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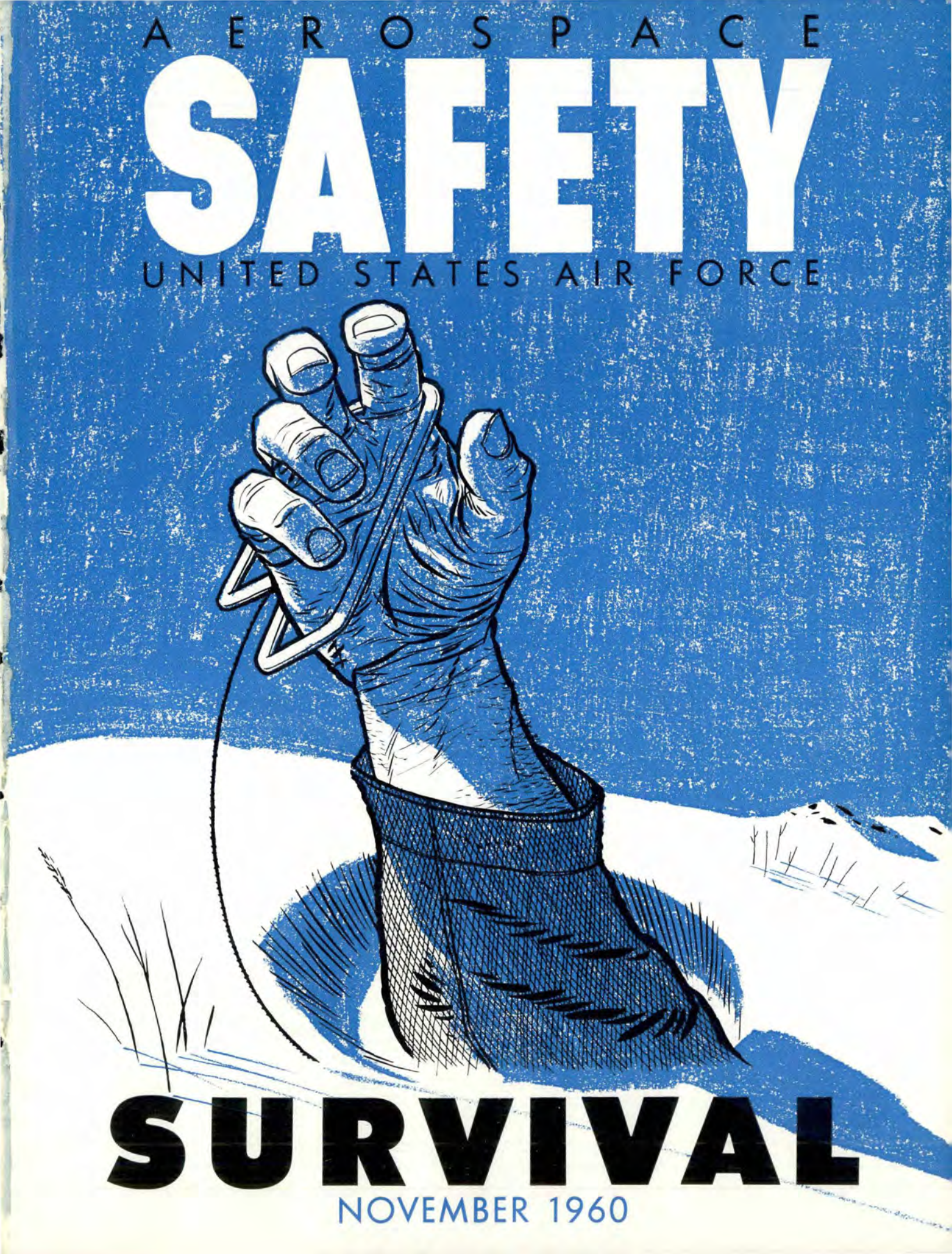

SURVIVAL

NOVEMBER 1960

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• TWO POINTS OF VIEW •

". . . And when the aft warning light came on I quickly remembered the Dash One emergency procedures and . . ."

"Emergency procedures, my foot! The only reason he didn't eject was that his pins were still in place."

VOLUME SIXTEEN NUMBER ELEVEN — USAF RECURRING PUBLICATION 62-1

SHORT·LANDINGS

★ ★ ***Major General Perry B. Griffith, Deputy Inspector General for Safety, USAF***

A few weeks ago, while waiting to take the runway at one of our fighter bases, I had a ringside seat for what looked to be a potential landing accident as a flight of four came in after a mission. Their formation was excellent, and their precision pitch-outs were fine. But their final approaches and touchdowns were something less than professional. One and all came boiling in on final just skimming the sagebrush. They carried full bore until just over the lip of the overrun, then chopped power and set down within the first 50 feet of the runway, THE WAY WE WERE TAUGHT TO SHOOT A LANDING STAGE IN PRIMARY FLYING SCHOOL.

Those pilots apparently had forgotten that good professional flying technique does not confine landings to the first 50 feet of the runway. And for mighty good reason. Almost 40% of our Air Force accidents occur in the landing phase—and altogether too many of these are caused by undershooting and landing short. These are non-emergency landings where wind and weather play a minor part, if any. They are caused by mistakes in judgment—pilot factor—pure and simple. And most of them are in jet aircraft. *But the habit learned in primary never seems to be forgotten.*

The reason the jet jocks have more undershoot accidents than the recip drivers was revealed in a recent study made in the Directorate of Flight Safety Research. It showed that high sink rate, lag in engine response to throttle control, high speeds, and the necessity for more precise distance and rate-of-closure judgments all contributed to jet landing accidents. Night conditions were a major factor contributing to the total; during one period, over one-third of the undershoots occurred at night. However, it happens to big aircraft too, and there is little excuse for that—particularly with reverse pitch props.

You might suppose that many of the pilots involved in short landing accidents were attempting to drop their birds in on short runways. Not so. At the time our study was made, almost three-fourths of the undershoot accidents occurred on runways 7000 feet or more in length. One statistical factor that emerged from the Directorate's study showed, as is to be expected, that young and relatively inexperienced pilots were involved in a disproportionately large number of these short landing accidents. This is understandable, however, since undershoots are largely caused by faulty perceptual judgments and unskilled motor responses—the result of inexperience and insufficient training.

Now if *proper* landing technique is as challenging as statistics prove it to be, surely a pilot is taking unnecessary risks when he cuts corners and deprives himself of any margin for error by trying to set his bird down on the first 50 feet of runway. The undershoot artist usually says that his accident might have been prevented had there been a longer overrun or more runway. And the overshoot expert says the same thing. But we obviously cannot keep extending runways ad infinitum. Nor do we need to, since length of runways has proved to be of little influence on undershoot/overshoot accident rates. There is no logic in permitting—and thus encouraging—our pilots to come in over the fence on the ragged edge of a stall so that they can set their birds down in the first 50 feet of an adequate runway.

What we can and must do is help our pilots acquire more precise and disciplined landing habits, from the time they pitch out until they taxi off the runway. This is not a red hot fighter pilot talking, but we have kicked this problem around a lot in our shop, in which there are several people who fit in that category, and the consensus here is that: An important element of good technique is to bring the aircraft in to the critical threshold area holding the exact power, speed, and altitude called for by the Flight Manual for the weight and configuration you're flying. Then when you ease back on the stick and power as you flare out, you are assured of a touchdown at your pre-selected point. You'll have solid runway under you in what one test pilot calls "the magic area." If you've *flown* your airplane to this point, and not just guided it, all one must do is come back on your stick and power in a coordinated motion and set it down. You couldn't land short even if you wanted to! If the experts out in the field disagree, we would like to hear from them—sincerely.

Landing sequence habits that allow one no leeway for the shortcomings of the human ocular apparatus, the vagaries of wind and weather, and the deficiencies of complex man-made equipment, set up a pattern whereby one little mistake or failure causes a short landing, breaks up machinery, perhaps kills the pilot. This is too great a price to pay for the dubious satisfaction of dropping it within the first 50 feet.

Don't make yourself another short-landing statistic. Don't try to land in that first, fatal, fifty feet! Uncle Sam provides us with enough runway. Use it. There are a lot of people alive today who were not too proud to go around when they realized an error in judgment had been made.

This is the story of eight men. It is the story of how some of them lived and how some of them died. It is the story of personal sacrifice, of hardship endured, of death finally met — and for some, survival attained.

HORROR IN HELL'S CANYON

Reprinted from Flying Safety Magazine February 1959

o o o

There were eight men on board at takeoff time. There were eight men who almost completed the flight. But half of them are no longer alive. The fact that they died is tragedy in itself. The cause of their deaths is even harder to accept.

Their story properly begins in San Antonio. The day is warm and humid. The crew of the C-119 go about their duties, as three passengers wait somewhat impatiently for the flight to begin. Everything is normal, routine. No trouble expected with the aircraft. And for several more hours everything does go well. The pilot knows that Ogden will have less than perfect weather, but he is equipped by his years of training to deal with weather. But let's let the pilot tell his own story.

"They were having a frontal passage in the San Antonio area. The weather at Hill AFB, Utah, was reported as 200 feet and one-half mile. The forecast was, I believe, 300 feet and one mile. This is guessing now, and snow was anticipated. However, the Weather Officer at Brooks didn't feel it would be that bad so he gave me 500 feet and one-and-a-half miles, with no particular emphasis on any heavy weather.

"At the weather briefing, I recall that the Weather Officer had indicated we would hit the clouds just west of Rock River (12,000 feet). That was exactly where we hit it as I recall. After we entered the clouds, flying was smooth in that area. No problems at all.

"There were breaks in the clouds from the Rock River (Wyoming) area to Ft. Bridger. West of Ft. Bridger it began to get a little rough. We put on the carburetor preheat and it was in this area that we discovered the right carburetor heat was not working. The left was working okay. However, the right carburetor heat had been working throughout the 10-day trip whenever it was needed.

"After passing Ft. Bridger, 1553 (MST), I believe, we lost the engine and we tried heat again (approximately 1605M), just in case there was a short in the switch or something. After it was realized that we wouldn't be able to bring the right engine back in, we added power to the left engine and feathered the right. From there on we lost altitude. During this time throughout the feathering of the engine we probably got down to 11,000 feet. We went to full rpm and manifold pressure for a few minutes and were able to maintain altitude and safe single engine speed. However, we soon were unable to maintain altitude and airspeed at 11,000 feet, and at this time we bailed out the passengers and two engineers through the back paratrooper doors (1617M). This was believed to be necessary because according to our ETA we were assumed to be in the Huntsville area or west, which would put us very close to the mountain tops.

"After we bailed them out, we were able to maintain 10,500 feet for only a short time. Then the navigator and the copilot bailed out of the paratrooper doors. *(Ed. note—Four or five minutes later.)*

"When the copilot went out, I was tracking outbound from Ft. Bridger. We were unable to pick up Ogden. I was on course and the heading was correct. After the copilot and navigator bailed out I attempted to set up the autopilot. The airspeed had gotten down to 80 knots and the altitude was about 10,200 feet. The first time the autopilot was engaged, the aircraft stalled. I disengaged it, retrimmed the aircraft and re-engaged the autopilot. Soon thereafter I left the aircraft through the rear paratrooper door.

"I figured I was one minute in the air and I landed in the trees. There was snow about a foot deep.

"I was in a small gully and I went up one side to see what I could see, but saw nothing in that direction. I headed back, wrapped the chute around me and started walking in the general direction I'd presumed the aircraft had gone. There was about one hour of daylight left.

"Shortly, I came upon what appeared to be a road. I followed this for awhile, looking for a tree area where I could get away from the wind and snow and stay for the night. I went off the road once but the trees offered no protection so I came back to the road and continued on until I found a clump of pine trees. It was just about dark so I started to make a pallet of pine branches under the tree. I wrapped up in the chute and pulled branches in around me to keep the snow and wind out. About 0030 I heard rifle shots and soon after I was picked up by the jeep patrol."

The pilot was the most fortunate of the lot. He spent about eight hours in the open, clad only in a blue gabardine flying suit, jump boots and lightweight gloves. Wrapping in the chute and holing up for the night were the saving decisions in his case.

The copilot was found 60 hours after the bailout, wrapped in his chute but dead from exposure. He was dressed in a summer flying suit and jump boots. No gloves or jacket.

The temperature continued to drop steadily for the next two days. At the time of bailout it was estimated

that the outside air temperature was just at freezing. During the first night, a Friday, it was guessed to have gone down to 20°F.

The navigator was not found until 10 days after the accident, about three-quarters of a mile west of the spot the copilot was discovered. He had tried to start a fire with a dime novel and some twigs he had torn from an aspen tree. The twigs never did burn and even parts of the book remained. He had removed his shoes and socks and placed his feet close to the tiny fire then leaned back against a log and crossed his arms. The parachute was wrapped tightly around him and it is known that he survived at least the first night because of a note he had written. Like the rest of the crew, he was scantily dressed—no hat, coat or gloves. A half-dozen cigarette butts were found nearby.

One of the passengers, an Army corporal paratrooper, survived after a tremendous display of guts and unselfish courage. His story is deceptively modest.

"When the engine conked out, the crew chief came back and told us to put our chutes on. We put them on and he went back up front, and a couple of minutes later he came back and said that we would have to jump. They opened the doors and we went out.

"After we got on the ground we weren't very far apart. *(Ed. note—The five men, including the two flight engineers and the three passengers, landed within 500 yards of each other and regrouped easily.)* We met down at the bottom of the canyon and talked the situation over. One of the crew chiefs took charge. We thought it would be best for two of us to start down the canyon (Hells' Canyon) for help, since one of the passengers had a very bad ankle. The sergeant in charge and I started down the canyon for help. The other three built a fire and stayed there the rest of the night. That was about 4:30. We walked until about 7:30. It got dark and the going was very rough. We were having trouble getting through the brush, so we decided it might be best to go back up and join the others at the fire. We didn't know how much farther it was to civilization. We were on our way back up there when we found a cave. We were tired and cold, so we stayed in the cave the rest of the night.

"The next morning we went back up to where we left them, but they weren't there. We looked for them for about 20 minutes and couldn't find them. There was nothing else to do but start back down the canyon again. We didn't know where they were.

"We walked all day until about 3 o'clock when the sergeant started getting weak. He couldn't go much farther. After a while he couldn't make any progress at all. I helped him as much as I could, but he was getting to be in pretty bad shape.

"The assistant crew chief caught up with us and we talked it over and he said the other two guys also were in pretty bad shape. We knew we had to get help or nobody was going to live. *(Ed. note—At this point the senior crew chief was left behind.)* We walked about two-and-a-half more hours and came to a sheepherder camp and from there we sent help up to the three others. We were taken to a ranch and from there to the hospital."

The tough little paratrooper, who is just under five-and-a-half feet tall and weighs maybe 130 pounds, actually gave his light army uniform jacket to the senior crew chief who had to be left behind. The two men who walked on left him propped against a tree and made their way on for help. When help did arrive, however, it was too late. The senior crew chief was dead.

The three men who were left behind when the corporal and senior crew chief decided to go for help managed to get a fire started. There they stayed for 17 hours before they too decided to walk out. It will be remembered that two of these were passengers and one was the assistant flight engineer. But let's listen to their stories, first from the crew chief, a staff sergeant 28 years old. As in the case of all the others, he was clothed in very light dress. A light flight jacket, flight coveralls and high laced boots were his clothing for survival in an area as desolate as any in Alaska. Now for the assistant crew chief's story.

"After my parachute had opened and I got my breath back, I could see that there were five open chutes—four besides myself. This was about 1620. I drifted over the other men and landed a short way from them. I could clearly see their parachutes and where they were heading when they landed. I could see one chute hanging in a tree. I hollered and told him to wait until I got there so he wouldn't unfasten his chute and break a leg in the fall.

"After we regrouped, I told the men that they'd better get their parachutes. The crew chief and the corporal said they were unable to get theirs because they were stuck in the top of a tree. At the time we believed that one of the passengers *(Ed. note—An Army sergeant, first class, and a man of about 230 pounds)* had broken his ankle from his descent when he landed in a creek. His foot had gone between two rocks. The other crew chief and the army corporal then decided they would start walking out to try to get medical help. The ranking Air Force noncom passenger agreed that they should do it so they left. We tried to find enough wood to build a fire but it was so wet you couldn't start anything. I then examined the ankle of the Army sergeant and found that it was badly sprained. He could stand on it, and from every indication there were no broken bones at the time.

"We then decided that we had better find a better place to stay and build a fire. We walked about two miles around the side of the mountain and found a

Simplified map of the bailout area. Number one: five men bailed out. Number two: two men find help. Number three: copilot left aircraft. Number four: copilot's body found. Number five: navigator bailed out. Number six: navigator's body found. Number seven: Pilot bailed out. Number eight: pilot found.

There are thousands of square miles of rough country in these western states of ours, yet men continue to fly in the comfort of their planes with little thought of the emergency that might come.

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large pine tree. We dug underneath the tree, under the snow, and found some dry leaves and broke a few twigs off the tree. The crippled man tore up his driver's license, all his orders and papers that he had in a notebook, including the notebook, to use for kindling. We managed to get a small fire going at first and we slowly got it to going better and better and we had a fairly large fire. We spent 17 hours under that tree by the fire. The next day we decided that if we were going to die, we were going to do it walking. I had asked if I could go along at 1030 in the morning and make it out of there but the other two voted against that.

"We then decided we would try to make it out—the three of us. So we started back the way we had come up the night before. We found the tracks of the two who had left the night before and we followed them down the canyon. The army sergeant couldn't walk too much because of his ankle and I had set a pace for myself that I figured I could keep up for as long as possible. The other Air Force sergeant managed to stay up with me for approximately four hours. He then seemed to lose all of his energy and had thrown away the part of the parachute that he had around him to keep warm. I gave him my part of it then and he kept slowing down more and more. I tried to make him walk to keep up with me. I hollered at him, cussed him, tried to make him realize that if he did stop he would die. I know that I, if I had stopped, wouldn't have been able to start again, so I just kept going as slowly as possible without completely stopping. The sergeant with me didn't seem to comprehend the fact that he was going as slowly as he was, so he fell slowly behind me. I didn't know whether the first two had made it out. Their trail was quite clear to follow until we got down in to the narrows of the canyon. I would lose the trail most of the time because I was walking right in the middle of the creek. Whenever I would get a chance to walk on the side of the creek in the snow I could see their trail quite clearly.

"I then came upon the other crew chief and the Army corporal, approximately 40 minutes from the time I had last seen the ones who fell behind me. The corporal was half carrying, half dragging the sergeant through the snow. I told them to get a move on so we could get out of there. The sergeant didn't know who I was, he was so far into shock. He didn't know what he was doing and he kept falling down all the time. We tried to start another small fire then. The only thing we had was a cigarette lighter and it didn't work. We knew that we would not be able to pack the sergeant out because he weighed close to 200 pounds and our own physical strength was almost gone. So the corporal took off his jacket—the small jacket he had on—and put it on the sergeant. We set him underneath a spruce tree and left him there.

"We started walking. He stayed about eight feet behind me and not once did he falter in following me. About two hours after we left the sergeant by the tree and 24 hours after we bailed out, we came upon the sheepherder camp at the mouth of Hell's Canyon. We pinpointed the canyon we came out of and told the authorities that were there about how far up the others were. They started to search for them."

Hell's Canyon had now yielded two of the five men it had held for over a day. Three were still somewhere in the brush-clogged stream bed. Of the three, only one more came out, the passenger with the injured ankle. The two others succumbed to the bitter cold and exhaustion about 30 hours after bailout. The heavyweight with the injured leg kept moving for some time, caught up with the body of one of the others and tried to drag him to the shelter of a tree. Then he himself sat down to die. Twenty minutes later rescuers from the sheepherder's cabin found him and brought him in to the cabin. Hell's Canyon had done its worst.

The wonder of the whole story is that anyone survived. What driving force brought four crewmembers through this ordeal is hard to explain. Those who were fortunate enough to have landed together did not stay together for mutual assistance and protection! A fire was built and abandoned.

No one was prepared, with training and equipment, to face the ordeal that fate had thrust upon them.

Men so poorly equipped for winter survival in the ruggedness of Utah mountains surely have little chance. Light clothing and not a survival kit among them.

Looking at Hell's Canyon from the top of the plateau, the scene is as desolate as any you're likely to see in northern Alaska. And by air, this is only 20 minutes from the warmth and life of Hill Air Force Base. Huntsville, a good sized town, was only 17 miles away from the most distant man to bail out. Yet these men might as well have been in remotest Canada for all the help others could give them immediately. The snow continued to fall and planes could not search. Ground parties in jeeps and snow-gos were practically helpless until the weather cleared. And the rescue efforts by military and civil agencies were quick, thorough and untiring.

A man must plan to be on his own when he leaves his aircraft in this country. He must be equipped to survive for several days until help can reach him. He must be properly clothed and he must have some sort of survival kit. He must obey the simplest rules of survival. If he is lucky enough to be with others, he must stay with them; he must make a fire and stay with it; he must be prepared to build at least a rudimentary shelter and wait in it for help.

There are thousands of square miles of rough country in these great western states of ours, yet men continue to fly in the comfort of their planes with little or no thought to the emergency that might come. The secure feeling a pilot gets from the knowledge he has two or more engines can be fatal. It must be remembered that the C-119 left from a southern Texas base in summer-like conditions. Five hours later, it was over some of the wildest, fiercest terrain to be imagined. The temperature had dropped over 60° from the time of takeoff to bailout. No one was ready for the sudden transition from complete security to dire peril. Only 20 minutes from home base, tragedy had struck. It could and will happen again. That it happened to these men is their personal tragedy. The ones who survived will never forget. ★

The effect of supervision on safety and . . .

VICE VERSA

Major General James W. Wilson, USAF
Headquarters SAC

Supervision has a very definite effect on safety and, *vice versa,* safety has a very definite effect on our supervision. Safety can be gained or lost only by sound supervision or the lack of it. Let's think about this for a moment. Supervision based on logic and common sense is straightforward and complete. It considers safety and accident prevention in the course of day-to-day job accomplishment. Now the supervision we are talking about is not only the supervision of other people but also the supervision of ourselves—what some call self-discipline. A lack of proper supervision—or discipline—breeds carelessness and carelessness causes accidents. Therefore, supervision and safety are really hand in glove, one and the same.

The best safety records and good supervision are always found in the same outfits. Those units have tight discipline and common sense supervision, and have rated high in the "no accident" column, time after time.

Our successful supervisor is the one who considers every detail of every job including a close look into all the elements of safety. He gives attention to the correct quantity and type of tools; the correct quantity and type of equipment; the correct skill or job specialty; the technical directives governing the job; the cleanliness of the area, equipment, and tools; and the on-the-job supervision requirements. When all of these have been considered and provided for, safety is almost a sure result.

We have all read articles in our service magazines about the need for training and compliance to promote and insure safety. You and I know the research and experience behind our technical directives and that each is based upon a proven and safe method of operation. Strict compliance would appear to be the logical and intelligent move for us all: safe and sane job performance.

The greatest contribution to work efficiency, safety and on-the-job training is through instilling good work habits among the workers. Good work habits are, of course, the primary desire of every supervisor. He realizes that good work habits in his subordinates make his job easier because his people will do the correct and safe thing. They follow the book, obey the law and meet the schedule. His people are successful and ambitious.

How can we obtain good work habits? There's only one way and that is to insure that the men are correctly trained and properly supervised. To make this work, first you've got to be sure each man understands exactly what his job is and how it is to be done. Then, use simple terms in explaining the job. Find out if he understands by direct questions, and show him the correct way to do it. Keep close contact with him. Second, keep the idea of his job and pride in his job at a high peak. Praise him when he does well, and show an interest in his accomplishments. Be sincere: answer his questions honestly and directly, and give him credit for his ideas. Finally, be consistent in your standards and your schedules. Establish high-quality standards, then live with your own standards. Plan to follow your schedule —then follow it. And always think ahead!

There's no doubt that cleanliness plays a big part in this supervision and safety game. Clean areas, equipment, tools, and people just naturally lead to safety records we all envy. Supervision of the right kind attains and maintains this cleanliness and, as a result, safety. So, your supervision means your safety. It is wise to remember this.

Now, what's the effect of safety on supervision? You know as well as I that a poor safety record results in many changes in supervision. In some cases this change is merely a change in personnel. In others the same personnel become more demanding and hard and less apt to really supervise. Many times, unreasonable demands and attitudes become the unrealistic substitute for the supervision that is really required. In addition, a poor record causes everyone to become overcautious in his work which slows production and actually increases the likelihood of more accidents. The net result is an unhappy situation at best and one to be avoided at all cost. The way to avoid it is to supervise and be safe.

So, the choice is yours. Does your supervision affect safety or, *vice versa,* does your safety affect your supervision? The answer—and the effects—are up to you. ★

DON'T DO IT!

. . . . *unless you've done it!*

"Nellis tower, this is Ballard Walnut, Over."

"Ballard Walnut, this is Nellis tower, Over."

"Nellis, this is Walnut. My position is 10 miles north at 22,000. I have zero oil pressure and am setting up an SFO pattern for runway 20 left. I am declaring an emergency, over."

"Roger, Walnut, understand declaring an emergency, zero oil pressure, Nellis landing runway 20 left, wind 180°, 6 to 10 knots report high key . . ."

"Ballard Walnut, wilco"—

"Nellis, Ballard Walnut, high key SFO"—

"Roger, Walnut, call low key"—

"Nellis, Walnut, low key gear down and checked"—

"Roger, Walnut, you are number one, cleared to land."

"Nellis, this is Walnut, I'm going around. I'm too high, request closed, over."

Does this sound familiar to anyone? Has something similar ever happened to you? It has happened here at Nellis; it has happened overseas in USAFE and I'll bet it has happened at your base.

For those who haven't figured out the point yet, it is this: Simulated flameouts (SFO) require judgment—very good judgment—in fact, more so than any other type landing pattern. The pilot concerned with the problem of an SFO has a big responsibility placed on his abilities, not only in flying the airplane but in exercising good judgment. Judgment is the key factor in getting on the ground safely. Use poor judgment and you get a poor pattern as we did in the example above. "Why was it poor?" you ask.

The decision to go around was a good one as far as it went because it would have been pure folly and probably fatal to have continued an obviously bad final to its conclusion in the barrier, if he was lucky. This pilot was giving it a try. He should have made it. He had 10 minutes to get squared away and had power to boot!

He missed—risked an expensive fighter aircraft, jeopardized lives and homes of bystanders on the ground, and—of primary concern—his own life in his haste to get on the ground. A precautionary landing from an SFO should be planned as a last chance approach; to think or practice otherwise is courting disaster. You can't count on the engine's continuing to run. In this case, however, it did, and all ended well. I'll bet you can read between the lines though and visualize what *could* have resulted. Let's talk about *when* and *when not* to deadstick the aircraft, and *when* and under what conditions to utilize an SFO pattern.

Nowadays the Dash One is quite clear as to the best course of action when committed to a flamed-out aircraft with no chance of airstart. "The best course of action normally is to eject." No one will argue with this. But, it goes further and states that a proficient pilot, with a well-planned approach, under ideal conditions, may elect to give it a try.

Now, no one wants to stick his neck out just for the aircraft. It can be replaced, but you know better than anyone else *your own* ability and shortcomings. If there is any serious doubt in your mind whatsoever if you should or should not attempt a deadstick landing, then DON'T. However, if you press on and utilize your experience and training to accomplish the landing, you will find that you can pretty well tell at low key whether or not you are going to hack it. And if you have any doubts at this point, you still have room for a nylon letdown, but this is about your last chance.

What you do about a deadstick landing is up to you. It is your decision alone to make and no one will argue with you. What you think is best will be the best course of action for you. However, those who dogmatically say they are automatically going to jump out if they flame out should re-evaluate their thinking and attempt to develop a more professional approach to this problem.

When and when not to utilize an SFO pattern: Before we get into this, we really should get squared away on one other subject closely related to it. This is *when* to declare an emergency. The following rule is a good one because it affords maximum protection to the pilot physically and also an answer to anyone's question: "Well, did you declare an emergency?":

- Declare an emergency anytime an aircraft malfunction occurs that is covered in the emergency section of the Dash One. If the Air Force didn't consider some of the small items emergencies, they wouldn't be listed in the red-bordered section.
- Declare an emergency anytime you encounter a difficulty which you feel merits special attention for yourself.

1st Lt. Walter M. Burkett, 4523d CCTS, Nellis Air Force Base, Nevada

Above all, do not feel that declaring an emergency belittles you; on the contrary it proves that you realize when a situation is getting out of hand or is about to. It is the mark of a professional to use all facilities available to get his aircraft on the ground safely, with as little danger as possible to himself and the aircraft. If this necessitates calling out the fire trucks, ambulance and first team tower crew, good! Because that is what you want. 'Nuff said?

Basically there are two classes of aircraft emergencies, referring, of course, to the mechanical functions of the aircraft. That is, we have those dealing with the engine, such as oil, fuel and so on; and those dealing with the aircraft, like flight control, utility system, and so on. An SFO would be the best type of approach in only the engine category and could possibly be a very definite drawback in the airframe type. With this in mind let's use the following basic procedure as a guide:

- Engine problems: simulated flameout
- Airframe problems: straight-in final approach
- Airframe—engine problems: simulated flameout.

An SFO pattern is based on the theory that it is better to go off the far end of the runway SLOW than to hit it short and fast. Coupled with this is the idea that if you flame out in this approach you should still make the field, and if for some reason you can't you have safe ejection altitude for a longer period of time than in any other approach. But remember, on an SFO you have power available. If you need it, use it. It is far better to require a little power to adjust your pattern than to be so high as to require a go-around. You're defeating your own purpose if you have to go around to execute a landing.

The purpose of this article is to bring out points that may help a few people and not merely to give basic techniques. A common error is to be too high on an SFO landing. This may be caused by overcompensating for possible loss of power. If available power can be matched by retractable drag devices such as flaps and speed brakes, any further partial or complete loss of power can be offset by retraction of the drag devices. Use of the speed brakes is straightforward enough but flaps may cause some concern. Remember, the aircraft will glide farther with the flaps up, provided speed is kept up to clean glide speed. If you do use flap retraction to stretch the glide, do it high enough and with enough airspeed to avoid an increased sink rate near the ground—which can be fatal. Now for the overshoot error which is less likely to be fatal. There are various ways to lose altitude: slip, skid, yaw, dive, and so on.

Some aircraft can be slipped. For example, the F-100. How many of you have slipped an F-100 in an SFO? Many of the students we get through Nellis and even many of the old heads wouldn't slip if their lives depended on it. Some day they might. If you've done it, you know it feels uncomfortable, but then so does taking off on very warm days. The important thing to consider is that at your pattern airspeed of 220 knots in an F-100, or for that matter anywhere above 200 knots, you can fully cross control safely and slip off the extra altitude easy as pie. Slipping adds about 2000 feet per minute to your descent. Just remember that smooth entries and recoveries should be utilized, but don't slip off too much and hit short—it may be very embarrassing, if not fatal.

Have you tried it? If you don't want to do it close to the ground at first, try it at 15,000 feet, gear down with speed brakes. You will see for yourself that what some people think is dangerous may well make the difference in your flying career.

In conclusion, don't exceed your capabilities; use good judgment, become proficient, and use the professional approach. And don't do it, actually, unless you've done it successfully in practice. ★

• • •

Rex Says

An accident and an incident with the same moral: First, during a supply mission, the pilot of an H-43B noticed the oil pressure indicator was fluctuating. He suspected only instrument malfunction and continued the flight. The supplies were delivered and during his return flight the oil pressure dropped to 5 to 10 psi. Soon, two explosions were heard and the engine flamed out. The aircraft was autorotated into a swamp. The next story: A T-29 was on final, shooting touch-and-gos, when the tower informed the pilot that the right engine showed white smoke. After touching down, the pilot made ready to go for another takeoff when he noticed the oil pressure had dropped to 40 psi and the oil temperature had risen to 110°C. Takeoff was aborted and the engine shut down. Investigators found the engine frozen, and metal particles in the oil sump and screen.

REX SAYS—The moral of these two stories is pretty obvious—don't take lightly the storm signals that are provided. When a warning light, pressure gage, EGT, RPM, and so on, indicate something isn't going right and you are in a position to get the bird on the ground quick like—do it! Then, at your leisure, on the ground, you can find out whether it was a false indication or not. Let's not believe the instruments just when they show everything is hunky dory; let's believe the gages when they yell at you that you should be making like for a precautionary landing! ★

The actions you take immediately after ejection will usually determine your fate. Knowledge and training in survival techniques will put you on . . .

The Right Side of

Mr. R. E. Wenrick, Safety & Survival Technician
Hqs Warner Robins Air Materiel Area, Georgia

You have pulled the handles and parted from your bird and are now riding your seat through the wild blue. You separate from your seat, your chute deploys, and you give a sigh of relief for you've just made a successful ejection. However, what you do within the next few minutes will determine whether your ejection was a temporary success or a permanent one. On numerous occasions fatalities have occurred after what appeared to be a successful ejection because the survivor did not know just what to do after parting from his bird to ride the silk back to terra firma.

To prevent a possible fatality after successfully parting from your bird, indoctrinate yourself with the following procedures so they will come almost automatically, should the situation arise. These procedures basically apply when using a back-type parachute and a seat-type survival kit, and should be used as soon as possible after deploying the parachute. They will reduce time spent in the water, conserve strength, and possibly give you time to check survival gear during descent.

First, actuate your kit to inflate the raft and deploy the kit. ML-4 containers are actuated by first releasing the ejector snap on the left side of the kit to disengage the adjustable strap from the parachute harness. Grasp the slide fastener release lanyard on the right front edge of the kit and pull it upward sharply to remove the slider from the slide fastener. Maintain pulling force to actuate the CO_2 cylinder, thoroughly inflating the raft and forcing the container open.

MD-1 containers are actuated by grasping the slide fastener release knob on the right side of the container and pulling sharply to the right, thereby pulling the barrel keeper from the slide fastener and actuating the CO_2 cylinder which inflates the raft and forces the container open.

Rigid-style seat kits, found in fighter and some bomber aircraft, are actuated by grasping the yellow release handle on the right side of the container and pulling sharply upward and backward to separate the handle from the kit.

In all of the foregoing containers except the ML-4, the inner container with survival gear will be suspended below the survivor approximately 25 feet, with the raft in between. On the ML-4 container the raft is on the end of the drop lanyard. If the raft has a tendency to float in the air when using the ML-4, hold on to the raft by the hand holds or place between your legs to prevent entanglement.

Now, as you float comfortably down, check to insure that your raft was inflated properly. If the raft has not inflated properly and time permits, the raft can be pulled up and inflation completed orally.

Inflate the underarm life preserver by pulling sharply downward and slightly outward on the lanyards that extend from the lower front corner of each container. If a failure occurs, the life preserver can be inflated orally before entering the water, thus reducing possible confusion. Snap and draw the inflated cells together with the adjustable straps provided. If individual preference indicates that the raft can be boarded easier with the cells not hooked together, this operation should not be accomplished during parachute descent. Snap them together after boarding the raft.

When near the water (somewhere between one and two thousand feet) open the safety clips on the parachute canopy releases. *Before attempting to open the clips, insure that the clips have not already been released as you could be opening the canopy release.* Place your right hand on the right canopy release, if provided, and your left hand on the left canopy release. When your feet touch the water, immediately operate the canopy release to spill the parachute. The arms may be crossed when operating the releases. This will prevent the front of the preserver from coming in contact with your face when you hit the water. In any water landing, altitude is difficult to determine. Do not release the canopy until your feet touch the water, no matter how close you think you are.

To prevent puncture of the raft, close the release safety clips. If possible, it is also advisable to release one side of the seat pan to prevent its puncturing the raft. Recover the raft by pulling on the life raft lanyard attached to your kit or seat pan and board in the method you prefer.

After a water landing you are likely to get tangled in the suspension lines. All personnel engaged in overwater flights should carry a hook and snapblade knife for cutting the suspension lines or risers. (Type MC-1, FSN 7340-526-8740.) When a parachute with one canopy release is used, cut the riser without the release. It is better to discard the canopy rather than retain it as recommended in the past. It may do more harm than good if you become entangled in the lines. If land is in sight, it may be advisable to retain the canopy because of its many uses on land. If this is not possible, try to retain a number of riser lines and possibly a gore or two from the canopy.

The foregoing procedures should be used day or night after bailout over water, or over land where the possibility exists of drifting over water or where position is uncertain. If you are certain that you are over land you may wait and release the kit at approximately one to two thousand feet to reduce ground impact. This delay will reduce oscillation.

When using a back-type life raft container (CNU-7/P), also inflate the raft immediately after chute deployment. To do this, pull on the yellow wooden ball

the Ledger

assembly that extends from the lower right corner of the case. If the raft tends to whip during descent, it should be held by the handholds or between your legs. Further use of the back-type life raft case can be found in T. O. 14S3-2-61.

You are now in the water and you may experience difficulty in boarding the raft if perchance you have never had some training. However, if you have been trained and are familiar with the raft and preserver, you should have little or no difficulty boarding the raft.

Each crewmember should have this training since at no time does he know when he will need it. The following methods of boarding the raft have been derived from actual live jump tests and may be helpful. However, with training, you may find that you can board the raft by an easier method. The method used is not as important as your ability to board the raft with the least expenditure of energy.

First, pull the raft to you by the lanyard. Then, hook the life preserver over the small end of the raft; elevate your feet, and pull yourself into the raft. It may also be possible to swim up into the raft with this method. Another way is to hook the front of the preserver over the raft and pull the raft down until one knee is in the small end. Or you might try this: turn your back to the small end of the raft and pull the raft under the buttocks. Some individuals have found it easier to board the raft with the cells of the preserver unhooked at the front and pushed aside with the arms.

"Well," you say to yourself. "I finally got in this little ol' raft and I gotta get out of this bulky harness." However, you should retain your harness; don't remove it unless necessary. Your survival gear is all attached, and removing the harness may result in loss of this equipment if you capsize. The harness may also be used as a pickup sling during rescue operation. It also provides some warmth. You should therefore first retrieve your equipment container by pulling in the drop lanyard, usually found attached to the neck of the CO_2 bottle, as soon as possible after boarding the raft, to prevent the container's loss. Use your signaling devices only when you are sure rescue personnel can detect them.

If it becomes necessary to remove your harness, do so at this time. Every consideration, however, should be given to retaining the harness. You must insure that the raft and survival gear are securely attached to your person before attempting to remove the harness. You can remove it by partially deflating one cell of the life preserver, pulling it inside the harness and allowing that side of the harness to slide off. Reinflate the cell when the harness is completely removed.

Finally, after what may seem like an eternity, rescue arrives and you are pulled from the water. Yes, because you knew what to do, your ejection will appear on the record book as a success instead of a fatality. ★

"EAST IS LEAST..."

José Perez, sitting on the rocky slope of a Castilian hillside, was humming an old Granada folk song. The sheep dog at his feet stirred, whined and started slinking off toward the sheep. José was not alarmed, however. He knew that no wolves or other predatory marauders were lurking in the area. It wasn't difficult to understand the cause of the dog's apprehension; soon even the sheepherder heard the distant hiss build up to a roar. Suddenly the zipping, cracking, crash of eight supersonic fighters roared overhead. The flame of their afterburners—orange red tails of defiant strength—wrote "fini" in an earsplitting howl of SPEED! SPEED! SPEED!

In seconds it was all over. José watched with awe as the aircraft diminished to mere specks and disappeared into the scattered clouds to the west. He watched the snaking trail of the faint black smoke dissipate.

To the north, in England, the hands of the Greenwich Observatory master clock joined together. It was 1200 hours, high noon. In less than 8 hours, with the breaks, these little silver birds would sit down at Myrtle Beach, South Carolina—an ocean spanned and a world removed. The newspapers would say this was another routine operation.

Lt. Col. George Merriweather of the U. S. Air Force settled back in his harness. All of his seven chickens had checked in, and the flight was on its climb to altitude. All that was left now was to grind up to 32,000 feet and head for the first midair refueling station.

Over the hump and leveling out, Col. Merriweather observed his flight spread out a little into a loose, comfortable formation. In an hour and 40 minutes they'd make their first aerial refueling.

"It sure would be nice," mused the Colonel, "if we could have some fat, sleek jet tankers waiting out there over all that water to give us some juice! I've made hundreds of aerial tanker hookups but I still get a queasy feeling in my stomach when I slow this baby down to just above stalling to take a 'drink.' I feel like I'm sitting in a straight back chair trying to balance it on a needle. With jet tankers we could refuel at cruising speed and altitude in half the time with no loss in performance. But no matter how you cut it, the KB-50 is a gas station—and welcome."

On time and on schedule, the refueling of the eight aircraft was completed, and without incident. As usual the hookup was accompanied by the standard byplay with the tanker crew. The standard yuks were exchanged.

"Say Mac, are you full of Texaco? I've got a credit card!" Or, "Hi hoss, check the oil and wipe the windshield while you're at it!"

After breaking off, the flight climbed back to 32,000 feet and bored on to the vital mid-Atlantic refueling. This would be the critical operation of the flight. This would be the "point of no return" leg. This flight would require precision navigation.

It should be noted that the pilot of a Century series aircraft does not have available the luxury of a roomy cockpit. He cannot leisurely spread out maps, draw

Lt. Col. Jack L. Giannini, Information Officer, Hq 12th Air Force, Waco, Texas

flight plans or pause for a coffee break. His calculations must be made *prior* to the flight. The burr under the fighter pilot's parachute is the fact that forecast wind conditions at altitude over the mid-Atlantic are not as accurate as one would like.

As the flight clipped off the nautical miles, Col. Merriweather reviewed and re-evaluated his flight plan. He knew that he had to be right but he felt, from the heading given him by the tanker navigator, that the winds had been estimated wrong by the weather people at Moron, Spain. Also he sensed the low pressure area supposedly sitting north of his course must be moving south faster than had been expected. After a fast recalculation he determined the winds were now coming up from the south rather than down from the north as he had anticipated.

With this determination firm in his mind, the Colonel performed a rapid recalculation. He requested and received concurrence on the wind change from the other members of the flight. With the computation of the new data, Col. Merriweather made his decision. His well modulated voice calmly transmitted over the VHF radio:

"Black Jack leader to flight, we are turning to a heading of two two four degrees."

Lt. Jackson, flying tail end Charlie, had just finished replacing his oxygen mask after a bite to eat. Through practice this had become a neat trick. First, it was necessary to unwrap half of a 10c candy bar, unsnap the mask, cram the candy in his mouth, then close the mask —without a breath! With his mouth full of candy, Lt. Jackson was thinking:

"Two two four degrees? That's wrong. He's turned us too far south. If we fly this course we will be over 200 miles south of our mid-Atlantic rendezvous point. What's the matter with that guy up there? I know what he's done. He *subtracted* the variation out here instead of *adding* it." Lt. Jackson's mind flashed back to those sweatbox classrooms at basic flying school. He remembered the effort it took to keep tuned in to Captain Waddington's lectures on basic navigation.

"Variation (he could still recall the New Hampshire twang of Professor Waddington) is the angular difference at a given point between True North and Magnetic North. It is expressed as the number of degrees which Magnetic North is displaced east (subtract) or west (add) from True North. In other words, gentlemen, 'East is least and west is best.' "

"Now how am I going to get the word to him," thought Jackson. "If I tell him right out he's made a mistake, all the other pilots will hear it and I'll *hear* from him when we land at Myrtle Beach. But if I don't tell him, he's going to put us in the drink out there. Frankly I don't think all those sharks have had their share of calories today. Boy, this is a time when I could sure use some advice from Abigail. Let's see, how would you write that?"

"Dear Abigail: My squadron commander has goofed on his variation. If I don't tell him, I'm going to spend the night in a dinghy 800 miles from nowhere. What do you suggest I do? Signed, Anxious."

As Lt. Jackson thought out his problem the airplanes were droning on and on to nowhere. He thought back to a detective movie he'd seen one pleasant evening recently on a late, late TV show at the girl friend's. There he observed a villain disguising his voice by pinching his nose. Thinking rapidly to be sure that he himself was correct, he pinched the nose section of his oxygen mask and depressed the mike button on the throttle:

"East is least and West is best—every time!"

It seemed as if the receivers were out in all of the airplanes. No return comment was forthcoming. For king-size seconds the flight droned on its erroneous way.

Then, as the uncomfortable anxiety of disaster started clutching his stomach with ice cold talons, an authoritative voice broke the radio silence, with:

"Black Jack flight this is Black Jack leader. We are changing our heading. Our new heading will be two seven two degrees. Please acknowledge."

Black Jack One, "Roger."

•

Black Jack Two, "Roger."

•

Black Jack Three, "Roger."

•

Black Jack Four, "Roger."

•

Black Jack Five, "Roger."

•

Black Jack Six, "Roger."

•

Black Jack Seven, "Thank God."

WINTER FLYING

Major Murray Marks, Director of Safety, Hq 7th Air Div (SAC) APO 125, N.Y.

Winter's already in full swing in some areas, and almost every year several aircraft and crews are lost in accidents attributed to the hazards of winter flying. In view of the extended periods of winter flying conditions in many parts of the United States and Europe, this article has been written to remind some and acquaint others with the problems to be expected so they may be alerted to the hazards.

The accidents I shall discuss were mostly influenced by typical winter flying conditions such as snow, ice, slush, and icing. Accidents which were attributed to fog, haze, and rain have not been included because these conditions frequently occur throughout the year in many parts of the country and are not peculiar to winter hazards. They must not be overlooked, of course, so my first point to pilots and supervisors is this: the dangers of fog, haze, and rain must not be minimized. Be prepared for them at all times. They can cause accidents just as severe as those caused by regular winter conditions.

The following capsule account of aircraft accidents shows which winter flying condition was either the primary cause or contributed to the mishap. In the first one, the pilot was warned of a slippery runway prior to landing. He overshot, touched down 2100 feet up the runway, and crashed into a wall at the end of the overrun. This accident, however, would probably have occurred on a dry runway.

Slush is the villain in the next couple of accidents because it broke or damaged flaps, engine nacelles, and cowling. In some cases the pilots were not warned of runway conditions and could not detect them because of poor visibility. Slush can be as dangerous as chunks of ice, especially when it is flung in gobs at high speeds. There is also the ever-present danger of skidding and of poor braking on slush-covered surfaces.

Six of the accidents I studied for this article were caused by one or all of the landing gear freezing in the UP position, resulting in gear-up landings. In each instance, the aircraft had taken off from a runway covered with a thin layer of melting snow or patches of frozen snow and slush. The landing gear, when retracted, was held in that position by the grit and ice which formed when the aircraft entered freezing temperature zones.

Uneven braking action is always a menace in the winter time. With ice patches or slush on sections of the runway, the pilot must always be careful that he does not jump on the brakes so hard that when he reaches portions of the runway that are dry, the tires blow out! You've got to use your brakes in the winter time, of course, and some portions of runways will be slippery and icy. This simply requires caution and careful observation on your part. However, you're probably better off at that than on a runway that is completely covered with ice. Several of the winter accidents I've examined occurred on icy runways where the aircraft couldn't stop at all; they simply went off into the overruns, with varying degrees of damage.

While many wintertime accidents resulting from skidding and no braking cause aircraft damage of some degree, they usually do not involve loss of life. In one case, however, a skidding aircraft hit an 18-inch snowbank—not dangerously high—overturned, and caught fire. Three people died. Snowbanks are always a hazard; it is imperative that they be kept cleared away from operating areas as much as possible.

One recurring feature of these wintertime accidents was the failure of tower and ground personnel to warn pilots of the conditions of runways, snowbanks, and taxi areas. With sufficient warning, pilots can think of some remedial action to take, even if it involves going to an alternate base. Let the aircrews know what they can expect when they touch down. Forewarned is forearmed, you know.

When I reduced some of the data I'd assembled, it was plain that aircraft accidents from winter flying conditions were due mainly to five major causes. These are:

- Snowbanks on runways.
- Melting snow and ice on runways and aircraft.
- Freezing of landing gear and flaps.
- Icy runways.
- Low temperatures and other cold weather effects.

Perhaps you've already thought of the same thing that occurred to me when I compiled this list: that with proper supervision and better pilot education in winter flying techniques, many of these accidents I've enumerated might have been prevented. Yes, it's unfortunately true that the same old failings show themselves again and again. Supervisors, the burden is on *you*. Prevention is more profitable than investigation, and a whole lot easier!

Anyway, let's take these five problem areas one by one and discuss them a bit.

The first one, snowbanks, is not an acceptable hazard. For those in SAC, compliance with the provisions of SAC Manual 90-1, "Standing Operating Procedures for Snow Removal," will eliminate this danger. If after a deep persistent snowfall the area is not completely cleared and if the snow is permitted to remain heaped up in banks and drifts, it will form compacted icy masses

There is just too much at stake to justify taking chances. which disperse slowly. Thus, although flying is continued without interruption, unsafe runway conditions may be unduly prolonged. The choice is between a short period of inactivity—with the prospect of a full and safe resumption of flying when the runway clears—or a longer period of restricted and comparatively unsafe flying.

Melting snow and ice, of course, must be removed from an aircraft prior to flight. No further explanation is needed on this one. But slush and wet snow on the runway continue to be a problem. The increased landing and takeoff speeds of present-day aircraft enhance the danger of damage to flaps and surfaces, which could easily have serious consequences. The main hazard lies in the rate of displacement and the force with which the slush and water is thrown against the aircraft. The mixture is often made heavier and more abrasive by the solid matter which contaminates runways after attempts at snow removal and other frost precautions. Clearing the runway down to the concrete can help prevent this. If in doubt about whether runway conditions are good enough for operations, it might be wise to consider a weather abort. An ounce of prevention, and all that.

Our third major accident cause, 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. I must add, however, that there is no evidence to prove or disprove the effectiveness of this practice. If you can come up with a solution to this problem, please let us know about it. The pages of *Aerospace Safety* would be just the spot for it!

As for the difficulties posed by icy runways, it is well known that the coefficient of friction on ice is much less than that on wet runways. Normally, this coefficient of friction increases as aircraft speed decreases. On wet ice, however, it remains fairly constant throughout the landing run. It may even decrease on dry ice. Stopping distances, therefore, are substantially increased with the danger of overrunning the runway, a distinct possibility even after the aircraft speed has been reduced considerably. Use of an icebound runway seriously increases the exposure to accident. Ice patches on runways cause wheels to lock and unlock with brake application, thus causing blown tires. The resultant possible damage to brake lines with the loss of hydraulic fluid can cause a serious fire.

I hope we can all learn from the sad experience of others as reflected in this study. To combat these winter flying hazards successfully, the hard and fast rule to be observed is: Exercise constant vigilance and avoid unjustified risks. Winter flying accidents *can be* prevented. But to prevent them, all supervisory and flying personnel must be aware of the problems and be prepared to meet them. And commanders must insure that all procedures dealing with winter conditions have been reviewed and are adequate to cope with foreseeable problems that may arise, or now exist.

Base operations officers bear a large share of the responsibility for helping prevent winter flying accidents. They should maintain constant checks of weather and runway conditions, and should warn pilots well ahead of any expected difficulties or hazards. With the arrival of snow, they must be sure that—if they are SAC types—the provisions of SACM 90-1 have been complied with prior to allowing runway use. When conditions warrant it, all persons involved with the mission responsibility should seriously consider suspending flying activities if circumstances permit.

Ultimately, of course, it is the man in the cockpit who must face the music if he goofs. It is up to him to know his Dash One winter procedures, inside and out! It is up to him to insure that all his deicing and anti-icing equipment is working properly *before* takeoff. He must know the condition of the runway, weigh it against mission requirements, and make the final decision. If he is wise, he will avoid any unnecessary risk, divert or abort, as required, and bring himself, his crew, and his aircraft home safely.

Here is a final checklist. Read it carefully and see if *you* are ready for the winter hazards that lie ahead, unless of course, you're already battling them. I am aware that at this time of the year some of our AF bases are wintered in and their crews are facing such hazards right now. If you are among them, perhaps you have a tip or two that you could send to *Aerospace Safety;* it might be helpful information for someone else.

Knowledge prevents accidents. If you don't have an accident, you won't have to employ any survival techniques and you'll save yourself a lot of time and effort. When that thermometer starts to drop, take care. You'll keep on the go through the ice and snow if you stay in the know. Happy flying! ★

Winter Flying Checklist

- Are you adequately clothed and equipped for the area you are flying in, or to?
- Is the aircraft free of frost or snow?
- Are the flight instruments thoroughly warmed up before takeoff into subzero temperatures?
- Do you know the complete anti-icing and deicing system of the aircraft?
- Do you know how to detect and combat carburetor icing and jet engine icing?
- Do you know what to do when encountering severe icing, freezing rain, and extreme turbulence?
- Do you know the value of inflight reports of unusual and unfavorable weather conditions, particularly heavy icing turbulence?
- What is the correct technique for landing, or after landing, on snow or ice? With crosswind components?
- Are you familiar with oil dilution systems, and do you cooperate with maintenance personnel in using them?
- Are you physically fit?
- Do you understand cold weather survival technique?

TRIGGERED TO

By constant drill in procedures and the use of proper lifesaving equipment, these well-trained troops are triggered to rescue pilots forced to give up their flight.

A2C H. D. Lucas, on the intercom, has just alerted the primary crash circuit which has direct connections to the fire department, hospital and base operations. Word given is that aircraft has crashed.

Using Disaster Control grid map, the crash is located eight miles from George AFB. TSgt W. S. Nellis and A1C J. S. Cardenas alert the secondary crash unit, giving location and other pertinent details.

"SCRAMBLE!"

1st Lt. J. R. Cutler, of Base Ops, briefs the Chaplain, Air Police and Div. Ops on accident location before rescue team leaves for crash scene.

RESCUE

Capt. Ralph C. Evans, Jr, Information Officer
831st Air Base Gp (TAC), George AFB, Calif.

The two smoke bombs in front of Capt. Malcolm Agnew will guide 'copter to crash scene. Fire Chief E. C. Marshall and Capt. J. G. Anderson have loaded the drum with oil and rags to simulate the crash scene.

Awaiting rescue is A1C Earl E. Payne. Card around his neck informs medics of the extent of injuries sustained in simulated low-altitude bailout. His only real injuries were ant bites.

In the life of each one of you who flies, there's always the remote possibility that you will prang one of those big beautiful birds in an accident. If you do, a highly complex, well-organized crash-rescue apparatus is triggered into action. Here at George Air Force Base, California, we have one of the finest crash-rescue operations to be found. This is partly because Brigadier General John A. Dunning, 931st Air Division Commander, insists upon continual practice to keep the emergency units in razor-sharp shape for their response to accident calls.

Typical of these practice sessions is the one pictured on these pages, conducted by Captain Malcolm J. Agnew, representing the 831st A.D. Operations. For realism, a message was passed to the George control tower operator at 1500 hours one afternoon stating that the lead aircraft of a two-ship F-102 formation practicing GCAs to the George runway had crashed. The message further stated that the pilot was seen to bail out at low altitude.

Alerted hospital, firefighting, air police and standby helicopter personnel quickly gathered at base operations. After a short briefing on the crash location, the team rushed to the chopper to fly out and give aid to the downed flyer. Meanwhile, a ground convoy of firefighting equipment, ambulance and air police guards left for the accident, some 8 miles off the end of runway one six.

While this action was taking place on the base, Captain Agnew and his men prepared the "accident" scene to greet the rescuers. Fire Chief E. C. Marshall and two of his men set off smoke flares and started an oil and rag fire in a 55-gallon drum to simulate an actual aircraft fire. A quarter of a mile away, A1C Earl E. Payne, of the 831st Ops Squadron Personal Equipment Section, lay down on the desert sand as the "injured" pilot. A tag on his chest announced the seriousness of his injuries.

What happened from the time the message was flashed that a plane had gone down until the injured pilot was brought in to the base hospital is shown in the photo series. What is not shown is some of the background of men, materiel, and money that go to make up the crash-rescue network.

Take, for example, the fire house alone. Under the control of the Fire Marshal are 76 men, operating in two shifts of 24 hours each. The men on shift eat, sleep, and live out their duty hours in the station. They perform OJT, work on their equipment, and prepare for those moments of emergency when a crew's life may hang in the balance, depending on their efforts.

Their mechanical equipment alone runs into many hundreds of thousands of dollars. Some of the foam trucks run $60,000 per copy; the smaller rescue trucks with the power saws, machetes, hand tools, axes, power winches and lighting systems, used to rescue crews trapped inside wreckage, cost $16,000 each. Rescue does not come cheap—but life doesn't either.

Besides the all-important firehouse, another location

Left, Flight Surgeon, Capt. J. T. Monahan, runs to injured pilot. Below, as patient is given on-the-spot first-aid, 'copter pilot 1st Lt J. P. Doran, has moved into position for immediate return to base.

Above, SSgt D. B. Bryson prepares stretcher for quick evacuation. Below, injured pilot is loaded aboard a cranked-up helicopter for a 4-minute trip to base ramp, where he will be met by ambulance.

"Triggered to Rescue" (Cont.)

that is alerted when the primary crash circuit goes off is base operations. This is the hub of all activities for either on-base or off-base crash-rescue operations. The base ops officer, Major Jack C. Owens, is the mission controller for the entire operation. When his dispatcher gets the word from the control tower, Major Owens immediately activates what is known as the secondary crash circuit. This includes such people as the Air Division and Base Commanders, their Operations Officers, the Chaplain, the Air Police, Claims, Flying Safety, Information, and the Armament Officer. They, and many others, have an important part to play in the drama of any crash-rescue operation.

Probably the most significant role of all is that taken by the helicopter pilots and crews. With the latest techniques and equipment, developed specifically for crash-rescue operations, these men are at the scene of the crash in record time, ready to fight the fire, pull out any trapped crewmembers, and fly them to the hospital. The chopper pilots at George AFB alternate on a 24-hour alert plan. Whenever the man on alert walks out the front door of his house, he must call the operations dispatcher and leave word as to where he can be located.

Also on board the chopper during rescue missions is the flight surgeon, one of the key men in the entire operation. He is usually assisted by a medical technician, and a fire department rescue expert well versed in the methods of releasing jammed canopies and extricating trapped and injured victims. These medical and fire department personnel are the first on the scene of the crash; they are aided by the others who come up by convoy.

While the helicopters and road convoys are on their way to the disaster scene, the base hospital is meanwhile preparing for any eventuality. As soon as the flight surgeon aboard the chopper knows the extent of injuries and the possible needs of the victims, he radios the base hospital to have everything in readiness. In this way precious moments are saved in the race against death or disablement.

There's the story. In good weather and bad, night and day, many dedicated men are prepared to leap off at a moment's notice to come to your aid if you have a mishap on one of your missions. Your better understanding of their work can relieve you of concern so that you can concentrate on keeping that airplane up in the blue. ★

Ambulance and Air Police vehicle have arrived at crash scene. The APs guard wreckage area while ambulance backs up helicopter evacuation.

Above, as part of realistic crash exercise, George AFB firemen, under supervision of Asst. Chief J. D. Phillips, extinguish fire. Below, injured pilot is transferred from helicopter to waiting ambulance for trip to hospital where everything is in readiness to receive him.

You've just bailed out ten people—one engine is going full bore, the other shut down—but windmilling! Best advice is to brace yourself and prepare for . . .

A FULL POWER LETDOWN

Captain William E. Brown, Jr., USAF
2589th AB Gp, Dobbins AFB, Ga.

The Instructor Pilot booted the heavy Gooney down the runway, while to his right the Aircraft Commander—also an IP—quickly sized up takeoff conditions. Panel okay, airspeed approaching 80 knots, lots of runway left, another "normal" takeoff.

"Gear up, 36"-2350 rpm, boost pumps off. Check that right cylinder head temp, looks hot."

The C-47 slowly climbed westward, reached 6000 ft. assigned and as the power was reduced to cruise, the 10 passengers settled back to begin whiling away the long hours to the first fuel stop. Up front the crew tidied up the cockpit, adjusting mixtures, checking engines and fuel caps, tuning initial frequencies—and then they too relaxed, called for coffee and settled back into the experience-worn groove of normal navigation. Another "routine" flight was in progress.

The left seat IP pulled out his sunglasses and nodded as his buddy in the right seat took over. "Smooth up here today," he said to himself. "Little hazy but should be no sweat. Props sound good, got 'em synched first try! Hope our forecast winds hold, should give us about 145 knots—ought to make Tinker by 5 o'clock."

The props momentarily went audibly out of synch, then back in. Both pilots quickly glanced at the tach, then at each other questioningly. The engineer came forward and added his questioning look to the group. "Normal." Then out of synch went the props again. Alerted by the first surge, all three men caught a 100-200 rpm increase indication on the left engine. The pilot put his hand on the quadrant as if expecting a necessary change to come.

"What's it look like to you?"

"I think the left governor isn't holding."

"Shall we go back?"

"Hold course for a few minutes and let's see what happens?"

"Chief, get the Colonel."

The third pilot, a command type, came forward, was briefed on developments, and after a quick staff meeting, a turn was started for home to get another airplane. Suddenly, the left prop let go! 2500, 2600, 2800 rpm. And as the pilot came back on the prop control, rpm stabilized, then slowly started down, reaching 2000. The pilot advanced the prop control an inch, then held it. 2400, 2600, 2800, 3000 rpm. Back on the prop lever, "Feathering Number One," shouted the pilot. Throttle back, mixture off.

The rpm hung near 3000 then slowly started downward, reaching a momentary low of 1700, then stabilized at 2100 rpm. The cockpit cleanup continued, but with fuel, ignition and power off, the left engine rpm stayed pegged at 2100. Number 1 would not feather! The lumbering C-47 started down—5-700 feet per minute—the airspeed was down to 100 knots. The ground was 5000 feet below.

Contact with home base DF had been immediate as the emergency started, and now, on heading, with passengers alerted, the bird had 37 miles to go. The crew interspersed their discussion of emergency procedures with futile attempts to shut down, or slow down, the windmilling prop. It was becoming increasingly obvious the aircraft would not maintain altitude. The crew chief went back to brief the 10 men in the cargo compartment on the situation and prepare them for possible bailout. Three thousand feet, 25 miles to go.

"When do we tell 'em to go, 2500 feet?"

"We're almost at that now. Let's wait for 2000—the terrain is about 1000 feet." Two thousand feet, 15 miles to go! Not a chance now.

"Let's get 'em out, Colonel!"

The Colonel nodded and turned for the cargo compartment to send the passengers out the door they'd seen their bags disappear through seconds earlier. In 15 seconds the Colonel returned. "All out!" he shouted. "Crew Chief's gone too."

The three remaining crewmembers anxiously scanned the panel and the ground for a runway. Still descending, but not as rapidly now—50 to 100 feet per minute; airspeed down to 85 knots with control becoming difficult. Minimum control speed, 76 knots! Still the hurried discussion continued. "Shall we get out?" "How about putting it down in an open field?" "Freeze the prop and chance a fire or prop separation?"

A mutual decision was quickly reached to stay with it and try for a civilian field 10 miles south of home base. It would be close, only 1000 feet terrain clearance, marginal airspeed, plus the fact that they'd been running the good engine at full power for over 15 minutes. Finally, after an eternity, the beautiful long concrete runway appeared several miles ahead, and after a throat-

catching moment of skimming over a small ridge, they had it made. Gear down on short final, then the beautiful prolonged screech of rubber on concrete. The C-47 turned onto a taxiway, pilot and copilot shut 'er down, and in the following silence the drained crew grinned at each other and spoke the words that safety produces after moments of terror.

A speeding station wagon raced them to Operations and, with the Colonel aboard, an Army helicopter headed for the jump area to join another chopper that had been dispatched just after the bailout. Ground parties, police and civilian ambulances from the small town near the incident scene were already picking up the survivors from the swamp. Within one hour, all 10 parachutists were safe in a local civilian hospital, three receiving medical treatment for the minor injuries received from their tree landings. The "normal" flight was over.

That's the story. Now let's look at some of the details of the emergency.

First of all, what caused the failure? Why did the prop run away, and to compound the emergency, why wouldn't it feather?

Maintenance soon discovered that the prop shaft oil transfer rings had failed. Oil pressure normally routed along the prop shaft to the prop governing and feathering systems remained in the engine, thus no pressure was available for prop control. A compound emergency—failure of both governing and feathering systems—but both caused by a single failure.

The cause of the failure? Unknown. Perhaps fair wear and tear, since this engine had 1160 hours on it at the time of failure.

Now, how about the bailout? Ten inexperienced troops leaped out the main cabin door, and with three minor exceptions, made it home free. Luck? Perhaps. But maybe more than luck. Perhaps it was planned that way—before takeoff.

In reviewing the incident we found that the passengers received a thorough briefing on emergency procedures, including a demonstration of fitting and use of a parachute. Each man aboard knew *before* takeoff what to expect in an emergency. And this briefing really paid off. The passengers knew what to expect, and more important, what was expected of *them* when the three short rings on the alarm bell sounded. No panic, no confusion; they were prepared. And when the awful words finally did come to "Bail Out!" the escape went off without a hitch. Ten men out in 15 seconds! A pretty good performance even for experienced jumpers.

Meanwhile, back at the controls, how about the troops doing the flying? Let's examine their predicament. What about a cold, realistic look at what they did, what they should have done and what they could have done. You'll recall, the first control movement when the emergency occurred was to retard the prop control, and it worked—temporarily. Now the book says, "Close the throttle, *then* the prop lever, and feather." But the crew wanted that engine to insure safe flight for the heavy airplane, and since the emergency was not yet fully developed, their experimentation was justified. For example, you don't immediately shut down a T-Bird when the fire warning light flickers. When it was finally determined the governor would not hold, the crew took proper action—according to the book—to shut it down.

Now we reach the real decision point. *The prop would not feather.* What should be done now? The Dash One is not too clear on this point. For an overspeed, it suggests retarding the prop control to full *decrease,* open the firewall shutoff valve (no fire), close the throttle, and that's that! But there's no discussion of what happens when you're stuck with an unfeatherable prop. The fact is, *the airplane will not fly* if RPM is above 2000. And below that it is touch-and-go. This point is of extreme importance because it means that the airplane is going to land whether you like it or not! Full power on the good engine still results in a descent. And if no chutes are aboard, as is the case for certain missions, the choice is a simple one: "Which plowed field or cornfield or wooded slope shall I set it down in?"

The aircraft involved in this particular incident grossed out at 28,000 pounds. Full power on the good engine (2700 rpm-48 inches) with the dead engine windmilling at 2100 rpm, the result was a 700-800 rpm descent at 90 knots. Even after jettisoning equipment, baggage and 10 people, leaving 26,000 pounds gross, the rate of climb indicator pegged at 100 feet per minute down, and in the struggle to maintain altitude, airspeed dropped to 80 knots.

What else could the crew have done to keep the bird flying? These choices were discussed:

First, close the fuel/oil shutoff valve and freeze the engine. This procedure would certainly reduce the drag of the windmilling prop, but what about fire, or the prop shearing and coming through the cockpit? This risk was unacceptable.

Second, how about restarting the engine in an attempt to get at least *some* power? Might work, but remember, the rpm was still climbing at 3000. How high will it go before it comes apart or catches fire or throws the prop? Still unacceptable.

So—the crew finally elected to toss out the tool boxes, the baggage, and even the passengers, and try for a runway. They made it, but at minimum altitude and near minimum control speed.

There's the story. We offer no solutions. We're just stating the facts of our experience and the decisions we made. It's up to you to prepare your crews for a possible C-47 "Full Power Descent." ★

• • •

"We may be flying space ships in the future . . . But right now I'm concerned with how safe is that Gooney Bird for flight!"

★ ★ ★ ★ ★ ★ MISSILANEA

The Missile Safety Officers Course is finally underway. There will be two classes in the fiscal year 1961, each 8 weeks long, with 25 students per class. The first course begins at the University of Southern California about 5 January 1961. The primary purpose of the course is to develop a basic foundation of knowledge and skills which can be applied to the formulation of effective missile accident prevention programs. The course will not be limited to the consideration of immediate problems but will include a basic scientific background for the students to enable them to adapt their accident prevention efforts to the requirements of new missile and space systems.

Although designed for Missile Safety Officers at the operational unit level, the scope of instruction is sufficiently broad to be valuable to staff missile safety officers and others with supervisory responsibility for missile safety activities.

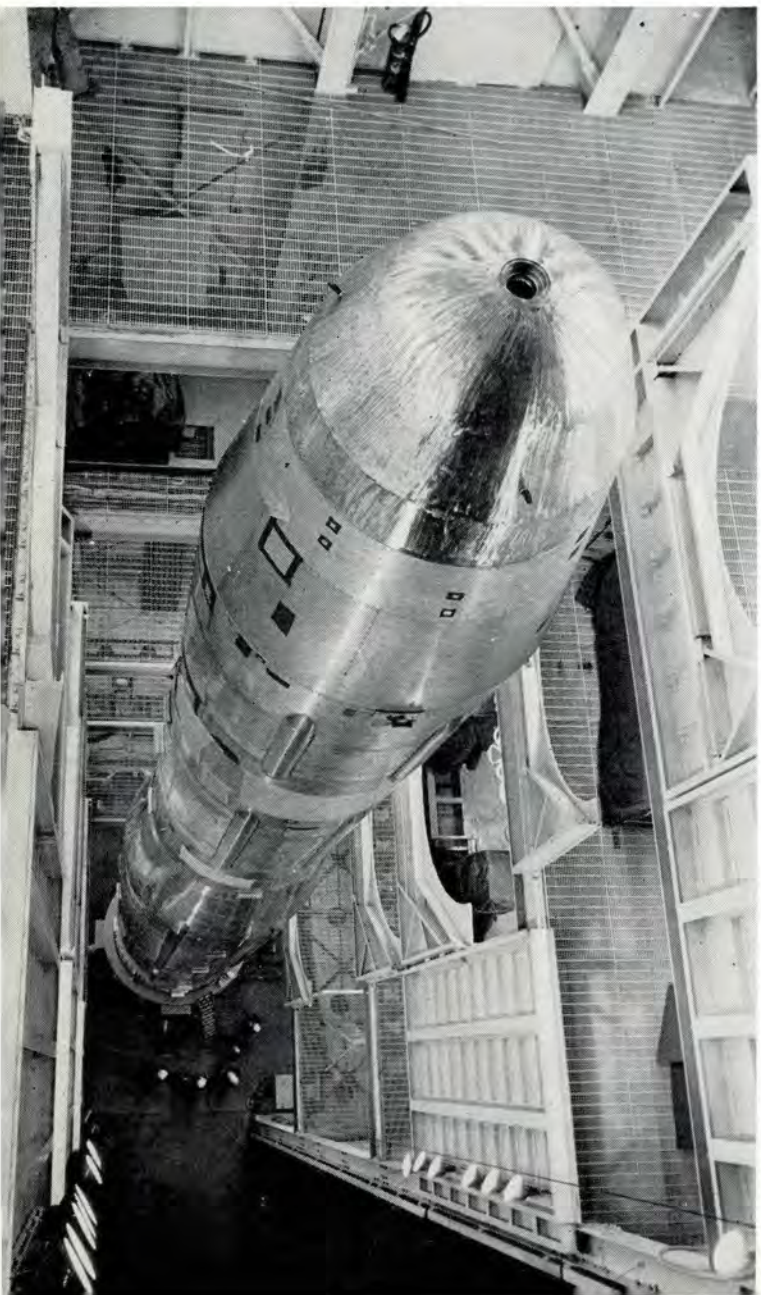
To secure full utilization of the education provided in the course, the student MSO must acquire training or experience in the operational use of some specific missile system, either before or after attendance at USC.

The course will consist primarily of major subject areas of applied science and missile technology. Supplementary courses are included for the analysis of human factors in missile operation and for the application of the techniques of accident prevention programs at missile installations. When the MSO leaves the school he will at least be stuffed with some of the following:

First, an understanding of the basic concepts of mathematics, physics, and chemistry, and their application to missile safety problems.

He will have acquired an introduction to fluid mechanics, propulsion, structures, and nuclear physics, with application to the operational problems of missile and space systems.

And, finally, to package his studies in a usable container, he will be given a survey of human factors prob-



Left, final inspections completed, TITAN is ready for Cape Canaveral. Towering more than 90 feet above base, it is shown at Martin plant, Denver, prior to air trip. Below, test pilot Burton Warren poses with Hughes' Super FALCONS. On right is GAR-3A radar guided "bird." Next is GAR-4A infrared seeker. In rear are GAR-1D (right) and GAR-2A. Left, foreground, is GAR-11 Nuclear Falcon, first air-to-air guided missile with nuclear capability. The 3-A and 4-A have Mach 2 launch speed, deadly accuracy, and will ignore enemy decoys.

So, what makes you think that you qualify for the missile insignia?

lems and a review of the techniques of industrial safety and the management of accident prevention programs.

The students will gain field experience through visits to manufacturers, i.e., Douglas, Lockheed, North American, and to test centers and military installations such as Edwards AFB, Jet Propulsion Lab., California Institute of Technology, and the Pacific Missile Range.

It's a well-rounded, carefully thought-out program to help insure the Air Force against catastrophic missile accidents. Do you think you could hack it? If you do get out here to USC, come on out to Norton and see us. The Directorate of Missile Safety Research people and the editors of Aerospace Safety Magazine would be delighted to have you.

• • •

Training films for weapon support systems have taken on an increasingly important role in the USAF Training Program. But, to be wholly effective, these films should be delivered with the system. With this thought in mind, Headquarters USAF initiated a Staff Study pointing out that obtaining the training films from the various aircraft and missile manufacturers will afford the Air Force an opportunity to obtain film aids not only concurrently with the delivery of the weapon support system, but with more accuracy than is possible under the present setup. Substantial dollar savings can be made which will enable the Air Force to increase its training film program. This will assure more training.

Following is a list of missile safety films on the production schedule for the fiscal year 1961 designed to acquaint missile personnel with their safety responsibilities. The films will depict major hazards, special problems, and protective measures required for, safeguarding personnel and materiel. The films cover the missile and all associated support equipment, including loading, handling, transportation and maintenance. Maintenance problems themselves will be covered in detail.

The films are basically "how to do it" productions in safety principles and methods. Highlighting the hazards of working with specific elements of missile weapon systems, the films will show by contrast and comparison just how safety practices and accident prevention methods should be employed. They will show what *to* do and what *not* to do.

Those specific hazard and accident areas that have been uncovered by present missile operations will be examined in detail, as will the remedial steps taken to overcome the deficient areas. Commanders, supervisors, and unit instructors should thus have a blueprint for analyzing their own areas of operation and should find assistance in setting up their own safety programs. As the film program unfolds, all aspects of missile maintenance and operation will be covered to provide basic background information for missile safety training.

The Air Force cannot afford to have the first missile accident. NOW is the time to prevent it from happening. These safety films should be of enormous assistance in the missile safety training program.

Films Planned For Fiscal Year 1961

Quarter	Title and Description	Technical Support by Major Command or Staff Agency
1-1	TITAN Weapon System Safety	SAC and Martin-Denver
1-2	BOMARC Weapon System Safety	ADC
1-3	MACE Weapon System Safety	ATC
1-4	HOUND DOG Weapon System Safety	SAC
1-5	GENIE (MB-1) Weapon System Safety	ADC
1-6	Missile Hazard Reporting	AFCMS
1-7	Pressurization Safety	AMC
1-8	Electrical Cables & Connector Safety	AFCMS
2-1	FALCON Safety (Ground-Air)	ADC
2-2	SIDEWINDER Safety	ADC
2-3	Missile Explosive Device Safety	AMC
2-4	Protective Clothing & Safety Devices	AMC
2-5	Launch Emplacement Hazards (Tactical-Cruise) (Ballistic)	(T-C) TAC (B) SAC
2-6	Battery Safety	AMC
2-7	Fire Protection Systems and Missile Safety	AFOOP-CE
3-1	MINUTEMAN Weapon System Safety	ARDC
3-2	Transport Safety (Ground-Air)	MATS
3-3	Safety In The Alert Hangar	ADC
3-4	RF & Electromagnetic Radiation Safety	AMC
3-5	Personnel Warning Systems	SAC
3-6	The Missile Safety Officer	AFCMS
3-7	Quantity Distance Factors in Missile Safety	AMC/ AFCMS
3-8	Cryogenic Safety	AMC
3-9	Design Safety (UR & Def Rpts)	ARDC
4-1	Fueling Missiles & Launch Tanks	SAC
4-2	Contamination & Decontamination Procedures	SAC
4-3	Danger Zones in Missile Environment	SAC
4-4	Missile System Deficiencies	AFCMS
4-5	The Missile Safety Technician	AFCMS
4-6	The Missile Safety Program Rpt	AFCMS
4-7	Missile Maintenance Safety	AMC

The sun was shining brightly and it was a joyous day at Johnson Air Patch. Captain Sam Space, an excess pilot from Yokota, had finally finished Mobile Training Unit (MTU) Theater Orientation. He had filled out stacks of questionnaires and listened to innumerable admonitions by ground and flight instructors and assorted Old Heads to "watch this beast and don't let the airspeed get below 155 on single engine—ever!"

"Nice guys," mumbled Sam to himself, "trying to shake me up on my first day out of MTU. Bet the next thing they're gonna spring is that old gag about 'airspeed you don't have, altitude above you, runway behind you, *and* field grade navigators.'"

The morning of the big day, disregarding the strident tones of his mate, Sam cleverly extricated himself from her presence and bolted for the door as she shouted her constant demand to "get yourself a good guv'ment job in the Officers Club and stay away from them Korea-lovin' Third Bomb troops!"

Captain Space immediately reported to the "Hangar of the Seven Day Happiness" (as the modest abode of the Training Flight is referred to, being the first and last steps toward many happy, seven day tours). Sam came face to face with Captain Fosdick, who was to be his fearless flight instructor and cockpit companion for the next few weeks and 14 leg-bending instructional flights.

"The first facts I want you to know," drawled Captain Fosdick, "are about the four most useless things in the Air Force. They are: airspeed you don't have, altitude above you, runway behind you . . ."

". . . and field grade navigators," chirped Sam, with a reckless abandon that sometimes causes instructors to apply for transfers.

Fosdick fixed his new student with a withering gaze and then quietly requested, "Get your personal equipment and follow me. You are due for an education in the facts I've just mentioned."

Captain Space was happily strapped in with his P-4 helmet, oxygen mask, shoulder harness, safety belt—everything in place just like the book called for. Fosdick was mounted on the side of the B-57 cockpit, going through the checklist and correcting any omissions or skipping around. After finishing the checklist, Fosdick requested Sam to "close your eyes and point to or touch each item as it is called out on the blindfold cockpit check."

Grinning foolishly in his oxygen mask, Sam confidently touched each knob or switch as it was called out. The cockpit check completed satisfactorily, Fosdick assumed his position in the rear seat and observed his student complete the engine start, make the necessary radio calls, and taxi out to the active runway. So far, so good.

"Johnny Tower, this is Newhouse three zero, ready for the active."

"Roge, Newhouse three zero, you're cleared on and off, altimeter thirty point zero four, wind northwest at ten."

"Roge, Newhouse three zero."

The B-57 rolled slowly into position and rocked gently to a stop as the brakes were set. Smoke and sound thundered behind as it quivered and rocked at 100% rpm. At full power the pilots checked all the gages: RPM, EGT, fuel flow, oil, hydraulic, loadmeters, a few others, and then the front seat pilot announced to the IP that everything was OK and ready to roll.

"Let's go," cleared Captain Fosdick from the rear.

The nose bobbed up and moved forward as the brakes were released, slowly at first, then gathered speed: 95, 100, 110, 115, nose off, 120, 127, and as the runway dropped away the gear was sucked up beneath the climbing aircraft. Then, 140, 155, 175, 200 and finally the airspeed pointer settled on 250 knots and the climb made out of the traffic pattern into the wild blue yonder.

"Mighty nice flying machine you got here, Captain," confided Sam into the hot mike system after an hour and a half of stalls, turns, and various other air work. "What was it you said about some sort of a practical demonstration?"

No sooner were the hasty words spoken into the impatient captain's oxygen mask than he experienced a sickening heaviness of the right rudder pedal. The J-2 compass and turn needle turned rapidly to the left, the airspeed dropped off—220, 200, 180 . . .

"Get the power back, lower the nose, and get some directional control!" barked the IP. "Tell me what the trouble is—and your intentions."

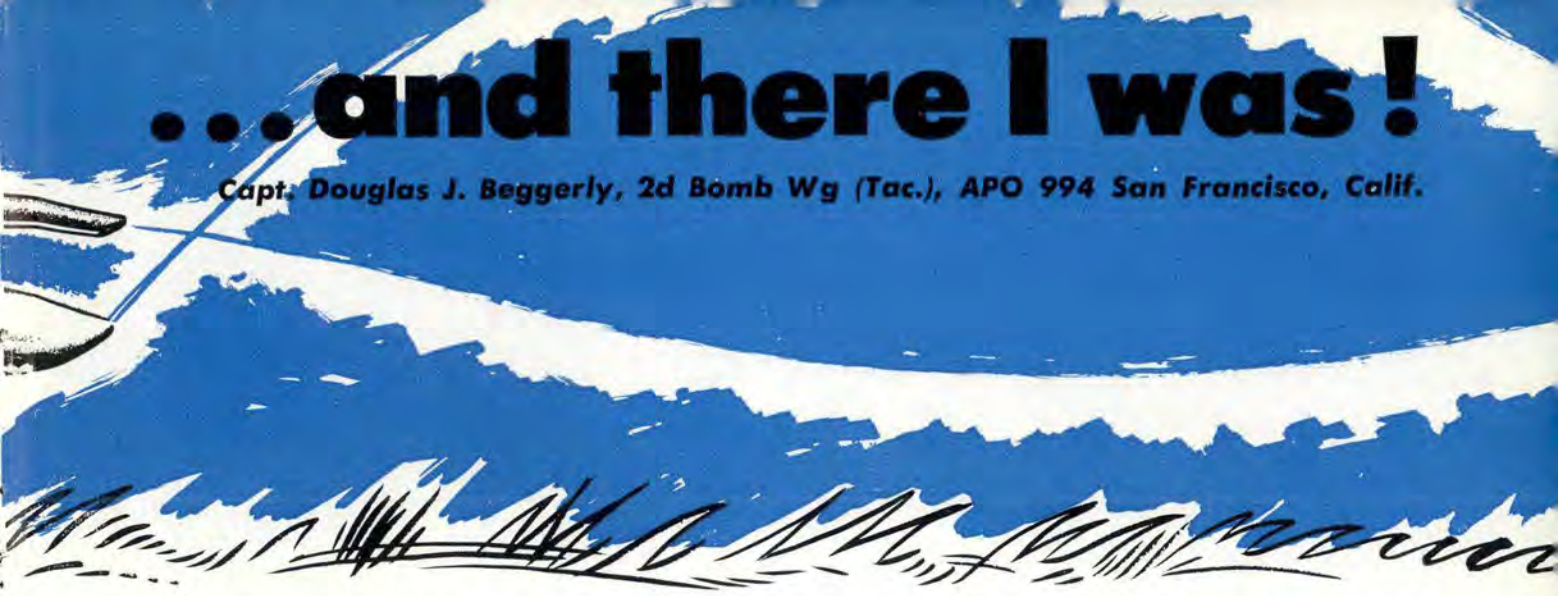
"I think I have a single engine," stated the flustered Sam, his breathing starting to sound labored.

"THINK, SHMINK!" yelled back the IP.

A glance at the EGT, fuel flow and RPM confirmed Sam's horrible statement. "I do have a single engine and I'm heading for Yokota."

. . . and there I was!

Capt. Douglas J. Beggerly, 2d Bomb Wg (Tac.), APO 994 San Francisco, Calif.



"Then get this lumbering beast over there and don't forget the fuel load and airspeed," further advised Fosdick, as he strained to monitor Sam's every move.

"Yokota Tower, this is Newhouse three zero, declaring an emergency!"

Roge, Newhouse three zero, switch to Guard.

"Newhouse three zero on Guard, Yokota. One engine flamed out in the vicinity of Omiya and I'm proceeding at 2500 feet direct to your station. Estimating initial in approximately eight minutes."

"Roger, three zero, you're cleared into traffic on runway three six, altimeter thirty point zero two, wind ten knots from northwest. Crash equipment standing by."

"Roge, Yokota. Newhouse three zero."

The sweat was beginning to trickle down his forehead into his eyes, and the inside of his oxygen mask was slick from breath moisture and sweat. The insides of his gloves were damp and sweaty as he clutched the single throttle in a strangling hold. Sam's right wrist was beginning to ache from holding the wing up with aileron and his right leg was beginning to feel numb and quivery from holding rudder for directional control.

"Damn that horn," thought Sam, as he was suddenly aware of the piercing sound of the landing gear warning horn. Just as suddenly he realized the horn was blowing because the throttle of the dead engine was off and the gear still up. "I'll just let it blow," Sam muttered into his oxygen mask, reluctant to take his hand from the throttle. Soon the horn sound failed to register on Sam's busy mind.

"Yokota Tower, this is Newhouse three zero turning initial, three miles out."

"Roge, three zero, we have you in sight. Report base with gear."

"Rog, three zero."

"I got this one hacked," thought Sam to himself. "Altitude on the money, airspeed 250, the break coming up."

Sam swung into the left-hand break smoothly and rolled out on downwind, and as the airspeed dropped to 200, he reached out and placed the gear handle in the DOWN position in an almost automatic reflex. He was dimly aware of a horn sounding, "as it should be with one throttle off," his excited brain erroneously registered.

Turn to base leg was slightly low, maybe 200 feet, airspeed 150. Nothing dangerous. "Hold the flaps until final and the field made," Sam reminded himself as he lowered the nose and turned on final. "Horn still blowing . . . I'll just push this horn silencer button so it won't bother me," thought Sam.

"Flaps coming down," Sam announced aloud over the interphone.

There was still no comment from the rear. The airspeed dropped off nicely—140, 135, 130. . . .

"Three zero, this is Yokota Tower. Your gear does not appear to be down!"

With a sick feeling, Sam glanced down at the gear position indicators. Up. Up. Up—the three little words fairly jumped from the indicator windows. A glance at the gear handle—a red light glowing prettily. "Now I remember. When the horn blows—"

"Three zero, taking it around!" declared Sam as his left hand suddenly shoved the throttle of the good engine full forward.

"Don't—," sounded the far-off voice of the instructor.

There was a blinding red flash as the B-57 rolled over and struck the ground in an inverted, nose-low attitude.

Weep not for Sam and the intrepid instructor, Fosdick. The only thing shattered in this "fatal-type accident" was the ego of a pilot so absorbed in the emergency that he failed to complete, or was distracted from completing, the necessary cockpit checks during an emergency landing. He then compounded his mistake by a mental block—"Captain, you don't go around below 500 feet in a B-57 with flaps down on single engine!"

This "accident," luckily for Sam, happened in a B-57 Flight Simulator that never left the ground.

Fosdick hit the reset button and as Sam's sweaty fingers raised the canopy, he was confronted by a cold-eyed IP who then completed an interrupted statement, "not field grade navigators, Captain, but pilots who interrupt instructors and then don't use their checklists."

There will be times when aircrew members like Sam will complain that the malfunctions and emergencies are repeated with excess frequency, or multiple malfunctions never occur in actual flight. The back seat riders, either navigators or instructor pilots, will always be thankful for the blessing, disguised as a B-57 Flight Simulator, that allows perfection of procedures and judgment *before* an actual malfunction or emergency. Prior to the real thing, when an error of judgment or improper procedure causes that "blinding, red flash," the man in the aft pit can always say through tight but live jaws, ". . . and there I was—in the back seat of the Simulator!"

"IF IT WEREN'T FOR SATURDAY"

Maj. Anthony S. Cavallo, USAF, Staff Officer, Ground Safety Research, Norton AFB, Calif.

Things were pretty quiet that Friday morning as I greeted my first hello. Master Sergeant Januse was a typical First Sarge type; he worked hard, had chalked up 18 years of service and he kept the squadron running like a Swiss watch. We discussed current business which involved a squadron of approximately 400 airmen and 220 T-Birds.

I was mighty proud of the 367th Flight Line Maintenance Squadron. Hadn't we fulfilled our contract with the Operations types for the past eight weeks? Our aborts were held to a minimum; our turn-around time had been right on schedule, and the present student class was *over* on flying requirements. In fact, there was talk that maybe the flight line squadron could have Saturday off.

It was a hot 110° as I took my daily walk down the full length of the ramp. The personnel knew the Old Man would be down and it kept them on their toes. The T-Birds were coming in from the first training mission. You could see the activity as both the refueling and servicing crews were preparing for the turn-around of some 90 T-Birds that had had their day several years back.

It was a sight to behold. Here was an efficient team organized for the purpose of getting the job done. Occasionally I would hear a yell followed by a few choice cuss words as one of the men touched a hot airplane. Apparently he'd forgotten that after a few minutes in this hot sun, the temperature of the aircraft skin would be in the neighborhood of 180°, hot enough to cook a choice breakfast menu.

Lt. Lambert, one of the squadron's engineering officers, met me at the far end of the line and remarked that one of the flights had only one oxygen cart and it *could* run into a little trouble meeting its turn-around time.

"What happened to the other three carts?" I asked.

He replied that the night shift worked until 0130 this morning and forgot about the requirement that all empty carts must be towed down to base shops for refill the first thing the following morning. Then he added, "The morning shift came to work thinking that all was well until the first turn-around when this discrepancy was discovered."

I suggested that the flight borrow another cart from down the line to help out.

Maintenance Control was close by and I thought it would be a good time for me to chit-chat with Major Johanson, Maintenance Control Officer, and see if he had our foursome lined up for a round of golf on Sunday. As I entered the office I could see that the Ol' Boy was worried.

"What's the matter, Dad?" I asked.

"The chief just called down," he said, "and is worried about "A" flight turning those 24 birds around in time."

"They'll be a little late, but tell him not to worry. We have plenty of backup aircraft that we'll use if necessary," was my confident reply.

While we were discussing the flight schedule for the following week, the Maintenance Control crash phone started ringing. That high-pitched ring always did scare the daylights out of me everytime I heard it. I made a mental note to have a special hard hat fabricated to muffle that hairy wail. As Johanson and I looked at each other, we wondered if it wasn't some dodo coming in late with minimum fuel and scaring everybody within hearing distance of his excited transmission.

"You answer it, 'Pro,'" Johnny said, "and I'll wrap up this contract with Ops for next week."

I picked up the phone, a little worried and trying to minimize my concern, and answered as coolly as possible, "Maintenance Control Office, what can we do for you or out of?"

It was A1C Cagney, one of our tower operators. "Sir, there's been an explosion down on the flight line. An aircraft is burning up and some people have been hurt. Everybody on the base crash list has been notified, sir."

I started to choke up; those ulcers came to life and I felt like taking two weeks sick leave. *"Where* on the line, Cagney?"

"In the vicinity of "A" flight, sir."

"Thanks," I said, as I started to run out of the office with the phone in my hand—not knowing that the cord was wrapped around Johnny's leg. No words can describe what happened next.

As expected, "A" flight was in a turmoil. Fire trucks, ambulances, fly safe types, sadistic onlookers and what have you, were milling around all over the place. Promptly, a carload of Air Police arrived and commenced to clear people away—except, of course, those with crash badges.

The T-Bird that was on fire was now a mass of custard filling. The stuff those fire types spray around always has reminded me of stale custard. When things cleared up, I saw an oxygen cart hitched to a tug about 30 feet out on the taxi ramp; the oxygen bottles were a mass of mashed-in metal, smoking slightly. Talking to the base commander was Dick Prossey, our Ground Safety Officer. They both saw me as I approached and walked over in my direction. I believe that if a spade had been handy, I'd have been the first man in history to dig a foxhole right through a solid cement ramp.

Dick had things pretty well lined up. How he procured the information and oral statements so fast was beyond my comprehension. As he briefly summed up the cause factors, a chill ran down my spine. The commander appeared quite concerned and requested that I get together with Dick on a detailed investigation into this matter.

Flight "A" had been working hard and long all week. Its turn-around record was perfect, an achievement no one wanted to mar. Naturally, yours truly was pushing them a little in order to impress the big boss. When it was discovered that only one oxygen cart was available at the first turn-around, the boys got a little excited and tried to hurry things, such as servicing oxygen simultaneously while the aircraft was being refueled and forgetting such items as making sure all grounding wires were secure, and only clean rags were being used around oxygen connections, and so on.

As the T-Bird rolled into parking position, A1C Serely, her crew chief, was ready and waiting with the only oxygen cart available. He anticipated servicing the oxygen system as soon as the aircraft stopped so that the other crew could have the cart for the same purpose. As soon as engine shutdown was indicated, Serely hooked up the cart system to the aircraft system. Almost immediately a refueling truck pulled up. Rather than wave the truck off, Serely decided he'd service his T-Bird. He temporarily closed the main oxygen filler valve, allowing the two systems to remain connected and, as he turned to the rear of the tanker, he grabbed one of the refueling hoses and dragged it out while the driver pulled out its mate. Serely took the left tiptank while the driver was giving him a hand with the right. Then he inserted the nozzle into the tip opening and squeezed the trigger. The JP-4 rushed out in copious amounts all over the outside of the tank, running over the wing and draining off to the rear onto the pavement. Serely released the trigger and grabbed the oily rag in his rear pocket and wiped the fuel from his face, hands and shoes. Airman Atkinson, chief on another T-Bird which had just landed, ran over to Serely and offered to help refuel. He proceeded to fill the left tank for Serely. Airman Serely then decided to continue the oxygen servicing while the two men JP-4d the tanks. Wiping his hands as he approached the cart, he turned on the main filler valve. Almost immediately he heard a slight hissing sound coming from the connections on the aircraft. Without thinking, he grabbed the connection with his right hand and attempted to juggle it around a bit for a better seal. While doing this he accidentally extracted the filler end. The escaping oxygen momentarily startled him. He instinctively cupped the nozzle with his left hand which held the oil and JP-4 saturated rag. What happened next was only conjecture.

Dick Prossey came to the conclusion that the explosion that occurred when the raw oxygen came in contact with the rag in Serely's hand, knocked him towards the wing, and set his clothes on fire. Immediately upon hearing the explosion, both men servicing the tiptanks released the triggers on the nozzles and jumped clear. At the same moment Serely—by now enveloped in flames—came in contact with the left wing of the aircraft. The driver of the tanker, with disregard for his own life, jumped into the cab and drove off, and parked 200 feet away.

Airman Atkinson grabbed Serely by the shoes and literally dragged him away from the burning aircraft, took off his own clothes down to his shorts and wrapped them around Serely to help extinguish and smother the flames.

Another airman, Jones, on specialist dispatch, jumped on the tug, to which was attached the remnants of the oxygen cart, and drove it off, approximately 30 feet away from the fire. Subsequently, the fire wagons and ambulances arrived on the scene. Airman Serely was severely burned with second and third degree burns on his face, arms, legs and major portions of his body. Airman Atkinson received major burns on his hands, arms and face and lost a good crop of hair.

That evening, around 1800, Dick brought in the 122—the Ground Accident Report—for my review and signature. We discussed the accident for more than two hours and came up with a list of things to be done to prevent a similar catastrophe from occurring.

Dick wound up by saying, "Pro, you pushed the boys too hard."

I said, "Yes, I know—if it weren't for Saturday." ★

Captain Langdon has contributed an interesting and very readable article on a much discussed subject. In fairness to him as well as to many others who have contributed in this area, it should be noted that there is much difference of opinion on the subject of fatigue. Physiological fatigue must be distinguished from boredom. Both static and dynamic factors must be considered in the production of physiological fatigue. What is a dangerous level of fatigue and how can it be measured? These and many other considerations point up the fact that there is still much to learn about the subject. Differences of opinion to the contrary, I consider Captain Langdon's article required reading.

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FATIGUE

Man's well-being and safety have been plagued by that beat feeling, called fatigue, since time began. Early in the era of man, many a saber-toothed tigress dined her young on filet of fatigued caveman. Today, we all have had friends who became statistics by falling asleep at the wheel while cross-country driving. Among the ancients, that oft-quoted father of physicians, Hippocrates, delved into fatigue effects upon Grecian dispositions. Mythologically conjecturing, Icarus' flight surgeon was probably the first to speculate about fatigue factors in the wax-winged inflight situation. Then, as in the beginning of our aviation era, structural failure overshadowed the weaknesses of man.

Now that metal has replaced wings of vegetable fibers, human errors have replaced failure in the forefront of accident causes. We can't tell you precisely the magnitude of flying fatigue's role in aviation safety. But unquestionably, flying fatigue plays its part in distorting judgment and trained skills, leading to midair collisions, loss of control at low altitude and during landing and approach, and other human-error accident categories.

Your friendly flight surgeon would happily trade his favorite torture instrument for a simple fatigue test, one that would light up and say "tired tiger blood—106° of fatigue." This would help to warn the tired-out, argued-out, hung-out invalids who insist on flying, to stay out of cockpits.

Flying fatigue badgered the Allies while flying the "hump" during WW II and in the Berlin Airlift when 90% of RAF crews complained of fatigue symptoms. Today, much of SAC's success in flying repeated prolonged missions has been due to careful prophylactic attention to fatigue factors. Tomorrow, flying fatigue may determine the configuration of capsule and mission profile designs if soloing space men are to spend weeks RON'ing around the asteroids.

The causes and manifestations of fatigue are varied. We've all experienced it, yet it hits each of us a bit differently. We fatigue in many ways, but in our flying we run into two general kinds: chronic fatigue and acute, single-mission skill fatigue. Interwoven into both of these is an additional type, physical fatigue. So that we'll be on common ground, let's have one expert's definition: "Fatigue is the deterioration and detrimental alteration of performance, arising from sheer duration or repetition of an activity aggravated by physical, emotional and psychic stresses."

Physical fatigue is straightforward. It is the muscular weariness that comes with strenuous muscular exercise and continued physical work. Physical fatigue aggravates inflight fatigue, producing cramped necks, and aching legs, backs and postural muscles after the aircrewman has lived for hours in an ejection seat. This fatigue is different in degree from the extreme muscular exhaustion produced by the laboratory physiologist electrically stimulating froglegs hooked to smoked recorders. Physical fitness is important since the recovery time is shortened and fatigue lessened by maintaining one's self in good physical condition.

I've seen the vigorously conditioned men of the Soviet Air Force. With no golf courses in the USSR, aircrewmen turn to more active sports such as gymnastics, cross-country skiing, and smashing heads and such for daily exercise. I would like to pass along the cheery comment of a Soviet air leader: "In combat when two men are equally matched in skill and aircraft, the one who can stand a bit more, who will tire and fatigue a bit less, will be the conqueror. Ours will be the stronger."

Chronic fatigue is the first type I'd like to discuss. This condition develops when physical, mental, and social recuperation between repeated missions is incomplete. It's our old companion—one goes to bed worn out, wakes up half-dead, and feels worse as the day drags on. In repeated maximum effort missions, this variety may appear within weeks and lead to complete functional breakdown of the more sensitive crewman unless broad efforts are made to prevent it.

The Berlin Airlift provided abundant experience with chronic fatigue. Crews complained of chronic tiredness, frustration, tenseness, bickering, increasing alcoholic intake, lightheadedness, and multiple minor physical complaints. Observers noted careless landings, ignored instruments, and sloppy flight planning. The RAF successfully directed their attention towards modifications such as moving the sleeping quarters to quieter areas away from the flight line, better messing, more efficient operations support, cutting needless waiting, and definite "off periods" to allow change of scenery and relaxation, accompanied by hints on how to maintain one's physical and nervous systems. These improvements were directed towards increasing the recuperative efficiency of rest time.

Another type is the single mission skill fatigue. Arising insidiously, skill fatigue is a more troublesome safety hazard in today's air operations. Air-to-air refueling has

prolonged cockpit times in aircraft that were designed for hops, skips and jumps. You all know skill fatigue: performance levels fall after hours of performing the same tasks, scanning the same instruments, searching the same sky for potential collisions, eating the same flight lunch, aching in the same ejection seat and wearing the same personal equipment.

Pilots and psychologists say the same things: the timing seemed to be off, the control column movements weren't accurate and smooth, parts of tasks were forgotten and less important side jobs were ignored; it took larger stimuli to produce the same response, vision was fixed rather than scanning, and daydreaming occurred.

The RAF found that fatigue occurred after 10 hours in piston aircraft, was greater at night, and progressed in severity during four 15-hour night missions with a day of rest between. They also found pilots varied greatly in fatigue response, that no significant fatigue was found after four-hour jet bomber missions and there were performance spurts for landings and emergencies. Along the same vein, in the USAF space cabin simulator flights, performance in some pilots falls markedly during the nighttime after 18 hours in the chamber and surges up again before "landing" terminates the 24-hour flights.

Where do you fit into the picture? In flying fatigue, control of both chronic and skill fatigue components depends upon a team approach. Peak operational effectiveness of every unit supporting flyers and the flying mission, whether it be the VOQ or the flight lunch kitchen, directly contributes to the prevention of flying fatigue. Fatigue problems can occur in everyday operations, but the real bearcat arises in maximum effort far-flung emergencies that necessitate operations from temporary airfields with tent living, adverse climates, and long communication lines in strange lands with rugged supply problems.

Basically the battle against fatigue is up to the individual, in other words YOU. The commander's plans and inspections can insure adequate support facilities, but he relies on the aircrewman to police himself. We still have pilots carrying into the air such things as RON hangovers, battles with the Miss/Mrs. and the man from the friendly loan company, and so on, as allies in the battle for alert performance against monotony, boredom and fatigue. Geritol isn't the answer for that tiger's tired blood.

Every base flight surgeon is squeezed by a few of his good flying friends who live beyond their body's stamina, who party and push past the point of no return, the point when the body tosses in the sponge. A recent victim daily flew long tropical missions with much partying nightly in some of the tropic's most exotic places before his body rebelled against continuous stress, no sleep, and food diluted with too much embalming fluid. Now this ex-flyer is terribly upset over his ground job. He misses the point—responsibility. Had his collapse been during flight, his partying little ego could have deposited some valuable people and a nice bird into the Sugar Loaf or Amazonian swamp. Another jaguar dining her young on a fatigued pilot. Why don't these likeable guys listen to friends and flight surgeons? "Live a bit less, maybe, but live longer."

These individuals with the self-extermination complex are exceptions. The Air Force pilot is a professional, matured past the war days and the "drink your friends goodbye, for tomorrow . . ." He realizes that ignoring physical requirements before and during flight only tires him out for the job, kids and wife. But there are some, and let's hope that you aren't one of them, who break all the rules. The old time Gooney jockey spending hours above 10,000 feet with no more than a smile at the oxygen mask, is letting his brain down. Vital gases are for vital thinking. The hurry-up man sipping his coffee through the doughnut hole instead of a boosting preflight meal is asking for a hungry, irritable brain.

The Norwegians found a minimum of 10% measured skill decrement in pilots after two laboratory Martinis. Others have demonstrated that the body burns alcohol more slowly at night, so if one's teeth itch and fingers twitch the morning after the night before, the hungover pilot should park his tired brain cells at the nearest desk for the day. Only a sadist could mention, besides the lung cancer, heart attack, peptic ulcer arguments against cigarettes, that the weeds produce sufficient blood carbon monoxide levels in the moderate-to-heavy smoker to give a blood oxygen altitude of 8000 feet before the flight boots are lifted from the brine.

Does the pilot with home front battles see the instrument panel or does he refight and rehash those battles during the mission? Who's brave enough to advise the troubled crewman to lay off flying until he gets his life straightened out? When? After he relieves a bit of misdirected tension in a fist aimed at a copilot or his commanding officer?

The individual has the upper hand in the unrelenting combat with flying fatigue. To support him, researchers are constantly striving for improvements in cockpit comfort and personal equipment. Recently one pilot flew 80 hours in a B-47 using a new, partially reclining ejection seat with a vibrating cushion. Aircrewmen learn to roll with delays and inefficiencies that others build into the flying situation. With constant training and increasing experience, flying problems are approached in a more relaxed manner. Crew rotation, in-flight feeding, proper oxygen discipline, stretching and tensing muscles, all frequently serve to diminish the effects of fatigue.

But best, the pilot should follow the recommendations of a leading RAF flight surgeon:

"He should approach flying like the Olympic athlete approaches the coming contest, a 'training' program, regular sleep, regular eating and exercise, no more than moderate smoking or drinking, learning to relax and run with an easy second wind and keep the females and other emotional problems in their proper place and away from the track."

It's up to you. Muster your support echelons, stay cool and fit. Knock the fatigue hazard! ★

Capt. David E. Langdon, USAF, MC, Aerospace Medical Center (ATC) Brooks AFB, Tex.

FALLOUT

LETTERS TO THE EDITOR

To go along with the times and particularly in view of the recent change in the name of your magazine to *Aerospace Safety*, we've decided to modernize our Letters-to-the Editor column from the time-old *Crossfeed* to a new title of *Fallout*. Some of you dyed-in-the-wool airplane drivers may think this is a bit of treason, but times will change despite personal feelings. By all means let us hear from you even when you do not agree with us. JLT

The following letter dated 19 August 1960, subject: "Application of Altimeter System and Instrument Error Corrections," is directed to all major commands:

1. Effective vertical separation of aircraft in any air traffic control system is primarily dependent upon the accuracy of the barometric altimeter. A uniform USAF policy on designation of a primary altimeter reference source and application of system and instrument error is essential to insure maximum safety of flight operations. This is particularly essential for high performance aircraft operating in the higher speed and altitude ranges.

2. A program to obtain flight test data and recalibrate all altimeters has been underway by ARDC and AMC since late 1957. The ultimate objective is to provide a cockpit altimeter correction data card similar to a compass deviation card. As an interim measure, all commands were directed to use altimeter system correction data available in the Pilots Handbook. Recent field inquiries indicate a requirement for restatement of this policy and incorporation in AFR 60-16.

3. The following policy will apply to all Air Force flight planning and flight operations:

a. *Primary Altitude Reference Source.* The primary aircraft altitude reference source is the altimeter located at the pilot position. (Left seat in side by side and front seat in tandem crew positions.)

b. *Application of altimeter system and instrument error.* The pilot in command will utilize the altimeter system (position) correction data contained in the pilot's flight manual applicable to the particular type and model aircraft. The system correction error will be algebraically combined with the altimeter instrument error data (AF Form 21L) if appropriate. (Compensation for instrument error is needed for earlier altimeter models—prior to the MA-1—still in service.) The net altimeter correction error will be applied to maintain the planned or assigned enroute cruising or holding altitude.

Note: *Temperature error* should be considered only with respect to insuring that the actual altitude of the aircraft permits required clearance of terrain and obstructions. Any change in assigned altitude or flight level to compensate for temperature error must first be approved by the appropriate air traffic control agency.

c. Example using T-33 aircraft:

(1) *Altimeter System Correction.* T-33 IAS 320 kts, clean configuration cruising at 15,000 feet is *minus 200 feet.* (T.O. 1T-33-A-1, Fig A1-5)

(2) *Altimeter instrument error.* (Assumed) Cockpit altimeter instrument error card (AF Form 21L) is *plus 50 feet.*

(3) Net algebraic altimeter error summation is minus 150 feet.

(4) *Inflight application.* To maintain 15,000 feet assigned altitude, the *pilot in command would fly* 14,850 feet indicated altitude.

4. The above policy will be incorporated in AFR 60-16, paragraph 58, at the next revision.

Headquarters United States Air Force

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A Flying Gas Chamber

The symptoms described in the article "A Flying Gas Chamber" (AEROSPACE SAFETY, July 1960) are typical of those which would be expected from exposure to significant quantities of Chlorobromomethane, a toxic material. On the other hand, the statements in the last part of the article are somewhat exaggerated in that residual injuries are not likely to follow complete recovery from the narcotic and anesthetic effects of acute exposures. The body tends to rid itself of this toxic material more rapidly than it gets rid of carbon tetrachloride.

Although CB is seriously irritating to the eyes, no permanent injury should result if the eyes are thoroughly irrigated soon after splashing occurs. Chronic exposure to low levels above the permissible exposure values over a long period of time can produce serious, permanent liver and kidney damage. In a single acute exposure, such as described in the article, this would not occur.

CB is readily absorbed through the intact skin. In view of the statements in the article that the pilot and copilot had handled the fire extinguisher it can be assumed that their hands had become contaminated with the liquid. Further, it is believed from analysis of the article that the serious symptoms exhibited by the aircraft commander were due to the increased exposure he received, resulting from the liquid CB thrown on his face. Even after switching to 100% oxygen, absorption through the skin would have continued, producing these more severe symptoms.

Suggested precautionary measures, as outlined in current directives, should be strictly complied with. These include going on 100% oxygen, attempting to ventilate the aircraft by ram air, and prompt descent and landing. In addition, personnel should be cautioned about the importance of prompt removal of liquid CB from the skin.

Col. C. N. Rothe, USAF, MC
Chief, Professional Division
Surgeon's Office, Hqs SAC

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C-Notes

I've read with interest your C-Notes article in the August issue and decided to tell you what happened to me last January.

I had this C clamp come loose, right after takeoff in an F-100F, and my first indication was total fuel quantity dumping rapidly. When it hit zero the forward fuel quantity started dropping and went to zero. Of course I was already heading toward base, maintaining safe ejection altitude. The next indications were equipment air overheat light ON, then the DC generator failed and would not reset. Next, the AC generator failed and it wouldn't reset! The heat and vent overheat light came ON. By this time I was on final and smoke began to enter the cockpit. A successful landing, however, was made six minutes after takeoff.

The point I'd like to make is this: after finding the trouble we realized that if I had only thought soon enough to turn off the bleed air switch, the trouble could have been minimized. Your recommended procedures for the F-100C are correct, as well as early D models, i.e., reduce to minimum power and land if you can make the field.

A suggestion: you might point out to readers that if they get (obviously) false electrical indications in the F-100F and late model F-100D, they may help the situation and eliminate further trouble by turning off the bleed air switch. I wish I'd thought of it!

Capt. Frank L. Yow, Jr.
Flt Cmdr, 4523d CCTS
Nellis AFB, Nevada

Thanks, Captain Yow, for your firsthand experience. Your suggestion for turning off the bleed air switch in late Ds and Fs is certainly appreciated. The "word" from those who've had it happen is always the most effective and accurate.

C-NOTES

Capt. David H. Auld, Fighter Branch, DFSR, Norton AFB, Calif.

Aft section fire and explosions are still in the limelight and headlines as far as F-100 operations go. The problem has plagued this aircraft ever since it became operational and to date the elusive "fix" remains undiscovered. During the past 31 months there have been 37 reported mishaps in F-100 aircraft in which the afterburner leaked and caused a fire, and 19 resulted in major accidents. Investigation of these mishaps revealed that nearly all failures were confined to the afterburner spraybars or to the manifold-to-spraybar tube assemblies—"pigtails!" Unfortunately, most of the fires occurred while in afterburner range immediately after takeoff at critical airspeeds and altitudes, and the resultant explosions required a low-altitude ejection at great risk to both the pilots and the civilians living near the air bases. The occurrence of these failures has been computed at one per 40,000 flying hours.

When a "pigtail" fails there is a muffled explosion. It's caused by raw JP-4 spraying over the afterburner diffuser case of the engine, directly behind the second and third stage turbine and the inner wall of the aft fuselage skin. Failure of a spraybar causes raw fuel to be dumped both inside and outside the afterburner duct wall, causing the fire to burn through the duct. During either failure the aft section overheat light will illuminate and the actual fire *could* burn through the support housings and hydraulic lines connected to the horizontal stabilizer actuator, causing both flight control systems to fail.

About the only thing a jock can do when she blows up—after he is committed to takeoff—is to:

- Jettison the external stores.
- Leave the throttle in afterburner range and grab for some sky—but keep in mind that *ejection might be necessary*.
- Once you're at safe ejection altitude, bring the throttle inboard, adjust power to minimum practical thrust, and check for continuing fire.

The engine is not going to come unglued immediately if the throttle is taken out of AB range. Actually, you are stopping the flow of AB fuel at a rate approximately 5 gallons per minute at sea level through each "pigtail" spraybar to the afterburner. If the fire is still strong or if the flight controls fail—Get Out!

As a matter of vital interest, most of the pilots who've had to eject under these adverse conditions are still on the USAF payroll. By the same token all survivors are bonafide members of the "I Used The Zero Lanyard" Club. This is a pretty important six bits worth of equipment when you consider that "stubbornness," or neglect to hook it up, could very possibly make you a permanent absentee from the Friday evening beer-drinkin' contest.

Two or three incidents which had all the makings of a major accident have been averted because the pilots saw the big picture, analyzed the problem, stayed below the state of "full panic," and brought the bird back home. One young pilot we know had spraybar failure immediately after takeoff, but continued in AB until he had 500 feet and 300 KIAS and then came out of 'burner operation. The positive airflow through the airframe at this speed blew the fire out, and the pilot made a successful and somewhat "routine" landing. Damage to the aircraft was a minor burnthrough in the AB inner liner.

Ya' just can't beat the system. It isn't easy to remain "calm, cool and collected" when a J-57 iron airpump starts to make loud noises. We here in Fighter have been aware of this critical problem ever since our first meeting with the F-100. However, until a permanent and reliable fix has been found, this aircraft is going to have aft section fires and explosions. naturally we hope it won't happen to you, but once again—as has been said many times—pilots will have to compensate for materiel deficiencies by demonstrating their calm, cool professionalism. The chances are slim that it will happen to you, but someone reading this C-Note will experience it probably next month, or the next! Wanta' bet on it? ★

"Those Clean Livin' Lads"

It seems to me, the Old Man said,
I must be getting old.
The ways of jocks must sure have changed,
From the things that I've been told.

I've reviewed the countless Forms 14
With endorsements thereunto,
And have come to this conclusion
Which I now relate to you.

It seems that just the "better troops"
Are busting all the planes.
The words "best pilot in the group"
Oft grace the birdman's last remains.

And did you ever note the way
It never is related,
That ol' Jack who piled in yesterday
Should have never graduated?

Take out the training folder
Of the jock who's quit the blue,
And of wine and song and wenching
You'll never find a clue.

And you never hear of "demon rum"
Called in for a share of blame.
The boys who fly our spacious birds
Are pure as Vulcan's mighty flame.

Now it's two beers at the club these days
And home in bed by nine.
You never hear of our brave lads
Ever getting out of line.

If it's just the cleaner livin' type
Who bashes crates like a bloody hero,
Give me a squadron of hard livin' lads
And I'll drop the wrecking rate to zero!

Archie D. Caldwell, DIG. For Safety

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