's an open ramp close to Base Ops, it's not only unfriendly and irksome but makes the base people work that much harder. Transportation of the crew to and from the airplane takes a driver and vehicle. The refueling crews, alert people and maintenance personnel (if needed) have a long travel time and sometimes have to cross active runways. Doesn't make sense does it? The next time you make a long trek in from your bird and find an empty ramp adjacent to Operations just casusally ask the AO if there is a good reason. It would be interesting to hear the answer.

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While talking with Captain J. K. Fox, Fly-Safe type at England AFB, Rex heard about this near miss. A '100 pilot got an indication his bird was sick with high oil pressure. He notified the tower that he was having difficulties and would make a straight-in approach. Tower acknowledged and asked him if he wanted crash equipment to stand by. The pilot allowed as how he would like that and was advised to check 7 miles on final. A T-33 was cleared on the runway for immediate takeoff (by the same tower operator on another channel). As soon as the T-Bird became airborne, he had to make a hard break to avoid the F-100 on final approach landing downwind. Q and A. Was the term "emergency" ever used? NO. Did this constitute an emergency? YES, because it is covered in the red bordered pages of the Bible (Dash One). Odds are that if the pilot had made a point of telling the tower it was an emergency, he would have received the entire airpatch and wouldn't have made a head-on pass at the T-Bird. The T-33 passenger was the TAC Evaluation Officer from 12AF and he confirms that this didn't look standard to him. There's a good article on *when* to declare an emergency, published in the November issue of *Aerospace Safety*. Note to AACS: If there is any doubt, hold the airpatch clear until you are sure what this guy having difficulty is going to do. Don't assume anything.

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This may be "old hat" to you by now, but just in case you haven't heard, Military Flight Service is going out, or is already out, of business. This was supposed to have happened about 1 January 1961. As Military Flight Service folds up, the Federal Aviation Agency will take over many, but not all, of the responsibilities and services. Rex will attempt to get you the latest and most definitive information available from FAA. In the meantime, your own operations officer should be able to clear up any misunderstandings. Try him.

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Let's talk about Lucky Channel 13 (Pilot to Forecaster) for a few minutes. In the February 1960 issue we ran a real fine article called "Sound Your R's" by Major Wallace "Pappy" Dawson. It must not have made much of an impression or we didn't get 100% pilot readership, because the same mistakes are still being made; namely forecasters are being asked for existing weather at such and such a place instead of the forecast weather for the time of expected arrival. Like the C-47 troop who called over San Antonio for the existing weather at Maxwell. Who cares what the weather is now when you won't be there for another 4 hours? The weather troops aren't mind readers so when you ask for Podunk's weather you are going to get the last sequence report from Podunk (it might be almost an hour old). As "Pappy" said, "All we have to do is remember that when we are talking to a weather forecaster, never to say 'weather' unless we say 'forecast.' Give it a go, old buddies, it may save some moments of "pure panic."

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Not long ago Lt. Colonel C. C. Jones wrote the Editor complaining about getting a "tired fanny" after sitting a while on the seat parachute (See Fallout column, Jan. '61 issue). Colonel Jones asked if any relief was in sight. We sent his letter to Wright Air Development Division, ARDC, in the hope they could shed some light. Colonel W. L. Leaverette, Chief Operational Support Engineering Div., wrote us on 25 November 1960, and there is some hope for all of us who've experienced "fatigued derrieres." His letter is quoted:

"The discomfort features of the seat style parachute (T-33 and B-57) were brought to the attention of Wright Air Development Division in early 1959 and a completely redesigned parachute is in production at this writing. Initial delivery is scheduled for December (1960) and it is the understanding of WADD that the old item will be withdrawn from service on an "in-kind" basis. Stock numbers and other supply data may be secured through inquiry to Middletown Air Materiel Area (NSE), Olmstead AFB, Pennsylvania. The pack of the new parachute (Part No. 50C7025-20) features metal side stiffeners to control the width of the packed canopy and the thin foam rubber cushion has been replaced with a 4-inch thick polyurethane cushion. The new cushion extends over the front end of the pack and the extended end contains the emergency oxygen supply. This arrangement permits the oxygen bottle to drop below the leading edge of the pack and eliminates a previous pressure point. The cushion cover is constructed of two-way stretch nylon which assists in easement of pressure concentration on the major tuberosities and cushion density eliminates contact with the release cover knob. The harness has also been redesigned to permit adequate and comfortable sizing in the 5th to 95th percentiles. Other changes include addition of the Type C-9 canopy to improve the low altitude escape capability and incorporation of a windblast resistant ripcord grip incapable of fouling the chest strap connectors. Other improvements designed to reduce maintenance problems and provide increased automatic ripcord release power have also been added. Service testing of the new seat cushion was conductd by local flight test pilots and rated pilots in administrative assignments. The cushion was tested in local and cross-country flights and the old seated discomfort problem was not evident in any test. It is also noted that contoured seat pans were considered and tested; however, the cushioning effects of polyurethane of proper thickness and density were superior and inflicted a lesser penalty in seated height."

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Talk about knowing a cockpit. Rex used to know a full colonel who, any time you challenged him, could draw from memory every T-33 instrument, gage, switch, dial, or control on the instrument panel, right or left console, front or back cockpit. Not only that, each would be in its proper place and he could tell you the function of each. Try it some time.

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For many years enterprising operations types and fly-safe officers have placed safety material within easy reading distance in our modernized outhouses. But Laughlin AFB has a new twist. They have reproduced, large scale, the instrument panel and right and left console of the T-33 and another jet. The reproductions are posted on the door and the side walls of each stall so you can't help but do a little cockpit studying in your leisure moments. ★

What's the Pitch?

You are flying your '84F in a GCA pattern prior to landing on a strange runway, with everything running according to Hoyle and looking rosy. The weather is reported 400 overcast and ¾ miles visibility; no wind, altimeter 29.90, landing runway 26, 8000 feet long, GCA minimum 300 feet and ½ mile for jet aircraft. Your final controller checks in loud and clear, and the time has come to hurtle your little pink body at the ground. He lets you know that you're approaching glide, on centerline.

Upon reaching the glide path area he asks you to set up a rate of descent for your type aircraft, suggesting 650 feet per minute, so down you go! You've decided that a final approach speed of 180 knots should be about right for the gross weight involved and intend to hang right onto it. Final control has stated that you need not acknowledge any further transmissions so you settle back to enjoy the ride to touchdown.

"Six-nine-eight, your range is four and one-half miles, heading 260 degrees. Going high on glide path, increase your rate of descent. Steer right 262 degrees, holding high on glide path. Your range is four miles, heading 262 degrees. This heading is bringing you back to centerline nicely, still high on glide path. Your range is three and one-half miles, heading 262. You're holding 100 feet high on glide path, increase your rate of descent. Your range is three miles, still holding high on glide path, heading 262. Turn left, heading 260 degrees. You're on centerline, range two and one-half miles. You're returning slowly to glide path, heading 260, range two miles. Heading 260 degrees is holding you on centerline nicely, still high on glide path. Range one and one-half miles. Turn one degree right, heading 261 degrees, range one mile, high on glide path, on centerline. Six-nine-eight, you are too high to complete this approach safely. Pull up and climb to 2000 feet heading 330 degrees. Contact approach control on channel one five. Acknowledge. Over."

The pilot acknowledges and pours on the go-juice. All didn't go so well. He established his 650 feet per minute rate of descent on schedule, but as soon as GCA said that he was going high, he changed to 950 feet per minute. At a low altitude this is a pretty rapid descent. Even at this rate of descent the pilot found that he only paralleled the glide path, so he went to 1050 feet per minute. This is a real thrill. Try it sometime. Fortunately, the final controller knew the pilot couldn't complete a safe approach, so he called it off. The pilot was most happy to comply with the suggestion and to try again.

This may seem like a far-fetched situation, but let's take a short gander at the stage settings.

This pilot's home station had a good GCA unit installed and had been working high performance machinery for a good while. A pattern had been established to comply with safe practices. One minor point that has become a major consideration in the past few years is the little difference between selection of a glide slope angle. This pilot's home station had a beautiful approach terrain-wise, the kind you dream about but seldom see. Therefore, a glide slope of two degrees was selected and this pilot had found that with this slope it took about 650 feet per minute to stay on glide path under the conditions that he flew GCA. It didn't seem out of the ordinary at all for this GCA operator to suggest 650 feet per minute rate of descent. This is the same wording which his own unit used. Much to his surprise, however, the 650 didn't work out. Glide slope angle had reared its ugly head. The strange GCA unit had worked a good number of jet aircraft but its main use was with conventional fan machinery. Its glide slope three degrees—a minor point? Let's look.

At the stated conditions, 180 knots, no wind, a two-degree slope gives you 637 feet per minute rate of descent. What does a three degrees slope do to you under these conditions? 953 feet per minute. Is it any wonder the pilot couldn't get back on the glide path? He could have made it back if he had suspected the steepness of the slope, couldn't he?

Flying a glide path is a consideration of the degrees of slope, the true airspeed and the amount of wind available. A change of five knots, airspeed or wind, will change the rate of descent by approximately 26.5 feet per minute on a three degrees slope, while the five-knot change on a two degrees slope amounts to approximately 17.2 feet per minute change.

The charts shown here involve speeds for high performance aircraft but, with a little figuring, can be adapted to any type of bird.

The glide slope angle is listed in the Radar Section of the FLIP Enroute Supplement. By utilizing the wind conditions and the glide slope, plus the final speed that the pilot intends to use, GCA should be a drop in the bucket. Try these charts with your GCA unit. Saving one approach would be well worth the trouble by eliminating the hunt and seek system of getting on the glide path. ★

Capt. Marvin D. Williams, 325th Fighter Wing, McChord AFB, Washington

Rate of Descent Table

2 DEGREES SLOPE 17.226 FT/MIN FOR 5 KT CHANGE

Kts TAS	15TW	10TW	5TW	0	5HW	10HW	15HW	20HW	25HW	30HW	35HW
175	672	655	637	620	603	586	569	551	534	517	500
180	689	672	655	637	620	603	586	569	551	534	517
185	706	689	672	655	637	620	603	586	569	551	534
190	724	706	689	672	655	637	620	603	586	569	551
195	741	724	706	689	672	655	637	620	603	586	569
200	758	741	724	706	689	672	655	637	620	603	586
205	775	758	741	724	706	689	672	655	637	620	603

2¼ DEGREES SLOPE 19.952 FT/MIN FOR 5 KT CHANGE

Kts TAS	15TW	10TW	5TW	0	5HW	10HW	15HW	20HW	25HW	30HW	35HW
175	755	735	715	695	675	655	635	615	595	575	555
180	775	755	735	715	695	675	655	635	615	595	575
185	795	775	755	735	715	695	675	655	635	615	595
190	815	795	775	755	735	715	695	675	655	635	615
195	835	815	795	775	755	735	715	695	675	655	635
200	855	835	815	795	775	755	735	715	695	675	655
205	875	855	835	815	795	775	755	735	715	695	675

2½ DEGREES SLOPE 22.214 FT/MIN FOR 5 KT CHANGE

Kts TAS	15TW	10TW	5TW	0	5HW	10HW	15HW	20HW	25HW	30HW	35HW
175	838	816	794	772	750	727	705	683	661	639	616
180	860	838	816	794	772	750	727	705	683	661	639
185	883	860	838	816	794	772	750	727	705	683	661
190	905	883	860	838	816	794	772	750	727	705	683
195	927	905	883	860	838	816	794	772	750	727	705
200	950	927	905	883	860	838	816	794	772	750	727
205	971	950	927	905	883	860	838	816	794	772	750

2¾ DEGREES SLOPE 24.229 FT/MIN FOR 5 KT CHANGE

Kts TAS	15TW	10TW	5TW	0	5HW	10HW	15HW	20HW	25HW	30HW	35HW
175	923	898	874	850	826	802	777	753	729	705	680
180	947	923	898	874	850	826	802	777	753	729	705
185	971	947	923	898	874	850	826	802	777	753	729
190	995	971	947	923	898	874	850	826	802	777	753
195	1020	995	971	947	923	898	874	850	826	802	777
200	1044	1020	995	971	947	923	898	874	850	826	802
205	1068	1044	1020	995	971	947	923	898	874	850	826

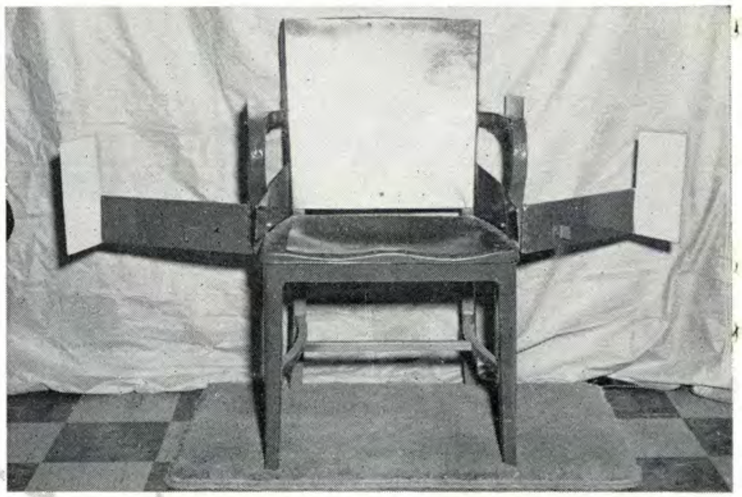
3 DEGREES SLOPE 26.481 FT/MIN FOR 5 KT CHANGE

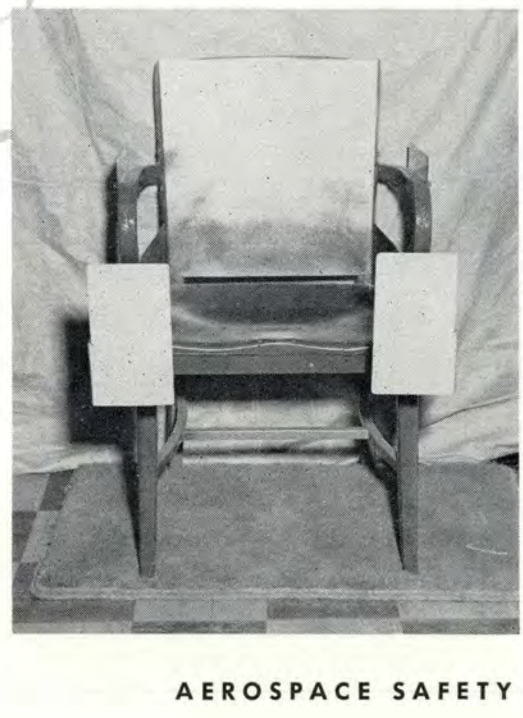
Kts TAS	15TW	10TW	5TW	0	5HW	10HW	15HW	20HW	25HW	30HW	35HW
175	1006	980	953	927	900	874	847	821	794	768	741
180	1033	1006	980	953	927	900	874	847	821	794	768
185	1059	1033	1006	980	953	927	900	874	847	821	794
190	1086	1059	1033	1006	980	953	927	900	874	847	821
195	1112	1086	1059	1033	1006	980	953	927	900	874	847
200	1139	1112	1086	1059	1033	1006	980	953	927	900	874
205	1165	1139	1112	1086	1059	1033	1006	980	953	927	900

DO-IT-YOURSELF

Something new has come out of the Survival Equipment Department at ARDC: an improved method of measuring T-Bird pilots for a proper fit of the back-type parachute.

The present method of finding out if a pilot can wear a back type chute in the T-33 is to use an ordinary tape measure. The pilot sits in a straight back chair and measurements are taken of his seated thigh length. On page 2-4, Section II, the T-33A-1 gives the seated thigh length limitations of 23 inches to wear the back type parachute. Therefore, pilots with 23 to





CHAIR ★

28 inches seated thigh length must wear the seat type chute. For overwater flights a pilot must, of course, wear a life preserver. If he wears an underarm life preserver, Type LPU-2/P, he must have a measurement of 19.65 inches or less *without his equipment on.* This measurement is very difficult to take because the pilots pull their arms in as far as they can to be within the tolerance.

A simpler method—a T-33 Measuring Chair devised by a civilian specialist in the Personal Survival Equipment Division, WADD—is reported to be a great improvement over the old one. This project has been officially evaluated and here's how it works:

The pilot, wearing his flying suit, jacket and the LPU-2/P life preserver, sits in the chair. The armrest on the chair is ¼ inch smaller than the actual T-33 aircraft seat. The seat, elbow to elbow measurement, is 21½ inches wide. The measuring chair, elbow to elbow width is 21¼ inches. The purpose of the chair is for simple, accurate and fast methods of measuring the pilot with his equipment on.

When he sits in the chair wearing his flying suit, jacket and life preserver—and can tuck his elbows into the arm rails without any difficulty, then he is assured that he can eject from the aircraft and his arms will clear the canopy rails with safety.

The T-33 ejection seat clearance for both the knees and elbows is critical. When a pilot cannot wear the underarm life vest he must wear the B-5 type life preserver which is the horse collar type. It is very uncomfortable to wear because it pulls down on his neck. As a result, most pilots want to wear the underarm type preserver because it is more comfortable.

For the seated thigh length, the pilot remains seated in the measuring chair while the knee measuring guards are brought forward and over his knees. If his knees fit inside the measuring guards he can eject safely from the front seat of the T-33 aircraft. If his knees do not fit inside the guards, then he cannot wear a back type parachute. If he does, he risks the loss of his kneecaps or his feet by striking the windshield during ejection.

The seat type parachute is used in the T-Bird when the seated thigh length is more than 23 inches but less than 28. It's not the most comfortable chute to fly with, consequently those pilots measuring less than 23 inches knee length prefer to use the back type parachute. This type is not only more comfortable, it allows for a lower bailout in case of an emergency.

Here are some points in the new chair's favor:

- It improves flight safety.
- By its simple, quick and accurate method of measuring a pilot, it eliminates any question in his mind regarding his fit in the aircraft and his safe ejection if he has to get out. The T-33 seat and cockpit is the smallest in jet aircraft.
- The pilot can actually see and feel the tolerance he would have if he had to eject from his bird.
- This measuring chair has been approved by the Base Flying Safety Officer. ★

Hq ARDC, Andrews AFB, Washington 25, D.C.

[*Editor's Note: The suggestion for this project originated with a civilian working as a Personal Survival Equipment Specialist, Wright Air Development Division. The cost of this chair is nominal and the Physical Anthropology Section of the Engineering Psychology Branch, Behavioral Sciences Laboratory at WADD, has recommended adoption thereof. Perhaps your Unit will give it a try. Write us if you do.*]

WHO'S TIRED? ME?

Our story starts with a conversation between two jet type airplane drivers in an Air Force Base Operations. For the sake of anonymity, we'll call them Mike and Joe (or should it be Charles and Terrence?). They are in a bit of a discussion. As we tune in, Mike is saying, "Joe, I know you want to get home to see your folks, but I'm beat. Let's go hit the pad and leap off in the morning."

"You promised, when we set up this flight, that you'd go on in to Hometown with me, Mike. It's only a couple more hours and the bird is serviced and the weather at home is good. I'd like to go on in so I'll be there for the whole two days."

"But Joe, neither of us got over four hours sleep last night after working on that project, and we've been up since about 6; it's now after midnight by my watch. That's enough for any pilot. Besides, we've already made two flights today. Come on and get a few hours sleep and I'll go on with you."

"No, I think I'll get on home. I can fly a couple more hours, no sweat. Pick you up here Sunday about 1600, O.K.?

"O.K. Joe, it's your bird. Take care, now."

To make a gruesome story much shorter, Joe's T-Bird crashed a few minutes later, just after entering a 500-foot ceiling after takeoff. The immediate cause of the accident at this writing is still unknown. The events leading up to this fateful moment, however, seem

Figure One — **Hours of Flights Per Individual Crewmember**

Type of Flying	Max. Hrs. of Continuous Duty (1)	Max. Flying Hrs/Duty Day (1)	Max. No. Flts/ Duty Day	Min. Hrs. Crew Rest Between Duty Days	Max. Flying Hrs/Month
Single-pilot Jet	14	6	3	12	80
Multi-pilot Jet	14	8	3	12	100
Single-pilot Reciprocating	14	10	4	12	100
Multi-pilot Reciprocating (One Crew)	14	12	4	12	100
Multi-pilot Reciprocating (Augmented Crew)	18	15	2	12	120
Helicopter	14	8	4	12	80

(1) Can be exceeded for one flight/day either with or without midair refueling.

to fall in a familiar pattern. Four hours of sleep the night before—a full duty day—a rush to the flight line after duty—two legs of a flight accomplished—an attempted takeoff in the wee hours of the morning on the third—the rest you know.

Then there's the case of the T-Bird pilot who reported for duty at his desk at the usual 0730 hour. He worked only half a day before starting the chain of events that cost him his life at 0130 the following morning. All we know is that he hit a hill about 1200 feet below the altitude he was supposed to be flying on the dogleg to a GCA final. A safe landing was just minutes away.

I'm not saying that fatigue caused these accidents, but I am pointing out that it was either a cause factor or at least contributed to the accident. Each year a significant number of aircrew members and passengers are involved in accidents resulting in a needless loss of life. During 1959 and the first six months of 1960, 58 accidents were reported in which fatigue was indicated as a cause or probable cause factor. In these 58 accidents, 234 personnel were involved, and 107 were killed.

We still are setting our standards for our physical well-being in flying by ground standards that would apply to automobile drivers at 50 mph. These same standards (or lack of them) kill hundreds of auto drivers each week. Someone said on these pages recently that a pilot should be in shape like an Olympic athlete. This also is somewhat inconsistent, if you stop to think about it. What has the athlete to lose but the race or the event? He still manages to go on living, in spite of the loss. Another comparison might be that the athlete is trained to react at speeds of 15-30 mph and our jet pilot at any speed up to hypersonic level with a complicated machine strapped to him. As the old cliché goes, he doesn't have to lift the airplane—only fly it—so I'm not presently as concerned with his muscle capacity as with his mental capacity and alertness.

Let's get right down to the heart of the problem—crew rest. If after reading this story you're going to search for an Air Force Regulation or directive, don't bother—there isn't one. And with good reason. While not impossible, it would be highly impractical to attempt to publish a regulation that would adequately cover the subject of crew rest when you consider the widely diversified type of missions flown everyday throughout the Air Force. Even if such a regulation were published, it would be so voluminous and complicated that it would be practically useless.

So it has been left up to the major commands to develop and publish crew rest directives that are compatible with their missions. In most cases the command regulations are adequate but as stated before they cannot cover the local and sometimes individual problems that exist.

What it boils down to is that the flying unit—be it a squadron, base flight, or group—needs a set of standards to go by. So after looking at some of the Command directives and giving them some thought, the schedule of limitations outlined in the chart (Figure 1) is proposed. Granted there are many variables such as night/day, weather/VFR, autopilot/no autopilot, age/youth or even bald/curly. The more of these variables you crank in, the more loopholes someone will find. I am aware that tactical commanders may have to direct variance from any standard. I am also aware that fatigue does not start suddenly at the end of the fourteenth hour.

The point is this: we must start somewhere and I think this is as good a start as any. What do you think? ★

Major William R. Detrick, USAF
Aviation Physiologist, Asst. for Life Sciences

well done

Lieutenant Wood, as pilot of an F-100D, was engaged in a mobility exercise from the ZI to Chaumont Air Base, France. From his western base he flew for 3 hours to Myrtle Beach AFB, So. Carolina. Then after a five-hour rest he was briefed for the overwater part of the operation which involved two air-to-air refuelings. Lt. Wood arrived over Bayonne, France, without incident, but there lost his radio contact with the rest of the flight for a ten minute period. When he again made contact all the aircraft were down to about 2500 pounds of fuel with the tankers 100 miles distant. At this time his utility hydraulic system failed, but in view of the tricky refueling operation ahead he elected to remain silent about his troubles while the necessary refueling communications were going on. He made his refueling contact sans speed brakes and upon completion found that the flight integrity was lost. Wood carried on as element lead toward his destination.

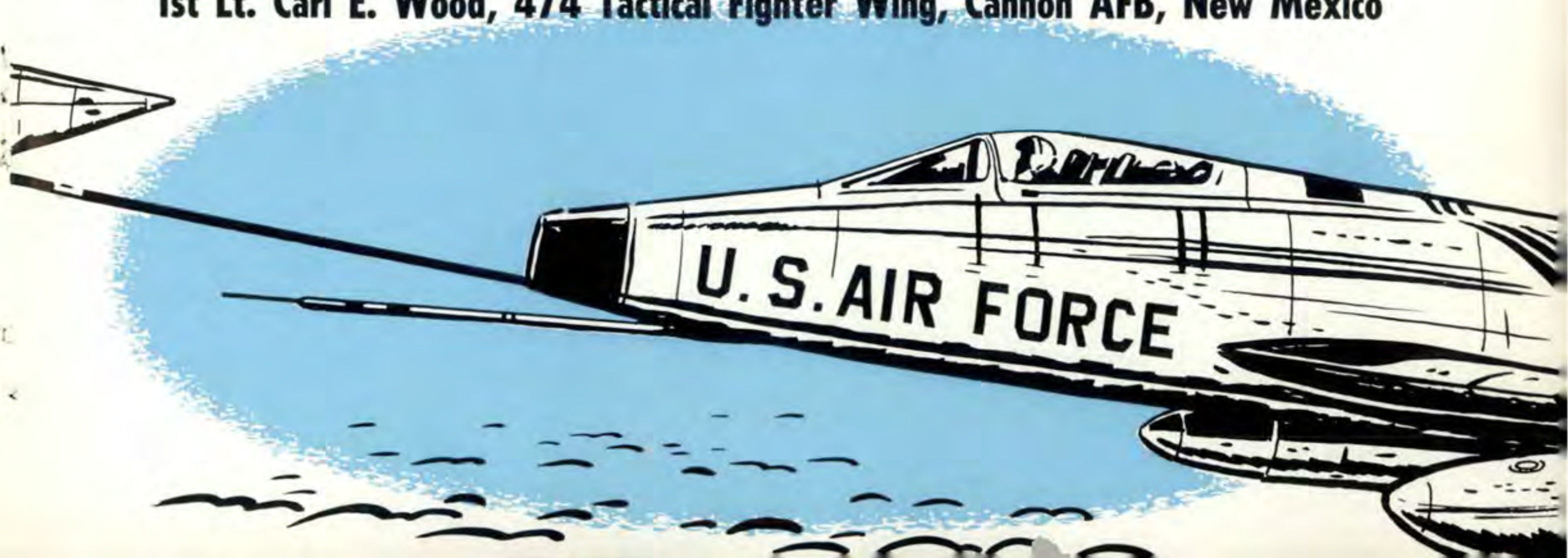
Upon reaching Chaumont Air Base he decided to climb and hold at 34,000 feet so that all the other mission aircraft could land first and not be forced to divert in case his aircraft should tie up the runway.

Lt. Wood entered the holding pattern with 3000 pounds of fuel and as he was letting down through 28,000 feet he was told that the barrier had been taken out by another aircraft. The tower then advised that he must divert to Chateauroux. Wood had forseen this and had computed the flight time to be 22 minutes. He contacted Chateauroux, received bearing and distance information and was approved for a straight-in GCA.

At this time his situation was this: He could not lower his speed brakes, his braking capacity was unknown, nosewheel steering was out, flaps could be lowered one time only by the emergency system and then raised only by air loads, the landing gear could be lowered only by the emergency system and could not then be raised. *With the fuel remaining he was committed to a strange field night landing on an inadequate runway in adverse weather conditions.* At this time he had been airborne 10 hours, much of this in weather. He requested turnover to GCA at the 60-mile range to allow time for slowing the plane to approach speed, then lowered the landing gear about 13 miles out. His final was made at 160 IAS and he touched down at the extreme approach end of the runway at about 140 IAS. The drag chute picked this time to fail and his braking was completely ineffective on the wet runway. Now the barrier decided to join in and it too failed. Result: a bent bird but no injury to Lt. Wood.

Throughout this flight, Wood showed a high degree of pilot skill. His calmness in time of stress, and his sound evaluation of a situation replete with hazard, indicates an exceptional degree of self-discipline and good judgment. Well Done Lt. Carl E. Wood! ★

1st Lt. Carl E. Wood, 474 Tactical Fighter Wing, Cannon AFB, New Mexico



FALLOUT

LETTERS TO THE EDITOR

Secret of Immortality

We instructor types here at Spence Air Base have wondered for some time about the real effectiveness of some of our lectures. Often we suspect that all is in vain—but a ray of sunshine broke through last Tuesday when we received the enclosed military letter as part of a classroom assignment. It very effectively demonstrates that at least our South Korean students have discovered the secret of immortality.

James S. Gage, P.T.O.
Spence Air Base, Georgia

"**SUBJECT:** Flying Safety
TO: ATC

1. Every students who are taking flying training have to keep it in mind how much flying safety is important. Because we have a responsiblity to keep not only one's own properties but also airplanes.
   a. We have to know about the airplane.
      (1) Because flying an airplane with knowing nothing about the aircraft is a nonesense.
      (2) Much knowing better flying.
   b. We have to put it into an action.
      (1) What a unbelievable things to flying without doing what we have to do as we know about aircraft.
      (2) Aircrafts were designed to be controlled by a man.
2. A man who is flying with much knowing and better doing will never die."

• • •

Winter Flying

In the article entitled "Winter Flying" (page 13, November issue), it says: "Our third major accident case, freezing of landing gear and flaps, can sometimes be overcome by exercising the landing gear and flaps at least twice after takeoff from a contaminated runway. This action dislodges as much of the slush and grit as possible before it has time to freeze again. * * * If you can come up with a solution to the problem, please let us know about it."

Here's a suggestion for your consideration: Route the heating ducts from the engine alongside the landing gear nacelle. This will keep the landing gear nacelle compartment warm enough to prevent components from accumulating frost and ice. Also, the units which become wet by being exposed to a wet and slushy runway will tend to dry up before landing. The expense encountered in construction and routing of these ducts would be well repaid by possibly preventing such accidents to happen.

MSgt Henry A. Szpyrka, USAF
Chanute AFB, Ill.

• • •

The Odds on Deadstick

As a practicing Century Series type jock, I am getting just a bit fed up with the wishy-washy stand taken by the literary types on the question of forced landing our high performance aircraft.

The November article, "Don't Do It Unless You've Done It," for example, states that "You know better than anyone else your own ability and shortcomings." It is precisely this attitude that has resulted in the F-100 Flight Handbook's statement that a proficient pilot may try a deadstick landing provided conditions are right. Yet it must be obvious that, on the contrary, most pilots are not capable of accurately judging their own capabilities. This, of course, is why we have IPs, check flights, weather categories, and all the rest.

As an IP, I have observed an approximate 40% failure rate on simulated flameout practice. All of these pilots who misjudged their approaches were "proficient," and almost all of them expressed complete confidence in their ability to successfully deadstick an F-100 if they were forced to do so.

As you have probably concluded, I believe that we are creating casualties unnecessarily by giving pilots the option of deadsticking the aircraft. I do not believe that the Century Series aircraft deadstick success rate matches the 86% all-altitude Century Series successful ejection rate (94% at 10,000 feet). It is, of course, possible that I am wrong, but the only way that I can be proven wrong is through controlled testing of the average pilot in each of our high performance aircraft. Why has this not been done?

If it is determined that the deadstick success rate of the average pilot does not match the ejection success rate, then I categorically state that the Air Force, in its present stand, is losing money. If this is determined to be true, then we have only one logical course to follow: outlaw deadstick landings. By "outlaw" I mean that the Dash One should state, unequivocally, that deadstick landings will not be attempted under any circumstances. We might wish to add a few exceptions such as "except when over Rogers Dry Lake," and so on.

This action will cost the Air Force some aircraft and may prove unpopular with the hot rock set, but it will probably be greeted with cheers by the "married with three kids" types. Any professional gambler knows that by playing the odds he will eventually beat those who play the hunch. I think it is about time the Air Force figures the odds on the deadstick problem. Until someone makes the decision, we will go on losing too many pilots, and we will do this in direct proportion to the increasing numbers of high performance aircraft introduced into the inventory.

Capt. George A. Nial
49th TFW Tac Eal (USAFE)
APO 123 New York, N. Y.

Qualifications? I have both successfully deadsticked and ejected from the F-100 (gained a USAFE "Well Done" for the former and my life for the latter), and I'm an odds-betting poker player.

We're glad to hear from you, Captain, although you're not the first fighter pilot to advocate the elimination of attempting to deadstick high performance fighters. The Directorate's position is clarified in the following extract from a letter to a unit recommending similar action:

"The flameout landing criteria established in the Flight Manual is certainly not a set of rules established by a small elite group of pilots. This criteria was hashed and rehashed from the Air Staff to the Major Air Commands, D/FSR, and down through the chain of command, and represents the thinking and judgment of numerous highly qualified persons and analysis of accident statistics. The intent of the entire section dealing with ejection versus forced landing is to take the stigma off the pilot who decides to eject rather than attempt a forced landing.

"The pilot at the controls of the aircraft at the time of flameout is the only person capable of making an intelligent decision regarding an attempt at a flameout landing. The Flight Manual establishes the criteria, the pilot supplies the decision. We will certainly never criticize a pilot who decides to eject rather than attempt a deadstick landing."

• • •

Full Power Letdown

As I read Captain Brown's article, "A Full Power Letdown" (page 18, November issue), the sequence of events of a similar incident which resulted in a major aircraft accident was brought to my mind. Captain Brown's story ends with the comment: "We offer no solutions; we are just stating the facts of our experience." Consequently, I'd like to relay a solution developed by the investigating officer here at Bolling. The report of the major accident which set up a similar circumstance is on file here, and I quote from the final evaluation by the Director of Flight Safety Research:

"Review of the report and allied correspondence reveals that upon teardown inspection of the engine it was noted that the prop thrust nut was not properly torqued. This permitted the front fixed gear to move forward under power, crushing the lower propeller oil feed pipe. This resulted in loss of propeller oil pressure and positive propeller control."

The investigating officer's report in this accident reads:

"Because this investigator is not an experienced C-47 pilot he called on the knowledge of other personnel, both military and civilian, who have a great deal of experience in this aircraft and with this propeller. These discussions reveal the technique that will successfully bring about the control of an overspeed condition of this type propeller. With no governor control over a propeller it will go into the low pitch position. The subsequent RPM indications will depend on the direct airspeed being flown. The higher the airspeed, the higher the RPM indications. The lower the airspeed, the lower the RPM indications will be.

"Therefore, in this situation the pilot must slow the aircraft down to the airspeed range of 100 mph indicated, at the same time reducing power on the good engine so that directional control can be maintained. Then he must add throttle for the affected engine until he overcomes the drag created by the windmilling propeller. He will attain the condition of negative drag and with additional throttle can obtain positive thrust. This will show an increased RPM but not to exceed 2700 if the airspeed is kept low. Essentially it is a fixed pitch propeller with the RPM indications controlled by power applied and the forward speed of the aircraft. This will enable the pilot to control the aircraft and successfully maintain his altitude. He would have to, in effect, 'slow fly' the aircraft."

Personnel contacted by the investigating officer included airline pilots possessing considerable experience with the C-47 and the Hamilton Standard Propeller representative. The procedure as outlined by the investigating officer is not incorporated in any instructions that pertain to flying the C-47. Following this accident I personally questioned many C-47 pilots concerning their reaction to similar circumstances and have not found one who has recommended a similar procedure in case of complete propeller failure on takeoff or at rather low altitude.

The failure of a propeller under such circumstances is certainly an emergency where positive instructions should be available to the flight crew. Even though failures of this type are probably rare, there is always that possibility of saving an aircraft and crew with the proper written word. Since the C-47 apparently is going to be around the Air Force for many years I would certainly recommend that the validity of the suggested procedure be established and, if applicable, that the Dash One be changed to incorporate such emergency procedures at the earliest possible date.

Any further information on the particular accident to which I am referring will be glady forwarded.

Col. Roscoe R. Haller
Comdr, Hq 1100th M&S Gp
Bolling AFB, Washington 25, D.C.

Thanks for your interest. The procedures you suggest will be reviewed by the Flight Manual Command Review Board.

• • •

Mac's Knife

While traveling around the country I've noted that many of the troops are still clinging to the old sheath knife worn on the side adjustment straps of flying suits. Whenever queried about the feasibility of this configuration invariably they say that they believe the knife would be retained during ejection because it is held in place under the parachute harness.

I believe a check of your ejection experience records will reveal that wearing a knife like this may possibly result in a severe puncture of the upper thigh, if the knife is retained at all. T.O. 14P3-1-503, 25 July 60, provides a fine solution to this problem. It requires a pocket for the MC-1 knife on all flying suits and trousers. Since this knife is a "must" item issued to all crewmembers, perhaps a paragraph pointing out the details might be appropriate.

Capt. Wayne E. Williams
Personal Equipment & Survival Officer
837th AD Shaw AFB, So. Car.

Suggest a stop at the Tech Order Library for a look-see.

Ejection

In the November issue appeared a very instructive article titled "The Right Side of the Ledger," by Mr. R. E. Wenrick. In content it was very good; however, it passed over separation from the ejection seat too lightly. It should have included a few remarks such as: "Concentrate on letting go of the handles. It's understandable that the firm object you're holding on to is your last contact with all that *was* safe, but you've just gotta' push away! Make it an automatic reaction to reach for the lap belt as soon as you separate from the aircraft. The automatic release could malfunction and you'd be stuck with a very heavy seat . . . literally."

Here are a few questions that have been kicked around the crew lounge for quite a while so, like the man says, "Dis must be de place."

Regarding the opening of the safety clip(s) on the parachute canopy release(s) prior to reaching the water, is it not possible for a person prone to shock (for instance, me) after ejecting to flip the safety clip down and with an automatic reflex, *actuate the canopy release, too?*

And whatever happened to the lanyard that connected the survival pack to the life preserver after passing through the parachute harness? If you got mixed up with your chute after landing in the water you could jettison the harness, giving you more freedom of movement and still remain connected to your pack and raft.

Now about the inflation of the underarm life preserver—keeping in mind that the most dangerous period is from the time you hit the water until you get into the raft—why not say: "Do no inflate the life preserver unless you need it, such as if tangled in canopy, in heavy seas, injured, and so on." This would leave less protrusions to become entangled and would make the job of getting into the raft a heck-of-a-lot easier. If you need it, use it. If not, don't!

Having successfully completed that excellent and strenuous Water Survival School under Major Ewing at Numazu, Japan, *two times* (not a pig for punishment, just the short end of RHIP), I've often wondered how a crewmember who had injured one hand or arm on ejection, or in combat, would ever strap that darn underarm life preserver together in a heavy sea. How about a light weight "horse collar" or "belt" type preserver?

Many thanks for a fine magazine and for taking the time to read this.

SSgt Harold D. Rawley
Wing Standboard Gunner
363d Tac Recon Wg, Shaw AFB

The intent of Mr. Wenrick's article was to illustrate post ejection survival techniques, emphasizing water survival. His opening remarks might well have concerned a conventional bailout. Your reference to seat separation is one of much interest and more about this problem can be read in an article titled "Seats Away" published in July. Also, the importance and need for positive action in effecting seat separation is often discussed with emphasis in monthly ejection summaries published by this Headquarters and disseminated in the FSO Special Study Kit.

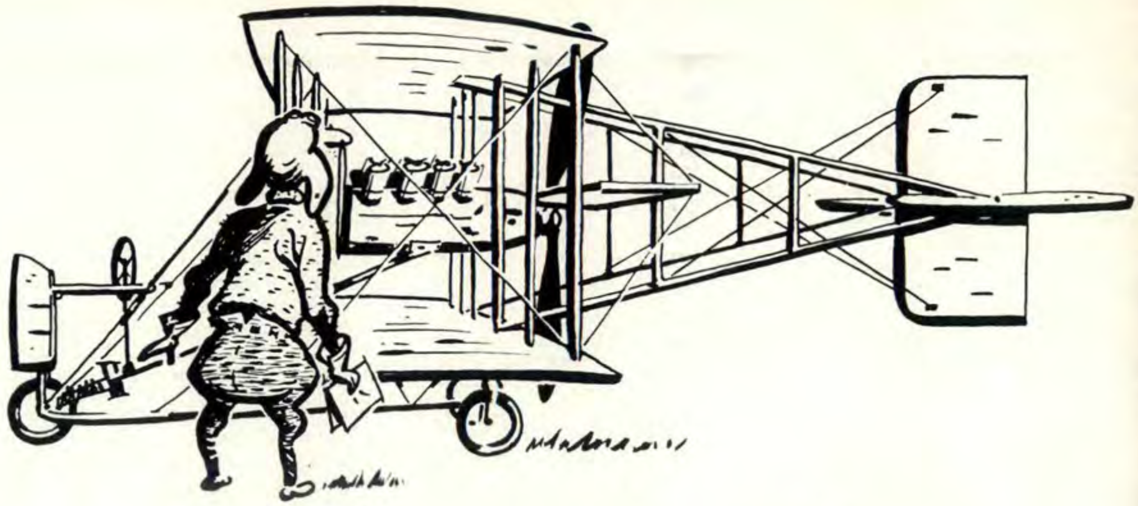
Now, as to your remaining questions in the sequence listed:

- *Inadvertent actuation of the canopy release after the guards have been removed is certainly a possibility during great stress, although bailout/ejection experience does not show this to be a factor. Usually a person in shock or exposed to such stress as this, will completely forget to remove the safety guards.*

- *The current concept with regard to water landings is to retain the chute harness since the life raft and survival kit are attached to it.*

- *Usually a downed crewmember finds that there is too much to do just to stay alive—after landing—therefore inflation of the life preserver during descent means one less thing to do, not to mention the great aid to resurface he will get from this inflated life vest after submersion.*

- *An injury would undoubtedly cause great difficulty in snapping the two cells together under adverse conditions. This step, however, is not absolutely necessary to the function of the preserver. The LPU-/P preserver, currently in use, is considered quite an improvement over the old B-5 (horse collar), although some B-5s are still being used.*



Here's how novice pilots learned to fly.*

1 The aeronaut should seat himself in the apparatus and secure himself firmly to the chair by means of the strap provided. On the attendant crying "contact," the aeronaut should close the switch which supplies the electric current to the motor, thus enabling the attendant to set the same in motion.

2 Opening the control valve of the motor, the aeronaut should at the same time firmly grasp the vertical stick or control pole which is to be found directly before the chair . . . The power from the motor will cause the device to roll gently forward, and the aeronaut should govern its direction of motion by use of the rudder bars.

3 When the mechanism is facing into the wind, the aeronaut should open the control valve of the motor to its fullest extent, at the same time pulling the control pole toward his middle anatomy.

4 When sufficient speed has been attained, the device will leave the ground and assume the position of aeronautical ascent.

5 Should the aeronaut decide to return to terra firma, he should close the control valve of the motor. This will cause the apparatus to assume what is known as the "gliding position," except in the cases of those flying machines which are inherently unstable. These latter will assume the position known as "involuntary spin" and will return to earth without further action on the part of the aeronaut.

* The above excerpt from operating instructions for a **1911 Curtiss aircraft.**

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